THE VALIDITY OF BIODATA AS A SELECTION TOOL WITHIN THE SCOTTISH ACCOUNTANCY PROFESSION

ELIZABETH BLACK ANDERSON GAMMIE

A thesis submitted in partial fulfilment of the requirements of
The Robert Gordon University
for the degree of Doctor of Philosophy

This thesis was carried out in collaboration with
The Institute of Chartered Accountants of Scotland

December 1998

CONTENTS

Page no

Page no

Page no

Page no

Page no

Page no

Page no

TABLES

Page no

Page no

Page no

FIGURES

Page no

THE VALIDITY OF BIODATA AS A SELECTION TOOL WITHIN THE SCOTTISH ACCOUNTANCY PROFESSION

ELIZABETH BLACK ANDERSON GAMMIE

A thesis submitted in partial fulfilment of the requirements of
The Robert Gordon University
for the degree of Doctor of Philosophy

This thesis was carried out in collaboration with
The Institute of Chartered Accountants of Scotland

December 1998

ACKNOWLEDGMENTS

There are many people who have been involved in this thesis over the last five years, and I apologise at the outset for any omissions that I may make in the following list of acknowledgments.

There are four very special people that I must pay tribute to, as without their invaluable expertise, help and support, this thesis would never have been completed. In alphabetical order they are: Dr Russell Drakeley, whose work I refer to extensively and who directed much of the Phase II Study, Professor Rhona Flin, Aberdeen University, who provided the psychological support, both in terms of the technical expertise and the personal lows that part-time research students suffer, Pete Jones, Aberdeen Business School, and Alex Wilson, School of Computing and Applied Mathematics, who both provided me with statistical and moral support throughout. To them I will be eternally grateful.

I would also like to thank Mark Allison, the Director of Education of ICAS, who was always very encouraging and who provided me with any relevant ICAS data where available. On the theme of ICAS, I am also particularly grateful to the referees of my ICAS monograph which was published in January 1999, and which was based on the Phase I Study. Their detailed advice and comments developed my research skills, and I am indebted to them for the time and effort they dedicated to help me along the process. In a similar vein, both Ann Lamb, and Professor Pauline Weetman deserve a mention.

I must also thank all the qualified accountants who completed my questionnaires and the three undergraduate students, Dierdre Sim, Roslyn Ness and Nicola Simpson, who had the thankless task of inputting all the data into the statistical package for analysis. Roslyn and Nicola are currently undertaking the ICAS examinations and I wish them well for their future studies. Gwen Sutherland deserves a special mention for her attention to detail in the final type-setting process, as does Anne Nicol, our ever helpful librarian, who appeared to enjoy tracking down obscure research articles on a topic that no-one had ever heard of! Thanks are also due to Jacqui Stewart, for her help, both in the typesetting of the Phase II questionnaire and the figures throughout the document.

You will note that I refer on many occasions to the work of Jane Harvey-Cook, and I must express my gratitude to Jane for her encouragement at the outset of this project. Her enthusiasm was a joy, and I hope that this completed thesis will give her some satisfaction, safe in the knowledge that here is further evidence to support the case for the use of biodata within the accountancy profession.

My penultimate thanks go to my supervisory team, Dr Charlie Weir and Brian Scroggie (both from Aberdeen Business School) who have ploughed through various drafts of this rather hefty thesis. The thud on the desk of yet another chapter to read could not have been a welcome prospect.

Finally, I would like to thank my husband and family. At the beginning of this research exercise, Scott, my eldest was a bump, and I have him, to either thank or curse, as it was pregnancy boredom that encouraged me to embark on this process. Carmen, my daughter, on the other hand was extremely disruptive at the bump stage, and frequent stays in hospital did little for my progress. However they have both been extremely patient with an irritable Mum who always wants to cut bedtime stories short as she has work to do! Bob, my husband deserves my final special mention. He has always been there to listen to my rantings, my highs and my lows and his never ending belief in my ability to see this thesis through to its ultimate conclusion has kept me going when the going got tough, which it appeared to do with unfailing regularity.

ABSTRACT

The aim of this thesis was to critically evaluate whether biodata could be used as a valid tool in the pre-selection process of trainee chartered accountants. Biographical details of recently qualified accountants who trained within the whole spectrum of ICAS training offices, were collected from a self-completion questionnaire. The data collected was used to develop statistical models predicting two relevant pre-selection criteria for the accounting profession, namely the ability to pass the professional examinations at the first attempt and the probability of remaining with the training provider for at least 18 months post qualification. The validity of the developed models for use within the Scottish accountancy profession was then evaluated.

Phase I of the thesis developed two models which considered examination performance, one based on honours graduates (n=183) and the other based on ordinary graduates (n=366) who qualified in the years 1988-1992. An empirical approach was adopted. Whilst statistically significant explanatory powers were identified for each model, a disappointing shrinkage was experienced when the models were applied to trainees who qualified in the years 1993-94. Two possible explanations were offered, the instability of the reference group and the empirical nature of the model derivation.

Phase II of the thesis therefore adopted a more rational approach through the formulation of a conceptual framework. General background areas were hypothesised to be relevant in the determination of the criteria, and within these general areas specific factors were highlighted and entered into the logistic regression models using data from trainees who qualified in the years 1993-4. Statistically significant models were developed for both fully-accredited honours (n=149) and ordinary graduates (n=225) and these models continued to retain their validity when applied to trainees who qualified in 1995. The model developed for non-relevant honours students (n=61) was not significant highlighting the need for further work in this area. Likewise, from the data collected, an effective tenure model was not developed.

This thesis has provided an additional validity study for the technique of biodata by identifying that rationally derived biodata models can be used to differentiate between fully-accredited trainees who pass their ICAS examinations at the first attempt and those who experience failure. This work therefore provides training principals who employ fully-accredited graduates to undertake ICAS training with a useful pre-selection tool. It also provides evidence that rationally derived models appear to retain their validity and experience less shrinkage than models which were developed using a more empirical approach. Finally, the work demonstrates that it is possible to develop biodata models which are transportable across the full spectrum of ICAS authorised training offices and that biodata can therefore be transportable from one organisation to another.

CHAPTER 1

RATIONALE OF RESEARCH

1.1 Introduction

The importance of selection in the accounting profession is of particular relevance as it is a service function that relies heavily on human resources. Ferguson and Hatherly (1991) suggest that human resources are the life-blood of the modern chartered accountancy firm, and its future will depend on the ability to attract, train and retain the best and most capable people (Nelson,1989). Indeed Ainsworth et al (1990) suggest that attracting and retaining competent, qualified professionals is one of the most pervasive concerns that professional accounting firms will face in the next decade. Selecting the right person for the job is not therefore about filling job vacancies,

> *'it is about building a workforce that is suitable and adaptable to suit the enterprise's changing needs'* (Plumbley: p.7, 1991).

Satterfield (1991) suggests that a successful recruiting programme is critical to accountancy firms in light of the shrinking number of accountancy graduates and greater efforts by firms to raise productivity and reduce costs through recruiting only the brightest and the best. This thesis explores and evaluates the use of biodata for the selection of trainee accountants who undertake their training with the Institute of Chartered Accountants of Scotland (ICAS).

A recent report of the Recruitment Trends Study Group set up by ICAEW[1] suggests that there is a developing manpower crisis looming over the profession which will have profound effects on the management and profitability of accountancy practices of all sizes in the 1990's. They stress that manpower planning

> *"needs to be set high on the strategic agenda of every managing partner, no matter what the size of his or her firm..........Traditional ways of doing things may no longer be acceptable or profitable...... Recruitment and retention of staff are going to require much more effort, imagination and money......Failure to give these problems the attention they deserve is likely to leave firms in a weak competitive position as they struggle to provide client services with a dwindling or second-rate workforce."*
>
> (Accountancy, February, 1990, p143)

This chapter will consider the supply of graduates seeking ICAS training places offered by the authorised training firms, before discussing the training costs of a graduate and therefore the importance of professional examination success and tenure of employment after completion of the training contract. It will then critically examine the selection methods as adopted by the authorised training offices which are seeking to recruit trainees within the ICAS system.

[1] The Institute of Chartered Accountants of England and Wales.

1.2 The supply of graduates for ICAS training contracts

Herriot (1989) identified that recruiters of graduates entering the field of business and finance face two potentially serious problems. First, the changes in demographic trends meant that by 1992 the annual number of school leavers in the United Kingdom was two thirds of its average for the 1980s (Institute of Manpower Studies (IMS) Graduate Review, Pearson and Pike, 1990). Consequently, the profession may have had difficulties recruiting from a smaller pool of graduates although, according to Tirbutt (1989), the decline is less pronounced in those socio-economic groups which contribute the bulk of entrants to the universities (ICAS trainees comprise virtually all graduates with around 95% holding degrees). Second, University funding has not only remained relatively static for accounting and business students but the government has tried to promote engineering and science courses by meeting the additional funds required by the higher fees for these courses. This position was exacerbated when the government in 1994 announced cutbacks in fee income for arts based degrees, including business and accounting students, and this has resulted in universities capping numbers entering these courses. These changes in the funding of higher education, together with the advent of student loans and now student fees, may see a reduction in the number of students entering universities.

The IMS study entitled "You and Your Graduates: The First Few Years" (Connor et al, 1990) suggested that a graduate recruitment problem may already exist and this was supported by ICAEW Recruitment Trends Study Group which predicted a 27% drop in school leavers, with a 30% increase in demand for graduates in the 1990's. This has lead accounting firms to believe that there would be an immediate and considerable shrinkage of graduates from which to select their trainees.

Recruitment to the accounting profession, however, has not yet suffered from these difficulties and indeed an increasing proportion of graduates would appear to be entering the profession. Harvey (1991) estimated that one in five graduates were being recruited into the general field of accountancy and finance. He found that student numbers within the Consultative Committee of Accounting Bodies (CCAB)[2] of the accountancy profession have increased by over 36% in the period 1980 to 1990. This trend has continued with a further increase of 21.6% in the four year period to 1994. These increases in numbers have not however manifested themselves in recruitment by member firms of the Scottish Institute, whereby the number of students entering training contracts with the Institute of Chartered Accountants of Scotland (ICAS) has fallen over the same 14 year period. The average number of training contracts registered in the period 1980 to 1994 was 459, ranging from 536 in 1980 to 406 in 1994. Training contracts registered with ICAS in 1995 and 1996 have remained at this 1994 level and the Institute predict that around 400 training places will be the norm for the foreseeable future. This reduction in ICAS training places would however not appear to have arisen because of a lack of suitably qualified graduates.

The number of trainees entering the Scottish chartered accountancy profession is determined by two factors: the number of suitable candidates wishing to fill the training vacancies and the number of training contracts offered by registered training firms.

In connection with the number of suitable applicants for ICAS training, the Institute constantly addresses the issue of numbers. This concern contributed to the fundamental change of the examination system in 1988. The previous framework

[2] The CCAB members are The Institute of Chartered Accountants of Scotland (ICAS), The Institute of Chartered Accountants of England and Wales (ICAEW), The Chartered Institute of Management Accountants (CIMA), The Chartered Association of Certified Accountants (ACCA), The Chartered Institute of Public Finance and Accountancy (CIPFA).

which was introduced in 1983 required students from fully-accredited degrees[3] to sit four examinations, the last being taken at the end of the training contract. This was seen to be unattractive to students when compared to other accountancy routes such as ICAEW which only stipulated that they undertake two examinations. This was compounded by the fact that ICAS required students with non-relevant degrees[4] to undertake a one year post-graduate course outside the training contract, whereas other bodies allowed the graduate to commence their training immediately and simply undertake further examinations. A two tier examination system was therefore introduced in 1988 for graduates with fully-accredited degrees and a professional course was run by ICAS for non-relevant graduates allowing them to progress directly from University to the training firms. This has proved attractive to many non-relevant students and, whilst the balance between fully-accredited and non-relevant degree holders remained fairly stable at the ratio of around 80% fully-accredited to 20% non-relevant graduates in the early 1990's, there has been a recent move towards greater recruitment of the latter which represented 37% of the 1997 intake. This however continues to contrast quite significantly with the English and Welsh Institute where there is a limited number of accountancy graduates and the ratio is reversed with 80% of their intake comprising of non-relevant graduates.

In connection with the number of ICAS training contracts available, numbers have been restricted in the past by the fact that all training contracts must be undertaken in a registered professional accountancy office. From 1991, registered office status was expanded to other commercial organisations subject to stringent vetting procedures by the Institute and it is now possible for students to Train Outwith Professional Practice (TOPPS). This scheme has not however made any significant impact on the number of training vacancies with an average of only 19 trainees per year progressing down

[3]Degrees which satisfy the ICAS requirements for accreditation and therefore contain a substantial element of accountancy and related subjects.

[4] Degrees which have an insufficient accountancy input for accreditation purposes and are therefore treated as non-relevant by ICAS.

this route. There has however been a reduction in the number of structured training places offered. This was initially triggered by the recession and was not reversed in times of economic recovery due to rationalisation and computerisation. Changes in audit methodology have also decreased the requirement for many trainees and this will have an impact on the staff mix over the next few years. Many firms have expanded their management advisory services, particularly in the areas of tax and financial planning (Ahadiat and Smith, 1994) and many of the bigger firms are now recruiting graduates into specialised departments of the organisation such as information technology but with no opportunity for undertaking the chartered accountancy training route.

It would therefore appear that the number of training places offered by firms have been reduced and that there is no shortage of graduates to fill these places. Indeed John Clarke, recruiting partner of KPMG in Glasgow, stated that

> '*It is a buyers market. There are far more graduates out there than training contracts.*'[5]

1.3 Training costs

A graduate entrant into a professional accountancy office constitutes a major investment involving a substantial outlay to cover the costs of recruitment, training and replacement, (Tirbutt, 1989). This investment is particularly onerous for those organisations that offer accountancy training contracts to graduates, (Harvey-Cook and Taffler, 1987). They claim that although the trainee provides the firm with an important component of its workforce, the training contract represents a very substantial investment to the firm. In addition to the basic salary cost there are

[5] Personal statement made by John Clarke in a telephone conversation.

training costs which incorporate the actual expenditure incurred in terms of fees (see Appendix 1) but more significantly the opportunity costs of the trainees when they are absent on block release and exam leave. Taking this into consideration, the total training cost (specifically related to the training contract) of a fully-accredited graduate amounts to £14,058 and this increases quite significantly to £27,710 for a non-relevant graduate, (Appendix 2). These figures however fail to take into consideration the cost of 'on the job training' whereby more senior members of staff are responsible for supervision and training, which ultimately reduces their chargeable time. In many respects this aspect of the educational process may be the most expensive to the firms. Indeed, Price Waterhouse in their 1996 recruitment brochure estimate that the cost of training a graduate to become a qualified chartered accountant amounts to around £100,000 and this is supported in the KPMG Leadership brochure which states that

> *'current estimate of investment per student over the three years is £100,000.'* (p23)

1.4 The importance of professional examination success

All these costs rise, both in actual and opportunity cost terms, if the graduate fails to proceed through the examination system without resits or in fact fails to qualify as a chartered accountant altogether. Many firms now restrict the number of attempts at each stage in the examination process to two and those candidates who fail at the second attempt will have their employment terminated. Gammie (1996), in a survey of the selection techniques of professional accountancy firms which employ ICAS trainees, found that 44% of training providers had lost trainees in the period 1990-1992 before they had completed their training contract. The reason cited in the majority of cases was the inability of the student to pass their examinations. This economic loss in human capital terms will adversely affect the firm but it appears to be accepted philosophically, albeit reluctantly, by the staff partners (Harvey-Cook and Taffler,1987). Benveniste et al (1986) in an ICAEW report suggested however that the costs borne by firms in relation to students who failed their ICAEW examinations were not that much different to the costs borne in relation to those students who passed. The real difference between these types of trainee were rather found in the income side of the equation and this was compounded by the disruption caused to the office/client routine and staff scheduling, both of which are unquantifiable but usually severe. The greatest cost is in terms of the candidate and the proportion of such failures will reflect adversely on the firm in the eyes of prospective entrants. Indeed, students who have performed well in the Institute's exams are often used by firms as a marketing tool to attract next year's graduates.

A Scottish based study undertaken by Cameron (1991) into the recruitment of chartered accountancy trainees in Scotland examined the factors which the "Big Six"[6] accountancy firms considered important when recruiting accountancy trainees. The results are presented in Table 1.1.

Table 1.1: Factors considered important in the recruitment process

Order of Importance	**First**	**Second**	**Third**	**Fourth**	**Fifth**	**Sixth**
Ability to pass exams	8	5	0	0	0	0
Accountancy graduate	1	0	1	3	1	7
Leadership potential	0	1	5	3	2	2
Presentable appearance	0	2	2	3	4	6
Interpersonal skills	1	7	4	0	1	0
Interest in Business	3	2	3	0	3	2

Source: The Recruitment Of Chartered Accountancy Trainees In Scotland, Cameron 1991, unpublished honours thesis

[6] The "Big Six" firms comprised: Arthur Andersen, Coopers and Lybrand, Deloitte and Touche, Ernst and Young, KPMG, Price Waterhouse. In 1998 Coopers and Lybrand and Price Waterhouse merged into Price Waterhouse Coopers.

All the firms are concerned with the ability of the students to pass their exams, ranking this factor as either first or second. Further evidence of the importance of professional examination success to training firms is ably demonstrated by the comment in the Touche Ross 1995/96 recruitment brochure which states

> *'Exam training, however, will be your first priority: your key objective (and ours) is to keep passing your professional exams at the first attempt.'* (p12)

This study will therefore define a successful trainee as one who passes the professional accountancy examinations first time. Whilst it is appreciated that this definition is only one of many factors that will create a successful appointment, if a trainee fails to negotiate the examination hurdle then they can never proceed to demonstrate their full worth to the organisation.

1.5 Tenure of employment after completion of the training contract

Another consideration must be the tenure of a trainee after qualification. The training firms will generally hope that many of those successful in qualifying as chartered accountants will be encouraged to continue, and progress in career terms, with the professional firm. Accountants who leave their training organisation immediately on qualification may not represent an adequate return on the investment to the firm. Training is only an investment if the qualified accountant remains with the firm, Tirbutt (1990). If the £100,000 investment as suggested by Price Waterhouse and KPMG (as outlined previously) is accepted as a realistic figure, then it is estimated that it takes 17 months of post-qualification output from a fully-accredited graduate to pay-back their training costs and this escalates to 20 months for a non-relevant student (see Appendix 2). Horowitz and Riley (1990) suggest that many undergraduates choose accountancy training as a means of deferring their long term career decisions, with few intending to pursue their career with the firm that they first join. This view is confirmed by Marxen (1996) who found that alumni of the "Big Six" firms in the United States had joined their training firm hoping to gain a variety of experiences and boost their credentials, with only 26% of respondents intending to pursue a long-term career in public accountancy. However, as this study was restricted to alumni and did not include staff who remained with their training organisation, any differences in the objective of working for their particular training firm could not be ascertained. In the context of the United Kingdom, O'Kane (1989) found that more than half of ICAEW members work outside the professional accountancy office. These statistics are mirrored in the Institute of Chartered Accountants of Scotland. Gammie et al (1995) in their survey of recently qualified chartered accountants (1989 - 1992) found that by the time accountants have been qualified for five years, 60% were employed outside the profession. This problem is exacerbated by the fact that after two years post qualifying only 44% of accountants remained with their original training firm. High turnover presents a perennial problem within the profession and, whilst some attrition is desirable, excessive rates will result in both a critical loss of expertise for the firm and additional non-recoverable expenditure for recruitment and training (Thomas and Thomas, 1989). Tirbutt (1990) suggests that the late 1980's have undoubtedly seen that the retention of newly qualified staff has become a matter of increasing urgency to the profession, as firms face pressures to reduce costs and keep fees low. In the recent ICAS syllabus review, professional firms indicated that they have been reducing the number of trainees which they recruit (this was evidenced earlier in the Chapter), with the intention of keeping trained staff longer within the organisation, following a 'train to retain' philosophy (Gammie et al, 1995). Bell (1995), Director of Recruitment in Price Waterhouse, explains this reduction as a function of the change in audit methodology and the impact of computer technology. However, as firms diversify into other areas such as management consultancy and information systems risk management, the need remains for a steady stream of personnel with partner and management potential (Harvey-Cook, 1995). As the economic recovery gathers momentum, however, these firms face fierce competition for their recently qualified trainees with improving opportunities and prospects (Hawksley, 1994). Quoting Peter Fitton, marketing director of Accountancy Personnel, the suggestion is made that demand for newly qualified accountants over the next three years could well exceed supply.

Firms therefore need to be able to identify at the interview stage those trainees who are likely to remain with their training firm after qualification. Harvey-Cook and Taffler (1987) question whether present recruitment procedures are necessarily tending to recruit people who are likely to want to remain in the profession in the longer term and who possess the appropriate skills and interests to make effective professional accountants.

This study will differentiate between those trainees who have remained with their training provider for 18 months post qualifying based on the pay-back periods as identified in Appendix 2 with those trainees who have left before this time. The former and latter are classified in this thesis as successful and unsuccessful investments by the training providers.

1.6 The recruitment and selection issues for the accountancy firm

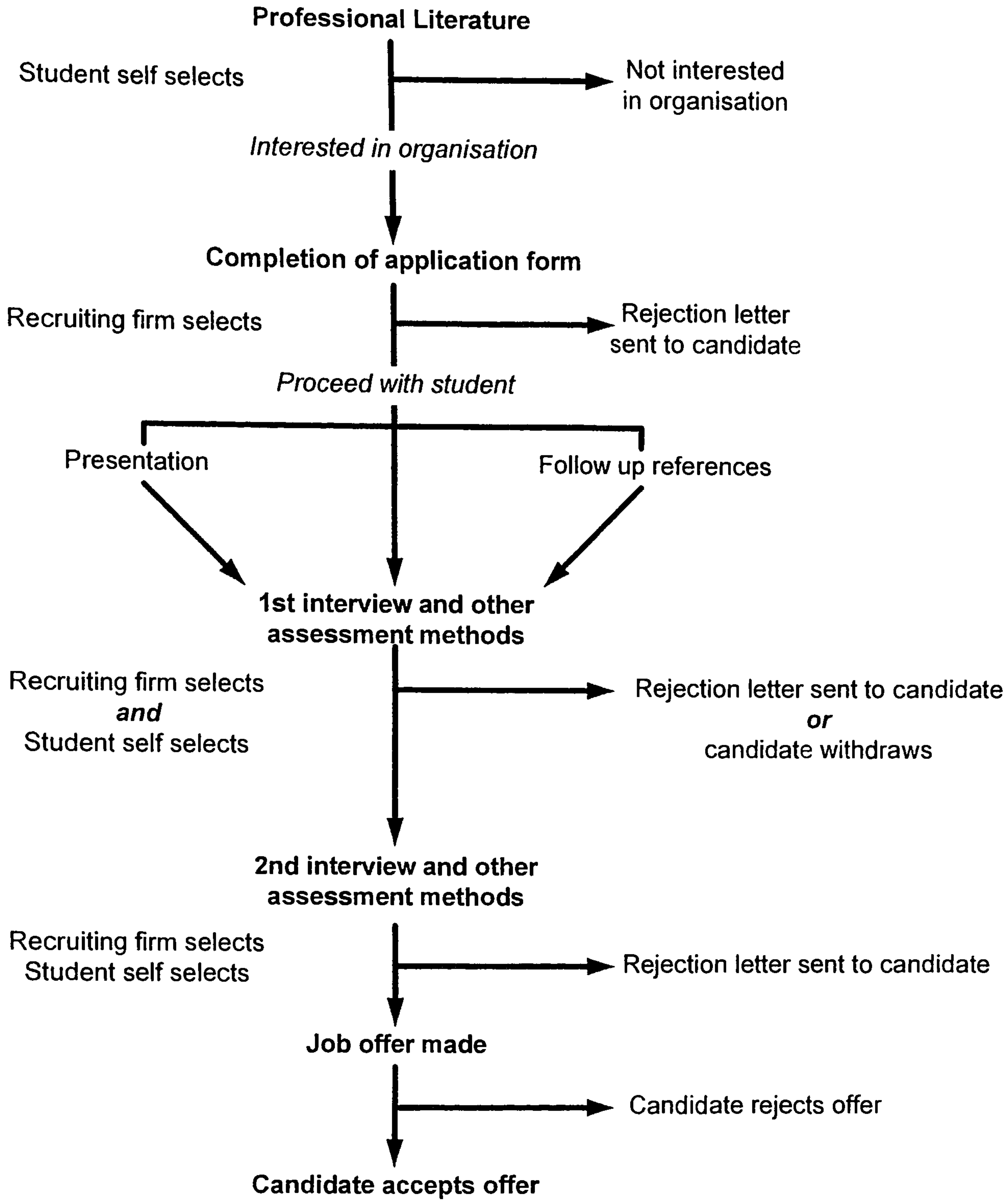
Now that it has been established that there are apparently more graduates seeking chartered accountancy training than there are places available, and the costs of training have been highlighted, the importance of both examination success and tenure of employment appear to be relevant. Training providers are therefore facing the problem of how to select the most suitable graduates from the pool of fully-accredited and non-relevant graduates that apply to their organisations for training contracts. This section critically examines the recruitment and selection process of ICAS training providers.

Graduate selection procedures evolve from the basic psychometric tradition which assumes that people can be described in terms of psychological constructs that explain their behaviour (Herriot,1984). Psychometric procedures aim to predict an individual's job performance by measuring individual attributes, skills, character traits, etc. These traits can be measured in a variety of forms with interviews, application forms and psychological tests being amongst those most easily recognised. Inferences of characteristics are drawn from these vehicles and suitability for employment is assessed on the basis of these judgements. Personnel selection decision-making rests therefore on the principle that there are job-related individual differences between people and that these differences can be measured with sufficient accuracy to be of benefit in the selection of people for jobs, (Robertson, 1994). Accountancy firms tend to adopt a very traditional approach to the selection of their trainees.

The accountancy profession in Scotland recruits almost exclusively from an all graduate intake with on average 95% of trainees holding a degree qualification. Therefore there are two points at which selection decisions are made, (Makin,1989). The first decision is made by the University or other Institute of Higher Education to admit an individual to a degree programme, therefore providing the individual with the education required in order to gain admission to the profession. The criteria for this selection are generally established by the perceived ability of the student to cope with the intellectual demands of the course. The second decision is made by the training providers to offer a training contract to a particular graduate and hence provide employment within the organisation. The criteria for this selection are generally determined by the perceived ability of the applicant to perform in the job. This thesis will concentrate solely on the second selection stage, namely the decision taken by the training providers to offer a training contract.

Harvey-Cook (1995) identifies three stages in the recruitment process of accountancy firms. The first stage is where the firms actively market themselves to the potential trainees via their professional literature. The remaining two stages, namely the application form sifting and interview procedure, constitute the selection process whereby a decision must be made as to whether a candidate should be considered further for progression to the next stage or be rejected. The final decision is then taken by the firm to offer a training contract. Care must be taken however that the firms do not concentrate solely on this reduction of applicants to the requisite number without considering the social process of selection (Herriot,1989). Not only does the applicant require to meet expectations but the organisation must also fulfil the necessary requirements in the eyes of the applicant. This is of particular relevance to the chartered accountancy profession where there is little to differentiate firms of a similar size. A diagram of the recruitment and selection process can be found in Figure 1.1.

Figure 1.1: The Chartered Accountancy recruitment and selection process



The remainder of this section deals with each of these stages in turn; the professional literature, the application form, the firm presentation, follow up references, the interview, and finally other assessment methods.

1.6.1. The professional literature

Professional literature is provided by ICAS which publish a yearly prospectus, the current syllabus and a bi-annual directory of training vacancies. The Student Education Department of ICAS also organises careers presentations to undergraduates and they encourage local training organisations to become involved in these events. This information provided by ICAS should allow the student to decide whether chartered accountancy is his or her chosen profession and career. Once this decision has been taken students must then consider the type of organisation with which they wish to undertake their training contract - from a multiplicity of firms of various sizes and client portfolios. ICAS classifies their training organisations into small firms (1-3 partners), medium firms (4-10 partners), large firms (> 10 partners), and TOPPS employers. Obviously included within the large firms are the "Big Six" organisations.

The firms also provide professional literature. This tends to be the publication of glossy brochures by the "Big Six" plus the larger firms and these are either distributed via the University or sent directly to the applicants. In light of this information, students will make self-selection decisions and, for those who self-select into the profession and into the firm itself, application forms will be sought and completed. Indeed many firms include an application form within their recruitment literature. Herriot (1987) questions the relevance of this publicity material suggesting that realistic information about either the organisation or the profession is not intimated. Harvey-Cook (1995) is also extremely critical of the profession at this first stage, suggesting that the promotional information is simply a marketing exercise to make firms appear more attractive to the applicants. She suggests that the information is not realistic and may in fact attract unsuitable candidates, resulting in the very high drop-out rates for ICAEW trainees (a loss of up to one third of the intake is not unusual), particularly in the early stages of a training contract. The expectations of new recruits appears to be a critical factor in explaining voluntary turnover (Wanous, 1977, 1980) with Wilson et al (1997) suggesting that there are two problems in relation to voluntary turnover. On the one hand expectations of new recruits may be unrealistic and falsely inflated prior to entering their first job, whilst on the other hand expectations may not be met when the anticipated and the actual experiences on the job do not match. The Scottish profession does not however suffer to the same extent from this problem of early drop-out rates. Although there are no published figures by ICAS on trainees who fail to qualify, the Student Education Department of ICAS estimate that only around 10% of each intake do in fact fail to qualify. Gammie (1996) in her survey of ICAS training providers found that 44% had lost students in the years 1990-1992 before they had completed their training contracts, although the reason cited in the vast majority of cases was the failure of the student to pass their examinations. ICAS trainees do not therefore appear to suffer from the same disillusionment as their ICAEW counterparts. This Scottish/English divide may be as a result of the differences in the profiles of the trainees (as discussed earlier in the Chapter[7]). Wilson (1989) undertook a study of ICAEW trainees who would be mainly non-relevant students and found that trainees were more committed to both the accountancy profession and their own training firm when they had gained prior exposure to the tasks that they were likely to encounter on the job. This was supported by Chatman (1991) who found that students with experience of the type of work which they will encounter within the firm will adjust to the profession more quickly, feel more satisfied and therefore remain longer with the firm. As graduates from accountancy related courses should have gained some prior exposure to the type of work they are likely to encounter during their degree, attrition is less likely within the Scottish context. Indeed, Ferguson and Hatherly (1991) found that in general Edinburgh University accountancy students expected the basic working

[7] In the ICAEW system around 80% of the intake derive from non-relevant degrees, whereas in the ICAS system, around 80% derive from fully-accredited degrees, although there has been a trend in recent years towards an increasing proportion of non-relevant graduates.

conditions to be more severe than that perceived by ICAS trainees who had also undertaken their degree at Edinburgh University.

The small and medium firms tend to rely on ICAS for their marketing effort although some firms prepare promotional material for display at the universities.

1.6.2. The application form

The second stage in the procedure is the processing stage whereby the completed application forms are used for pre-selecting candidates for interview. This sifting of applications is necessary as it is wasteful in both manpower and cost terms to conduct interviews with unsuitable candidates (Harvey-Cook, 1995). The accounting profession therefore needs to narrow down the candidates into those who are clearly unsuitable (application form rejected), those who appear to have a high chance of succeeding (progress to the next stage of the selection procedure) and those who are borderline (progress to the next stage if there are sufficient firm resources to continue).

This reliance on the application form for pre-selecting candidates is not unique to the chartered accountancy firms. In an IMS survey (Bevan and Fryatt, 1988) on employee selection in the UK, it was found that 90% of respondents used application forms and, of these, 81% used the forms to filter out unsuitable candidates with almost all believing that the application forms were reliable enough to predict job performance. Similar results were found in the IRS survey conducted in 1996 (EDB 85), where it was found that 85.8% of organisations in the UK which recruited graduates utilised the application form as a method of selection.

To enable categorisation of candidates, the information on the application form should be matched against the perceived requirements of the organisation. Guion (1992) stresses that the selection decision is based on an implied prediction and therefore a clear understanding of the job to be filled is necessary by the recruiting firm. This should be achieved through the formal analysis of the job, resulting in important behavioural criteria for candidates. There is however a wide diversity in the amount of information sought. Llewellyn (1988), on the subject of application forms for chartered accountancy training contracts quotes a London University finalist as saying

> *'some firms ask for so much detail that there's nothing new to say at interview - and others ask for so little that you know they are only interested in your 'A' level grades....'* (p 104)

Appendix 3 summarises the information sought by a variety of firms ranging from the "Big Six" accountancy firms through to the smaller practice, many of which adopt the local University's standard application form. The application forms of the "Big Six" firms are very long, requesting detailed information about past history and future aspirations. These forms will necessitate considerable time and effort to complete and forms that seem unnecessarily long will be rejected by the prospective trainees, (Llewellyn, 1988). Anecdotal evidence at The Robert Gordon University would suggest that this is indeed the case. Harvey-Cook (1995) suggested that much of the information requested is redundant in practical terms and that the decision on the information to include or exclude is based on arbitrary judgements by the firms of the details which are useful and/or necessary for the job. Other forms are so short that they cannot fail to miss capable all-round candidates who have just missed that extra point at 'A' level or Higher. Llewellyn (1988) questions whether there is any mileage in developing a standard well designed application form, suggesting that

> *'the use of a straightforward and thoughtful application form may make selection for first interviews more effective.'* (p 104)

However, the application form can only be used as an effective selection tool when the information provided can be processed in a manner to predict the applicants likelihood of success. Harvey-Cook (1995) questions the accountancy profession's ability to do this, suggesting that the categorisation of the applicants is often conducted in an intuitive manner and not based on any statistical methodology. She goes on to suggest that

> *'Much of the information on the application form seems to be used as a prompt for suitable presentations at interview and is not, in effect, used for selection purposes.......The use of such information with no underlying statistical basis is invalid and must inevitably contribute to inappropriate selection decisions.'* (p 16)

Wingrove, Glendinning and Herriot (1984) also expressed their concern on the reliance of the application form sift, stating that, unless organisations can demonstrate that the information contained in the application form is predictive of job performance, pre-selection undertaken in this way will appear haphazard and unsystematic, resulting in unreliable pre-screening. This is an issue for accountancy practices as Harvey-Cook and Taffler (1987) found that only two firms used a structured check list scoring system as a decision aid for assessing applications and no firms were using formal statistical methods at the pre-selection stage.

1.6.3. The firm presentation

Once the firms have pre-selected candidates from the application form, many invite these applicants to a presentation, often held in the premises of the local office.

Llewellyn (1988) suggests that these presentations seem much closer to public relations than recruitment exercises although she concedes that they are an excellent informal forum for applicants, recruiters and recent graduate entrants to meet, exchange views and raise questions. The value of these presentations in the selection process is therefore rather limited but they do afford the opportunity for the firm to sell itself to the undergraduate.

1.6.4. Follow up references

The majority of application forms require candidates to list one or more referees, usually an academic, together with an employer or personal referee. These references are then usually taken up after the sift of application forms but before the first interview. However Gammie (1996) found that less than half of ICAS recruiting firms followed up these references. This is hardly surprising as, according to Anderson and Shackleton (1986), most references are virtually useless as screening devises. They state that

> *'...reference letters commonly contain little or no specific relevant information and such details that are included are mostly indefinite and inaccurate.....Thus, it is reasonable to conclude that the effectiveness of the reference letter as a screening device is highly dubious.'* (p 23)

Harvey-Cook (1995) suggests that candidates are unlikely to cite a referee who may not give a positive report and that it is very rare for negative responses to be contained in reference letters. Indeed Gammie (1996) discovered that, in her study of ICAS recruiters which followed up references, 22% found the reference letters to be neither a valid indicator of ICAS examination success or work effectiveness as evidenced by their performance in the office. However, she also found that employers which always followed up academic references tended to employ trainees who performed better in the examination system. This suggests that there is value in the academic reference as a predictor of future academic performance.

1.6.5. The interview

The organisation has now imparted information to the prospective trainee in the form of recruitment literature and the graduate has responded with the submission of the completed application form. For those candidates who successfully negotiate the application form sift, they are invited for an interview which may either take place at the University or in the offices of the local firm. In some instances there are two rounds of interviewing, the first interview being conducted by a senior member of staff who will pre-select the final short-list for the second interview, which is usually conducted by a partner of the organisation. Gammie (1996) in her survey of ICAS training providers found that every respondent used interviewing[8], either in a one-to-one format or in a panel form, with similar findings for the selection of ICAEW trainees (Harvey-Cook and Taffler, 1987) .

Herriot (1984) suggests that the graduate selection interview is regarded as the focal point in the recruitment process. It may be the first point of personal contact between the organisation and the candidate and

> *' for the first time, there is the possibility of dynamic, two-way communication.'* (p 68)

This view is supported by Llewellyn (1988) who suggests that there is nothing to replace a meeting with the actual person. She states

[8] With the exception of one TOPPS employer who only used assessment centres.

> *'The interview is the opportunity to ask questions, and get the 'feel' of the candidate. It is a two -way process and the student will use the occasion to get a feel of the firm.'* (p 106)

Herriot (1984) stresses the importance of the interview as an information providing exercise and negotiation vehicle and hence an extremely important situation for social exchange to occur. He later suggests (Herriot, 1987) that firms do not see themselves as assessing graduates only on the basis of their likely competence. They believe it necessary to recruit graduates who share their style of corporate identity and culture and feel the only method of assessing this is via the interview. Indeed, Bell (1995) identifies the importance of the one-to-one in-depth interview to Price Waterhouse, suggesting that, in the selection process, it is the key part for relationship building with candidates through focused two-way discussions. Likewise Stanton (1990), reporting on the Coopers and Lybrand selection process, notes that the firm recognises the duality of purpose of the interview, namely, to assess the students as a possible employee and to sell the firm.

Herriot (1984) however raises concerns that, where the interview is used as a psychometric tool for assessment purposes, it is clearly unsuitable. He states

> *'Judged by the acid test of psychometric efficiency - that is, its validity - the selection interview is a miserable failure.'* (p 69)

This is obviously a problem for the accountancy profession as according to Harvey-Cook (1995)

> *'..since the application pre-sift is cursory, the reliability of the recruitment process is almost exclusively focused on the interview result.'* (p 18)

There is a wealth of research that has been conducted into the reliability and validity of the selection interview, with many adverse findings. For the selection interview to be considered a reliable measure, the identical judgements would be made by the same interviewer of an applicant upon different occasions and different interviewers would also make similar judgements of the same applicant. To satisfy the validity test, judgements derived from the interview could be demonstrated to predict behaviour in the job for which the interview was taking place. The selection interview literature has been ably reviewed by Schmitt (1976) covering work published until 1975, Arvey and Campion (1982) continuing with a review from 1975 and Anderson (1992) conducting a retrospective meta-review of eight decades of interview research, together with a further review in 1997. There is little doubt that the evidence points to the relatively low validity, poor reliability and susceptibility to bias and distortion of the interview.

The usage of the selection interview is therefore not a function of its technical adequacy (Smith and Abrahamsen, 1992). Indeed methods which are both well established and require little in the way of technical skills are the most popular. Robertson and Makin (1986), in a survey of 108 randomly selected firms from the Times 1000, found that the selection techniques used when choosing managers were very much based on the historical interview and reference reports (see Table 1.2).

Table 1.2: Use of methods for managerial selection in British companies in 1984 and 1989 (percentages for each group) and data for managerial and graduate selection in 1996

METHOD	1984 NEVER USED	1989 NEVER USED	1984 ALWAYS USED	1989 ALWAYS USED	1996 MANAGER SELECTION	1996 GRADUATE SELECTION
Interview	1.0	0	81.4	90.5	100.0	100.0
References	3.7	4.1	67.3	73.9	N/A	N/A
Cognitive Tests[9]	70.8	30.1	5.2	12.3	48.0	43.3
Personality Tests	64.4	35.6	4.0	9.6	57.2	38.3
Biodata	94.2	80.9	1.9	4.2	3.9	3.3
Assessment Centres	78.6	41.1	0	4.2	28.9	30.8

Sources: 1984 Figures, Robertson and Makin (1986), 1989 Figures, Shackleton and Newell (1991), 1996 Figures, Industrial Relations Survey published in the Employment Development Bulletin 85 (1997)

Despite encouraging progress in the movement to more sophisticated methods of selection, as found by Shackleton and Newell (1991) in their comparative study, and more particularly in the IRS survey, the interview remained dominant and indeed was used by 100% of employers recruiting graduates and managers in 1996. The IRS survey (1997) also discovered that 63.2% of graduate recruiters found that the interview was the most important method in their selection decision. Assessment centres came a poor second, with 18.3 % of respondents classifying this technique as the most important method. Similar results were achieved by application forms and CVs where 16.6% rated these the most important methods for selection. Ability/aptitude tests came last with only 1.7% of respondents classifying this type of selection technique the most important.

[9] The Robertson and Makin (1986) and Shackleton and Newell (1991) studies classified tests as cognitive whereas the IRS survey classified tests as ability/ aptitude. For the sake of comparison, the two have been treated as synonymous.

These results are interesting because the popularity, together with the perceived importance, of the various methods are in inverse relationship to their validity as predictors of job performance (measured by supervisor ratings). Hunter and Hunter (1984) conducted a meta-analytic study, which is a statistical method for bringing together the results of many different investigations. They found that, in relation to the validity of some factors used for predicting performance for entry level jobs for which training will occur after hiring, the composite score for ability tests gave the highest mean validity (0.53), followed by job try-out (0.44), with interviews showing a very low correlation (0.14). This meta-analysis will be discussed further in Chapter 2.

This work on the usage of selection procedures therefore highlights a gap between the research evidence and practice (Robertson, 1994), which raises the question of why, despite the research evidence, there is still continued reliance on the interview as a selection device. Smith and Abrahamsen (1992) suggest three possible reasons:

> *'First, organisations may not know about the findings on the validity of interviews and may continue to use them in mistaken belief. Second, the findings on validity are known but discounted because the alternatives to interviews are unacceptable in some way (egs. cost or acceptability to candidates). A third possibility is that organisations are not primarily concerned with prediction when designing their selection systems.'* (p 207)

The evidence arising from the Bevan and Fryatt (1988) and Abrahamsen (1990) studies suggest to Smith and Abrahamsen (1992) that the first explanation is the most likely. This lack of knowledge of the research literature may certainly be true for the accountancy profession when one considers that the majority of the selection will be undertaken by qualified accountants and not trained human resource professionals.

Indeed, Gammie (1996) found that in her study of ICAS trainee employers the reasons for adopting the interview as a selection technique were extremely varied. The most frequently cited responses for interviewing were: to find out about the applicant's personality (15%); to ascertain suitability for the office (9%); and it was the most suitable vehicle for extracting maximum information about the candidate (13%). Another popular answer (15%) was simply that it was the most effective method to obtain the desired results!

Several studies have shown that the reliability and validity of the interview can be raised when an interview schedule or guide is used (Keenan and Wedderburn, 1980; Herriot and Rothwell, 1983, Huffcut and Arthur, 1994; McDaniel et al, 1994; Conway et al, 1995). Indeed Weisner and Cronshaw (1988) suggest that structured, job-related interviews provide quite effective criterion-related validity, with Anderson and Shackleton (1994) suggesting that one of the critical factors in maximising the contribution of the interview is to use a pre-formatted and structured approach. However in light of the comments made about those undertaking the interviews within the profession, it is hardly surprising that Harvey-Cook and Taffler (1987) found that only 44% of chartered accountancy offices in their study used a structured interview methodology.

1.6.6. Other assessment methods

Other methods of assessment are also used by the professional firms, such as testing (personality, job-related, cognitive), group discussion exercises, situational inventories or assessment centres utilising a variety of testing procedures. Gammie (1996) however found that very few ICAS training offices utilised other techniques apart from the traditional interview. A minority, only 20% (n = 11) of the sample, used testing as a selection technique and this was restricted to the larger firms (the "Big Six", the large firms and the TOPPS employers). Assessment Centres were used by 3 respondents in an effort to assess managerial and leadership potential, aptitude tests were used by 5 respondents to identify those students who may struggle with the examination process, psychometric testing was used by 3 respondents for personality analysis, and finally one respondent used a numeracy test for non-relevant graduates. Only 1 respondent used group discussion as a selection technique. Gammie (1996) concluded therefore that very little progress has been made by the profession since the Harvey-Cook and Taffler (1987) study. The evidence of Smith and Abrahamsen (1992) in their integrative analysis of the Robertson and Makin (1986), Bevan and Fryatt (1988), Abrahamsen (1990) and Shackleton and Newell (1991) studies would suggest that the utilisation of these techniques by the accountancy profession exceeds that of recruiting organisations in general. They found that the maximum possible usage in the UK of cognitive tests was 11%; personality tests, 13%; work samples, 18% and assessment centres, 14%. However these studies were concerned with the selection of managers as opposed to graduates. The IRS survey (1997) which specifically examined the recruitment of graduates found that in 1996 43.3% utilised ability/aptitude tests, 30.8% assessment centres, 19.2% literacy/numeracy tests and 38.3% personality questionnaires. This suggests that the accountancy profession is lagging behind the recruiters of graduates in general, although four years have elapsed since the Gammie survey was conducted and more organisations may now be utilising testing in some form.

Now that the use of alternative selection procedures has been established albeit only by the larger firms, the question that needs addressing is whether these techniques are valid predictors of future performance. As discussed above, the Hunter and Hunter (1984) study into the various predictors for entry level jobs revealed that the predictor with the highest mean validity was for tests of cognitive ability (0.53). A similar study conducted by Schmitt et al (1984) into the validity of predictors for specific criteria found that, in relation to achievement/grades (the equivalent of professional examination success), special aptitude tests achieved an average validity coefficient of (0.275), personality tests (0.152), general mental ability tests (0.437) and assessment centres (0.312). Unfortunately, there is no data on the average validity coefficient for interviewing and therefore comparisons cannot be drawn. However when one considers the Hunter and Hunter (1984) study which examined the validity of the interview, these alternative measures would appear to perform relatively well in the prediction of achievement and grades. Their performance in relation to turnover however is less impressive with average validity coefficients as follows: personality tests (0.121), general mental ability (0.141).

It would therefore appear that whilst these alternative means of assessing candidates are valid and perform better than the traditional interview, less than a quarter of ICAS recruiting firms utilise these procedures and the practices are restricted to the larger firms only.

1.6.7. Summary

Once undergraduates have decided that they wish to pursue a career in chartered accountancy and that they wish to undertake ICAS training, they need to decide the type of firm and the firms to which they are going to apply. These decisions will be based on the professional literature provided both by ICAS and the recruiting firms.

Interested applicants will then complete the application forms, which request a variety of information. These forms are then screened and the first selection by the firm takes place. It is suggested that this selection is undertaken in a haphazard manner as there is no evidence to suggest that the information contained in the application form is predictive of job performance.

Candidates who have successfully negotiated this pre-sift and who are still interested in a post with the recruiting organisation will then usually be invited for an interview or series of interviews. Some firms may also invite students to a firm presentation which is really a marketing as opposed to a selection opportunity for the firms. This may take place either before the interview process commences or between first and second interviews. Prior to the interview, firms will also follow up on references if they are utilised although in the majority of cases this is not carried out. The research evidence questions the usefulness of reference letters although it is suggested that there may be value in academic references as a predictor of future academic success.

The purpose of the interview was discussed, highlighting the importance of the interview as part of the social process of the recruitment strategy. However, concerns were raised about the validity of the interview in its role as a selection technique and this highlighted a gap between the research evidence and the selection techniques adopted in practice. Despite evidence to suggest that the validity of the interview could be raised where a structured approach is adopted, less than half of accountancy firms utilised this methodology.

Although other assessment methods such as testing demonstrate higher criterion-related validities, they are only adopted by a minority of recruiting firms and the application of these techniques tends to be restricted to the larger firms. It would therefore appear that there is considerable room for improvement in the accountancy profession to improve their selection strategies and Gammie (1996) concludes

> *'Although the firms would appear to be satisfied with their selection results, they should strive for maximisation from their investment'*
>
> (p 37)

There is little doubt therefore that the accountancy firms adopt a very traditional approach to both the recruitment and selection of their trainees which can be criticised by the research evidence. However, another related issue to consider is the profile of characteristics that are currently desired of trainee accountants by the various employers of accounting graduates; in other words, the nature of the qualities which the training providers are looking for in their selection process. Research has been undertaken into the nature of the decision processes involved in both the pre-selection and the selection of graduates, with the researchers suggesting that, by identifying and assessing the relative importance of these desirable characteristics, recruiters will be aware of the important attributes sought in trainees.

1.7 Candidate attributes for selection of graduates

In the field of graduate recruitment, there have been some studies of the relationship between candidate attributes and decisions taken by graduate recruiters, with the majority of the work carried out in USA. Habbe (1948, 1956) in surveys of 126 and 240 companies in USA found that, in the evaluation of college graduate applicants, interview impression and school grades were ranked highest, with lowest rankings for employment experience and test scores. The findings of Dickinson (1955) were similar in a consideration of the importance of seven factors for success in several fields of management, ranking intelligence highest and physical traits lowest. Sullivan (1961) also indicated that academic grades and extracurricular activities were important considerations in the selection of college graduates. Carroll (1966) however did not support these earlier findings. He found that, of the biographical characteristics studied, only appearance, rank (physical attractiveness), marital status, and office experience were found to be significantly related to any of the job-seeking success criteria. His results however were derived from those students involved in the college recruiting process at the undergraduate level and therefore derive from the 'poorer' end of the market in grade score terms (the majority of high grade point average students progressing to graduate school). This may explain why grades were not significantly related to any criterion of job-seeking success as very few of his respondents passed the high grades that were in evidence in the previous studies.

Other studies namely, Campion (1978) and Wingrove, Glendinning and Herriot (1984), have concentrated on the pre-selection decisions based on application form data by identifying those features of application forms which will predict whether or not the applicant will be considered for further assessment. Campion found that, out of 9 predictors, only grade point average and fraternity or sorority membership successfully discriminated between accepted and rejected forms. Wingrove et al (1984) used a much larger number of variables and, while predictors varied both within the individual and type of organisation, educational achievement, work experience and leisure activities generally predicted success in pre-selection.

A more recent study based in Scotland is that of Keenan and Scott (1985) who investigated the relationship between attributes of Heriot Watt graduates and their success in finding employment. They found that there were no discernible relationships between age, sex, social class, type of schooling and success in obtaining employment. On the other hand, a number of University-related items were correlated with success in finding a job, including classification of degree and relevance of vacation work. Neither membership of clubs and societies, nor being an office holder, had much predictive power for final employment decisions.

Notwithstanding differences between the studies, there appears to be an underlying trend of previous academic achievement (however defined), extracurricular activities and work/vacation experience being related to the selection of graduates at either the interview or application form stage. All these studies were concerned with the selection of graduates in general. However there have been a few studies which have concentrated solely on the criteria adopted for the selection of graduates for accountancy places.

1.8 Criteria for accountancy trainee selection

Previous research indicates that academic performance is a key criterion for selecting accountancy trainees. This would appear to follow the basic behavioural axiom on which biodata is developed, namely, that past behaviour is a valid predictor of future behaviour (Owens, 1976). Kakar (1992), for example, quotes a larger accountancy firm suggesting that past examination performance is the fairest measure so far identified as a measure for pre-selection.[10]

Lewis et al (1983) reported the results of a mail survey from geographically dispersed offices of the 12 largest US accounting firms, questioning the importance of various credentials for entry-level accountants. The recruiters indicated that grade-point average and interview performance respectively were an applicant's most important credentials. The importance of grade-point average was also found by Dinius and Rogow (1988) who studied seven out of the then big eight accountancy firms in the United States, with other factors considered important being attendance at a quality University, attractive personality characteristics, participation and leadership in organisations, together with personal appearance and presence. Of lesser importance were academic aptitude, references and membership of organisations. Both these studies concentrated on the large accounting practices. However Krzystofik and Fein (1988) in a US study compared national and local accounting firms. They also found that academic performance as demonstrated by grade point averages were considered important factors in selecting candidates for interview irrespective of firm size. The top four factors considered to be the most important in the pre-selection process were

[10] As stated by Ms Jo Magne, national personnel manager at Moores Rowland.

synonymous although the ranking dependent on firm size was different. The results can be found in Table 1.3.

Table 1.3: Important factors in selecting candidates for interview

Factor	National Firm	Local Firm
Grade Point Average (Accounting)	3rd	1st
Grade Point Average (Overall)	2nd	3rd
Work Exp in Accounting	4th	2nd
Evidence of leadership	1st	4th

Source: Krzystofik and Fein (1988)

Pasewark et al (1988) conducted a similar study with their results suggesting that, for "“Big Eight”" accountancy firms, academic performance played the most important role in the recruiting decision, followed by involvement in extracurricular activities. These two factors were also considered important by national firms outside the “Big Eight”. Hassell and Hennessey, Jr, (1989), again concentrating on the “Big Eight” accountancy firms in the United States, ranked specific personal characteristics and general selection factors as to their relative significance to the recruiting process. Among the general factors, personal characteristics, grade-point average and interview performance attracted the highest significance, with intelligence, communication skills and motivation for the personal factors. The review of these United States studies demonstrate that, with the exception of grade-point average which was of ubiquitous importance to the recruiters, there was inconclusive evidence to support other factors. However a more recent study by Ahadiat and Smith (1994), whilst acknowledging the importance of traditional performance indices such as grade-point average and quality of applicant's University, also highlighted the importance of personality and socially oriented characteristics, which comprised seven of the ten highest-rated factors. Whilst these findings accentuate the importance of the applicant's interview performance where employers typically try to assess personal attributes and social proclivities among interviewees, no information is provided on the attributes sought at the application form stage where recruiters are facing the challenge of reducing their applications by up to 90%.

Four UK studies have been identified, which specifically examined the criteria sought by professional firms. The first of these was undertaken by Harvey-Cook and Taffler (1987) who examined large accountancy practices in London. They found that general academic performance was the pre-eminent factor considered important in evaluating prospective trainee application forms. Non-academic information, neatness of form completion and range of extracurricular activities were however given particular attention by firms. References or recommendations appeared to carry little weight at this stage.

Two other studies were conducted in Scotland by Cameron (1991) who concentrated on the "Big Six" accountancy firms and Gammie (1996) who examined the range of practices from small firms to multinational practices. Cameron (1991), as discussed earlier in the Chapter, found the ability to pass the examinations the most important factor and this was supported by Gammie (1996) who found that academic achievement was the ICAS training providers' pre-eminent criterion in the consideration for interview selection. The ICAS training providers were asked to identify up to four criteria for screening application forms and the results are presented in Table 1.4.

Table 1.4: Criteria considered for selecting graduates for interview

Criteria for Screening the Application Forms	First Criterion	Second Criterion	Third Criterion	Fourth Criterion	Total	Rank
Academic Achievement	38	7	3	2	50	1st
Outside Interests	-	9	3	5	17	2nd
Work Experience	1	7	5	1	14	3rd=
Personal Qualities	-	5	8	1	14	3rd=
Written Skills/Present	3	5	1	2	11	5th
Other Misc	1	1	6	2	10	6th
Accredited Degree	4	3	-	-	7	7th
Local Connections	3	1	1	1	6	8th
Particular University	1	4	-	-	5	9th=
Interest/Commitment	1	3	1	-	5	9th=
None Specified	2	9	26	40	N/A	N/A
Totals	54	54	54	54	54	N/A

Source: Gammie (1996, p34)

Discounting the two respondents who did not specify any criteria, only two training providers did not use academic achievement in the screening process.

The latest study was that conducted by Simon and Kedslie (1997), who solicited the opinions of ICAEW recruiters on attributes potentially relevant to the selection of trainee CA's. Utilising factor analysis, 9 interpretable factors were produced which accounted for 59.4% of the total variance for all respondents. The 9 factors together with their percent of total variance explained was as follows: personal skills (24%), fit of applicant with firm (7%), communication skills (5.3%), University/student interface (4.8%), academic performance (4.4%), previous work experience (4.1%), post graduate qualification (3.4%), universities reputation (3.4%) and integrity and ethical standards (3%). The demise of academic performance in this study (only ranked 5th), in comparison to the other two studies, may be due to the fact that the Harvey-Cook and Taffler (1987) and Gammie (1996) studies specifically looked at the criteria utilised in the pre-selection for interview, whereas the Simon and Kedslie (1997) study considered the selection process in its entirety.

The criticism of all these studies however is that the predictive ability of the various variables identified in the recruiting process have not been examined and therefore no empirical validation carried out. Whilst these may be desirable characteristics in the eyes of the recruiters, are they valid predictors of future performance? At best these studies only provide a vehicle for accounting educators to assist students in the recruiting process and to provide accounting students with the knowledge of the relative importance of their backgrounds to the recruiting decision. These studies do not provide evidence for the accounting training providers to evaluate or improve their recruitment strategy.

Whilst there is evidence that previous academic achievement (however defined) may be indicative of future success, the question that needs addressing is the specific aspects which are important. Although there are basic examination statistics published by ICAEW each year on performance, relating pass rates to UCAS points, degree class and type of University, there is currently no published statistical evidence specifically related to ICAS trainees on which the firms can base their selection decisions. The firms therefore tend to rely on anecdotal evidence from their previous trainees which may result in unsystematic and invalid selection. Likewise, apparently there has been no published research undertaken in the UK on tenure of employment of recently qualified accountants and therefore there is no statistical evidence on which the recruiting firms can base their decisions.

1.9 Summary

Accountancy firms receive far more applications from candidates than the number they wish to interview which necessitates some form of reliable and cost effective filtering process. A graduate entrant into a professional accountancy office represents a substantial investment, and the costs of this investment will rise if the trainee fails to pass their examinations at the first attempt. To enable firms to recoup their investment it is also necessary for trainees to remain with their training firms for around 18 months post-qualifying. Firms pre-select prospective trainees on the basis of their application forms, before relying on the traditional interview, despite the research evidence questioning the validity of the interview as a selection technique. Only a small minority utilise more advanced techniques such as testing.

It is argued that the application form elimination process is conducted in an intuitive and unsystematic manner without any recourse to statistical evidence on which to base the selection decision. Studies in the field of graduate recruitment have shown that previous academic achievement, extracurricular activities and work/vacation experience are criteria sought by recruiters and previous academic performance is a key criterion for the selection of accountancy trainees. Presumably this is based on the importance that recruiters place on the ability of accountant trainees to pass their professional examinations. However, the area of keen interest is how particular aspects of previous performance are related to future performance.

1.10 Rationale of research

England (1971) suggested that the application forms could be used actuarially, whereby data is collected from a large number of recruits and related statistically, in the manner of a conventional credit-scoring system, to their subsequent job performances, appropriately measured. If the weights established are relatively constant over time, then the resulting model can be used to sift later application forms on a routine basis. The technique of using the information in this manner is known as biodata. By objectively scoring biographical information which is demonstrated to be related to success in occupational pursuits, biodata can be regarded as a 'predictor' for the 'criterion' of success. The technique of using the information from the application form, actuarially and explicitly, has not yet been explored by the recruiters and this may result in unreliable pre-selection. The benefits from the utilisation of this technique for accountancy firms was proposed by Harvey-Cook and Taffler (1987). They suggested that instead of accountancy firms making selective judgements on an intuitive basis from the application form, the biographical details on the very same form when processed by an appropriately developed statistical model could be very useful in forecasting subsequent performance. They state that for the accountancy profession

> '*Pre-selection is a vital stage in the recruitment process with firms possibly only able to interview 10-15% of those completing an application form....the information on the application form generally has considerable influence upon decisions made at all stages in the selection process, and can represent a very powerful predictor of job performance.* '(p104).

The interest in the use of biodata in pre-selection for accountancy firms arises therefore from the need for a systematic and valid method to pre-screen applicants on the basis of biographical information which might be predictive of success on a chosen criterion, for example professional examination success or tenure of employment after completion of the training contract (Strebler,1990).

The fundamental difference therefore between biodata and other traditional methods of selection lies not with the inclusion of certain items concerned with an individual's background as indeed many items considered pertinent by recruiters may actually be valid predictors of success. The difference lies with the fact that the respondent's answers are combined, based on statistical evidence, to produce a score analogous to that produced from a test. It is the score from this test rather than the value of judgements of individuals reading the application form or conducting the interview that is used in the selection process. Biodata should therefore provide

> *'less biased information in a more economical fashion.'* (Stokes and Reddy, 1992, p288).

Indeed, Gratton (1989) suggests that the adoption of statistical procedures to process biodata at the pre-selection stage is the best method for pre-selecting graduates for entry level jobs, where training will be done after recruitment since these candidates have a limited amount of work experience on which to be assessed. If the screening of potential trainees is conducted in a systematic and reliable manner, the validity of the interview for the prediction of subsequent performance will not be so critical. This could remove the assessment of likely competence from the interview and provide the interviewer simply with the task of conducting a socialisation process, identifying those candidates who match their organisational ethos.

1.11 Aim and objectives of thesis

The aim of this research thesis is to critically evaluate whether biodata could be used as a valid tool in the pre-selection process of trainee chartered accountants undertaking their training within an ICAS environment with particular reference to ICAS examination success, and in achieving tenure of employment for at least 18 months post-qualifying.

The focus of this thesis is therefore concerned with the development and evaluation of a practical tool namely a biodata model that could be used by training providers to pre-select graduates for ICAS training places. The thesis has not set out to develop or test the validity of the theoretical base on which biodata is founded.

The specific objectives in relation to the aim are to:

1. Critically evaluate the effectiveness of biodata in the differentiation of ICAS trainees between those who successfully negotiate their professional accountancy examinations without resits and those who experience failure.

2. Identify the key determining background factors which influence ICAS examination success and could be used in a selection enviroment.

3. Analyse the effectiveness of biodata in the differentiation of trainees who remain with their training provider for at least 18 months post qualifying and those who leave before this time.

4. Identify the key determining factors, which could be used in a selection environment, influencing tenure of employment after completion of the training contract.

Chapters 2 and 3 provide the review of literature, and the methodology for the empirical work is outlined in Chapter 4. The exploratory Phase I Study, developing an examination success model, is detailed in Chapter 5. The results from this initial exercise, together with the evidence from other work highlighted in the literature, provide the focus for the development of a conceptual framework which is outlined in Chapter 6. The development of the examination success models, the Phase II Study, is identified and discussed in Chapter 7. The tenure model development is undertaken in Chapter 8. Chapter 9 provides the conclusions to the thesis, highlights the practical implications for the training providers, and recommends making suggestions for further research.

CHAPTER 2

REVIEW OF LITERATURE - THE CONCEPT, HISTORY AND VALIDITY OF BIODATA

2.1 Introduction

Chapter One concluded that chartered accountancy firms need a valid and systematic method to pre-screen application forms and it was suggested that biodata is the best method for pre-selecting graduates for entry level jobs. Advocates of biodata claim that the best predictor of future behaviour is past behaviour and that biographical records of job applicants, such as their past experience and achievement, can be objectively assessed to predict future job performance. This chapter is divided into three main sections. The first section will attempt to define the concept of biodata, the second section considers the history of the development of the technique, and section three presents a critique on the validity of the technique.

2.2 The nature of biodata

Biodata is a term used for information concerning an individual's personal life history and experience, including biographical accounts of personal history and characteristics. Although there is no universally agreed definition of biodata, the most frequently cited is that purported by Owens in 1976. He defined biodata as

> *'scored autobiographical data which are objective or scorable items of information provided by an individual on previous experience (demographic, experiential, attitudinal) which can be presumed or demonstrated to be related to the personality structure, personal adjustment, or success in social, educational or occupational pursuits'* (p612).

Apart from explaining the nature of biodata, this definition identifies two key points. Firstly, biodata encompasses wider aspects of personality and motivation rather than simply behaviour alone. Secondly, the definition emphasises a classical predictive model of selection. Therefore if biodata can be identified as items which are related to success in occupational pursuits, they can be regarded as the 'predictors' of a specific 'criterion' of success (Gunter et al, 1993). In the context of this thesis, two criteria are taken as a measure of success for a given activity. The first criterion is successful completion of the professional accountancy examinations, which is defined as "pass all the ICAS examinations at the first attempt". The second criterion is tenure, or to remain with the training provider for at least 18 months post qualifying.

The exact choice of items to be classed as biographical is quite controversial and efforts to define the content of biodata have been unsystematic (Mael, 1991). Gunter et al (1993) illustrate this point by suggesting that

> *'....a biographical item may vary on any of the following dimensions:*
> ** Verifiable - unverifiable*
> ** Historical - futuristic*
> ** Actual behaviour - hypothetical behaviour*
> ** Memory - conjecture*
> ** Factual - interpretative*
> ** Specific - general*

** Response -response tendency*

** External events - internal events*

** Strictly biographical - attitudes'* (p 5)

However autobiographical data, which are known as biodata items have traditionally been classified into 'hard' and 'soft' categories. Biodata items are therefore not necessarily restricted to historical and verifiable items, such as age or secondary school attended. These are known as 'hard items' and would be commonly found in the traditional application form. They may also include any item which describes the individual, such as personality, motivation, attitudes, values and aspirations. These are collectively known as 'soft' items. The inclusion of these attitudinal, interest and value type items in biodata forms has led some researchers to equate biodata with measures of personality and interests (Hough, 1989; Shultz, 1991). There is often therefore a very fine dividing line between a personality inventory and a 'soft' biodata inventory. However the biodata questions will always allow a definite, unique answer which a personality question may not. Biodata items are also

> '*much broader in content than personality and interest inventory items because they capture prior behaviour and experiences that determine both choice behaviours and reactions to various situations.*'
> (Stokes & Reddy, 1992, p287).

Addressing both types of data, 'hard' and 'soft', researchers have attempted to classify the information into various sub-sets in order to demonstrate the areas of a person's background encompassed by biodata items. Drakeley (1988), one of the few researchers in the UK who has worked in the field of biodata, proposed that biodata items could be classified into three broad categories, namely, background, commitment and achievement. Background data reflect both the opportunity structure of society and the individual's immediate situation, such as parent's social class, gender, type of school attended. Commitment data reflect an individual's needs, attitudes, expectations and affiliations, such as leisure activities undertaken. Achievement data reflect an individual's prior successes and failures, such as school, University and work performance. He suggested that

> '*these three types of biodata items should differentially predict different types of outcome, and should in doing so interact with each other.* (p2)

Mael (1991) succinctly summarises the scope of biodata by suggesting that

> '*virtually any event or behaviour that has actually taken place, whether it reflects capabilities that existed earlier or is itself the shaper of subsequent behaviour, is appropriate subject matter for biodata items. Thus the only item that defines a biodata item is its reflection of a current or past part of the person's life history.*' (p771-772).

He then proceeds to identify a taxonomy of item attributes of biodata which fall into three categories. The first of these can be seen as defining the domain of biodata and includes historical items such as an individual's age when employed in their first full time paying job. The second group of attributes have been advanced merely as methodological stringencies to ensure correct reporting of behaviour and include from the taxonomy the attributes of external, objective, first-hand, discrete and verifiable items. An example of a biodata item falling within this second group would be the grade achieved in Higher Mathematics (verifiable item). The third group, which includes the controllable, equally accessible, overtly job relevant, and non-intrusive item attributes, reflect the legal or moral concerns about using certain types of item for selection purposes. An example of a biodata item falling into this third category would be an individual's appointment as a school prefect (equal access). Following a discussion of the various attributes, he concludes that the only necessary attribute of a biodata item is that it is historical, although other attributes may be utilised to reduce the risk of false declaration, to increase fairness and to comply with the legislation.

Whatever the nature of the individual items within the questionnaire however there is one fundamental difference between biodata and other selection methods carried out to elicit historical data about prospective employee's suitability for employment, such as the application form, interview or background investigation. With biodata the respondent's answers are combined to produce a score analogous to that produced from a test. It is the score from the test rather than the value of judgements from individual reading of the application form or background data information that is used in the selection process. Biodata should therefore provide

> '*less biased information in a more economical fashion.*' (Stokes & Reddy, 1992, p288).

2.3 The history of biodata

Just after the turn of the century Galton (1902) stated

> '*The future of each man is mainly a direct consequence of the past - of his own biological history and of those of his ancestors. It is, therefore, of high importance when planning for the future to keep the past under frequent review, all in its just proportion.*' (quoted in Owens, 1976, p609)

Similarly, Guthrie (1944) confirmed this view by stating

> *'An individual's...past affiliations, political and religious, offer better and more specific predictions of his future than any of the traits that we usually think of as personality traits. When we know how men adjust themselves through learning to their situation, and also know the situations to which they have been exposed,...we know the men themselves and there is no need to speculate concerning the deeper reaches of the soul until we can explore these with similar knowledge.'* (p66)

The prediction of these psychologists was therefore that past behaviour is a valid predictor of future behaviour and as Owens (1976) himself states

> *'one of our most basic measurement axioms holds that the best predictor of what a man will do in the future is what he has done in the past'* (p 625)

This dictum is often cited as the rationale on which biodata was developed.

However it was not psychologists but a group of American underwriters in 1894 who created the idea and the prototype of standardising and scoring, by empirically keying, the information contained in the job application form. Colonel Thomas L. Peters of the Washington Life Insurance Company of Atlanta proposed that one way to improve the selection of life insurance agents would be to require all applicants to answer a list of standardised questions such as; present residence, birth date and place, marital status, (Ferguson, 1961). In 1915, Woods (see Ferguson; 1961, 1962) attempted an empirical analysis of the responses of effective and non-effective salesmen to the individual items of an application blank and in 1917 Scott included an application blank or personal history record among his "Aids in the Selection of Salesmen". Goldsmith (1922) analysed 150 application forms from a population of 502 insurance salesmen. Her sample comprised 50 superior, 50 inferior and 50 indifferent insurance salesmen and from these forms she identified those characteristics which collectively distinguished between these three groups. She subsequently assigned weights to each question reflecting the likelihood of success associated with a particular answer in her original sample. The conventional application form was therefore converted into what is now commonly known in the United States of America as a weighted application blank (WAB). Using the conventional application form in this manner, the WAB works on the aforementioned principle that the best predictor of future behaviour is past behaviour. By the mid-thirties, this WAB technique was well developed and had become so common place as to allow Long and Sandiford (1935) to review 23 different techniques.

Although many methods of empirical keying founded on item-criterion relationships have been developed (Guion, 1965), the WAB approach of England (1971) is the most commonly cited in the contemporary literature as an empirical keying method for scoring and combining biographical data and the term WAB has become synonymous with England's method. According to England, the intelligent development of a weighted application blank can be outlined as follows:

> '1. *Personal history information such as age, years of education, previous occupations, and marital status represent important aspects of a person's total background and should be useful in selection. The major assumption is that how one will behave in the future is best predicted by how one has behaved in the past or by characteristics associated with past behaviour.*
>
> 2. *Certain aspects of a person's total background should be related to whether or not he will be successful in a specific position. Numerous studies have shown that information contained in application forms is predictive in selecting*

employees for certain types of positions. Personal factors such as age, years of education, previous occupations, and marital status have been found to be correlated with indicators of desirable employee behaviour (length of service, supervisory ratings, sales volume, and average salary increase)

3. *A way of determining which aspects of a person's total background are important for a given occupation is needed so we can predict whether or not it is likely to be successful in a given occupation.*

4. *A way of combining the important aspects of a person's total background is needed so we can predict whether or not it is likely to be successful in a given occupation. By determining the predictive power of each application blank item, it is possible to assign numerical weights or scores to each possible answer. Weights for these items may then be totalled for each individual and a minimum score established, which, if used at the time of hiring, will eliminate the maximum number of undesirable candidates with a minimum loss of desirable candidates'.*

(England, 1971, p 4-5)

It is not clear when the idea of casting the item options of an application blank into multiple choice form first emerged, although according to Owens (1976) the US military establishment in World War 2 enjoyed considerable success in their use of the scored biodata form. Mumford and Owens (1987) suggest that the first use occurred during World War 2 when application blank responses in a multiple-choice format were used for American Air Force student pilot training programmes. They cite an early study by Guilford and Lacey (1947) who found that an empirically keyed set of multiple-choice background data items predicted success in Air Force training programs at the $r = .40$ level. By combining the predictive power of empirically keyed background data items with the scoring efficiency provided by the multiple-choice format, the modern background data form, the biographical questionnaires (BQs), came into being.

Despite an increasing uptake in the US of the technique (Mitchell, 1994), a very small number of organisations within the United Kingdom utilise the technique. Robertson and Makin (1986) found that in their study of 108 British organisations, representing a response rate of 36% from their sample of 304 companies selected from the Times 1000 (1983), only 1.9% always used biodata, with 1% using the technique for approximately half of their applicants and 2.9% for less than half of their applicants (see Table 1.2 in Chapter 1). The use of biodata was confined to those organisations that employed 500 or more, in other words the large organisations. Unfortunately, for those respondents who used biodata for only some of their applicants, there are no data identifying the type of job where the technique was utilised. Although the overwhelming majority (94.2%) had never used biodata, Robertson and Makin felt that there appeared to be an increasing interest in biodata, stating that

> *'others, in informal 'write-in' comments, indicated that its use was under serious consideration.' (p51)*

The frequency of these comments however were not indicated. Shackleton and Newell (1991) updated this information by examining how British selection practices had changed in the five year period to 1988. For comparison purposes they selected from the same population, namely Times 1000 (1988), and they asked the same questions. Their sample size was however much smaller, with a random sample of 120, although with a significantly improved response rate of 61% (n=73). Despite a progression made in the field of testing and assessment centres (see Table 1.2 in Chapter 1), the use of biodata as a predictive tool and therefore as a vehicle for pre-selection has remained relatively rare, with only 4.2% of respondents always using biodata and 80.9% of companies never using biodata. There is therefore a reduction of 13.3% of organisations who never use the technique and the greatest increase in utilisation of the technique was found in organisations using biodata for 'less than half' of their applications, namely 10.9% of organisations. Shackleton and Newell (1991) also found that some 'small' (<200 employees), and 'medium' (200-500 employees) were now also utilising the technique, although the majority of firms were classified as large (> 500 employees). The trend of utilisation however has apparently not continued. The IRS survey published in 1997, based on 157 employers in the UK, revealed that only 5.1% of employers used biodata as a regular part of the selection process for any job type. Only 3.9% of organisations recruiting managers utilised the technique, and this fell to 3.3% of organisations which were selecting graduates. It was also found that the technique was restricted to the larger organisations, employing greater that 200 people.

2.4 The validity of biodata

As the real power and usefulness of biodata lies with the ability of biodata keys to predict future behaviour, it is necessary to examine whether knowledge of an individual's past life experiences can be used to generate items with high predictive validity and strong explanatory power. Mumford and Owens (1987) suggest that it is only possible to fully establish the meaningfulness of background data measures by considering evidence which points to content, construct and criterion-related validity. A background data measure displays content validity to the extent that items incorporated in the measure will capture prior experiences and behaviour which contribute to the development of differential performance on the criterion of interest. Criterion-related validity on the other hand examines the ability of the predictor measure to predict the criterion measure, for example, the ability of a biodata instrument to predict successful examination performance. Finally construct validity considers the ability of the scale to measure variables that are theoretically related to the variable which the scale purports to measure, for example, the characteristics of a person's background history in relation to future examination success. Historically, however, the validity of background data measures has been established through criterion-related validity studies.

Innumerable research studies have been conducted into the life history antecedents of worker behaviour to ascertain if future job success can be effectively predicted from information about background and past experience. These earlier studies have then formed the basis for either a narrative or meta-analytic review focusing on the predictive validity of biodata compared with other tests. The narrative reviews collated the results of research across different organisations to determine if there are any trends in the criterion-related validity of biodata. The reviews were conducted by Schuh (1967), Asher (1972), Owens (1976) and Reilly and Chao (1982) and their findings strongly supported biodata validity. The meta-analytical studies, which used a set of techniques which were sensitive to statistical artefacts that can cause differences across studies, also accumulated the results of several previous studies. This meta-analytical work was carried out by Hunter and Hunter (1984), Schmitt, Gooding, Noe and Kirsch (1984) and Bliesener (1992)[1]. The results from these studies also supported the technique of biodata. Both of these approaches are discussed below together with a section which examines individual validity studies that have been undertaken in the UK.

[1] Unfortunately this study was published in German, and there is no available English translation. However, Gunter et al (1993) reported the main findings of the review.

2.4.1 Narrative reviews

Schuh (1967), concentrating his review on job tenure, found that in 19 out of 21 studies, one or more biographical items had a predictive relationship with job turnover. He concluded that

> '..... *some items in an applicant's personal history can be found to relate to tenure in most jobs.'* (p.145).

Schwab and Oliver (1974) questioned the optimism of Schuh's findings, however, as only 14 of the studies reviewed were cross-validated[2]. Cross-validation is necessary as there is no assurance that the correlations derived from one sample would hold true for another sample from the same population. Asher's review in 1972, using the constrained classification that biodata items should be historical and verifiable, as with 'hard' biographical items, examined 11 studies conducted in 1960 through to 1970. He found that the scorable application blank was used to predict work behaviour which ranged from unskilled to skilled and that the predictive power of biodata exceeded other predictors such as tests of intelligence and aptitude in all cases and at all arbitrary validity coefficient cut-off points. Of particular interest to this thesis is the review by Owens (1976), when he considered studies which related scores on biodata instruments to various criteria of academic performance. He identified four studies, all conducted in the United States, and all related to the trainability and hence performance of freshmen, (Asher and Gray, 1940; Anastasi et al, 1960; Prediger, 1969) and the work at Ohio University conducted by the Institute for Behavioural Research in Creativity (IBRIC, 1968). These studies emphasised some potentially significant dimensions of trainability such as the ability to predict grade point averages and first semester grades. Owens concluded that the trainability of freshmen

[2] Cross-validation is a technique whereby the model developed on one sample is tested on another sample. The ability of the technique to predict is reported on the ability of the model to predict the hold-out and not the developmental sample.

> *'can be predicted rather well from a score on an empirically keyed biodata inventory.'* (p619)

Reilly and Chao (1982) reviewed 58 studies using biographical information as a predictor. Because the number of studies was so large, individual biodata studies were not discussed in detail. Instead, average validities for biodata studies were summarised using only those studies which had been cross-validated. The results were presented for various types of criteria, namely; tenure, training, ratings, productivity and salary, within broad occupational categories, namely; military, clerical, management, other non-management, sales, and scientific/engineering. Occupational categories were pooled across criteria which were in turn pooled across occupational categories. The average coefficient for each of the criteria ranged from 0.32 to 0.46, which Reilly and Chao state compares favourably with the validities for tests as found by Ghiselli (1966, 1973). The average coefficient for each of the occupations ranged from 0.14 which related to non-management jobs other than clerical, to 0.50 relating to sales occupations. As the unimpressive average validity of only 0.14 was based on only two coefficients, as opposed to a minimum of five coefficients in the other occupations, they expressed little concern over the relevance of this validity statistic.

The evidence from these narrative reviews would suggest that biodata is a valid predictor of future job performance for both a variety of criteria and occupations.

2.4.2. Meta-analytic reviews

Although these narrative reviews provide an important insight into the criterion-related validity of biodata, they are open to criticism. Narrative reviews may be insensitive to some of the statistical artefacts that can cause differences between studies. These artefacts include sampling error, unreliability of measurement and restriction of range. Hunter and Hunter (1984) suggest that much better results can be obtained by quantitative analysis of results across studies. The most common method of quantitative analysis is that which was proposed by Glass (1976), who named the procedure meta-analysis. However his technique is also open to criticism that, if the variance across studies is taken at face value, then the problem of sampling error is neither recognised nor dealt with adequately and different conclusions may be drawn when sampling error is considered. Schmidt and Hunter (1977) developed a formula for correcting the variance across studies for sampling error and a variety of formulas have been developed since then, which are mathematically compared in 1982 by Hunter, Schmidt and Jackson.

Hunter and Hunter (1984), in their meta-analytical study, corrected the variance of validity for sampling error and where possible corrected for reliability and range restriction. However, there are artefacts that continue to remain uncontrolled and these include bad data, computational, transcriptional and typographical errors. Thus the corrected standard deviations will continue to be overestimates of the actual variation in validity across jobs. Their study reviewed the findings on ability tests, reassessed past meta-analyses and presented a new meta-analysis, prior to providing a summary comparison of all the predictors studied using supervisor ratings as the measure of job performance. Their comparisons were made separately for two sets of predictors; those that can be used for entry-level jobs where training will follow hiring and those used for promotion or certification. As this thesis is concerned with entry-level jobs, only the results relating to the category will be examined, which can be found in Table 2.1.

Table 2.1: Mean validities and standard deviations of various predictors for entry-level jobs for which training will occur after hiring

PREDICTOR	Mean Validity	Standard Deviation	No of Correl	No of Subjects
Ability composite	.53	.15	425	32124
Job tryout	.44		20	
Biographical inventory	.37	.10	12	4429
Reference check	.26	.09	10	5389
Experience	.18		425	32124
Interview	.14	.05	10	2694
Training and experience ratings	.13		65	
Academic achievement	.11	.00	11	1089
Education	.10		425	32124
Strong interest inventory	.10	.11	3	1789
Age	-.01		425	32124

Source: Hunter and Hunter (1984), Table 9, p 90

Although these results confirm the relative superiority of biodata against conventional selection measures, with a mean validity of .37 for biodata in comparison to the interview with a mean validity of only .14, Hunter and Hunter (1984) question whether any alternative is equal to tests of cognitive ability which are shown above as ability composite tests.

Unfortunately as the empirical evidence on the restriction of range (the attenuation in the obtained validity of a procedure caused by using the procedure or anything correlated with it for selection purposes) was available only for measures of cognitive ability, corrections could only be made in this area. Hunter and Hunter argue that this is irrelevant as the alternatives considered were largely uncorrelated with cognitive ability and hence any indirect restriction of range would be negligible. Although this defence may be acceptable in countries where ability tests are the norm, this is not the case in the United Kingdom. Where biodata is used for pre-selection or application forms are read prior to the selection interview, both direct and indirect restriction of range may occur.

Schmitt et al (1984) undertook a similar study, reviewing and meta-analysing 99 criterion-related validity studies published in either the Journal of Applied Psychology or Personnel Psychology during the years 1964-1982, some of which were included both in the work of Reilly and Chao (1982) and Hunter and Hunter (1984). Unlike Hunter and Hunter (1984) they did not attempt to adjust for any statistical artefacts with the exception of sampling error as the data that would have made these corrections possible were not available. They suggest however that most of the variability in the validity coefficients can be explained by sampling error and that any additional corrections as utilised by Hunter and Hunter would only affect the relative size of the validity coefficients and would have little effect on their variability.

Their study applied meta-analytic methodology to examine validities as a function of five study characteristics, namely; validation research design, the type of criterion used, the type of predictor used, the predictor-criterion combinations and the occupational group studied. Their results indicated that concurrent validation designs (where measures of predictors and criteria are collected from job incumbents) produce validity coefficients roughly equivalent to those in predictive validation designs (where predictor data are collected from job applicants and hiring decisions are made with no knowledge of the predictors). Both of these designs produce higher validity coefficients than does a predictive design which includes use of the selection instrument. In respect of the type of criterion used, they found that, while their results yielded no information concerning appropriate/inappropriate weighting of predictors, subjective criteria did not result in inflated validity coefficients. Indeed, use of performance rating criteria resulted in lower validity coefficients than did the use of other more 'objective' criteria. In comparing the mean validities of various types of predictors, namely; Special Aptitude (0.27), Personality (0.15), General Mental Ability (0.25), Biodata (0.24), Work Sample (0.38), Assessment Centre (0.41), Supervisor/Peer Evaluations (0.43) and Physical Ability (0.32), biodata did not perform well in comparison to the other predictors. However these mean validities combine various predictor-criterion relationships and, more relevantly, those relationships specifically related to the area of study. It is necessary therefore to examine the specific predictor-criterion relationships relevant to this thesis. As this thesis is concerned with the examination success and tenure of employment of chartered accountancy trainees, of particular relevance are the results on turnover and achievement/grades. Their results are contained in Table 2.2.

Table 2.2: Average validity coefficients for various predictor-criterion combinations

Predictor	Number of validities	Total sample	Average validity coefficient	Variance of the coefficientσ	Variance due to sampling error	Variance left after deduction of sampling error	Per cent unexplained
				Turnover			
Personality	5	15927	.121	.00104	.00030	.00074	71
Gen. ment ability	8	12449	.141	.01877	.00062	.01815	97
Biodata	28	28862	.209	.01444	.00089	.01355	94
Physical ability	3	852	.154	.00762	.00336	.00426	56
				Achievement/grades			
Special aptitude	8	1093	.275	.03622	.00625	.02997	83
Personality	6	980	.152	.01406	.00584	.00822	58
Gen. ment ability	5	888	.437	.02209	.00369	.01840	83
Biodata	9	1744	.226	.07841	.00465	.07376	94
Work sample	3	95	.314	.01876	.02566	-	00
Assessment Centre	3	289	.312	.00692	.00846	-	00
Physical ability	4	976	.281	.00327	.00348	-	00

Note: All predictor-criterion combinations for which less than three coefficients were available were ignored

Source: Schmitt, Gooding, Noe and Kirsch (1984), p417

As Table 2.2 shows, studies using turnover as a criterion have almost exclusively used biodata as a predictor presumably because of the notion that past behaviour with respect to job or life changes is the best predictor of future behaviour, Schmitt et al (1984). Their results suggest that this phenomenon is true with biodata achieving the best mean validity. However it should be noted that all the validity coefficients for the turnover criterion are low. This may be due to the fact that the predictor instruments identified in the study do not mirror the wide range of potential determinants of turnover, such as job satisfaction, organisational commitment and perceptions of the labour market as identified by Mobley et al (1979).

Table 2.2 reveals that measures of achievement/grades are best measured by general mental ability with an average validity coefficient of 0.44, with biodata achieving a poor coefficient of only 0.23. In comparison to the work of Hunter and Hunter on entry level jobs, where it is assumed that achievement and grades will be a derivative of supervisory performance ratings, these mean validities are lower, although it should be noted that this is the case for all the predictors common to both studies. This is probably due to the Schmitt study making no attempt to adjust for sampling artefacts with the exception of sampling error. Notwithstanding, there are similarities within the studies when ranking of the predictors is carried out. Both studies identify general mental ability as the best predictor of achievement grades with work samples/job tryout ranking second. However biodata performed well in the Hunter et al study, yet only performed better than personality tests in the Schmitt et al study. As a wide variety of predictors have been used to predict achievement and grades, the number of studies and total sample size for any given predictor category is low, which may adversely affect the results. Clarification is also needed on the definition of achievement/grades and further analyses would have been useful in this area.

Whilst these narrative studies and meta-analytic reviews provide support for the validity of biodata, it should be noted that all studies are combined, with no filtering out of poor studies. This could lead to an underestimate of the actual validity of biodata. The same could be argued however for the other types of predictor and hence the ranking of biodata with the other predictor measures may not be affected. Problems may also arise by combining these different studies in a meta-analytical approach as different validities may be averaged for essentially different kinds of predictor. Hence, these meta-analyses on biographical data estimate the validity of a general method of predictor construction as opposed to that of a specific biographical construct (Schmidt and Rothstein, 1994). Indeed, Bliesener (1996) draws attention to the fact that there is a considerable variance in the estimated validities both across and within individual meta-analyses. He suggests that this creates uncertainty both within a research and practical environment and he therefore attempts to present a more exact estimation of validity by making corrections for all analysed artefacts. Bliesener (1996) goes on to conclude that

> '*biographical data are a valid predictor of an applicant's suitability. This, combined with their high economy, their universal applicability, and the ease of combining them with other predictive procedures, makes them a valuable instrument in personnel selection.*' (page 118)

Hunter and Hunter (1984) however suggested that biodata keys were not transportable and that they appeared to be specific to the criterion measure used to develop the key. Reilly and Chao (1982) also suggested that biodata devices do not transport from one organisational setting to another. Therefore the question that needs to be answered according to Gunter et al (1993) is what is measured by biodata when the different studies are combined? Although biodata compare favourably with many other types of assessment of job applicants and employees, what is of relevance is the criterion-variable specificity of the predictor, together with the particular occupational group within which it has been tested.

Rothstein et al (1990) questioned whether validities could be generalized by raising the hypothesis that organisational specificity of biodata validity results from the methods typically used to select and key items. They investigated the empirically keyed autobiographical component of the Supervisory Profile Record (SPR), screening the items initially for job relevance, with retention only if they showed validity across organisations. Cross-validation was performed on approximately 11,000 first line supervisors in 79 organisations, with the resulting validities meta-analysed across organisations, age levels, sex, levels of education, supervisory experience and tenure. In all cases the validities could be generalized, were temporally stable across time and did not stem from measurement of knowledge, skills or abilities acquired through job experience. Although their results do not suggest that the level of generalisability found in their study could always be expected from biodata, they demonstrate that biodata instruments can be constructed and validated in a way that will lead to validity generalisability.

2.4.3. Individual studies based in the United Kingdom

A potential problem identified with the above validity reviews is that all the studies were published in the United States and were conducted using employees of American organisations either in the United States or abroad. Can it be assumed that similar validities would be found using British subjects? There is apparently no published research prior to 1988 on the use of biodata in the United Kingdom (Drakeley et al, 1988), which is presumably due to the very small number of organisations within the United Kingdom utilising the technique (as discussed earlier). However, with the slowly increasing use of biodata within organisations in the United Kingdom, it is the expectation that there will be an upsurgence of research in this area, but to date there has been relatively little work published and no narrative or meta-analytic reviews undertaken on work based in the United Kingdom. It is therefore necessary to look at individual studies.

One of the first empirical studies with British subjects appears to be that of Drakeley, Herriot and Jones (1988) who attempted to discover the criterion-related validity of biodata in predicting training success and turnover relative to other selection instruments. Their subjects were 702 male Royal Naval officers who entered training from civilian life between January 1981 and April 1983. The sample was divided into development (n=420) and cross-validation (n=282) samples based on the basis of the date of entering training, with the cross-validation sample consisting of the later entrants. Different scoring keys were developed for two training performance criteria and two training wastage criteria, using England's (1971) WAB technique. After excluding one of the wastage related criterion on the basis that its WAB was highly correlated with the performance criteria, they applied the scores based on three criteria to the cross-validation sample and calculated the validities. After corrections were made for both direct and indirect restriction of range, these validities were then compared first to the Overall Assessment Rating (OAR) as allocated at the conclusion of the Admiralty Interview Board's assessment centre procedure and second to a composite test score of four psychometric tests of intellectual aptitude. They found that appropriately weighted biodata predicted the professional examination success with a criterion-related validity of 0.5, almost as well as the OAR (0.55) and the composite test score (0.5). However they also found that the leadership WAB was actually better at predicting professional examination success with a validity of 0.55 despite the allocated weights differing quite considerably and some of the items being entirely different. The leadership WAB was nowhere near as successful at predicting the leadership marks (0.20) as the OAR (0.48), although the validity was a slight improvement on the composite test score (0.16). The commitment-related WAB achieved a modest validity of 0.33. However this was an improvement over the other predictors which failed completely to predict this criterion measure. Drakeley et al conclude therefore that their research has

> *'demonstrated that appropriately weighted biodata are as good predictors of professional training success as longer procedures, although some elements of the latter are superior in the reduction of leadership training success. Moreover, they may predict voluntary withdrawal at a low level when other instruments fail to do so'* (p151)

Further discussion on the commitment-related WAB can be found in the section dealing with tenure.

Other studies include an armed forces investigation which was reported by Winter et al (1987) at the British Occupational Psychology Conference and two civil service studies conducted by Bethel-Fox et al (1988) and Oates (1985). The recently privatised recruitment agency RAS also utilises biodata to grade applications for the Civil Service Fast Stream programme, with RAS directors Scott and Taylor (1997), suggesting that it the most effective way of sifting the 4000 applications which the programme receives each year. A few very large employers such as Cheltenham & Gloucester, CIS, Girobank, and Sketchley Retail are also known to use the technique (IRS survey, 1997). However there appears to be no published research work on the validity of the technique within these organisations.

There is therefore a need for research to be conducted in this area within the United Kingdom to explore the validity of biodata as a technique within the British culture.

2.5 Individual validity studies of particular relevance to this thesis

One of the main criticisms of biodata is the lack of generalisability, (Gunter et al, 1993), and the primary concern of decision makers interested in the implementation of biodata as a selection tool is the degree to which biodata keys are generalizable across organisations and jobs (Stokes and Reddy, 1992). Evidence suggests that biodata does not travel well from job to job or one organisation to another (Hunter and Hunter,1984) particularly where biodata predictors are sensitive to idiosyncratic situational elements of the organisation in which they were developed, (Reilly and Chao, 1982). However Rothstein et al (1990) suggest that it is possible to develop biodata forms that can be generalised across organisations, although they are not explicit as to how this generalisability is achieved. Wilkinson (1993) however suggests that it is the range restrictions on the data which are used for the development of the instrument that restrict the applicability across organisations. He proposes an alternative approach to the development of a biodata instrument. Instead of relating biographical items of a person to their global job performance, items would be related to specific attributes of a person which are defined through the person specification for any particular job. Biodata items would therefore focus on individual attributes which may have relevance in a variety of different settings. However the underlying assumption surrounding this new approach is that the required attributes for a particular job are in fact related to job performance in a particular area. This would require existing successful employees to be profiled and an identification made of the attributes which they posses.

Biodata would also appear to be specific to the criterion used in their development. Drakeley et al (1988) found that items which predicted one criterion were different from those used to predict another criterion. Moreover, the same responses could be a 'good' sign for one criterion and a 'bad' sign for another, (Drakeley, 1988). These findings supported the work of Howard (1986) who examined the relationship between college factors and managerial performance. He suggested that to use items developed for one criterion to predict another criterion would be misguided. This would seem hardly surprising given the nature of biodata development, whereby the criteria predicted has usually been organisationally specific and represents some global assessment of job performance (Wilkinson, 1993).

This lack of generality reflects the largely atheoretical approach that is traditionally associated with biodata and would suggest the necessity of developing keys specifically for the type of job and criterion chosen. Therefore although studies in other professions may be of interest, biographical keys with high validities in one profession may not be relevant in another.

The criterion variables tested against biodata which are pertinent to this study are examination success and tenure of employment in relation to the chartered accountancy profession. It is therefore necessary to specifically examine work that has been conducted in these fields.

2.5.1. Accountancy examination success

There are predictive studies which have been carried out in the accountancy field which may be of relevance, although none as yet published in the United Kingdom. Several studies, mainly based in the USA, have focused on the evaluation of prospective accounting students to undergraduate programmes, (McCormick and Montgomery,1974; Delaney et al, 1979; Buehlmann, 1975). Table 2.3 identifies other more recent studies conducted in the Far East and the United States of America.

Table 2.3: Studies examining undergraduate accounting performance

Study	Samples	Number of variables	Significant predictor variables	Criterion measures
Dockweiler and Willis 1984 USA	365	11	Entering GPA Grades in two intro accounting programme	Overall GPA in Undergraduate Accounting Programme
Clark and Sweeney 1985 USA	80	14	GPA at 45 hours Grade in English Grade in Mathematics	Achievement of a 2.3 GPA in last 21 Semester hours
Eskew and Faley 1988 USA	352	7	SAT - a measure of academic aptitude equal to the sum of the math and verbal scores from the Scholastic Aptitude Test HSG - the sum of the mean high school Maths and English grades CG-college grades which were a measure of the collegiate academic performance equal to the last cumulative grade-point index NQ- number of quizzes taken which was intended as a measure of course-related effort and motivation PRE-previous related experience PAE-pre-college study of account/bookkeep	Examination performance in overall introductory accounting course
Gul and Fong 1993 Hong Kong	443	7	Self Expectation of Examination results High school grade in English High school grade in Mathematics English Secondary School Education Personality type Intention to obtain a Business Degree Previous knowledge of accounting	Achievement at first year undergraduate level
Tho 1994 Malaysia	615	5	Exposure to High School Accounting Studies Exposure to High School Maths Grade obtained in Economics	Achievement in first level tertiary account courses

Source: various (see Bibliography)

The study conducted by Dockweiler and Willis (1984) at Missouri-Columbia University examined the relationship between 11 independent variables and the subsequent performance of undergraduate accounting students. Their methodology utilised correlation analysis to measure the individual relationships of various factors to performance in the undergraduate accounting program, a step-wise regression analysis to order the various factors in predicting subsequent performance and finally discriminant analysis using the factors found to be the best predictors of performance in the accounting curriculum. They defined performance as the overall grade point average each student earned after entering the undergraduate accounting program. Their results indicated that the entering grade point average was the single best predictor of subsequent academic performance, although certain other factors such as the grades in the two introductory accounting courses also predicted subsequent performance in the undergraduate accounting curriculum. Classifying the students based on these three independent variables, their model achieved an overall correct classification of 81%, although unfortunately it produced a significant misclassification of 28% of the rejection group. Scores on college aptitude tests and high school rank were not found to be useful in predicting a student's performance.

In another US study, Clark and Sweeney (1985) defined success as achievement of a 2.3 grade point average in the last 21 semester hours of accounting courses, as employers give substantial weight to this average in entrance-level employment and it also allowed for late starters. They started with fourteen variables all of which were academically related, and adopted discriminant analysis for the development of their model. After using a stepwise procedure to reduce the number of variables, their model correctly classified students into accept/reject groups with a statistical accuracy of 78% using only three characteristics, namely, grade-point average at 45 semester hours, grade in English composition and grade in college mathematics. More significantly, 90% of those in the rejection group were correctly classified.

Three years later, Eskew and Faley (1988) published another US study. They used multiple regression analysis to develop a model to explain student examination performance in a first college-level financial accounting course. They entered the seven variables shown in Table 2.3. The variables were found to explain 54% of the variance in the course performance and six of the seven variables contributed significantly to the explanation of the variance. The coefficients of partial determination indicated that the SAT and NQ variables had the largest marginal contributions which led Eskew and Faley (1988) to conclude that

> '*The maxim that ability plus effort leads to higher levels of performance apparently hold here.*'(p142).

The only variable that was not found to be significant was the HRS variable which measured the number of credit hours of previous college study.

Moving to the Far East, Gul and Fong (1993) examined the factors that affected accounting student performance at a first year undergraduate level in Hong Kong. Using a multiple regression model they found that self-expectation of examination results, English secondary school education, high school certificate level grades in English and Mathematics, personality type, intention to obtain a business degree and previous knowledge of accounting were significant predictors of student performance, although the self-expectation variable had the largest marginal contribution. The regression model explained 48% of the variation in student performance on the course. However, although all the seven variables were statistically significant discriminators as evidenced in the F-test, only the self expectation variable contributed to any real extent to the final model. The significance of this variable is not surprising, however, as the survey was conducted three weeks prior to the final examination and therefore the expectation is that the students would be more aware of their own ability and performance. A more useful and certainly a more pragmatic exercise would be to exclude this variable from the model and re-examine the model's ability to explain the variance in student performance.

Tho (1994) undertook a similar study. He selected five independent variables, three academic and two socio-demographic. Using stepwise multiple regression he found that the three academic factors were found to significantly explain 66% of the variations in performance in the first-level tertiary accounting course at the University of Malaya. The three factors were exposure to high-school accounting studies, exposure to high school mathematics and the grade obtained in STPM Economics (the equivalent of the Scottish Higher). The grade for Economics was selected for two reasons. First, the subject was taken by almost every student and the grade in Economics was highly correlated with the mean overall STPM grade (the equivalent of the UK UCCA point score). Second, the mean overall STPM grade was felt to be inaccurate as it included the grades of Economics, Mathematics and Accounting, making it difficult to isolate the effect of each of the subjects. The two socio-demographic variables, namely, gender and residential status, did not contribute significantly to performance variability. Despite the limited number of independent variables initially chosen, a reasonable model was developed, which explained 66% of the variation in student performance.

These five studies relating to performance in undergraduate accounting programmes in the United States and the Far East suggest that previous academic performance is a statistically significant indicator of University performance, albeit that the criterion of success was defined differently in each case. Unfortunately due to the limited information supplied in the studies in respect of the independent variables, it is difficult to compare the predictor variables and this is particularly the case in relation to those variables relating to Grade Point Scores (GPA). All the studies, with the exception of Dockweiler and Willis, separately identified in a variety of combinations previous grades in Mathematics, English, Economics and Accounting studies, whereas the

Dockweiler and Willis study utilised the overall GPA from school as the independent variable. Whilst Tho (1994) stated that the overall GPA was not entered into the model in order that the effect of each subject could be isolated, the other studies did not provide this information. What remains unclear therefore is whether the subjects as separately identified do result in a better prediction than the overall GPA score which incorporates performance across all subjects. It should also be stressed that only the Gul and Fong study identified any non-academically related variables in their model, although this may simply be a function of the limited number of variables originally entered in each study. It should also be noted that the only study to undertake a validity exercise on their developed model were Clark and Sweeney (1985) who found that there was no shrinkage from the developmental sample, with 80% of students correctly classified. As it is usual however to expect some shrinkage in the ability of a developed model to predict when applied to a different sample, the predictive ability as reported in the other studies may be overstated.

Other studies of more relevance to this thesis have concentrated on the successful professional examination performance. The American Institute of Certified Public Accountants' Uniform Statistical Information Questionnaire studies have resulted in several publications regarding the relationship between certain attributes and professional examination performance, (Reilly and Stettler, 1972; Leathers, 1972; Sanders, 1972; Leathers and Sullivan, 1978) although unfortunately many of these studies have been largely descriptive in nature. In a more recent study however, Marcus Dunn and Hall (1984) undertook an empirical analysis of the relationships between CPA examination candidate attributes and candidate performance in Texas. First time sitting candidates (n=280) from the November 1977 and May 1978 examinations completed a questionnaire which included information regarding 38 attributes classified into the five categories of personal data, academic background, preparation for the examination, work experience and prior exam data. After the selection of twelve of these attributes on account of their relevance to the performance on the professional examinations, together with one interaction variable constructed from the variables representing undergraduate and graduate accounting hours, multiple linear regression models were developed for each of the examination parts of audit, law, theory and practice.

The four hypothesised regression models, together with the individual model R^2 values, which represent the measure of the goodness of fit of a particular model, can be found in Table 2.4.

Table 2.4 Regression models and their goodness of fit

MODEL	Audit	Law	Theory	Practice
Scholastic AptitudeTest	SAT	SAT	SAT	SAT
Accounting Grade Point Average	GPA	GPA	GPA	GPA
Completion of one audit course	AUD			
Undergraduate accounting hours			HRSU	HRSU
Graduate accounting hours			HRSG	HRSG
Interaction Term for Accounting hours (HRSU x HRSG)			IHRS	IHRS
Years out of School	OUT	OUT	OUT	OUT
Years experience in Public Accounting	EXPCPA		EXPCPA	EXPCPA
Years experience in Industry			EXPIND	EXPIND
Institution Attended	SCH	SCH	SCH	SCH
Hours of Self-study	STDY	STDY	STDY	STDY
Completion of a CPA Review Course	REV	REV	REV	REV
Candidate's Age	AGE	AGE	AGE	AGE
Goodness of Fit of Model R^2	0.40	0.40	0.50	0.49

Source: Marcus Dunn and Hall (1984)

The evidence from the resulting models suggested that candidates with greater scholastic aptitude and higher Accounting GPA tend to earn higher examination scores. The results also indicated that increased undergraduate and increased graduate accounting hours also had a positive influence on the theory and practice examination scores, although the coefficient was not significant for the undergraduate accounting hours in relation to the theory examination. Variables representing the school attended were significant in several instances which suggested that performance is associated with the school attended. The results for variables representing self study had a positive association with examination scores whereas completion of a CPA review course was not significant although, when the hours of self-study were excluded from the models on the grounds of multicollinearity, the completion of a CPA review course was found to have a positive association with examination performance. The numbers of years out of school was found to have a significant negative relationship with examination scores for law and theory but no significant relationship with audit and practice scores. Marcus Dunn and Hall suggest that the reason for this may be due to the fact that the law and theory examinations are more textbook orientated and hence more adversely affected by the period from leaving school. Attributes lacking significant associations with examination performance include candidate's work experience, age and completion of an audit course. In a similar fashion to the undergraduate studies, as the model R^2 was reported for the developmental group and no validity exercise had been undertaken, the ability of the model to accurately predict another data set may be overstated.

Another American study conducted by Siegal et al (1994) investigated the factors affecting performance of both Certified Management Accountants' (CMAs') and other accountants working in industry. They determined performance by supervisors' annual evaluations and the average time between promotions. As it has been found that academic achievement has a more significant effect on the performance of employees in the earlier stages of their career (Ferris, 1982; Agrawal and Siegel,1989), they divided the responses into three categories: employees at the lowest level, middle level and highest level. It was found that there were more persons with a master's degree in higher positions (68%) as opposed to those in lower positions (30%). Significant differences were also found in the low group for the average promotion period of employees with a bachelor's degree (22.6 months) and those with a master's degree (17.5). The results suggest therefore that accountants with master's level education tend to occupy higher level positions in large industrial companies. Furthermore, employees with this educational background also make faster progress through the organisation by quicker promotion. Unfortunately there were no data available on the professional examination performance of these employees, as an interesting comparison could have been drawn.

Apparently, only one study has been completed in the UK on determinants of early career success of accountants, although another study is ongoing. Both studies were based in England and concentrated on the ICAEW system. Jane Harvey-Cook (1995) undertook a PhD at City University examining biographical indicators of accountancy trainee examination success and overall performance of accountant trainees, concentrating on the 'hard' items of biodata which are verifiable. Her work is incorporated in the Taffler et al paper (1995). The study was restricted to medium sized firms as it was argued that these firms have less resources available to devote to selection and may find the recruitment of high calibre staff more problematic than large firms. Using data drawn from applicant resumes, logit models were developed by stepwise procedures to differentiate between successful and unsuccessful trainees. The first model compared trainees who had passed the first two levels of examinations at the first attempt within two years with those who had failed or were referred in both examinations or who failed or were referred at the first level at the first attempt and then left the firm or did not then develop and pass PE1 by the end of the two year period. The second model compares those subjects which combine examination success as defined above with good practice work rating by their firms on the basis of their first six months and those who left their firm for other than uncontrollable reasons, i.e. the clear recruitment failures.

Table 2.5 details the first model and lists the component variables which were all significant at better than 0.05 .

Table 2.5 : Model for the prediction of examination success

Variable	ß	Wald Statistic**	Level of Significance	Exp ($ß_j$)
No. A grade "O" levels	0.37	21.62	0.0000	1.45
First class or II.1 degree*	1.19	13.50	0.0002	3.29
No. art/lang. "A" levels	-0.69	12.88	0.0003	0.50
BSc degree*	0.86	6.75	0.0094	2.36
Headboy/girl at school	1.87	5.64	0.0176	6.50
Private sector education*	0.82	5.25	0.0219	2.27
Constant	-1.64	17.32	0.000	

* denotes binary variable
** χ^2 distributed with 1 d.f. in each case

-2 log likelihood model χ^2 = 71.93
(For $\alpha = 0.01$ and 6 d.f. $\chi^2_{calc} = 18.55$)
Psuedo-R^2 = 0.638

Source: Taffler, Harvey-Cook and Williams (1995, p17/18)

The model results in an overall probability of correct classification of 74%, which differed significantly from chance classification of 51%, at a significance level of better than 0.01.

The second model is outlined in Table 2.6. Once again there are six component variables, all of which are significant at the 5% level.

Table 2.6: Model 2 for the prediction of overall performance

Variable	ß	Wald Statistic**	Level of Significance	Exp ($ß_j$)
No. maths and science "A" levels	0.61	14.81	0.000	1.84
Headboy/girl*	2.36	7.31	0.007	10.54
School social activities	0.43	5.55	0.019	1.53
GCC % exemption	2.53	5.30	0.021	12.51
First class or II.1 degree*	0.87	4.77	0.029	2.39
Size of social interaction groups at University	-0.47	4.03	0.045	0.63
Constant	-2.14	16.61	0.000	

* denotes binary variable
** χ^2 distributed with 1 d.f. in each case

-2 log likelihood model χ^2 = 44.08
(For $\alpha = 0.01$ and 6 d.f. $\chi^2_{calc} = 18.55$)
Psuedo-$R^2 = 0.889$

Source: Taffler, Harvey-Cook and Williams (1995, p19/20)

Once again the model demonstrates a commendable classification of 75%, which is significantly different at the 0.01 level from the predicted chance classification of 50%. Cross-validations were carried out on these models by Harvey-Cook (1995) with disappointing shrinkages. However, as the Harvey-Cook (1995) study is the most relevant to this thesis, a further discussion of these models will take place in Chapter 7 when the Harvey-Cook (1995) results will be compared to the models developed in this thesis.

Despite these shrinkages, Harvey-Cook (1995) proceeds to suggest that firms should calculate the logit scores for prospective trainees to assess the probability of success. If the firms were then to use the upper end of the scoring scales as decision aids, the intake of poorer students should be reduced and the uptake of better students increased. Unfortunately the biodata instruments derived in the models were specifically developed to predict candidate success in medium sized firms only, as opposed to the generality of the professional accountancy firms. The next step in the research must surely be to ascertain whether the models hold good for the larger firms where it is suggested by Harvey-Cook (1995) that firm specific models may perform better. The model was also developed on non-relevant graduates which in many respects invalidate the models for the recruiters of accountancy trainees progressing down the ICAS route, as the Scottish system continues to employ the vast majority of trainees from relevant accounting backgrounds. Harvey-Cook (1995) however does suggest that her model will also hold true for relevant accountancy graduates. In addition, as the models were restricted to only the early success in the trainee's career, examination failure at the final hurdle was not considered. Trainees who fail at this late stage in their training contract must also be considered 'bad investments' to the firm and should also be avoided at the selection stage. Ratings by the firms for the first six months could also be criticised for the short time-scale of work experience, as this may not necessarily be indicative of the future performance of trainees, particularly when they have progressed from a variety of degree backgrounds. There is also no control for any inconsistency between firms in respect of the work experience ratings. Finally, a question must be raised about the validity of the methodology used in the development of the models. The samples for development of the models were restricted to only those who either met the 'success' criterion or met the 'failure' criterion. The trainees who fell in between the two categories, around 50% of the original sample were excluded from the model building exercise.

Notwithstanding these criticisms, the models which were developed proved to be significant indicators of future examination success and overall performance as defined. Further research should be conducted within the chartered accountancy field to test the operational utility and inter-temporal predictive validity of the biodata models developed and to extend the work to the Scottish provision which is very different from that of England and Wales.

Professor Richard Wilson at Loughborough University is also currently undertaking a longitudinal study examining the early career success of accountants within one firm of chartered accountants in England. His definition of success is based on an internal ranking of the individual derived from the staff development programme within the organisation. The results from this study have yet to be published and comparisons of the findings will be of interest.

Each of these studies, which consider the 'success' of accountants however defined, highlight the importance of previous academic performance. However due to the limited information supplied on the various variables entered for the development of the ultimate model, it is difficult to draw particular conclusions. The Marcus Dunn and Hall study was mainly confined to the variables representing scholastic aptitude and knowledge specific to the examination, with only three variables supposedly addressing the issue of motivation, namely, the hours of self-study, completion of a review course and age. Whilst the models' goodness of fit values (R^2) were reasonable, large amounts of variation in examination scores still remain unexplained. By extending the scope of the background data, improvements could perhaps be made to increase the explanatory power of the regression models. In the Taffler et al study, the first model which is wholly concerned with examination success and failure is mainly composed of academic items that would support the studies cited above which considered the performance of students in undergraduate accountancy programmes. Of particular interest is the fact that these academic items reflect both school and University performance, suggesting that the most recent academic performance from University is insufficient as a predictor without the supplementary school performance. The second model which incorporates both measures of academic success and practice work performance included additional social involvement variables, suggesting that these may measure the practice work potential. However, assuming that promotion is based on successful work performance, the Siegal et al study suggests that persons with master's degrees are promoted quicker than those with bachelor degrees, which would indicate that scholastic performance continues to be significant in the later stages of an accountant's career.

2.5.2. Turnover and tenure of employment

Apparently there are few studies which have examined the tenure of employment of accountancy trainees after qualification which is surprising when the training costs of professional accounts is considered (as discussed in Chapter 1). However there are many studies which have examined whether biodata can be used effectively to predict the likelihood of staff turnover among new recruits and job applicants in other occupations. Indeed, many of the criterion validity studies on biodata mentioned above have considered tenure of employment as the predictive criterion. Stokes and Cooper (1994) provide a useful summary of validity coefficients for several categories of criteria based on data provided by Reilly and Chao (1982), Barge and Hough (1986), Hunter and Hunter (1984) and Schmitt, Gooding, Noe and Kirsch (1984). This summary is replicated in Table 2.7.

Table 2.7: Criterion categories

	Reilly & Chao (1982)		Barge & Hough (1986		Hunter & Hunter (1984)		Schmitt et al. (1984)	
	r_{xy}	*N*	r_{xy}	*N*	r_{xy}	*N*	r_{xy}	*N*
Training Success	.39	3	.25	18	.30	11		
Absenteeism and Turnover			.25	15			.21	28
Tenure	.32	13	.32	18	.26	23		
Proficiency ratings	.36	15	.32	26	.37	12	.32	29
Production data	.46	6	.31	10			.21	19
Substance abuse			.26	1				
Delinquency			.20	3				
Unfavourable discharge			.27	2				
Promotion					.26	17		
Achievement/grades							.23	9
Status change							.33	6
Wages	.34	7					.53	7

Source: Stokes and Cooper (1994) in Biodata Handbook, p312

The results of the table suggest that although biodata are particularly useful for predicting training success, proficiency ratings and wages, the technique is less useful for predicting absenteeism and turnover. However, although the validity coefficients may be lower for turnover than training success for example, the relevance of the validity is in comparison to other selection techniques adopted. As discussed above, Schmitt et al (1984) found that biodata were used to predict turnover more frequently than any other predictor and the mean validity (0.21) for these biodata turnover studies were better than the mean validity of other predictors such as general mental ability (0.14) for example. Stokes and Cooper (1994) suggest that the low coefficients for tenure validity may be due to the erroneous inclusion of absenteeism in the criterion of tenure and the fact that sophisticated measures of turnover are often not developed for validation studies. For example, Stokes, Hogan and Snell (1993) could not distinguish between voluntary and involuntary turnover in their tenure study.

Drakeley et al (1988) however specifically addressed this difference in their work on Royal Naval officers (discussed above), whereby they differentiated between voluntary (commitment-related withdrawal) and non-voluntary withdrawal (ability related withdrawal). They found that although the validity coefficient was small (0.24), biodata succeeded in predicting voluntary withdrawal from training. However it should be noted that the voluntary withdrawal WAB failed completely to predict the other criterion measures. Likewise, the other criterion WAB failed completely to predict voluntary turnover. This would suggest that, although biodata can provide an indicator of tenure of employment, some aspects of biodata are more relevant to the prediction of withdrawal than others. This raises a concern for the accountancy profession as, if the criterion of tenure and examination success can be demonstrated to be mutually exclusive, the firms will need to prioritise their requirements in the selection of successful accountants.

Gable et al (1989) also differentiated between voluntary and involuntary turnover. They examined the relationship of application form information to managerial trainee voluntary turnover. By collecting data from employment applications of all individuals entering the management training programme of a large, national retail shoe chain in the US over a two year period, the trainees were classified into either poor performers or high performers based on their 90 day performance review. In their analysis of voluntary turnover they found that whilst there was a significant relationship between the exploratory biographical variables and the high performers there was no significant relationship for low performers. They therefore suggest that information other than that presently ascertained on the application form might be accurate predictors of turnover among low performers and that further work should be conducted in this area. Unfortunately there is no information on the data supplied by the application form, and therefore it is difficult to assess the type of information that may be useful in predicting tenure of employment.

Stokes and Cooper (1994) however refer to two unpublished doctoral theses which have focused on factors that may influence turnover. The first of these was a longitudinal study undertaken by Palmer (1992) examining the tenure of US managers over a nine year period from 1980 to 1989. She found that it was possible to identify the early-exit managers, that is, those who had left within the nine year period at a better than chance rate. It was early adolescent experiences, measured at eighteen, that distinguished the two groups with early-exit managers having higher scores on Social Introversion and Social Desirability and lower scores on Intellectualism and Religious Activity than the long term managers. Measures taken in 1980 to reflect their early adulthood experiences of Job Satisfaction, Nonwork Satisfaction and Occupational Status were not found to differentiate between the two groups. The second study, also based in the US, was undertaken by Allison (1992) who compared individuals that had changed by moving from one of eight occupational groups to another with those who had remained in the same occupational group since leaving college. She found gender differences in that adolescent experiences predicted occupational discontinuity for women and that young adult life experiences (collected six to eight years after college graduation) were predictive for men. Both these studies highlight the importance of including biodata that reflect life experiences across different time periods of adult development in order to capture potentially useful information for predicting job tenure.

Another study conducted in the US was that of Breaugh and Dossett (1989) who examined both four biodata items and the unstructured employment interview to predict turnover in bank tellers in a medium sized bank. They found that prior job tenure, relevance of previous work experience and education level significantly predicted teller turnover. Unexpectedly, the fourth biodata item which examined whether the teller had a relative or friend at the bank did not have a significant correlation with turnover. Their results demonstrated therefore that carefully chosen biodata items were valid predictors of employees' turnover. Unsurprisingly, the interviewer ratings were not found to be associated with turnover, although it must be stressed that these ratings were simply an overall score for the teller and not a score specifically in relation to turnover. Whilst prior job tenure and relevance of previous work experience may not be appropriate for prospective trainees entering into ICAS training contracts as the majority of trainees will progress directly from University, this study does demonstrate that biodata items can be used to predict turnover, which the interview apparently does not.

2.5.3. Turnover in professional accountancy offices

Despite the accounting profession encountering high rates of turnover both in the UK (Gammie et al, 1996) and in the US (Rhode et al, 1976; Barkman et al, 1992), apparently very little research has been undertaken in this area, although several studies have examined why turnover occurs in professional accountancy firms, relating individual attitudes/perceptions such as job satisfaction, job involvement, organisational commitment and role stress to turnover intentions. Indeed, Rhode et al (1976) suggest that

> *'Aside from individual psychological traits, the environment of the work-place and the nature of the work tasks may also be contributory factors to professional staff turnover.'* (p733)

Dean et al (1988) suggest that accountants suffer from occupational reality shock (ORS) which may be described as the discrepancy between an individual's work expectations before joining an organisation with those perceptions after joining the organisation. They found that for the employees of a multinational accountancy firm, the extent of ORS, as measured one year after commencement of employment, does impact on the employee's organisational commitment attitudes and intentions and to a lesser extent behaviour. Wilson et al (1997) looking specifically at new recruits entering into training contracts suggest that ORS may relate to three areas of unmet expectations. The first relates to unmet expectations in relation to the occupation, the second in relation to the job within the context of a particular firm and the third to the specific job content. However Wilson et al (1997) go on to suggest that for those trainees who remain with their training provider for the first year of their training contract, the link between ORS and tenure may be considered more tenuous. As discussed in Chapter 1, this early drop-out problem is not really an issue with ICAS trainees and it is suggested that ORS is not such an issue where the majority of trainees have progressed from a relevant accountancy course at University.

Other studies have focused on unfavourable or, indeed, perceived unfavourable work environments as a function of professional accountants' turnover. Rhode et al (1977), for example, found in their study which utilised an exit interview approach that work and supervisory relationships together with a lack of communication were factors cited in the decision to leave. However the researchers do point out that some employees who were "let go" by their employer may simply be rationalising the firm's decision by blaming the firm for poor job support and they were unable to control for this. An article by Pearson (1977) published in the same year also focused on an unfavourable environment by listing eight management dysfunctional behavioural patterns that encouraged professional accountants' turnover. Knapp (1980) also identified numerous factors that affected turnover decisions. Alternative job prospects, long working days and management indifference to employees were found to be the most important.

There would appear however to be a paucity of theoretical models linking objective individual attributes, such as education level and age, and external factors such as organisation size, to objective individual performance variables such as time-to-turnover. In a response to this, Hunton and Wier (1996) have developed a framework which identifies three categories of independent variables, namely, individual attributes, environmental influences and organisational factors, although they do not discount the fact that other additional and intervening variables may influence the relationship between the independent variables and the time-to-turnover. The individual attributes were as follows: attained education level, gender and professional certification. Type of industry was recognised as the environmental influence and company size as the organisational factor. As this study was conducted in industry as opposed to the profession, the results may have limited generalisability. However any differences in the individual attributes would lead weight to the argument that background data factors could be used to predict tenure of employment. Significant main effects of education level and professional certification were indicated on time-to turnover probabilities, although interaction with other variables was evident, for example, both education by certification and education by gender. From a research perspective, Hunter and Wier (1996) suggest that these interactive effects highlight the unpredictable nature of individual, environmental and organisational factors on tenure of employment. These interactions would also suggest that separate biodata models should be developed for different sizes of training organisation.

Holland (1973) suggested that different types of people are attracted to certain occupations dependent on their type which will remain stable over time (further discussed in Holland's Vocational Preference Theory in Chapter 3). He suggested that accountants are conventional type people and are therefore conforming, conscientious, orderly, persistent, practical, and self-controlled. However he further theorised that accountants in industry would also display enterprising characteristics and would therefore be acquisitive, adventurous, ambitious, domineering, energetic and self-confident. In contrast, accountants who remained in the profession would be more investigative, displaying analytical, critical, intellectual, methodological, precise, unassuming and rational characteristics. This theory was tested by Aranya and Wheeler (1986) who found that accountants' personality types were mainly conventional and enterprising, although not investigative, and this was the case for both employees in public accounting firms and employees in industry and government. Aranya and Wheeler (1986) suggest that this unexpected result may stem from the fact that Holland may have misinterpreted the professional environment of accountants. They therefore suggest that the profiles of accountants who leave the profession to follow a career in industry are not substantially different in type to those who remain.

Mobley et al (1979) however suggest that an individual's personal characteristics will have an influence on work-related stress, job satisfaction and turnover intentions, which will ultimately determine turnover behaviour. This theory was supported by Rasch and Harrell (1990) who suggested that an accounting professional's personal characteristics do indeed affect the individual's turnover intentions either directly or through the two intervening variables of work-related stress and job satisfaction. Their results based on the data collected from 66 accounting professionals employed by a '"Big Eight" firm revealed that, regardless of gender, individuals with a strong influence orientation[3], high achievement orientation[4], and a Type A[5] personality profile may be predisposed to experience less work-related stress, greater job satisfaction and lower turnover intentions in the work environment of a large public accounting firm. This is not however the typical finding of Type A personality and stress, where other studies for example have demonstrated that a Type A personality is actually associated with high work-related stress (Chesney and Rosenman, 1980; Ivancevich et al, 1982).

[3] Individuals with relatively strong power needs and weaker affiliation needs.
[4] Individuals who react positively to work environments where they are positively responsible for accomplishing difficult but feasible goals and subsequently receive feedback information about their personal performance.
[5] Individuals who tend to be aggressive, competitive and possess a high degree of time urgency.

There have however been very few studies which have examined the characteristics of those trainees who remain with their training firm and those who change their employment. One of these studies was that conducted by Rhode et al (1976), who undertook a longitudinal study of graduate and undergraduate degree holders in accounting, covering their first five years of their public accounting careers in the US. Their findings revealed that there were several empirically derived configurations of biographical variables which were associated with turnover. College /University of final degree, father's occupation, father's education, religious preference, parent's annual income, College/University grade point average, number of extra-curricular activities and mother's occupation were all found to be meaningful predictors of staff retention or turnover. Whilst much of this information would be intrusive if requested on an application form, there is evidence to suggest that biographical details can be used to differentiate between trainees who remain with their training provider and with those who do not.

2.6 Summary

This chapter introduces the concept of biodata. Although controversy surrounds what actually constitutes a biodata item, the overriding defining criterion is that the item will be a historical reflection of a person's life history. These background items can then be combined to produce a score which can be used to predict some aspect of job performance. The chapter then discusses the long and interesting history surrounding the use of biodata highlighting that, for prediction purposes, biodata has been a feature of selection for almost a century, although very few organisations in the United Kingdom utilise the technique and there is a paucity of literature within a UK environment. The chapter then discusses the validity of the technique which demonstrates that there is little doubt that biodata is a valid predictor and compares favourably with many other kinds of test data in the assessment of job applicants and employees. It was also revealed that biodata can be used in a variety of settings to predict future performance on a variety of criteria. Researchers and practitioners therefore rarely question the ability of biodata forms to predict. However the subject of increasing debate is the relevance of biographical information about an individual as a predictor of future performance however defined. The next chapter will continue the review of literature by examining why biodata would appear to predict future job performance, incorporating the theoretical advances that have been made within the area. A discussion will then take place as to the most appropriate method of developing a biodata model for this particular research exercise. The problems associated with biodata will then be discussed with the implications for the empirical section of the thesis highlighted.

CHAPTER 3

REVIEW OF LITERATURE - THE PREDICTIVE QUALITY OF BIODATA, CRITICISMS OF THE TECHNIQUE AND IMPLICATIONS FOR DEVELOPMENT

3.1 Introduction

The previous chapter defined the concept of biodata, before outlining the history of biodata over the last century. The chapter concluded by examining the validity of biodata across a variety of criteria and settings. This chapter will continue the review of literature by examining the rationale for biodata's predictive quality, before highlighting the problems associated with the technique. This will then lead to a consideration of the implications of the literature for the empirical section of the thesis.

3.2 The rationale of biodata prediction

Most of the work on biodata conducted during the 1960's and 1970's focused on maximizing prediction, with little regard for the use of biodata in gaining an understanding of the antecedents of success and failure in various occupations. Therefore although the empirical approach of biodata frequently yielded significant results, it has often been the subject of attack. Establishing relationships based on purely empirical evidence often makes little sense to psychologists and biodata models frequently provided instances where the relationship between the criterion and predictor is far from obvious, for example attendance at a circus for successful door-to-door salesmen (Appel and Feinberg, 1969, as quoted by Gunter et al, 1993). It has been suggested that the combination of items resulting from typical empirical development procedures used in their creation are often meaningless (Baehr & Williams, 1968; Dunnette, 1962). Guion (1965) reported that

'*The procedure is raw empiricism in the extreme; the 'score' is the most heterogenous value imaginable, representing a highly complex and usually unravelled network of information.*' (p 382).

The empirical approach was also challenged by Mitchell and Klimoski (1982) for failing to advance any theoretical understanding of why biodata would predict the criterion of interest, although they concluded that empirical keying methods were appropriate for scoring biographical data where the objective of the exercise was to maximise the prediction of the job criterion.

3.2.1. The conceptual understanding

It is suggested by Stokes (1994) that the 'crossroads' of understanding may have come at a conference chaired by Henry (1966) whereby it was concluded that increased prediction using biodata might only be achieved by learning more about the causal relationships underlying items that are predictive. Although there were a few studies in this area that preceded this conference, attempts to tackle the issue of developing a conceptual understanding of biographical information have been common in the literature since the conference.

For example, Asher (1972) puts forward three theoretical explanations as to why 'B-items'(biographical items) seem to have accuracy in predicting specific work behaviour. The first of these is the non-fiction theory, which suggests that the scorable application blank is representative of an individual's history while other predictors, such as the unstructured interview, may simply be a caricature. The second theoretical explanation is the relevant item theory. This was based on the Lykken and Rose (1963) paper, which addressed the point that the validity of any test may be dampened because it will include both 'relevant' and 'irrelevant' items. As biodata has a predictor space that is homoscedastic, since only 'relevant' items are selected in the set which is used to predict the specific criterion behaviour in the cross-validation, this should improve the performance of the biodata model. The third theoretical explanation is the point-to-point theory, which suggests that biodata is successful as it does not attempt to make predictions by measuring general mediators such as intelligence, traits or aptitudes. Instead the accurate prediction is a function of a point-to-point correspondence between predictor space and the criterion space. The more points they have in common, the greater is the validity coefficient.

This point-to-point theory was based on the behavioural consistency model of Wernimont and Campbell (1968), who suggested that pre-employment behaviour samples obtained from either real or simulated situations should be consistent with relevant dimensions of job behaviour and would therefore be good predictors of job performance. This implies that if an individual has already successfully performed some of the behaviours required for future job performance as demonstrated by their biodata, then they should perform successfully in their new role. Whilst this theory could certainly explain the relationship for some 'hard' biodata items such as educational attainment at school and university acting as a behavioural example of professional examination success, this theory copes less well with 'soft' biodata items which could be viewed as signs rather than samples of behaviour.

With the increased focus on the acquisition of understanding of the patterns of life history which determine the predictive power of background data measures, the rational approach to biodata was developed, whereby a conceptual framework or theory guides instrument construction. Owens and his colleagues in the United States pioneered the early work in this area and his chapter on background data in the Handbook of Industrial and Organisational Psychology published in 1976, is often referred to as the original reference on the subject of biodata, (Strebler, 1990). Owens (1976) proposes that

> '*biodata be regarded as providing a post-mortem view of the development of the individual - an inverted pyramid of many recent and a few remote events the validity of which is limited chiefly by the insight of the author and by the memory and intention of the respondent.*' (p625)

He then goes on to suggest that if this view of biodata is adopted as a measure of prior experience, then it is possible to establish a functional relationship with the broader domain of measurement, thereby supporting one of the most basic measurement principles that the best predictor of what a man will do in the future is what he has done in the past.

3.2.2. The Development/Integrative model

Owens and his colleagues proceeded to extend this behavioural axiom to the notion that subsets of individuals who are identified as experiencing similar past behaviour would consequently follow similar paths across their lifestyle. Owens (1968, 1971) therefore used biodata to classify people into clusters and developed a theoretical framework for biodata with the Developmental/Integrative (DI) model. Underlying this model is the notion that

> '*some patterns (people) will be more similar than others and that they can therefore be subgrouped in the interest of achieving greater generality of predicted behaviours.*' (Owens & Schoenfeldt, 1979, p571)

Owens (1976) suggested that if different kinds of individuals encounter differing patterns of experiences as they develop, then, by identifying these experiential patterns, it should be possible to identify the sort of person that experiences these patterns. Therefore, dependant on one's nature, although people are influenced by their experiences, they will seek or avoid many experiences and situations on the basis of perceived compatability with their self perceptions.

The model is therefore developmental in that it emphasises previous life experiences that represent fundamental inputs at various stages in a person's development. It is integrative in that such experiences can be described not only in terms of their outcomes but also in terms of the values, traits and behaviours of the individual.

The work of Owens and Schoenfeldt (1979) may be viewed as an application of the DI model. Using rational and statistical procedures they derived a 389 item Autobiographical Inventory (AI), which was subsequently reduced to 275 due to computer limitations, from a pool of 2000 items representing significant aspects of life experiences in adolescence and childhood. The items reflected the contexts within which adolescents live, together with events outside the control of the individual and behavioural choices reflected in the activities selected by the individuals. The AI was administered to 1900 freshmen entering the University of Georgia, USA in 1968. These freshmen were also required to provide/complete a number of reference measures such as the high school grades, Strong Vocational Interest Blank and other measures of values, goals and neuroticism. The responses to the AI were factor analysed and the subsequent factor profiles were used to form subgroups with similar patterns of prior experience, which yielded 23 male and 15 female subgroups. These analyses led directly to the development of an 118 item short form Biographical Questionnaire (BQ) which comprised of the highest loading items from the original AI. This short form was subsequently used with further samples of undergraduates in the orientation programmes of 1970- 1974 to assign membership to the relevant subgroups. It was found that the subgroup structure was stable, with only a small loss of fit, and 73% of persons were assignable to a subgroup in 1968, reducing to 65% in 1973. This led Owens and Schoenfeldt (1979) to state that

> '*the stability and generality of the subgroup structure appear to be substantial, and whatever instability is present will tend to cause only conservative errors.*' (p578)

The 44 subsequent field studies reported on by Owens and Schoenfeldt (1976), which evaluated the integrity or cohesiveness of subset behaviours, found that more than 80% of the studies were successful in demonstrating differential subgroup performance. The Owens and Schoenfeldt paper therefore demonstrated that it was possible to identify subgroups of individuals with similar past histories who behaved differently in a large number of outside studies and this provided the focus for subsequent research.

3.2.3. Holland's vocational preference theory

On a similar theme, Holland (1976) in his vocational preference theory assumed that vocational interests, vocational choices and characteristics of people in related occupations are manifestations of a common personal disposition or construct. He therefore suggested that prior experiences shape the way in which individuals approach decisions about their future and that members of a particular vocation will have similar histories of personal development.

> '*Vocational choice is assumed to be the result of a person's type, or patterning of types and the environment.*' (p533)

Citing previous work published in 1959, 1966 and 1973, he suggested that people can be characterised by their degree of similarity to one or more of six vocational types and that membership of these groups is derived from an interaction of a variety of personal and cultural forces. His six category typology was identified as; realistic, investigative, social, conventional, enterprising and artistic, and for each type a theoretical formulation is offered to explain the vocational preference and other behaviour. In summary, Holland's theory posits that individuals seek an occupational environment that corresponds to their strongest personality orientation. According to this theory, the accounting stereotype is an individual case of the Conventional type which characterises the secretarial-managerial professional environment. This environment will include occupations that encompass a range of simply understood, passive execution of tasks and secretarial activities dealing with computations such as those of auditors and tax practitioners. Aranya et al (1978) attempted to trace the stereotype accountant in the framework of Holland's theory by comparing accountancy students with psychology students. By examining vocational interests, as well as inclinations towards conformity and adherence to socially accepted values, they found that there was a match between the accounting stereotype and the Conventional type as identified by Holland.

Eberhardt and Muchinsky (1982) integrated both these paradigms into their study of 437 female and 379 male college students, using Owens' Biographical Questionnaire (BQ[1]) and Holland's Vocational Preference Inventory (VPI[2]). The VPI requires a respondent to read a list of occupational titles and indicate a preference for each. The students were classified into one of the six vocational types as identified above in the Holland study and they found that significantly different life history experiences differentiated the lives of the six vocational types. Up to 35% of the variance in the subjects' vocational interests could be explained by their life history experiences.

A related longitudinal study was conducted by Neiner and Owens (1982), who examined the relationship between responses to Owens' BQ and job choice six years later. They administered the BQ to 531 female and 464 male freshmen to calculate factor scores which were used as predictor variables. Their job choices identified

[1] The BQ administered was the final version questionnaire which comprised the 118 items as outlined in the discussion on the Owens and Schoenfeldt (1979) paper.
[2] The vocational preference inventory is a personality inventory composed entirely of occupational titles, which is completed by the person indicating the occupations which he or she liked or dislikes. There is evidence that this is useful for assessing vocational preferences.

during their first three to four postcollege years were coded according to Holland's vocational classification scheme and used as categorical variables. The results showed that Owen's BQ factor scores were able to explain 24% of the variance in vocational choices for males and 20% for females, therefore supporting the hypothesis that biographical information regarding precollege life experiences is empirically related to post-college job choice. Although these results were relatively weaker than those of Eberhardt and Muchinsky (1982), Neiner and Owens suggest that this is at least partially attributable to the different criterion measures used in the two studies. Eberhardt and Muchinsky inferred membership of Holland's job groups by responses to the VPI whereas the Neiner and Owens study used actual job entry. The findings of Neiner and Owens do however appear to lend some further support to the primary axiom of the DI model of Owens that past behaviour is a useful predictor of future behaviour.

However the Neiner and Owens (1982) study was criticised by Davis (1984) for not addressing the second major axiom of the DI model which suggests that individuals who have behaved similarly in the past will continue to behave similarly in the future. His study therefore focused on this aspect of the model. He examined the differential validity of 20 male and 14 female biographical subgroups in terms of 12 factor analyzed dimensions of postcollege experience. His results indicated that some of the biodata subgroups, which were formed on the basis of similar early life experiences, continue to exhibit significant similarity with respect to postcollege experiences as measured seven year later. However he found that the homogeneous subgroups exhibit declining similarity over time. In other words the biodata groups from Owens' model displayed larger within-group variation and smaller between-group variation on variables measured at successive points in time. These findings question the stability of biodata over time and this will be considered later in the section on criticisms of biodata.

Another study which concentrated on tracking subgroups of individuals with similar past histories across time into their college and postcollege years was conducted by Eberhardt and Muchinsky (1984). They factored life history items, generated from Owen's BQ to predict the membership of over 800 male and females to one of Holland's vocational types. They found that the congruence between actual and predicted group membership of 40.4% for males and 51.8% for females far exceeded chance expectation. However it cannot be ignored that the results differed markedly depending on vocational type. An extremely poor congruence was shown between all the predicted 'conventional' subjects and the predicted 'enterprising' female subjects. The conventional type for both men and women, which according to Aranya et al (1978) would house members of the accountancy profession, was the least predictable from biodata information, which led Eberhardt and Muchinsky (1984) to state that this group of people

> '*have no outstanding characteristics that would lead them to be other than "conventional" individuals'* (p180)

Although the findings of Eberhardt and Munchinsky (1982, 1984) and Neiner and Owens (1982) are noteworthy, the question of whether these empirical findings yield theoretical insight still arises. Indeed, Osipow (1973), in a comprehensive review of earlier research surrounding Holland's theory, concluded that although the tests of the theory indicate its validity in broad outline, it is seriously limited in that it explains little about the process of personality development and its role in vocational selection. Neiner and Owens (1985) however responded to this criticism and, in an effort to transcend the empirical findings of their work, attempted to make psychological interpretations of the canonical discriminant functions, before examining their compatability with Holland's theory. They found that where interpretations could be made they supported Holland's theory that individuals seek an occupational environment which corresponds to their strongest personality orientation. The findings of their study however also suggested an alternative explanation for the biodata-job choice relationship. They suggested that life experiences also provide opportunities for skill and ability development, for example, it is likely that an individual who has struggled at school will have low expectations of either being successful or accepted for an academic position. They state that

> '*Intellectual and social activities during youth and adolescence can be viewed as both skill and ability-building exercises, as well as manifestations of personality orientations. Biodata probably represents both perspectives.*' (p133)

These studies which suggest that persons who enter particular occupations or careers share common life experiences are referred to as the *career* method by Schneider and Schneider (1994). These studies are of particular relevance, when tenure of employment after completion of the training contract is considered, as they address the prediction by identifying the similarity of persons in terms of their life history experiences after they have actually chosen the career they wish to pursue. Schneider (1987) proposes an attraction-selection-attrition (ASA) model whereby people are attracted to, selected by, and remain with organisations that are in keeping with their own attributes. He therefore predicts that people within an organisation will be very similar to each other as, if this similarity is not displayed, then people will leave, thereby increasing the homogeneity of the persons in the setting. This supports the work of Holland (1973) who argued that people with personality types that are incongruent with their vocational environment will leave their job or occupation to seek an environment which is congruent with their personality type.

An interesting study which focused on biodata and vocational stability was that of Rose and Elton (1982). They examined first year college students in the US over a four year period. The students completed a vocational interest inventory to assess their personality and identified their intended college major which would be undertaken four years later. This was interpreted as an indication of their vocational choice. These majors were classified into Holland's six vocational environment. Students' whose personality type were congruent with their intended college major tended to remain with this major after the four year period whereas students, who experienced incongruence with their major, tended to switch majors by the end of the four year period.

Schneider and Schneider (1994) suggest therefore that the implications for biodata and vocational choice are that vocations are composed of similar types of people and this is likely to be the result of two processes. The first is that people's life history experiences are likely to determine which type of vocation they are attracted to initially. The second is that the fit between the individual and the vocational characteristics are likely to determine whether individuals will remain in a particular vocation.

3.2.4. Super's Life-span Life-space theory

This notion is reminiscent of Super's (1980) Life-span Life-space theory, which considers not only occupational choice as in Holland above but also career development. He purports that an individual's career can be defined as the combination and sequence of 'roles' played in the 'theatre' of life. There are nine major life roles that can be played, which fall in broadly chronological order but which may be overlapping. The roles are: child; student; leisurelite; citizen; worker; spouse; homemaker; parent; and pensioner, and the relative importance of these roles will vary throughout an individual's lifetime. The principal 'theatres' are: the home, the community, the school (including college and university) and the workplace. Each role is typically played in one theatre but roles may impinge on each other by spilling into a secondary theatre and in this instance role conflict may exist. The roles are shaped primarily by the individual, who acts as a focus for personal and situational influences. The personal influences consist of their genetic pre-dispositions as modified by experiences and the environment whereas the situational influences consist of the geographical, social and economic context in which any individual functions. Therefore remote situational determinants will interact with recent personal determinants and success in early roles will act as a determinant for later roles. He suggests that non-occupational positions occupied before the commencement of the adult career will influence both the adult position occupied and the way in which their role expectations are met, stating

> '*Thus the amount and type of schooling is one determinant of occupation entered, and the first occupational position, both its type and job performance, is one determinant of later occupational positions open to the individual....The more adequately, in self-perception and in that of others, the adolescent plays preoccupational roles, especially those of student and of part-time worker, the more likely are success and satisfaction in occupational roles*' (p 286)

Super therefore provides some explanation of the changing validity of different aspects of biodata as the importance of various variables, such as pastimes, interests, school performance, will fluctuate according to the level of individual development as recent experiences supercede earlier ones. This may pose a problem for the accountancy profession who will wish to identify, at the recruitment and selection stage, those students who are likely to remain with their training provider post qualification, as many of the life experiences will take place during the training contract and this information may supercede or indeed invalidate information on a person's background that existed at the time of selection.

3.2.5 The ecology model

The implication of these intervening life experiences was considered by Stokes, Mumford and Owens (1989). They followed individuals over the longest period of time, from their adolescent subgroups to their adulthood subgroups, measured six to eight years after college graduation. They found considerable evidence for the predictiveness of biodata membership, with the majority of both the female and male adolescent subgroups following significant pathways into the adulthood groups. However discontinuity was evident for members of other subgroups and the evidence suggested that intervening life experiences led to this discontinuity. It was therefore necessary to address how individuals would go about constructing a coherent pattern of behaviour and experiences that maintained itself over time despite marked changes in developmental tasks, situational demands, and potential opportunities. This led Mumford and Owens (1984) and Mumford, Stokes and Owens (1990) to propose a theoretical framework to which they have referred as the ecology model.

The model suggests that individual development proceeds as a result of the continuous interchange between individuals and the environment in which they exist. Individuals will bring to any situations their past which will include their intellectual, personality and social resources. These resources will have been formed on the basis of their heredity and early environment and will have been continuously influenced by interactions and experiences throughout their lives. Throughout an individual's life, choices will be made about activities and the choice will seek to maximise the likelihood of achieving long term success in terms of adaption to the environment. This choice behaviour will result in a process of channelled differential development whereby differential characteristics initially emerge and then are maintained. Subsequent activity selections with their related outcomes will lead to a further refinement of the individual's characteristics. Over time, individuals create an interpretable development trajectory which can be predicted.

Stokes and Reddy (1992) comment on the value of the ecology model when they state that

> '*it provides a framework for the development of biodata forms in the future which are not only predictive, but are more theory based. Because biodata forms describe individual characteristics and experiences, they offer a vehicle for understanding factors which lead to criterion performance more readily than other selection devices.*' (p294)

The development of biodata forms should therefore take place within the broad conceptual framework in which causal influences and development markers are systematically specified as advocated by Mumford and Stokes (1992). In their review of some of the advances in item and scale development, Stokes and Reddy (1992) found that there was an increasing focus on a more sophisticated conceptual framework by the biodata researchers. They found that

> '*what is most important is the systematic development of items in relation to the attributes required for adequate performance. Such careful item development procedures provide the evidence needed for content and construct validity, and they enhance the meaningfulness of biodata measures.*' (p298)

By using rational scaling procedures and subgrouping, the opportunity is afforded to step beyond the prediction plateau reached some years ago with biodata inventories.

Despite these studies however, there is still little evidence to yield great insight into how particular development experiences influence behaviour, although the criticism of 'shotgun empircism' can hardly be levelled at the work conducted over the past two decades. Empirical research continues however to be conducted, with researchers performing atheoretical multivariate analysis on their data. The rational researchers, on the other hand, concern themselves more with theory and meaning and attempt to make sense of their data at every stage of their analysis. Generally, however, advocates of biodata are not extremists and many of them try to interpret their findings whilst continuing to rely on the statistical results for their predictions. The implications of these theoretical developments will be considered later in the chapter.

However, despite the acceptance of the predictive validity as discussed in Chapter 2, at least when the biodata forms are initially developed and the more theoretical insights which have been suggested for the success of the technique, biodata would still appear to be underutilised, particularly in the United Kingdom (Robertson and Makin, 1986; Shackleton and Newell, 1991, IRS Survey, 1997). Critics and reviewers of biodata have tended towards fairly similar objections and it is necessary therefore to discuss these criticisms before examining the implications of the literature for the development of a biodata model suitable as a selection device for the accountancy profession.

3.3. Criticisms of the technique

The raw, naked empiricism of the technique is often regarded at the main objection to biodata, as discussed earlier in the chapter. Another objection is the lack of generalizability as discussed in Chapter 2 on different criteria predicted by biodata. Three other major objections commonly cited by researchers are stability over time, fakeability and the accuracy problem and finally the fairness and legality of the technique. Each will be dealt with in turn. In addition, two other problems associated with the technique will be highlighted, namely, the time-consuming nature of the development of any biodata key and the need for a sufficient data set on which to develop the key.

3.3.1 Stability over time

Concern is frequently expressed that biodata forms may not be stable, which will ultimately question the reliability of the predictive stability. This is expressed by Gunter et al (1993) who question whether weighted items or scoring keys, developed at one point in time, are going successfully to predict aspects of job-related behaviour at some later time?

Some of the early studies have provided mixed evidence on the stability over time issue. Buel (1964) found that 13 out of an original 16 valid items retained their predictive efficiency, whereas Hughes et al (1956) found that a scoring key developed in 1951 was no longer differentiating to a significant degree in 1954. Wernimont (1962) noted that the validity of a WAB developed to predict turnover of women office staff shrank significantly over a five year period and, using a similar key, Roach (1971) found that shrinkage occurred over a two year period with validity falling from 0.46 to a mere 0.29. Brown (1978) on the other hand, investigating the long-term validity over a 38 year period of a personal history item scoring key applied to life assurance agents, found that very little validity was lost.

Studies examining the stability issue, which adopt the test-retest method[3], have reported very high reliability coefficients, generally in the region of the 0.80's to the 90's over long periods of time (Mumford and Stokes, 1992). However when retest

[3] whereby the researcher tests the respondents once and then retests the same respondents some years later using identical questions.

reliabilities are investigated at the item level as opposed to the reliability of the total score, the coefficients have been found to be considerably lower. Shaffer et al (1986) examined stability of responses to a biodata form over a five-year period by retesting a random sample of individuals who completed Owens' BQ as used in the Owens and Schoenfeld study. They found that the average test-retest correlations of the 1977 and 1982 factor scores were encouraging, with a score of 0.78 for males and 0.76 for females. However, the most stable factors were clearly those rated as objective, with the least stable male factor being the subjective social desirability factor with a correlation of 0.49, and the least female factor being the moderately subjective factor of cultural-literary with a correlation of 0.50.

Some of the research previously discussed in the Development/Integrative Model section may also serve to underlie the concern over stability. For example, the factors in 1968, upon which Owen's original questionnaire were based, differed for men and women. The Owens and Schoenfeldt study published in 1979 reported refactoring and the discovery that the initial factors as identified by Owens in 1968 were almost precisely duplicated. This suggests that there was stability over time, although they acknowledged that, as individuals within biodata subgroups are exposed to a variety of new situations and environments, their experiential paths will diverge and some subgroups may be expected to split. This would necessitate revisions of the classification of biographical types into the new menu of subgroups. Eberhardt and Muchinsky in their work published in 1982, however, investigated the factor structure stability of Owens' BQ and found only partial congruence in their replication. While the factor structure was consistent for males, it was not entirely the same for females.

Several previously observed factors failed to emerge and the suggestion made by Eberhardt and Muchinsky (1982) is that females' life experiences are changing and that this will affect the factor structure.

Another study previously discussed was that of Neiner and Owens (1982) which was apparently the first attempt to investigate the validity of biodata over a long period (7 years). Although the study was ostensibly an analysis in prediction, it can be argued that when measures are taken on the same individuals at two or more points in time, it may seem more appropriate to regard the study as one of stability rather than prediction. Although there were two different biodata instruments used, which were developed independently of each other, the Biographical Questionnaire (BQ) being administered in 1968, and a Post College Experience Inventory (PCEI) administered in 1975, the results of the study are helpful in identifying the relationships between nominally differing biodata variables over time. Their findings indicated that biodata collected from female and male college freshmen via the BQ accounted for 17% and 12% respectively of the variance in independently derived biodata collected via the PCEI, from the same subjects 7 years later. Although these findings are modest, Neiner and Owens (1982) suggest that their work provides further evidence that relevant biodata on individuals may reveal unique patterns of past behaviour that significantly relate to future behaviour. They do recognise however that the PCEI is not simply reassessing the same traits measured 7 years earlier by the BQ but is identifying new, independently derived factors of life experience. A related longitudinal study examining the differential validity of biographical subgroups of male and female college graduates conducted by Davis (1984) found that significant and multivariate differences were found between the biodata subgroups, although the differences were not large or extensive. In connection with stability over time, Davis (1984) concludes that

> '*The study indicates a need to revise the classification of individuals into new biographical subgroups as new experiences impact to change the interests, values, attitudes, and perceptions of subgroup members.*' (p12).

Super's Life-span Life-space theory and the Ecology model, as discussed earlier in the Chapter, also suggested that there would appear to be a limited life expectancy for some biodata variables as individuals are refined by their interactions with an ever changing environment and elements of past experience may diminish in influence in light of more recent experiences.

The problem of stability is therefore a matter of concern when using biographical data for prediction purposes. The extent to which a biographical item is stable over time would appear to be dependent on whether the item is objective and verifiable or subjective and hence more difficult to verify. Objective items based on actual events such as examination performance for example are less likely to be distorted than say subjective items which may deal with feelings and perceptions at a given point in time. However, it is suggested by Mumford and Owens (1984) that even where background items have stable predictive implications, if an empirical approach is used, the efficiency of the model may shift over time. They propose that biodata instruments derived through empirical procedures require periodic updating. This leads Gunter et al (1993) to conclude

> '*In general, the evidence suggests that the 'shelf-life' of biodata is between three and five years.*' (p59)

Harvey-Cook (1995) however points out that, in situations where predictive models have been developed from objective biodata and are focused on time-specific criteria such as chartered accountancy training success, the model should not lose validity over time, provided that the relevance of the criteria remains unchanged.

The stability problem is not however restricted to the biodata form. Ultimately, the usefulness of an empirically keyed biodata inventory will be assessed on the resulting model's ability to predict criterion performance within independent samples drawn from the reference group of interest, which in this case is trainee chartered accountants (Hogan, 1994). The predictive power of a biodata model depends therefore, not only on a well defined criterion, but also on the definition of the validation sample or reference group, (Mumford and Stokes, 1992). If a reference group does not comprise a reasonably well-defined and homogeneous group of individuals, Mumford and Owens (1987) suggest that extreme variation within this group will make it difficult to produce the significant group differences required in the empirical keying effort. In light of the importance of the reference group for the development of the model, the stability of the reference group must also warrant consideration. Shifts in the nature of the reference group may occur over time which will render the key to be increasingly less effective (Thayer, 1977). The studies of Kirkpatrick (1968), Brown (1978) and more recently Rothstein et al (1990) however suggested that well-developed items which are not especially vulnerable to changing cultural differences, may retain their validity over some time. The implications of lack of stability within the reference group will be further discussed in the Phase I Study in Chapter 5.

Compounding any changes in the reference group are also organisational and extraorganisational changes, which have to be reviewed periodically, as movements in these areas may also impact on the validity of empirical keys across time.

3.3.2. Fakeability and the accuracy problem

Obviously the extent to which responses are accurate or consistent to a biographical questionnaire could affect the utility and validity of any biodata study. Shaffer et al (1986) note that individuals in industry express particular concern about the impact of faking on biodata responses in an employment setting. A potential disadvantage of biodata is that the process may be susceptible to faking, which raises three questions:

> *'(a) Does faking occur in operational settings; (b) If faking occurs, can it be mitigated? and (c) To what extent does faking attenuate validity?'* (Kluger and Colella, 1993, p763-764)

However faking is only one of several problems which can influence the accuracy of biodata responses and errors in memory, carelessness and response bias may also affect the results. It must be stressed that any discrepancies are not the sole domain of biodata but are shared by a wide variety of noncognitive measures which can be used for selection or other purposes within an organisation.

Researchers, examining the fakeability of biodata, have generally tended to adopt one of two methodologies. The first of these asks respondents to answer a biographical questionnaire twice; once, honestly, and then to complete the questionnaire again with the remit of promoting a particular desirable type, although not necessarily in that order. The second methodology involves checking the accuracy and validity of the respondents' biodata responses against the corroborative evidence of independent judges who are in a position to verify the information provided, which shall be referred to as the verification method. Lautenschlager (1994) provides an extensive view of the literature on biodata, focusing on the topics of response distortion, faking and the accuracy of responses to biodata questions. He identified twelve published articles spanning the period from 1950 to 1990, which he summarizes in a table reproduced below.

Table 3.1 Characteristics of studies examining response to distortion to biographical questionnaire items

Study	Subjects/Job Type	Situation	Focus	Measure of Distortion
Keating et al. (1950)	Unemployed workers (79) female, (157 male)	Job counselling	Verifiable items (3)	Correlation and percent agreement
Mosel & Cozan (1952)	Job applicants: sales and office (65 female, 61 male)	Selection	Verifiable items (3)	Correlation and percent agreement
Klein & Owens (1965)	Students (55) Recruiters (79)	Simulation with faking instructions	Empirical keys (2) (41 items)[a]	Transparency index: maximum possible score minus observed score
Goldstein (1971)	Job applicants: nurses aides (111)	Selection	Verifiable items (4)	Percent agreement
Doll (1971)	Aviation officer candidates (300)	Research purposes	Mixed item types (200 items)	Changes in item option endorsement
Cohen & Lefkowitz (1974)	Job applicants: clerical, sales, supervisory (118)	Simulation with faking instructions	Mixed item types (80 items)	Item discrimination for MMPI K-scale groups
Casio (1975)	Incumbent police officers (8 female, 104 male)	Simulation with faking instructions	Verifiable items (17)	Correlation and percent agreement
Cascio & Osburn (1977)	College students (57 female, 91 male)	Selection	Empirical keys (2) (57 items)	Mean differences between fake and honest scores
Thornton & Gierasch (1980)	College students (94 male)	Research purposes	Empirical keys (10) (no. items specified)	Mean differences between fake and honest scores
Pannone (1984)	Job applicants: electricians (221)	Research purposes	One "fake" (verifiable) item	Between-group differences for falsifiers vs. nonfalsifiers on means and correlations
Shaffer et al. (1986)	College students (113 female, 124 male)	Simulation with faking instructions	Mixed item types (118) Component scores (13 for males, 14 for females)	Test-retest correlations and mean differences at five years
	Parent(s) as observer (53 female, 56 male)	Research purposes	Mixed item types (26 for males, 22 for females) Component scores (3)	Correlation of parent (as observer) with original student response and mean differences
Hough et al. (1990)	Faking study: enlisted military (245 male)	Selection-like context	Content and response validity scores (15;209 items)	Between-group mean differences
	Concurrent study: enlisted military (9,359; sex unspecified)		Content and validity response validity scores (15)	Moderation of criterion-related validities using response validity scale scores
	Applicant comparisons with above groups: Recent inductees (125; sex unspecified)		Content and response validity scores (15)	Between-group mean differences on scales

Note: Numbers in parentheses indicate sample size for "Subjects/Job Type" or number of items/keys/scores for "Focus". Where sample sizes are given without other information, the sex of subjects was not specified.

[a] Since each key had 22 items, and at least 3 were common to both, the total could not exceed 41 items.

Source: Lautenschlager (1994, p395-396)

There would appear to be inconsistent findings in respect of fakeability and accuracy. For the studies that used corroborative evidence, as a test of accuracy and fakeability, Keating et al (1950) and Mosel and Cozan (1952) found very high correlation coefficients between self reported information and previous employer data on the objective measures of weekly wages, duration of employment and job duties. The Cascio (1975) study lent further weight to this evidence, reporting that responses to verifiable items are unlikely to be distorted. The findings of Goldstein (1971) however, who also used the technique of verification of self-reports from previous employer's data, seriously questioned the reliability of biodata, with a substantial number of discrepancies found, most notably a 53% disagreement for both the size of previous salary and duration of previous employment. However, as these two items would have been measured on a continuum of response options and there was no information provided on the size of the difference that constituted a disagreement for these continuous items, it is difficult to judge the practical significance of these results. Another positive result for biodata was found by Shaffer et al (1986), although their external observers were the respondents' parents, which it can be argued are not the most perfect of observers. They hypothesised that objective items would be answered more honestly and found that objective items had the highest correlations with the 'independent' verification, followed by the moderately subjective and, lastly, the subjective items which recorded the lowest correlations.

For the studies that used the technique of simulation with faking, Klein and Owens (1965) found that college seniors were able to fake a life history questionnaire, although it was noted that the subjective key was more susceptible to faking than the objective key. This led Klein and Owens to conclude that subjective items which are by their very nature, nonverifiable, are probably not answered with the veracity classically attributed to verifiable responses on an application blank. Doll (1971) supported these findings, with results which showed that subjective and continuous items had the greatest propensity to be faked. Pannone (1984) however suggested that objective and hence potentially verifiable items are faked. He incorporated a dummy question relating to the use of a piece of equipment which was non-existent and found that one third of the applicants claimed to have used it! Excluding the score from this question, the total score from these applicants exceeded the scores from the applicants who did not claim to have used this fictional equipment. Although this study demonstrated that a considerable proportion of applicants responded fraudulently to an objective biodata item, the objectivity of the questionnaire is not clear cut. The questionnaire was based on items developed from job task statements and the response scale simply reflected the level of experience the respondent had with each task, which must surely be, in many respects, judgemental and therefore subjective.

Klein and Owens (1965) also suggested that selecting and/or weighting items in biographical inventories on the basis of their relationship to a subjective criterion may cause them to be relatively transparent. This was supported by Thornton and Gierasch (1980) who concluded that empirically derived keys may be no less susceptible to faking than measures developed for more general purposes. However Schrader and Osburn (1977) found that there was no evidence to suggest applicants instructed about a specific position would be more able to distort responses.

Mumford and Owens (1987) speculated that the inconsistent findings of the fakeability studies may be due to differences in item-keying strategies, although it is not often clear in many instances which type of keying procedure was actually used. Kluger et al (1991) therefore investigated the response biases in biodata scores on Socially Desirable Responding (SDR) derived from both option-keying (OK)[4] and item-keying (IK)[5] procedures. They found that keys developed under research conditions where subjects simulated responding as job applicants were susceptible to a lowered validity, which lead them to the conclusion that keys should be developed on applicant samples where the same motivational sets will be operating. They also found that IK scores were susceptible to inflation for SDR whereas the OK scores were not. Finally, they proposed that one way to control invalid SDR responses is to warn subjects that attempting to fake will offer them no advantage, which is an area further considered by Kluger and Colella (1993).

The first objective in the Kluger and Collela study was to provide empirical evidence for the existence of faking biodata tests in practice. The second objective was to experimentally determine in an operational setting whether warning subjects not to fake will affect their responses and, if the responses are affected, how are they affected. By randomly warning 214 of 429 applicants for a nurse's assistant position against faking, they found that the warning did indeed mitigate the propensity to fake, although the

[4] An option keying stategy analyses each response to the questionnaire item and the response will only contribute to the score if it correlates significantly with the criterion. An item with five Likert-scale points therefore might be keyed so that a 3 contributes +1, a 4 contributes -1, and the remaining responses, 1,2 and 5 contribute 0. This method offers the potential advantage of both capturing the linear and non-linear relationships between the item scale and the criterion.

[5] An item-keying stategy on the other hand assumes linear relationships between item scores and the criterion. Therefore a 5-point Likert-scale coded item which was postively correlated with the criterion, would contribute a 1 to the biodata score if the responses was coded 1, contribute a 2 for a score of 2 and so on (assuming unit item weights).

specific warning affects depended on how obvious the item was. For obvious items, the warning reduced the extremeness of item means and item variances. For items that were not transparent, however, the warning did not have an effect on item means and actually reduced item variances. It was also found that these faking effects were best predicted when the transparency of the items were operationalized in terms of item-specific job desirability in addition to the item-general social desirability as used in other studies. These results suggest that faking does occur in an operational setting but that, with a warning issued against faking, it can be mitigated. However as the estimates of faking in this study were obtained by comparing the responses of those who were warned, which assumed that they would then answer honestly, against those who were not warned, which assumed that they would fake, a true comparison is not being made unless the two assumptions hold.

It would therefore appear that verifiable items are less susceptible to distortion than those of a non-verifiable nature and that in an experimental setting biodata questionnaires can be faked. The next question to be addressed therefore is whether or not response distortion reduces or enhances validity. Once again there appears to be contradictory evidence. For example, Pannone (1984) suggested that validity was affected by faking whilst Hough et al (1990) found that distortion had very little effect on the concurrent validities for biodata scales. At the other extreme, Crosby (1990) demonstrated in her study that responses to a measure of social desirability were unrelated to a) most of the biodata score items and b) the total biodata score and that, as social desirability was a significant predictor of her criterion measure, this increased the validity beyond that obtained from the biodata key alone for the males in her sample. Kluger and Collela (1993) suggest that these conflicting views may be due to the fact that the Hough et al (1990) study and the Crosby (1990) studies only employed Social Desirability as a measure of faking when in fact Job Desirability could be superior in predicting bias responses.

Stokes et al (1993) also examined the influence of SDR on validity estimation of biodata scoring keys developed through both predictive (applicant) and concurrent (incumbent) validation designs, focusing on impression management. Their first hypothesis was that applicants would show greater levels of SDR to a biodata inventory than the incumbents. The second hypothesis was concerned with the impact of SDR on the validity of the biodata forms; would SDR attenuate the validity of a biodata key derived in a validation study with applicants but not with incumbents?

In respect of the first hypothesis, statistically significant differences were found between the mean SDR scores for the applicants (43.58) and the incumbents (25.22). Differences varied however across item content areas and it was apparent that applicants chose socially desirable extremes more frequently than incumbents in some categories more than others. For example items relating to working climate, work style and preferences, personal and social adjustment and school achievement and interests had marked discrepancies. Items such as previous work experience and training, extracurricular activities at school, career development and economic influences revealed minimal differences. Of particular interest to this thesis is the fact that, in the school achievement and interest category, all the items which displayed a significant discrepancy related to interests in particular school subjects, which is subjective, as opposed to achievement records in high school which are verifiable.

In respect of the second hypothesis, tenure of employment was used as the criterion measure. The most important finding was the lack of overlap between biodata keys developed in the incumbent and applicant samples. Irrespective of whether IK or OK procedures were used (Kluger et al, 1991), 20% or fewer of the items that were valid in the incumbent sample were valid in the applicant sample. Using regression procedures to select those items which provided unique predictive power, it was found that the final keys shared no commonly scored items. The cross-validity of the incumbent key in the applicant sample was 0.08 for the IK procedure and 0.09 for the OK procedure. These results call into question the common practice of developing biodata keys on incumbents and assuming their generalizability to applicant samples. However it is not feasible to abandon biodata form development on incumbent samples, although it must be recognised that developing a key that will generalize from incumbent to applicant samples may require considerable effort and it will therefore be essential that incumbent samples are as closely matched to applicant samples as possible.

There is evidence therefore that objective biodata items are less susceptible to distortion than items which are more subjective. There is also evidence to suggest that direct warnings of possible response verification may reduce intentional distortion. Lautenschlager (1994) lends further weight to this conclusion by citing some unpublished studies in military testing situations that support this hypothesis. However it would seem clear that when candidates are instructed to do so, they are capable of distorting their responses so as either to increase or decrease their scores as requested. However, as Kluger and Colella (1993) identify, the majority of this past research has been subject to external and /or internal validity threats. The research has typically been undertaken in laboratory settings, or in non-operational settings, or with nonequivalent group comparisons of an operational setting to a non-operational setting. There is therefore the possibility that applicants will fake their responses in an non-operational setting but would not fake in actual practice, thereby overestimating the degree of actual faking. Indeed Lautenschlager (1994) states

> '*It may well be that the concern over distortion of biodata responses is much ado about next to nothing.*' (p414)

Arising from this research literature review are the obvious issues for practice. Drakeley (1989) and Lautenschlager (1994) make some recommendations for the use of biodata forms in organisations in an effort to minimise response distortion. For example, Drakeley (1989) suggests that where possible historical and verifiable biodata should be used and both authors suggest that the instructions issued for the completion of the biodata form should include a warning that response verification will take place.

To conclude this section regarding the fakeability problem, the absolute truthfulness of responses given to biographical data items is still not known precisely and Lautenschlager (1994) suggests that it reasonable to question whether such knowledge is obtainable or even necessary.

3.3.3. Fairness and legality of the technique

If biodata items such as sex, race, religion etc are identified to be major biographical determinates, there would be a temptation to select particular groups of people and reject others. This may be contrary to the law pertaining in the particular country in which the instrument is being used and the inclusion of such questions may be challenged in the Courts if they are included in inventories for the purpose of personnel selection. Furnham (1997) suggests that items such as age, sex and marital status may be challenged by the courts if these were items included in a biodata inventory which was used for personnel selection.

As discussed in Chapter 2, although biodata would appear to be used in the United States of America, it is not commonly used in the United Kingdom. It is not surprising therefore that nearly all the research on the fairness and legality of biodata has also been conducted in the United States and hence concentrates on the regulatory web of state and local laws, regulations and guidelines which apply in that country. For a review see Sharf (1994). Many studies will however have implications for the use of biodata in the United Kingdom where the Commission for Racial Equality and the Equal Opportunities Commission monitor the employment practices of recruiters in the UK to ensure there is no discrimination on the grounds of race and sex.

As many personal history or background experiences are related to gender, race and age, the question is raised as to whether biodata unfairly discriminates against protected groups. With the increasingly stringent governmental requirements in the

United States, Baehr et al (1994) suggest that many organizations have ceased to use biodata in the selection process in order to avoid possible litigation. Indeed, if WAB/biodata items are linked to race, religion, sex or age, and the biodata tool excludes these protected minorities or majorities disproportionately, giving rise to adverse impact, it would not be possible to use biodata in the selection process.

Owens (1976) argues however that due to the empirically derived nature of biodata models, only job-relevant items will be included and that the responses will be evaluated in terms of their relationship to subsequent job success and hence should not be challenged on the grounds of discrimination. Pace and Schoenfeldt (1977) point out however that the empirical process by which application blanks and other biodata forms are validated is both a strength and a weakness. It is a strength in the sense that criterion-keyed biodata predictors

> '*...usually demonstrate...validity, since they are in fact derived in a way to ensure it.*' (p162)

The weakness is derived from the fact that empirically based keying does not always produce a face valid predictor. They go on to stress that, in order to comply with equal opportunities legislation in the USA, all items in a biodata model should be demonstrably job-related.

The literature would not however appear to support that there is differential validity for members of different groups. Owens (1976), who cited various early studies, concluded in his section on validity that

> '*All in all, the available evidence would seem to suggest that the major dimensions of biodata response are quite stable across cultures, age, race, and sex groups and companies.*' (p623)

Reilly and Chao (1982) in their narrative review identified eleven studies which reported minority versus majority subgroup comparisons. Although the number of studies was limited, they put forward two tentative conclusions:

1. an adverse impact on minority groups may be expected where the criterion mean differences are large but, where the differences are small, the biodata predictor means will differ less
2. the validity and fairness of biodata can be expected to hold for both minority and majority groups, although different keys may be needed for males and females.

Treating men and women differently in the development of biodata keys suggests that the same life experiences have different effects on them, dependent on their sex (Wilkinson, 1997). The suggestion that biodata inventories do sometimes distinguish between male and females was suggested by Sands (1978) who found that biodata for US Navy recruits needed different predictors for male and female recruits and Nevo (1976) found that different predictors were needed to predict male and female promotion in the Israeli Army. Ritchie and Boehm (1977) however found conflicting evidence in their development of a biodata inventory for managers where equally good cross-validities were found for both men and women. A more recent study was that conducted by Rothstein et al (1990). Although the central hypothesis of their study was in connection with the intrinsic specificity of biodata to a particular organisation which is discussed in the section on validity, they also hypothesised about the generalisability of biodata validities across age, race, sex, education, experience and tenure. They therefore conducted separate meta-analyses to examine whether the validity of their derived single Supervisory Profile Record (SPR) key generalises across these variables. Their results provided evidence that biodata validities were not necessarily moderated by either sex, age, race, education, prior experience or tenure. Further conflicting evidence on gender is also apparent at the factor level as was discussed earlier in the stability section. Eberhardt and Muchinsky (1982) found that factor structures were not stable across gender, whereas Stokes et al (1987) examining sex differences in the same questionnaire found that the factors were very similar. Wilkinson (1997), in one of the rare studies conducted in the UK, suggests that in relation to vocational choice treating women differently from men is not defensible. He suggests that women's life history background differs from men on account of their different role expectations and opportunities as opposed to the effects of a specific experience. He therefore attempted to derive a common set of factors to describe the background's of the participants to test this alternative view. His results reveal that the factor structure for men and women is very similar, which leads him to conclude that

> *'Overall, the evidence presented here does not provide support for the view that the biodata determinants of vocational interests differ significantly between men and women.'* (p58)

The inconsistency of these findings should encourage researchers to at least check their own results to identify whether any sex differences do exist.

Complying with the legislation however may not in itself be sufficient to satisfy the critics on the grounds of fairness and any biodata questions must be viewed not only in the light of employment legislation compliance but also in the context of social acceptability. Biodata models may for example contain variables which appear to favour certain social groups and, whilst it is not illegal to discriminate on the grounds of social class, Gunter et al (1993) suggest that it is potentially risky for two reasons.

> *'1. On both sides of the Atlantic being non-white tends to mean being poor, so indices of class are often indices of race.*
>
> *2. An enterprising journalist or politician could make considerable capital attacking a selection process that looks both capriciously arbitrary, and blatantly biased in favour of middle-class applicants.'*
>
> (p 60-61)

Super's Life-span , Life-space approach (1980) (as discussed earlier in the Chapter), has been criticized by sociologists for placing insufficient evidence on the constraints imposed by an individual's background. Roberts (1981), for example, suggested that a person's social class will determine entry into particular types of organisations and he blames the organisations for this situation as they perpetuate class biases through the use of discriminatory selection procedures, such as preference given to independent schooling. Indeed, Harvey-Cook (1995) suggests that if a biodata model is developed from a sample which is biased towards certain social sectors, for example in the accountancy profession where there has in the past been little likelihood of low social class background employees, the model may be biased against those from the lower social classes. Drakeley (1988) argues that the apparent tendency by employers to select, albeit subconsciously, on the basis of background, reflects in reality the average academic attainments and aspirations of the different class groups. He cites the study by Kelsall et al (1972) which found that 'working class' students were more likely to aspire to teaching rather than the high status professions such as law and accountancy to which the 'middle class' students aspired. The Molinero (1984) study also revealed that children of professional parents are 30 times more likely to apply to university than are the children of unskilled manual workers. This position may escalate in light of the reduction of government funding for undergraduates and the advent of student loans and fees as those students whose parents are unable to contribute to their university costs may be deterred from taking up higher education.

Harvey-Cook (1995) also raises the point that students graduating from polytechnics, most of which have now been converted to 'new' universities, will also have a reduced likelihood of being selected for a profession such as chartered accountancy, as the degree from a new university is not commonly perceived to be equal to that of a traditional university. She suggests that if the new universities continue to exhibit differences in entry qualifications and quality of degree status, the professions will continue their arguably unfair recruitment practices. A biodata model however may counteract this issue whereby the type of university may not be relevant in the determination of accountancy success, and other variables may be more pertinent.

Drakeley (1988) attempts to integrate existing accounts within the context of the social opportunity structure by suggesting three classes of items; achievement, background and commitment. He argues that the sociological constraints work with the situational constraints, as identified by Super (1980) to shape aspirations and attitudes. He defines achievement data as those measures of educational achievement or awarded positions of responsibility, background data as items such as parent's occupation, number of siblings and type of school, with finally commitment data incorporating items such as membership of societies and leisure pursuits. He suggests that his threefold classification has implications for the use of biodata particularly if the effects of background are as pervasive as British sociologists suggest. He proposes that selection on the basis of background data may violate the spirit if not the letter of the equal opportunities legislation in the UK. He proceeds to stress however that it may be insufficient simply to exclude any obvious background items from a biodata inventory as achievements and commitments may depend on background factors. He therefore raises the hypothesis that background could moderate the relationship between achievement and performance and proposes that it may be necessary to develop methods of combining items that control for, or at least minimise the impact of, background. He found however that in his study of British Naval Officers no direct moderating effects were observed and there was no evidence to suggest that the relationships between measures of achievement and training performance was in any way different across levels of social status.

Despite this encouraging evidence, there remains an implication that items which perpetuate bias or prejudice, or are outside the control of the individual, should be excluded from the biodata inventory. However, the work of Holland, Owens and Super indicate that experience plays an important role in determining job choice and success and those with inappropriate previous experiences will not have such a good chance of success or achieve similar job satisfaction as those that do have the appropriate prior experience.

> '*Therefore while it is inevitable that sociological influences affect future behaviour and are beyond the control of the individual, there is a case for examining apparently contentious behaviovr for evidence of obvious unfairness, rather than dismissing it out of hand.*' (Harvey-Cook, 1995, p 54)

She goes onto suggest that if any 'damage' has been done by the applicant's past experience, it is unrealistic to expect employers to actively recruit candidates whose backgrounds will indicate that they will not be successful.

Sharf (1994) however, speaking from the litigious environment of the USA, cautions the developers of biodata to be cognizant both of the bludgeoning regulation and public attention devoted to test items. He concludes that personal history items included in biodata selection procedures will require both logical and empirical evidence in order to satisfy the emerging consensus of what constitutes generally accepted principles and practices of personnel psychology. He suggests that the challenges presented by the legal process should encourage psychologists to explain how biodata items contribute to the understanding of organisationally effective behaviour, which will afford the opportunity to pursue the goal of merit-based equality of employment.

Whilst the regulations regarding selection in the UK fall short of those in the US, developers and users of biodata in the UK should not simply concern themselves with compliance with the letter of the law and therefore with verifiable discrimination. They must also consider the increasing debate surrounding citizens' rights and privacy. Although not currently regulated by legislation, there remains a risk that some candidates may be offended by certain biodata questions which may affect their views of the organisation and hence its recruitment success. Robertson and Smith (1989) for example suggest that in terms of applicant reactions, biodata seems to be the least favoured of the three mainstream selection methods of biodata, situational interview and assessment centres. Furnham (1997) also indicates that graduate trainees in particular are very wary of biodata forms. He suggests that they dislike the multiple-choice format often found in biodata questionnaires and capable students may be deterred from applying to an organisation that adopts such a selection strategy. This is of particular relevance to the accounting profession where there is little to differentiate between firms of the same size. Indeed many applicants will apply to all the 'Big Six' firms or perhaps to all the medium sized firms that have an office in their preferred location. If one of these firms were to include potentially intrusive questions either at the application form stage, at a detailed biographical inventory stage, or even at an interview, this may have an adverse impact of the attitude of the candidate towards the firm. Ultimately this could lead to the rejection of an offer in favour of one from a firm which did not employ any intrusive questioning. Baehr et al (1994) however advocate that it is possible to replace items that originally utilised overly personal information with items that are clearly more job relevant in their content without losing either reliability or validity. Their challenge was to develop items that measured interest and success in financial management and demonstrated the assumption of responsibility without the use of either quantitative information such as present earnings or information about the structure or functioning of the personal family. Their analyses indicated both construct and criterion-related validity in respect of both salary and level of functioning. Whilst further work will be required to confirm these validities using larger samples and additional performance criterion measures, the results led Baehr et al (1994) to conclude

> *'By proactively modifying and upgrading biodata measures, companies and psychologists will continue to have the use of some of the most durable and valuable information available for human resource management decisions.'* (p353)

The critical issue however is whether an employer has a valid reason for favouring one type of candidate over another. Where biodata is based on statistically significant evidence, there is less scope for criticism than for say the selection interview where sex, race, physical characteristics, dress and social background may affect the interviewer judgement.

3.3.4 The time-consuming nature of the development of a biodata key

Although biodata keys should in an ideal world be developed on job applicants[6], this is a very time-consuming and expensive process which is not a practical alternative for many organisations. Indeed, Gunter et al, 1993, suggest that the approach often used in practice utilise incumbent details[7] for the development of the biodata model. However, if a different biodata model may be obtained where the reference group consists of job incumbents as opposed to job applicants, different kinds of reference groups may result in substantially different keys (Mumford and Owens, 1987; Hogan and Stokes, 1989; Stokes et al, 1993) and this is of grave concern to the biodata practitioner. There are two possible explanations for this. The first may be as a

[6] This type of approach is commonly referred to as the predictive approach whereby biodata information is collected from all job applicants prior to any hiring taking place. The selection decision is then taken on the basis of the existing selction criteria, for example the interview. After a period of time has elapsed, data is collected on the criterion, which in this case could either be ICAS examination performance or tenure of employment after completion of the training contract.

[7] This approach is often referred to as a concurrent design, whereby biodata are collected from existing employees and the criterion data is collected at the same time.

result of the motivational differences between job applicants and incumbents where the job applicants responded in a socially desirable manner as they want to obtain a job. The second reason for differences between job applicants and incumbents could be that of work experience where it is suggested by Hogan (1994) that the validity of concurrently derived keys may be a derivative of knowledge acquired from the relevant job experience. Rothstein et al (1990) however refuted this hypothesis by suggesting that increasing job experience does not produce increases in concurrent validities, which would be expected if the validity of a model stemmed largely from job experience. Notwithstanding this, where a biodata model is to be developed on job incumbents as opposed to job applicants, care must exercised over social desirability responding and job experience contamination.

3.3.5. Sufficient numbers within reference group

Another important consideration for empirical key modelling is the size of both the developmental group and the cross-validity group. It is necessary to ensure that samples are sufficiently adequate to differentiate performance on the particular criterion based on non-chance differences. This is one of the reasons that the use of biodata in practice tends to be restricted to large organisations as the sample of staff required for the development work needs to be sufficiently large to obtain valid results. Hogan (1994) suggests that where correlational and differential regression methods are used, sampling error[8] is a significant threat and large sample sizes are required to assure the stability of the empirical keys. Campbell (1974) suggested that multiple regression procedures should not be used on sample sizes of less than 150 with Mumford and Owens (1987) proposing that, as a rule of thumb for correlational analysis, between 200 and 400 individuals will be required in both the developmental and the cross-validation groups. Nunnally (1978) however argues that the sample size should be a derivative of the ratio of persons to predictors (either items or

[8] Statistics that tend to capitalise on chance factors operating within the selected sample.

response options) and should range from 5:1 to 10:1. He suggests that this is due to the fact that the opportunities to take advantage of chance are positively related to the number of predictors included in the analysis and negatively to the number of persons in the sample. The goal therefore should be to maximise the number of persons to predictors. Hogan (1994) therefore recommends that where background data measures exceed 100 or more predictors, developmental samples should comprise between 500 to 1,000 persons. This is demonstrated in practice by Harvey-Cook (1995), who identified 27 predictor variables and then proceeded to develop her model on 156 subjects, which is a ratio of 5.78:1.

Cross-validation is extremely important in relation to empirically keyed background data measures as the model which has been developed on the sample will to a certain extent capitalise on sample-specific factors operating within the sample, which may result in unrealistically high validity estimates. It is therefore the validity co-efficient derived from the cross-validation sample that should always be quoted. Despite the essential nature of cross-validation with empirical keys, recommendations regarding the appropriate sample sizes vary. England (1971) for example suggests that the validation group should be 33% larger than the cross-validation group, with Cascio (1982) recommending that there should be at least 125 individuals in each criterion group. Hogan (1994) also recommends that a second sample for cross-validation should ideally be of similar size. Differences were also found in published studies. Clark and Sweeney (1985), for example, developed their model to predict undergraduate accounting performance on 80 students before carrying out the validation exercise on 56 students from the subsequent year. Drakeley et al (1988) also utilised a larger developmental sample. They used 420 Royal Naval officers in their study to develop their models and this was subsequently cross-validated on 282 officers. Likewise Harvey-Cook (1995) developed her models on 229 1985/86 trainees, with her initial validation work being undertaken on 137, 1987 trainees. She however also undertook an additional validation exercise on 323 trainees from the years 1988 to 1990.

The critical issue, however, is that a cross-validation exercise is carried out and that it will be necessary to have sufficient numbers in this validation group to minimise the risk that any results obtained have arisen purely by chance.

3.4 Implications of the literature for this study

The real power and usefulness of biodata is derived from the ability of biodata items to predict future job performance. There is little doubt that background data compare favourably with many other kinds of test data in the assessment of job applicants and employees. This can be demonstrated across a variety of occupational groups and specific work-related behaviours (as discussed in Chapter 2). There are however several facets of the literature which have implications for the empirical development of this research exercise and these will now be outlined.

3.4.1. Development of specific biodata models dependent on the criterion

The suggestion was made in Chapter 2 that biodata keys are neither transportable and hence are criterion specific nor generalisable across different organizations, although this has been challenged. Therefore, despite the apparent validity of biodata as a predictor of staff turnover and tenure and accountancy examination success both at the undergraduate level and the professional level, it will be necessary to develop specific biodata keys to examine both professional examination success and tenure of employment after completion of the training contract. Notwithstanding this, the previous research will contribute hypotheses on which to base those items of a person's background which may be relevant. This will be discussed further in Chapter 6.

In light of the numbers undertaking ICAS training each year (approximately 400) which will be split across many training organisations, with the maximum number of training employed within any individual training firm around 50[9], it would be difficult to develop a model for one training organisation as there would be insufficient numbers within the reference group for developmental purposes. This was not a problem experienced by Harvey-Cook (1995) who undertook her study within the ICAEW context, as far higher numbers enter ICAEW training[10] and she was able to obtain sufficient numbers for her study by concentrating on 22 medium sized firms mainly centered in and around London. Generalisability across organisations should not present a problem in this study in relation to professional examination success as this criterion is specific irrespective of the organisation in which the trainee will operate and the organisations themselves should offer a relatively homogeneous training environment. It should therefore be possible to develop a model for ICAS examination success that would be applicable across all sizes of training organisation. However in relation to tenure of employment after completion of the training contract, it may be necessary to consider the organisational level of analysis rather than simply an individual level of analysis in order to determine whether different biodata items

[9] The largest number of trainees in the 1997 intake of ICAS training was 52. Source: Education Department of ICAS.

[10] For example, 3965 students commenced their ICAEW training in 1995/96. Source: Education, training and student salary statistics, 1995/96, ICAEW.

predict stability of employment after completion of the contract. This is due to the fact that although the training experience is relatively similar within the profession irrespective of size, the type of practice work undertaken by the various offices varies quite considerably, although offices of the same size (small, medium and large) tend to offer similar work experiences and could therefore be sub-grouped accordingly. There may also be different career opportunities offered by different sizes of training organisation and this may also affect tenure of employment post-qualification.

3.4.2. Restriction of variables to 'hard' biodata items

3.4.2.1 Stability over time

Despite the encouraging results in respect of validity, biodata is not without its critics, and fairly similar objections are raised in the literature. Concern is raised about the stability over time of biodata keys particularly in light of rapidly changing environments. The evidence suggests however that verifiable biodata items are less susceptible to diminishing stability over time although concern is raised about the stability of keys developed through the empirical approach, resulting in the recommendation that biodata keys are regularly updated. In order however to minimise any loss of stability, this study should restrict the biodata keys to verifiable or 'hard' items.

3.4.2.2 Accuracy and fakeability

Concerns surrounding the fakeabilty and accuracy problem may be fuelled by the evidence that when candidates are so instructed they can distort their answers to either increase or decrease their scores dependent on the remit received. However, once again in support of verifiable items, objective biodata items are seen to be less susceptible to distortion than subjective items. This provides further evidence for restricting the biodata items to 'hard' items only. Warnings of response verification is also seen to reduce intentional distortion and this is of particular relevance in the accounting profession where integrity is seen as an essential personal quality. The threat of checking response accuracy should have the desired effect of reducing faking to the minimum. It must be stressed however that the majority of the research conducted in this area has been conducted in a non-operational setting and there is little evidence to suggest that those who faked in these trials would actually fake in practice.

3.4.2.3. Incumbent versus applicant samples

By restricting background data items to 'hard' items of biodata which were available at the time of application to the organisation, any social desirability problems that may arise, together with any contamination experienced through contact with the organisation by which the individual is employed, should be alleviated, (Stokes et al, 1993; Becker and Colquitt, 1992). The effect of any subsequent job experience should therefore be minimised.

However it must be stressed that this study does adopt a concurrent validity design whereby the subjects both for the developmental sample and the hold-out sample are posthumous in that they are not applicants for accountancy positions but are in fact some distance beyond this point in their careers. This will be further discussed in the limitations of the study outlined in Chapter 4.

3.4.3. Empirical versus rational approaches to biodata development

The discussion in the early part of this Chapter leads on to the debate about whether to adopt an empirical or rational approach to biodata development. This will now be considered. There are basically two main approaches to deriving biodata items. The first of these is the empirical approach. In this approach biodata items would be selected on the basis of their capacity to discriminate between people according to certain criteria (which in this instance would be professional examination performance and tenure of employment after completion of the training contract). Items that failed to discriminate individuals on the criterion, evaluated through the utilisation of a statistical test, would be excluded from final item selection. The empirical keying approach is thus founded on item-criterion relationships with little recourse to theoretical underpinning and it is intended to maximise the prediction of an external criterion, (Gunter et al, 1993). Use of this technique permits rapid screening of applications by means of a simple scoring of the application blank and is therefore a useful pre-screening technique for use with other selection techniques.

The rational approach, on the other hand, utilises a conceptual framework or theory to guide the instrument construction, selecting biodata items *a priori* to measure constructs thought to be related to the criterion under investigation. Any significant relationships can then be interpreted and understood, (Gunter et al, 1993).

3.4.3.1. The empirical approach

Until the mid-1970s, the most popular method for developing a biographical inventory was through a strictly empirical approach. Several studies have focused on the methods for weighting items in order to maximise both the predictability and cross-validation of the derived model, with the most popular method being that of England (1971) as discussed in Chapter 2. However in light of recent information technology advances, this non-parametric method may be replaced by multivariate methods such as linear discriminant analysis and logistic regression, which are more statistically acceptable (Harvey-Cook, 1995). Harvey-Cook (1995) suggests that the WAB approach of England (1971) is a crude method of model derivation. She highlights both the problems of uncertainty over the statistical significance of any items which differentiate between the two groups as no tests of statistical significance are carried out on the differences and the large number of variables in the WAB method which will result in 'overfitting' of the model to the developmental sample. However despite differing methods in relation to item selection and weighting, all methods share a common set of basic operational procedures which are summarised by Hogan (1994). The seven major steps are as follows:

> *'(a) choosing or developing the criterion, (b) identifying the criterion groups, (c) selecting items to be analyzed, (d) specifying item response alternatives, (e) weighting items, (f) cross-validating, and (g) developing cut-off scores'* (p 73)

The empirical keying approach has however been criticised for its basic empiricism, (Dunnette, 1962; Baehr and Williams, 1967; Pace and Schoenfeldt, 1977), with this method facing challenges simply for failing to advance any theoretical understanding of why biodata would predict the criterion of interest (Mitchell and Klimoski, 1982). Establishing relationships purely on empirical evidence has resulted in instances where the relationship between the criterion of interest and the predictor is far from obvious, for example attendance at a circus to predict successful door to door salesmen (Appel and Feinberg, 1969, quoted by Gunter et al, 1993). Mael and Hirsch (1993) also suggest that the use of this method will result in models which are highly sensitive to sample-specific characteristics, resulting in excessive shrinkage when the model is cross-validated on another sample.

3.4.3.2. The rational approach

In light of the studies discussed above, which have attempted to advance a more theoretical understanding of biographical information, a more rational approach to biodata development has resulted. This more rational approach to biodata assumes that there are clusters of behaviour which can be subsumed under different categories. Inventory items are selected *a priori* to measure constructs thought to be related to the criterion. Procedures like factor analysis are used to derive scores from the background factors that are then related to the criterion of interest. Thus, when significant relations are obtained, they can be interpreted and more easily understood. Biographical research in the last two decades has therefore increasingly been focused on a more sophisticated conceptual framework (Stokes and Reddy, 1992). However, if biodata items are to be restricted to objective and verifiable items for this study, as discussed above, problems may arise for the rational approach, as the homogeneous and subjective items preferred in this approach would be eliminated (Mael and Hirsch, 1993). They suggest that it is necessary to get the balance right between those items which appear to have the most promise for theoretical advance, but which may be subject to distortion, with those items which are most resistant to distortion but which provide little understanding as to why they successfully predict the criterion of interest.

3.4.3.3. The hybrid approach

Mitchell and Klimosky (1982) questioned whether it was rational to be empirical and they concluded that empirical keying methods were appropriate for scoring biographical data when the recruiter simply wants to maximise the prediction of a job criterion. Mumford and Owens (1987) suggest that empirically keyed background data scales are still the most effective predictors of a particular criterion performance, despite alternative techniques such as rational scales (Pannone, 1984), factorial scales (Owens, 1976) and sub-grouping (Owens and Schoenfeldt, 1979), although they recognise that some shrinkage may arise from the initial validity co-efficient when applied to a later sample. This view was supported by Drakeley (1989) who found that, when the purpose is to maximise prediction of a criterion, the empirical methods would appear to result in a slightly higher predictive validity than the rational method.

Stokes and Reddy (1992) suggested however that the distinction between empirical and rational strategies is often blurred and that a combination of approaches may be most useful for maximising predictability and interpretability of the results. This combination approach was adopted by Harvey-Cook (1995) in that she adopted a rational approach to item compilation in her empirical study. She restricted her background history items to verifiable items commonly available on standard application forms, thereby arguing that

> *'choosing the variables from the data pool which are known to be good predictors of future success in criterion terms may also be considered as taking the rational approach'* (p92)

She may however have over-estimated the ability of the training providers to ask meaningful questions on the application form in light of the discussion in Chapter 1.

Mael (1991) suggests that a method for re-establishing the respectability of the much maligned empirical approach would be to develop a variation of empirical keying which he refers to as '*rainforest empiricism*' (p787). In this approach, theoretical discretion would be utilised both in the development and keying of the items and this should lead to a more conservative but more meaningful derivation key. This approach therefore attempts to bridge the gap between the empirical and rational perspectives. Mael and Hirsch (1993) utilised this method and found that, in their study of cadets of the United States Military Academy, this '*rainforest empiricism*' resulted in validities and cross-validities from each empirical key, which were significantly related to the four criteria, namely four operational ratings of demonstrated leadership capability. There was no evidence of excessive shrinkage.

As the accounting training providers will wish to maximise the predictive power of any developed model and will be less concerned with any theoretical issues that may suggest why certain background items predict the criterion of interest, the empirical method cannot be ignored. However, it would be difficult to convince a training provider to alter their current pre-selection strategy on the grounds of some background items which have very little meaning and provide limited reasoning as to why they do discriminate on the criterion of interest. The combination of approaches as utilised by Harvey-Cook (1995) will therefore be adopted in Phase I of the examination performance study, with post hoc interpretations of the background factors found in the resulting model suggested. The Phase II Study on examination performance will provide for a more theoretical approach to the empirical procedure as suggested by Mael (1991) whereby general hypotheses will be set up and theoretical discretion will be used in the development of the background variables, which should lead to a more meaningful biodata model. This more rational approach will also be adopted for the tenure study.

3.4.4. Other issues

3.4.4.1. Fairness and legality

Another concern was that surrounding the fairness and legality of the technique Whilst the majority of the research has been conducted in the United States, many of the studies have implications for the United Kingdom. Whilst the literature would not appear to support that there is a differential validity for different minority groups, biodata inventories would appear on occasion to distinguish between male and female and this should be examined in the present study. It will be therefore be necessary to consider the impact that the final developed model has on the accept/reject rates of both males and females. This will be considered in Chapter 7.

In addition care must be taken to ensure that biodata items do demonstrate both logical and empirical evidence to warrant their inclusion in a background questionnaire. Compliance with statutory regulation and accepted personnel guidelines may however not be sufficient. Firms will also need to consider the potential invasiveness of the biodata questioning particularly if only a limited number of firms were to adopt the technique. When there is little to differentiate firms in the eyes of the prospective student, firms that pursue overly personal questions may find that students reject a job offer and accept an offer from another firm. Questions will therefore be restricted to those commonly found on an application form. This will avoid graduates becoming disillusioned through the need to complete a multiple-choice questionnaire.

3.4.4.2. Stability of the reference group

The late 1980s and early 1990s has seen considerable change in both the higher education sector and the ICAS examination system. The early 1990s saw the removal of the binary divide between the polytechnic sector and the university sector in the UK, with university status being awarded to many of the polytechnics. The impact of this change is difficult to quantify and it is suggested that there will be little influence, as the 'old' polytechnics have simply been reclassified by many as the 'new' universities and these institutions are still regarded by many as the poor relation of the 'traditional' universities. University funding has changed with many courses, including accountancy and business related degrees, facing capping restrictions on their intake. In order to maximise funding, Scottish Universities have allowed more students to progress down the honours route, thereby attracting funding for four years instead of only three years. This has resulted in a movement in the ratio of honours/ordinary graduates entering ICAS training contracts. In the late 1980s the split of ICAS trainees entering training contracts was around 40/60 (honours/ordinary), whereas the split in the 1995 ICAS intake was 70/30 (honours/ordinary).

A fundamental change in the ICAS examination system took place in 1988, with transitional arrangements taking place in 1987. Prior to the change, students from fully-accredited degrees were required to sit four examinations and students progressing from a non-relevant degree undertook a one-year post-graduate conversion course before commencing their training contract and the ICAS examination process. Thus there was nothing to differentiate the cost of either a fully-accredited or a non-relevant trainee in relation to the examination system. A two tier examination system was introduced in 1988 for fully-accredited graduates and a three tier system for non-relevant graduates thereby allowing them to progress directly from University to their training firm. This change has transferred the cost of converting these non-relevant into relevant students from either the Government or the students themselves[11] to the training provider and the cost of training a non-relevant student is considerably more than that of a fully-accredited trainee (as highlighted in Chapter 1). In cost terms therefore prior to the change, fully-accredited and non-relevant graduates could be evaluated on an equal playing field, whereas after the change firms have to evaluate the additional costs and perceived benefits of recruiting a non-relevant student.

Unfortunately there are no published or available statistics on examination performance of particular groups of students prior to 1990 from ICAS and it is difficult therefore to draw comparisons before and after the change. However prior to the change, the current Director of Education of ICAS in a personal statement suggested that fully-accredited graduates performed better in the examination system than non-relevant graduates[12]. Since 1990 however, it would appear that non-relevant students outperform their fully-accredited counterparts.

It will therefore be necessary to consider these education changes throughout the developmental process, and this will be discussed further in Chapters 5 and 6.

3.5. Summary

Biodata is founded on the basic behavioural axiom that past behaviour is an excellent predictor of future behaviour and, whilst the early work in the 1960's and 1970's

[11] These courses were largely self-funding, only some local authorities funded the fifth year of study.
[12] Due to the funding issue that surrounded this conversion course, the quality of the non-relevant was somewhat mixed and it is suggested that this lead to the poorer performance of many of these non-relevant students in the ICAS examination process.

focused on the maximisation of prediction with scant regard for the acquisition of understanding, more recent work has concentrated on the development of a more rational approach to the subject. Since the late 1960's attempts have been made to advance a more conceptual understanding of biographical information and various theories have been proffered by psychologists. These theories extended the behavioural axiom as stated above to the notion that subsets of individuals who encountered similar patterns of behaviour and experiences could, consequently, follow similar paths across their lifespan. Intervening life experiences between adolescence and young adulthood however pervaded this basic theory and later theories therefore suggested that individual development proceeds as a result of the ongoing interchange between individuals and their environments. The value of these theories is through the provision of a framework for the development of biodata forms in the future which will be seen to be not only predictive but also more theory-based.

Although several criticisms can be levelled at biodata and problems identified for development of suitable models, many of these issues can be addressed and minimised by adopting a thoughtful approach for the development of the biodata models. The implications of the literature is therefore considered which has directed the empirical work of this research exercise in certain directions, namely:

1. To develop the examination performance models across all training organisations irrespective of size

2. To consider the development of the tenure model dependent on size of training organisation.

3. To restrict items to 'hard' biodata items

4. To use an application form type approach to elicit the information

5. To adopt a hybrid approach for the development of the selection models combining the empirical approach with a more rational technique.

Whilst it is appreciated that this approach will perhaps lose much of the evidence of prior behaviour and experience which determines the future job behaviour of trainee accountants, it must be seen in comparative terms to the techniques currently adopted by the profession for pre-screening as discussed in Chapter 1.

If biodata models can be developed within the Scottish chartered accountancy profession which can be shown to successfully predict the performance criteria, then these models could be considered as a valuable alternative to the current method of pre-selection and a valuable supplement to the traditional interview. Utilising biodata in this way should provide the training providers with a quick, reliable, and statistically relevant method of sifting through application forms, which should in turn reduce recruitment costs and maximise productivity resulting from more accurate selection decisions.

The next chapter will consider the methodology that has been utilised in the quest for an alternative pre-selection technique for ICAS training providers.

CHAPTER 4

METHODOLOGY

4.1 Introduction

Biodata inventories have been demonstrated (see Chapter 2) to be one of the best predictors of a variety of job performance criteria in organisations. However, as it is suggested that biodata may be criterion specific (as discussed previously in the literature review), in order to develop selection models that will be of use for a training provider wishing to recruit a trainee to undertake the ICAS system of training, it will be necessary to ascertain which aspects of a person's total background are important for a Scottish chartered accountancy training contract. Because the ability to pass the examinations and tenure of employment on completion of the training contract are considered important, as discussed in Chapter 1, two biodata models will be developed, one for each of these performance criteria. The first model will aim to identify the background items which differentiate between those trainees who pass their professional examinations first time and those who experience resits. The second will seek to identify the background items which differentiate between those trainees who remain with their training provider 18 months after qualification and those who leave before this time period has elapsed. This Chapter outlines the methodology used for the development of the models. It will begin by restating the aim and objectives as outlined in Chapter 1, and then discussing the methods that will be adopted to achieve the stated aim and objectives.

4.2 Aim and objectives

As detailed in Chapter 1, the aim of this dissertation is to critically evaluate whether biodata could be used as a valid tool in the pre-selection process of trainee chartered accountants undertaking their training within an ICAS training environment with particular reference to ICAS examination success and tenure of employment for at least 18 months post-qualifying.

The objectives of the study are therefore to:

1. Critically evaluate the effectiveness of biodata in the differentiation of ICAS trainees between those who successfully negotiate their professional accountancy examinations without resits and those who experience failure.

2. Identify the key determining background factors which influence ICAS examination success and could be used in a selection environment.

3. Analyse the effectiveness of biodata in the differentiation of trainees who remain with their training provider for at least 18 months post qualifying and those who leave before this time.

4. Identify the key determining factors, which could be used in a selection environment, influencing tenure of employment after completion of the training contract.

Specific hypotheses about the general background factors which are thought to be pertinent in the determination of the two criterion measures will outlined in Chapter 6 (examination success) and Chapter 8 (tenure of employment) respectively.

This chapter will identify the reference groups used for the development and analyse the means of extracting and collecting biodata information. Sample sizes are then outlined with a subsequent discussion of the sample. Finally the statistical analysis process and the model development procedure are identified and explained.

4.3 The selection of the reference group

The reference group for the Phase I Study will concentrate on trainees who have qualified in the years 1988-1992. These trainees will therefore comprise those who undertook their training under the 'old' system, trainees who experienced the transitional arrangements and trainees who progressed from the 'new' system. The cross-validation sample will be based on trainees who have qualified in the years 1993 and 1994.

The reference group for the Phase II Study will be based on trainees who have qualified in the years 1993 and 1994 and have therefore undertaken their training under the new system. The cross-validation sample will be based on trainees who have qualified in the year 1995.

4.4 Methods of obtaining biodata

Two areas of information that need to be collected for the development of a biodata model relate to the criterion measure and the independent or explanatory variables. Methods of collecting biographical information, include school or University reports, employer references and suitably structured interviews. Some research studies have utilised various sources for their collection, as demonstrated by Drakeley et al (1988). Others, such as Harvey-Cook (1995), collected both the criterion and explanatory data from the records of firms held for the individuals included in her sample. Gunter et al (1993) suggest however that for pre-selection there is really no substitute for a purpose designed self-report questionnaire which is an ideal vehicle for generating a large number of biodata items which will then be used for the development of the explanatory variables. This was the method, for example, utilised by Doran et al (1991) in their study of the determination of student performance in two introductory accounting modules. They obtained their exploratory variable information from a specifically designed survey administered to the students. The data for their criterion of examination performance was collected directly from the University.

Whilst the collection of the explanatory variable information was collected for this study by a specially designed questionnaire which is discussed further below, the data for the criterion measures were also collected from the same self-reporting questionnaire. This is an unusual method to collect criterion data and this will be further discussed in this chapter under the section on the limitations of the data collection methodology.

4.5 The questionnaire

The objective of the data collection was to elicit information from recently qualified chartered accountants on their background history, with a view to identifying information, both on the criterion measure and for the explanatory variables required for the development of models. Many of the implications from the literature review as discussed in Chapter 3 shaped the format of the data collection. It was decided to use a questionnaire, containing questions commonly found on an application form, as the most appropriate method of collecting a large amount of data about an individual's background history. If a model could be developed from the information obtained in this manner, then a firm would not run the risk of alienating a potential trainee through the requirement of completing a multiple choice questionnaire. It was also possible to target a sufficiently substantial number of individuals, deemed necessary in order to have an adequate reference group. This will be discussed later in the chapter. Although the scope of a person's background history is far reaching, (Mael,1991) it was decided to gather information which was mainly factual and verifiable. Restricting the biodata items in this manner addresses some of the criticisms levelled at biodata as discussed earlier in Chapter 3. The information would therefore be non intrusive generally, verifiable, encompassing historical items such as number of Higher A grades. Such data would be classified as a 'hard' as opposed to 'soft' items of biodata which attempt to describe the individual in terms of personality, motivation, values and aspirations.

4.5.1 The process of questionnaire construction

Although the survey questionnaire could be implemented in several different ways, including by personal interview, telephone, or mail (Chisnall, 1992) it was decided to undertake a mail questionnaire. This type of questionnaire has many advantages and May (1993) lists five such examples. Four of these advantages were of relevance to this particular study as indicated below.

1. The costs associated with mail questionnaires are far lower than that of face-to-face interviews and this was very significant given the large numbers required for the data collection for this study.

2. The anonymity afforded by a mail questionnaire can be pertinent when individuals are requested to divulge background history.

3. Individuals can complete the mail questionnaire at their leisure and this is a key factor in light of the job responsibilities of recently qualified chartered accountants.

4. A mail questionnaire permits coverage of a wider geographical area and this was relevant in light of the numbers of ICAS qualified chartered accountants who pursue a career abroad.

A final advantage identified by May (1993) concerned the lack of interviewer bias. This was not necessarily of particular relevance as the questions were of an objective nature and were therefore less susceptible to such bias.

May (1993) also identified four disadvantages of mail questionnaires. The need to keep the questions relatively simple and straight forward, together with an absence of control over the interpretation of the questions, were not expected to cause problems due to the objective nature of the background history information that was being requested. A third disadvantage related to the correct respondent answering the questionnaire and this was considered by obtaining address labels from the membership records department of ICAS. The questionnaire was therefore specifically addressed and mailed to the recently qualified trainee. The final disadvantage was the probability of a low response rate, for example Emory (1980) suggests that 30% would be satisfactory. Whilst it was recognised that this may be an issue, an attempt to overcome this problem was made by sending out a covering letter with each questionnaire, specifically written to the addressee informing them that the research had the support of ICAS and confirming confidentiality of the response (as suggested by Oppenheim (1992)).

The questionnaires for both the Phase I and the Phase II Studies were designed following a review of the relevant theory and consideration of measures which previous studies have found to be valid predictors of future performance in related applications, as discussed in Chapter 2. The Phase II questionnaire also incorporated questions that are commonly found in application forms of recruiting professional accountancy firms. A summary of the information requested in these forms is contained in Appendix 3.

Chisnell (1992) categorises questions into two main types, closed and open-ended, suggesting that the closed question format requires answers which are strictly limited whereas open-ended questions requires the respondent to answer in any terms that he or she sees fit. Both types were used depending on the nature of information required. Closed questions were used as simple alternatives designed for filtering variables or giving multiple choice type answers when there was a pre-determined finite number of responses. Open questions were used in the main to request specific information, for example, school grades or sports undertaken at University. Care was taken over the amount of space and number of lines provided for the answer in an attempt to pre-determine the length and fullness of responses gathered as suggested by Oppenheim (1992). A coding framework was then developed classifying the open responses into broad categories to enable the responses to be coded in a meaningful manner, again as advocated by Oppenheim (1992).

Care was taken that the questions included in the questionnaires were phrased in a manner which were specific and could be easily understood, asking for background history items in well-defined terms. Questions had to be economically worded, with detailed areas broken down into a series of readily answerable, short questions, as suggested by Chisnall, 1992.

The questionnaires were designed to guide the respondent through their background history in a logical manner, exploring one area fully before progressing to the next. This enabled the respondent to develop their mental processes and to facilitate recall, as past associations and memories are awakened by a systematic approach (Chisnall, 1992). Both questionnaires sectionalised a person's background history into five basic areas as follows:

1. Background
2. School history
3. Higher education history
4. ICAS history
5. Employer history

These sections follow the life history of the trainees and are in a logical order for response. The development of each theme of the questionnaire will be outlined below in the section on question content.

The Phase I questionnaire was firstly scrutinised by an academic expert in the field of questionnaire design as advised by Sudman and Bradburn (1982). This examination considered the question content and phrasing, suitability of question format, question sequence and overall layout. Following minor adjustments, the questionnaire was then evaluated by a senior member of the education team at ICAS, who provided the expertise in the field of trainee selection and ICAS examination systems in force during the training periods in question. The questionnaire was then piloted (within the confines of the ICAS Education Department) whereby all members of the technical staff who had qualified in the period 1988-1992 (n=5) were asked to complete the questionnaire with the remit that they were taking part in a pilot study. The respondents were also requested to make any comments on the design of the questionnaire, as advocated by May (93). The objective of this pilot was to ensure that the questions were readable, answerable and unambiguous to the respondent. The responses to the variety of open questions were also examined to ensure that they could be coded in a meaningful fashion (this will be discussed later in the chapter) and that the alternatives offered in the multiple choice questions provided sufficient scope for valid responses (Chissnall, 1992). Minor adjustments were made in relation to some question wording, before the questionnaire was finalised. The Phase I questionnaire can be found in Appendix 4.

4.5.2. Content of the Phase I questionnaire

As discussed above the questionnaire followed the life history of the trainees and the development of each background theme will now be described in turn.

4.5.2.1. Background

This section comprised two questions. The first asked the respondent to identify their gender. Although sex cannot be used as a differentiating tool in the selection process, there is conflicting evidence in the literature regarding the effect of gender on biodata validities (Eberhardt and Muchinsky,1982; Stokes et al, 1987). It will therefore be necessary to investigate any sex differences in the resulting models. The second question requested the respondent's age on commencement of the training contract. This question was asked to ascertain whether age would affect examination performance. No questions were asked about social class or parents' occupations as these were felt to be intrusive and outwith the control of the candidate. Gunter et al (1993) suggest that whilst it is not illegal to discriminate on the grounds of social class, it is potentially risky.

4.5.2.2. School history

This section comprised eight questions, dealing with different aspects of secondary education. Respondents were asked to identify which secondary school they attended and (by way of clarification for coding purposes) were asked to identify the type of school. Although it may be argued that type of schooling is a derivative of social class this question is commonly asked in traditional application forms and hence should not be perceived as invasive.

The next five questions addressed academic performance. Respondents were asked to identify whether they sat 'O' grades or the English equivalent GCSEs and then to notify the grades achieved, in a variety of common subjects with space for the identification of other subjects not included in the questionnaire. A similar procedure was followed for the achievement of Highers or 'A' levels, with the inclusion of an 'other' box for the identification of CSYSs or a non-standard education pass. An additional question relating to higher academic level was asked if any subjects were retaken in order to improve the original grade. These questions should enable a variety of variables to be developed based on previous academic achievement, for which there is substantial evidence in the literature (as discussed in Chapter 2) to suggest that this will be relevant in the determination of future academic performance.

The final question was more open ended and asked if any sports/outside interests were pursued during the school career, with an indication of, on average, the number of hours per week spent during term time on each activity. The inclusion of this type of question is based on the premise that membership of teams and societies or the pursuit of certain hobbies and interests is an area on which recruiters often focus as they perceive that socialisation by group participation as opposed to more solitary pursuits is indicative of future success.

4.5.2.3. Higher education history

This section included twenty-one questions on a variety of aspects concerning the individual's university background. The first four questions were set to establish if the respondent progressed directly from school to university or if there was a subsequent delay, indicating the reasons for, and length of such a break and explaining how the time was utilised. The inclusion of these questions was to ascertain the effect of any work experience on subsequent performance.

The next question asked the respondent to identify the University or Polytechnic which awarded the trainee's first degree. As these trainees would have graduated from higher education establishments during the binary divide era, any differences between the "old" and the "new" university sectors should be investigated. Harvey-Cook (1995) suggests that this divide will continue to pervade the selection of graduates as she argues that a simple change of name from Polytechnic to University will not affect the performance of the resulting graduates in their CA training, given that the new universities exhibit differences in entry qualifications and quality of degree status. In addition Marcus Dunn and Hall (1984) also suggested that differences in examination statistics between universities should be investigated as their model included a variable which considered university attended.

Respondents were then asked to identify their first degree to enable comparisons of CA examination performance to be drawn between relevant and non-relevant graduates and between different non-relevant degrees.

The next question addressed the issue of number of resits encountered in each year of the first degree course undertaken. This question was based on the premise that students who have resits in their degree programmes are also more likely to experience resits in their professional accountancy examinations, as they have already demonstrated academic weakness.

The following three questions referred to honours degree courses and the classification obtained by the respondents. For those who did not undertake honours, the questionnaire sought to identify by way of an open question the reasons for not progressing through the honours route.

The next seven questions once again consider the relevance of work/vacation experience by seeking information on both placement and vocational work, requesting data on length of time, the nature of the employee organisation and the role of the respondent in the organisation. The inclusion of these questions was based on the findings of Eskew and Faley (1988) who provided evidence that previous related experience was indicative of accounting examination performance.

Information on post graduate qualifications were then sought in the next three questions. This is of particular relevance to an ICAS study for trainees who commenced their training contracts pre 1988, as all non-relevant graduates were required to undertake a one year post-graduate conversion course before they could enter into a training contract with a training provider.

The final question in the university section followed the same format as the social activity question in the school section, requiring information on sporting and other outside interests whilst at university together with the average hours per week spent on each activity during term time.

4.5.2.4. ICAS history

The next section was mainly designed to elicit information for the development of the criterion variable, although the first six questions considered potential information of relevance for the independent variables. Respondents were asked to identify whether they had progressed directly from University to a CA training contract and the reasons for a break together with information on their utilisation of the break period time. The question was then raised, in open format, as to the reasons for choosing a chartered accountancy career with ICAS. Although the response to this question is non-verifiable, this is a commonly found question in chartered accountancy application forms and is seen as a measure of commitment and motivation by the training providers.

The following six questions requested ICAS examination performance information. The first was a filter question based on the date of commencement of the training contract which is of relevance for the examination system that the respondent undertook. The number of attempts at each level of the professional examinations were requested, together with information on the subjects required to be sat at the professional stage for non-relevant graduates commencing their contract during or after 1988.

4.5.2.5 Employer history

One of the primary concerns of decision makers in the implementation of biodata as a selection tool is the degree to which biodata models are generalisable across organisations and jobs (Stokes and Reddy, 1992). Whilst it may be argued that, for a selection model, training after the selection event is irrelevant to the development of the model, data on the training organisation will be useful in determining if the differences in examination performance between students are entirely due to differing backgrounds, or due to the training organisation in which the trainee is employed. The first four questions in this section attempt to address this issue by considering the training environment in which the trainee operated during the examination years. The last question also considers the time spent on any sport or outside interests to ascertain whether such activities may be to the detriment of examination success.

4.5.3. Content of the Phase II questionnaire

The Phase II Study questionnaire was in the main developed from the original questionnaire. However additional questions were included in the later version which arose from the emerging literature, the review of the most recent training firm application forms (contained in Appendix 3) and the initial findings from the Phase I Study. The questionnaire received scrutiny from the same academic expert referred to above who reviewed the Phase I questionnaire. Once minor changes had been made, the questionnaire was sent to a multinational accountancy firm, a medium sized accountancy firm and a multinational oil company in Aberdeen, for completion by recently qualified ICAS accountants (1993 and 1994) as a pilot study. Comments on the questionnaire design were also requested. Completed questionnaires were returned by 10 accountants and minor typographical adjustments were made. The finalised questionnaire can be found in Appendix 5.

The following sections will consider the additional questions that were included in the Phase II questionnaire.

4.5.3.1. Background

Questions included in the questionnaire on the grounds that they were commonly found in training providers' application forms covered nationality, area of family residence, marital status, a driving licence, car owner status, general health and history of serious illnesses.

Questions were also included concerning the respondent's siblings and their order of birth. These were variables found by Herriot (1984) to be useful in the determination of job performance. Herriot (1984) also suggested that the nature of both the paternal and maternal occupations could be relevant. This was supported by informal discussions held with training providers who had anecdotal evidence to suggest that the type of occupation undertaken by a trainee's parents was also influential in their performance as an accountant, suggesting that trainees with parents who were self-employed performed better in the professional accountancy office environment.

4.5.3.2. School history

Several additional questions were included to encompass the areas commonly found on training provider application forms which had not been part of the Phase I Study. These questions related to the individual secondary schools attended, a sixth year experience, academic prizes awarded, positions of responsibility held, number of jobs taken during secondary education, jobs with responsibility for others, positions of responsibility held in relation to sports and other interests undertaken at school, number of athletic prizes awarded at school and the foreign visits made by an applicant during secondary school education.

The preliminary results of the Phase I Study altered the layout of the question requesting academic grades. The Phase II format required respondents to differentiate between 5th and 6th year results. This will enable an UCAS point split to be made at the end of fifth year. A question was also included requesting information on any subjects failed at school in fourth, fifth or sixth year.

Two additional questions were also included based on the results of the Harvey-Cook (1995) study. The first asked whether the respondent had been a headboy or girl at school. The second requested information on the number of memberships of clubs, societies and/or teams at school.

4.5.3.3. Higher education history

In line with the training provider application forms, the question on vacational employment was expanded to include all employment for the Phase II Study as opposed to only jobs within a financial environment. However the Phase II question also asked respondents to indicate whether the job was related to chartered accountancy. Information was also requested on whether the job entailed responsibility for supervision of others. Others included on the grounds of training provider application forms were positions of responsibility held whilst at university, both within and outwith a sporting environment, number of athletic prizes awarded at university and the number of foreign visits that the respondent made during their university education.

Information on the number of memberships of clubs, societies and/or teams was also requested, as suggested by Harvey-Cook (1995).

4.5.3.4. ICAS history

The questions from the Phase I questionnaire which related to the categorisation of the respondents, dependent on the system of ICAS education, were deleted as they were no longer necessary. All trainees now completing the Phase II questionnaire should be products of the new system of ICAS education. An additional question requested respondents to identify whether they had experienced any resits at the professional stage, the first layer of examinations undertaken by the non-relevant students only.

4.5.3.5. Employer history

An additional set of questions were entered into this section in order to consider tenure of employment after completion of the training contract. Respondents were asked to identify the year in which they became members of the Institute of Chartered Accountants of Scotland and the months of delay that had elapsed since the completion of the training contract. They were also asked to identify whether they were still with their training provider, their reasons for leaving if relevant and details of their employment after their training provider.

As identified previously, the purpose behind the data collection from the questionnaire was to develop explanatory variables. These variables, referenced to their relevant question in the questionnaire together with the rationale for their development can be found in Appendix 9 for the Phase II Study.

4.6 The Phase I sample

Questionnaires were sent to 1,000 recently qualified ICAS accountants with a covering letter explaining the purpose of the research exercise. The sample comprised 200 from each of the qualification years 1988 to 1992, which represented 45.6% of the population (n = 2,193). This random selection was undertaken by the Members' Records department of ICAS, and address labels were provided accordingly. The number of returned, valid responses was 624. This equates to a response rate of 62%, which is considered above average for self-completion mail questionnaires.

4.7 The Phase II sample

Questionnaires were sent to all accountants who qualified in years 1993 (n = 405), 1994 (n = 393) and 1995 (n = 395). Once again the Members' Records department of ICAS provided the address labels. The 1993 and 1994 members were contacted in May 1996, with a follow up questionnaire for all non-respondents sent out in July 1996. The 1995 members were contacted in June 1997 and non-respondents were followed up in August 1997. The number of returned valid responses for each of the years was as follows: 1993 - 304, which represents a response rate of 75% ; 1994 - 241, which represents a response rate of 61%, and 1995 - 262, which represents a response rate of 66%. An additional 4 questionnaires were returned with the 1993/94 population, which did not identify the year of qualification. The total number of responses therefore for 1993/94 amounted to 549, which equates to an overall response rate of 69%. This is an excellent response rate for a self-completion mail questionnaire.

4.8 The limitations of the sample and data collection

There are however three limitations of these samples which must be stressed at the outset and one limitation of the criterion measure.

4.8.1. Limitation of the samples

The first of these is in respect of restriction of range. The population of applicants to chartered accountancy offices will include both those who manage to secure a training contract and those who do not manage to progress beyond the selection process. The samples for this thesis were drawn from those applicants that were actually successful in obtaining employment, and is therefore drawn from a restricted population of applicants. The models developed from these samples will therefore be conditional on the already existing pre-selection criteria and any conclusions drawn from the results need to be considered in this context. This problem however is not restricted to this study but is a common issue for much biodata research work which develops the initial model on a previously selected population (Gunter et al, 1993).

The second limitation is the fact that the sample was drawn from the population of accountants that were ultimately successful in completing the professional accountancy examinations and subsequently their training contracts. The respondents were then classified as either successful (passed all their professional examinations first time/ remained with their training provider for 18 months post qualification), or unsuccessful (experienced at least one resit/ left their training provider before 18 months post qualifying). Unfortunately there are no data available from ICAS on either the total numbers who fail to complete their training each year or indeed on the individuals who drop out of their training contracts for whatever reason. As individuals can only be traced through the ICAS data retrieval system if their name and the year in which they commenced their training contract is supplied, a population of unsuccessful trainees defined as those who failed to complete their training contract is not available. The complete failures (those who failed to qualify) were therefore excluded from the analysis. The only solution to this problem would be to undertake a longitudinal study, identifying the backgrounds of individuals as they apply for training contracts and then follow the individuals through the examination system. This technique was however rejected on the basis of the time scale involved, which would become extremely unwieldy if all parts of the examination system were to be considered.

Unlike the ICAEW however which experiences a very high drop out rate, of up to one third experienced by recruiting firms (Harvey-Cook, 1995) either through examination failure or for other reasons, the vast majority (around 90% according to the ICAS Education Department) of trainees commencing their ICAS training ultimately qualify. Therefore, large numbers of the population that commenced a CA training contract with ICAS have not been excluded from the analysis. In addition, as the analysis focuses on the personal background history items which differentiate between those trainees who are successful and those trainees who have experienced failure (albeit of those who ultimately qualify), the utilisation of this restricted population is permissible as the results would only be invalid where the complete failures exhibit the same characteristics as the successful trainees.

The third limitation is in respect of non-response bias. There is always a possibility that non-response bias could affect the results where the whole population is not surveyed and where there is less than 100% return. In the Phase I Study the sample was drawn from a random selection of recently qualified trainees and there is no evidence to suggest that this sample was not representative of the population as a whole. For example, the gender split of the respondents was 60:40 men to women and this was in line with the students numbers from the years in question (Gammie and Gammie, 1995). In the Phase II Study, the whole population was circulated with the questionnaire. Despite the extremely high response rate, however, there is no guarantee against bias and Oppenheim (1992) suggests that consideration should be given that the reason for the non-return is connected with topics in the questionnaire. Unfortunately it is not possible to compare pass rates from the questionnaire responses to ICAS statistics as ICAS do not calculate percentages of students who pass all their professional examinations at the first attempt. It is therefore impossible to monitor non-response bias in these terms. This should be borne in mind when considering the conclusion.

4.8.2 Limitation of criterion measure

It is rather unusual for the criterion of interest to be self-reported. In other words, it is customary in biodata research for the criterion of interest (which in this case is either ICAS examination performance or remaining with the training provider for 18 months post-qualification) to be supplied by some independent means. For example, in the Harvey-Cook (1995) study, student files held by the training organisation were used to identify examination results. This therefore raises questions about the validity of this research exercise if the criterion has been misreported. This could have arisen either by the inability of the respondent to accurately recall the information or by the respondent faking the information on the questionnaire with the intention of deceit. This raises the question of why anyone would want to provide erroneous information about their ICAS examination performance or indeed career path since qualification. It would therefore appear unlikely that any form of deceit would have been practised by the respondents. This is exacerbated by the fact that the professional education system highlights the importance of honesty and integrity within the professional ethics course which all respondents will have undertaken. In respect of the inability to recall accurate details of performance, anecdotal evidence would suggest that trainees who have undertaken the arduous study and examination process will have their results forever etched on their memory! There is also a very short time lag between the 18 months post qualification and the questionnaire completion which would suggest that memory recall should not be a problem.

It was however decided to undertake further work to confirm that the information supplied by the respondents in respect of their ICAS examination success was indeed correct. From the trainees who qualified in 1995, 50 were selected at random and their self-reported ICAS examination performance was noted. This information was then sent to ICAS for verification by the Student Education Department. Out of the sample of 50, there was one error whereby a student who had incurred two resits at TPC1 and one resit at TPC2 had also incurred a resit at the professional stage. Whilst the TPC 1 and 2 results were correctly recorded by the trainee, she failed to record the professional stage resit. From the information provided however she was correctly classified as a resit student. It would therefore appear that there are no grounds to question the self-reported criterion measures.

4.9 The non-parametric analysis for the Phase I Study

The responses to the first questionnaire were coded and entered into the SPSS statistical software package (Norusis, 1992). One of the variables related to the criteria of interest, namely examination performance (see section on variable selection to follow), with the remaining variables concerned with predictor data items. These explanatory variables are contained in Appendix 6 for the Phase I Study. Different levels of measurement were utilised to categorise the variables dependent on the data available for each. This is of particular relevance for subsequent data analysis, as only certain techniques can be used on data measured at specific levels (Sirkin, 1995). As the minimum level of measurement for modelling is ordinal data, any nominal level measurement variables, for example those which simply addressed different attributes, needed to be converted to ordinal variables. This was done by converting the nominal data, for example University attended, into a simplified dichotomous variable, such as 'new' University or 'traditional' University. Ordinal level of measurement was therefore used for variables where there was a logical sequence of a variable's categories without an exact amount and for nominal dichotomous variables which cannot be taken out of sequence, resulting in these variables being treated as if measured at the ordinal level. Interval levels of measurement were used for variables where a numerical score was available, for example number of UCAS points, or number of A passes at 'O' grade.

The first step was to analyse the relationships between the dependent variable, namely, passing all the professional examinations first time, with the independent or explanatory variables. This first step is broadly similar to the approach of England (1971) who suggests that the differences between the criterion group are calculated for each variable in an effort to determine the predictive power of each item before weights are assigned for each possible answer. However in this study a superior approach is adopted as inferential statistics were calculated and this allows for the quantification and testing of the statistical significance of the relationship.

As the distribution of the dependent variable cannot be assumed to be normal, statistical procedures which do not require assumptions about the underlying distribution must be considered. The Mann-Whitney test was therefore adopted, which is the non-parametric alternative to the more commonly known t test. The Mann-Whitney tests the hypothesis that two independent samples come from populations with the same distribution, without the distribution being specified, and hence does not need to satisfy the normal distribution test (Norusis, 1992).

By comparing the medians of the variables from the group that passed all their examinations first time to the medians of the variables from the group that experienced at least one resit, the relationship can be quantified by calculating the Z score which is a standardised normal deviate score that is useful for comparing variables that come from distributions with different means and different deviations.

The results from this test should demonstrate those variables which appear to differentiate between the group which passed their examinations first time and the group which experienced failure, and for which the null hypothesis (no differences between the medians of the two groups) can therefore be rejected. Once these non-parametric results are available it is then possible to develop the statistical analysis further with the use of model building.

4.10 The modelling technique

The next step in the procedure is to develop a statistical model which will actually quantify the relationship of these independent variables, which differentiate between successful and unsuccessful trainees, to the dependent variable. The statistical development of a model is again the broad equivalence of England's method whereby those items which fail to discriminate against the two groups are discarded and the remaining variables which demonstrated differences are weighted according to a set of tables. However this approach is more sophisticated as the multivariate analysis will provide some explanation of the relative power of the background factors in their prediction of the criterion of interest and hence will identify the significance of the contribution of the variables to the final model. There are a variety of multivariate statistical techniques that can be used to predict a binary dependent variable from a set of independent variables, for example multiple regression, discriminant analysis and logistic regression, and there is a continuing debate in the statistical literature about the most appropriate methodology for models with dichotomous dependent variables. However, as it is envisaged that the model could be used to predict the probability of a candidate passing first time, multiple regression as a technique was rejected. This was due to the fact that the predicted values could not be interpreted as a probability. Discriminant analysis was also rejected as serious questions have been raised about the restrictive statistical requirements posed by the technique (Jones, 1987). For the linear discriminant function to minimise the probability of misclassification, certain assumptions about the data must be met. Each independent variable must be a sample from a multivariate normal population and the population covariance matrices of the dependent and independent variables must also be equal, (Norusis, 1992). If these underlying assumptions of discriminant analysis hold, then Efron (1975) demonstrates that discriminant analysis performs better than logistic regression. However as several of the independent variables in this analysis are dichotomous, this will violate the multivariate normality and population covariance matrix assumptions, and therefore result in non-optimal results.

The objective of logistic regression is similar to the other rejected techniques

> *'To find the best fitting and most parsimonious, yet biologically reasonable model to describe the relationship between an outcome (dependent or response variable) and a set of independent (predictor or explanatory) variables'* (Hosmer and Lemeshow: 1989,p1).

The technique will also provide the conditional probability of an observation, in this case a trainee, belonging to a certain class, such as those who pass all professional examinations first time. The model therefore directly estimates the probability of an event occurring by weighting the independent variables and creating a score for each trainee, which will represent the probability of the trainee passing all the professional examinations first time.

The Logistic regression model is calculated as follows:

$$P = \frac{1}{1 + e^{-z}}$$

P is known as the logistic score, which provides a measure of the probability of passing the ICAS examinations first time.

Z is the combination of each independent variable(X), for example the number of UCAS points, weighted by the coefficient (β), with β_0 representing a constant.

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_n X_n$$

In order to better understand the interpretation of the logistic coefficients, the logistic model can be written in terms of the odds of an event occurring.

Writing the logistic model in terms of the log of the odds, commonly referred to as the logit, it is seen that:

$$\log\left(\text{prob (event)}/\text{prob (no event)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_n X_n$$

However as it is more comprehensible to consider the odds as opposed to the log odds, the logistic equation can be written in terms of odds as follows:

$$\text{prob (event)/prob (no event)} = e^{\beta_o + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_n X_n}$$

(Norusis, 1992)

The β coefficients are estimated so as to maximise the joint probability of passing the examinations first time for the known successful candidates and the probability of not passing first time for those candidates who were known to have experienced failure. The relative importance of variable X_n is measured by $\exp(\beta_n)$ which denotes the factor by which the odds ratio increases for a one unit change in that variable. The statistical significance of each resulting variable in the model can also be reported.

4.11 Multicollinearity

One of the assumptions of the classical multiple regression model is that no exact linear relationship exists between the independent variables in the model. Where this perfect collinearity exists, it is easily identified and rectified by the exclusion of one of the variables. However, if any of the variables or combinations of variables are highly correlated with each other, there may exist a problem of multicollinearity, (Pindyck and Rubinfeld, 1987). In practice it is not uncommon to observe correlations among the independent variables. However care must be taken that serious multicollinearity does not exist in the regression analysis, otherwise an unstable and invalid model may result, (Mendenhall and Sincich, 1988). Just how large these correlations must be before multicollinearity causes concern to the model builder is somewhat subjective. However, Gunst and Mason (1980) suggest that it is only necessary to investigate pairwise correlations larger in magnitude than 0.70.

It is therefore necessary to calculate the strength of association between the independent variables in order to identify whether a multicollinearity problem exists. The Spearman Correlation Coefficient was therefore calculated for the variables identified from the Mann-Whitney test which were felt to be of importance. This exercise is a commonly used non-parametric measure of correlation between two ordinal variables, whereby the values of each variable are ranked from smallest to largest and the Pearson correlation coefficient computed on the ranks (Norusis, 1992, p208). The rank correlation ranges from between -1 and +1, where -1 and +1 indicate a perfect linear relationship between the ranks of the two variables. If any of the independent variables have a stronger association than 0.70 then multicollinearity may be a problem and a decision is required on the variable which should be retained for modelling purposes.

4.12 Development of the logistic regression model for predicting examination success - the Phase I Study

All the variables were identified which were statistically significant (as demonstrated by their Mann-Whitney score) in their differentiation between the group of trainees who passed their examinations at the first attempt and those who experienced failure. Any variables which were too highly correlated with each other were excluded on the grounds of multi-collinearity. Then a further reduction of variables took place. This was undertaken via a system of automated model building and the procedure is further discussed in Chapter 5. The resulting models in the Phase I Study can therefore be seen as exploratory models, which are empirically driven, albeit with a quasi-rational approach in that all explanatory variables have been derived from questions commonly found on application forms.

4.13 Development of the logistic regression model for predicting examination success - the Phase II Study

A slightly different approach has been adopted for the Phase II Study, whereby a framework has been developed and a more rational approach adopted in which hypotheses have been formulated about the pertinent characteristics of trainees who succeed in the ICAS examination process. This is further discussed in Chapter 6. Arising out of these hypotheses, specific background variables are identified and entered into the model building exercise without a need for any automated reduction of variables. This is further deliberated in Chapter 7.

4.14 Development of the logistic regression model for predicting tenure of employment

In light of the paucity of tenure studies which identify background factors that have been found to be valid predictors of tenure in the accountancy environment, it may be more problematic to develop a model utilising the Phase II examination success model methodology, as there is little information in the literature to drive the hypotheses. However, in light of the work that has been done and the anecdotal evidence furnished by training providers, the Phase II methodology will be adopted. This will be further considered in Chapter 8.

4.15 Variable selection

As the outcome variable in logistic regression is required to be dichotomous, the model to predict examination passing potential was developed using "pass all professional examinations first time" as the dependent variable and was coded as follows:

Pass all examinations first time:	1
Pass but fail one or more examinations:	0

The model to predict tenure of employment after completion of the training contract was developed using "remained with the training provider for 18 months post qualification" as the dependent variable and was coded as follows:

Remain with training provider	1
Leave training provider	0

4.16 Goodness of fit of resulting models

Identifying how well the model classifies the observed data is one method of determining the effectiveness of the logistic model. R^2 is often informally used as a goodness-of-fit statistic as it measures the proportion of the variation in the dependent variable explained by the multiple regression equation. However Pindyck and Rubinfeld (1987) question the appropriateness of this statistic in logistic regression, identifying several problems. They state that

> *'The difficulty with R^2 as a measure of goodness of fit is that R^2 pertains to explained and unexplained variation in the Y and therefore does not account for the number of degrees of freedom in the problem.'* (p79)

They go on to suggest that R^2 should not be used to compare the validity of alternative regression models or indeed any other model derived from a different statistical technique, where the dependent variable varies from regression to regression,

> 'R^2 *cannot be used directly to compare models with different dependent variables.*' (p82)

In logistic regression therefore the model chi-square ($\chi 2$) is reported as it indicates the goodness-of-fit for the model incorporating all the independent variables. It is calculated by taking the difference between -2LL[1] for the model with only a constant and -2LL for the current model. It is therefore an indication of the exploratory ability of the model for either predicting examination success or tenure of employment post-qualification. This statistic provides the equivalent of the overall F test in multiple regression (Norusis, 1992).

However, many social scientists calculate the tetrachoric correlation (r_t) where X and Y have been reduced artificially to two categories, which in this case is where X is the actual score and Y is the predicted score. The r_t gives a coefficient that is numerically equivalent to a Pearson r and may be regarded as an approximation to it (Guilford and Fruchter, 1978). The complete equation for the r_t is however very long and complicated and the cosine-pi formula is an approximation formula that is commonly used for estimating the correlation. The most convenient formula for computation can be stated as follows:

$$r_{\text{cos-pi}} = \cos\left(\pi \frac{\sqrt{bc}}{\sqrt{ad} + \sqrt{bc}}\right)$$

where *a* represents the trainees who passed first time and are correctly predicted by the model, where *b* represents the trainees who passed first time but whom were predicted to fail, where *c* represents the trainees who failed one or more examinations

[1] The probability of the observed results, given the parameter estimates, is known as the likelihood. Since the likelihood will be less than 1, it is customary to use -2 times the log of the likelihood (2LL) as a measure of how well the estimated model fits the data. A valid model is one that results in a high likelihood of the observed results which translates to a small value for -2LL (if a model fits perfectly the likelihood is 1, and -2 times the log likelihood is 0).

but whom were predicted to pass first time and *d* represents the trainees who failed and were predicted to fail. Therefore *a* and *d* represent the like-signed cases and *b* and *c* represent the unlike-signed cases.

The assumption underlying the r_t requires that both X and Y represent continuous, normally distributed and linearly related variables. The assumptions of continuity and normality of distribution can be defended for the examination success model in that trainees who fail will range from those who marginally fail to those who experience considerable failure. Trainees who pass will also range between those who pass with flying colours to those who only marginally pass. It is therefore likely that the answers to either question represent a continuum of behaviour. Continuity and not a true dichotomy is therefore the most probable state of affairs. If the continuum argument is accepted then

> *the general law of unimodal distribution approaching normality in psychological traits may be cited in defense of the other requirement.*
>
> (Guilford and Fruchter, 1978, p312)

This will also be the case for the tenure model whereby X and Y are not truly dichotomous. Those trainees who leave their training provider within 18 months of completion of their training provider will do so within the range of 0 - 18 months. In other words some trainees will leave immediately on completion of their contract and others will leave after say 17 months. Likewise trainees who remain, may only stay until the cut-off point of 18 months, whilst others continue for longer.

In respect of both models, it should also be noted that an estimate of the r_t should not be made where the split between either those who passed and those who failed is very one-sided or where those who remained and those who left within 18 months is one-sided (Guilford and Fruchter, 1978).

The r_t will therefore be calculated in addition to the model χ^2 for the models in order that a comparison can be drawn with other studies.

4.17 Methodological issues

As standard percentages of students do not pass each sitting[2] of the ICAS examinations it is likely that the pass rates of the population will fluctuate dependent on when the examinations were taken (this will become apparent from some of the results presented in Chapter 6). This poses a methodological problem for the development of a binary state prediction model where the distribution of the criterion of interest can be skewed (Palepu, 1986). It should be noted however that although the two states of interest, namely pass all ICAS examinations at the first attempt and fail one or more examinations, could be present in the population with unequal frequencies, a random selection of the population in the Phase I Study and the whole population in the Phase II Study was circulated with the questionnaire and there is nothing to suggest that the sample in the Phase I Study is not representative of the population as a whole. It is therefore assumed that the examination statistics from the respondents will be representative of the examination statistics of the population as a whole, although this may be affected by response bias as discussed previously. There would therefore not appear to be an unequal sampling problem with the study and

[2] In an ideal world, the Examination Board of ICAS will set consistent papers which a wide and stable population will have an equally good chance of passing and stable pass rates from diet to diet could therefore be expected. The Director of Education of ICAS in a written statement 'personally contends that this does not necessarily happen'. He acknowledges that at TPC1 there have been occasional blips in particular papers but accepts that this is evened out by the number of other examinations and effective ability of the Examination Board to smooth the overly-stretching or under-demanding papers. The examination pass rates for TPC1 are therefore relatively stable over time. The same is not the case with the TPC2 examination statistics where the pass rates have ranged from 56% in 1996 to 89% in 1997. For the period in question for this study, however, the TPC2 results have been rather more consistent.

therefore no adjustment is necessary for the constant (Maddala, 1992). Likewise, as the holdout sample was also drawn from the respondents of the 1995 qualified population, assuming that there is no significant response bias, there should be no error rate estimates that fail to represent the model's predictive ability in the population.

The use of an arbitrary cut-off probability in the holdout sample for the predictive ability tests, however, does make the reported prediction accuracies difficult to interpret (Palepu, 1986) without specifying the prior state probabilities. SPSS automatically classifies the data subjects based on the comparison of the estimated examination success probability, with a pre-determined cut-off probability which is an arbitrary figure set at 0.5. Therefore if the model calculated a probability of > 0.5 the trainee was classified as a 'pass' trainee whereas if the model calculated a probability of < 0.5 the trainee was classified as a 'fail' trainee. However, Palepu (1986) suggests that the most appropriate cut-off which should be employed for a prediction exercise is the 'optimal cut-off probability'. This is calculated, for example, by plotting the distribution of the probabilities for the examination performance for the 'pass first time' and 'fail one or more' examination trainees in the same sample that is used to develop the model. The cut-off probability is the intersection point of the two plots. An optimal cut-off probability will therefore be calculated for each model and a classification will be undertaken on both the arbitrary cut-off point and also the optimal cut-off point.

4.18 Summary

This chapter examined the methodology that has been utilised for the achievement of the objectives of this research study. The chapter began by identifying the selection of the reference group. The different methods of obtaining biodata were then discussed before the structure of the chosen method of a self-reported mail questionnaire was outlined. Sample statistics and sample limitations were then identified. Finally the development of the non-parametric analysis, choice of modelling technique, and problems of multicollinearity, were discussed before the procedure for developing the final models outlined. The next four chapters consider the results of the analysis. The first of these will consider the results of the Phase I Study, with the later chapters considering the results of the Phase II Study.

CHAPTER 5

THE PHASE I STUDY

5.1 Introduction

As discussed in the literature review previous research studies have suggested that prior academic achievement is a key criteria used by recruiters of accountancy graduates. Some firms may therefore set a minimum number of UCAS points to narrow down the field of application forms[1], others may look for specific grades in subjects such as Mathematics and English[2]. Firms recruiting trainees who undertake the ICAS system of education, however, have no statistical evidence to evaluate their selection criteria in relation to successful ICAS examination performance. This chapter identifies the factors which appear to differentiate between those students who pass all their ICAS examinations at the first attempt with those who experience resits. These aspects are then related in a quantifiable manner, through the development of statistical models using logistic regression, in an effort to determine the factors predicting the ability to pass professional examinations.

[1] For example the Aberdeen office of Ernst and Young require at least 24 UCAS points for applicants with a 2.2 degree and 22 UCAS points for applicants with a 2.1 degree. David Rollo, recruiting partner with Coopers and Lybrand in Aberdeen, also acknowledges that they screen application forms on the basis of UCAS points. Other anedontal evidence was reported by Amanda McMillan who is responsible for accreditation within the Student Education Department of ICAS. She suggested that in her Degree Accreditation Working Party research work she found that firms in the main pre-select students from their application forms on the grounds of their UCAS points.

[2] For example, Chiene and Tait a medium sized firm in Edinburgh will only recruit graduates who have an A grade in both their Higher English and Mathematics.

5.2 The development of the logistic regression model for predicting examination success - the Phase I Study

The Harvey-Cook (1995) research indicated that the choice of subject was relevant in the determination of ICAEW success, both in the later stages at school (by their choice of A levels) and at University. To enable a detailed analysis to be carried out in this study, both of the choice of Higher subjects taken at school in Scotland and of the Higher results in a particular cognate area, a decision was taken to exclude those trainees who had studied for A levels at school as opposed to Scottish Highers. The original sample size of 624 was therefore reduced to 549. No further modelling work has been carried out on the remaining 75 students (12% of the original sample) who had studied A levels at school as it was felt that the sample size was too small to draw any meaningful conclusion.

Harvey-Cook (1995) suggested that honours classification was a significant predictor of ICAEW examination performance, although the English system of higher education is different to that of Scotland. Students in higher education establishments in Scotland can choose to progress down the ordinary route, graduating in three years, or down the honours route, graduating in four years. This contrasts with the English and Welsh system whereby students can obtain an honours degree in three years and the unclassified or ordinary degree as a chosen route is extremely rare. In Scotland it can be argued that some of the best students opt out of an honours degree as they wish to 'fast track' into the profession whereas in England, an unclassified degree is most often awarded when a student on an honours course has not achieved the required standard. It was therefore decided to develop separate models for Scottish unclassified and honours students in an attempt to accommodate the educational differences between the Scottish and English higher education systems.

Out of the original sample of 549 (all of whom had undertaken Highers), 183 were honours and 366 were ordinary graduates. The examination performance of these graduates in their ICAS examinations can be found in Table 5.1.

Table 5.1: Examination performance of honours and ordinary graduates - Phase I

Background	Pass first time	Fail one or more	Total
Honours graduates	105 (57%)	78 (43%)	183
Ordinary graduates	162 (44%)	204 (56%)	366

Once the variables which appear to be related to professional examination success have been identified by the examination of the Mann-Whitney scores[3], and are excluded if multicollinearity is present[4], the variables can then be reduced via a technique of automated model building. Whilst high intercorrelations of predictor variables have been identified and variables which are too highly correlated with each other excluded, there is still a possibility that certain of the remaining variables add very little to the overall prediction. This is due to the likelihood that they measure one or more of the factors which are also measured by the stronger predictors, in a redundant manner. Automated model building answers the statistical question of whether an added variable contributes enough to the existing predictors to justify including it in the final model. The technique utilised in this thesis is the forward stepwise selection for automated model building. This model selection technique uses the score statistic for entering the variable into the model. The model commences with only the constant, then at each step the variable with the smallest significance level for the score statistic is entered (provided that it is less than the chosen cut-off value, which in this case was 0.05). All entered variables are then

[3] which were obtained by comparing the group of trainees who passed all their examinations at the first attempt with the group of trainees who experienced failure.
[4] which was examined by calculating Spearman correlation coefficients for each of the variables.

examined to see if they meet the removal criteria. If no variables meet the removal criteria, the next eligible variable is entered into the model. If a variable is selected for removal and it results in a model that that has already been considered, variable selection stops. This process continues either until a previously considered model is encountered or no variables meet entry or removal criteria (Norusis, 1992).

5.3 The honours graduate model

From the questionnaire data, Mann-Whitney scores were calculated for 39 variables to identify those variables which appear to differentiate between those trainees who pass all their ICAS examinations at the first attempt with those who experience failure. These are listed in order of significance as demonstrated by the absolute Z score in Appendix 7. Of the 39 variables, 7 were significant at the 1% level, 4 variables at the 5% level and 4 variables at the 10% level. These 15 significant variables are detailed in Table 5.2.

Table 5.2: Significant background factors - honours graduates

Background factor	Absolute Z score	Level significance
Honours classification	5.9247	0.0000***
Number of resits in 2nd year at University	3.6006	0.0003***
Postgraduate qualification obtained	3.5798	0.0003***
Number of subjects retaken at Higher to improve the grade	2.9790	0.0029***
Number of UCAS points obtained	2.8199	0.0048***
Number of hours spent on sports etc. at school	2.8126	0.0049***
Higher grade in Mathematics	2.6086	0.0091***
Whether degree is relevant or not	2.4802	0.0131**
Number of resits in 1st year at University	2.4421	0.0146**
Number of resits in 3rd year at University	2.0207	0.0433**
Number of analytical Highers	2.0654	0.0389**
Number of sports or hobbies undertaken at school	1.8563	0.0634*
Number of hours spent on sports etc. at University	1.7967	0.0724*
Number of non-analytical Highers	1.7299	0.0836*
Whether sports/interests undertaken at school	1.6784	0.0933*

***= significant at the 1% level, **= significant at the 5% level,
*= significant at the 10% level

Spearman correlation coefficients were then calculated for these 15 significant variables to ascertain multicollinearity. These results are presented in Appendix 8. Relevant degree and postgraduate courses were highly correlated with a coefficient of 0.6992. Although this score is slightly less than the cut-off point as identified in the methodology chapter, it was decided to exclude one of these variables. The reason for this strong relationship is a result of the 1983-1986 system whereby, students from non-relevant degrees were required to undertake a post-graduate conversion course (as discussed in the first chapter). Many of the students who undertook post-graduate courses would therefore be non-relevant graduates and the two variables are in effect measuring the same criterion, which in this case is the relevance of the degree during the 1983-1986 system. The post-graduate variable was therefore excluded as the relevant degree variable will be of pertinence to all the ICAS educational systems, both before, during and after the change. There was also a relatively high correlation ($r = 0.6612$) between the number of hours spent per week on hobbies/interests at school and the number of hobbies taken. Once again although the coefficient was slightly less than the suggested cut-off, the number of hobbies variable was excluded on the grounds that the absolute Z score of this variable (1.8563) is less than the Z score of the number of hours spent (2.8126).

The remaining 13 variables were then entered into the logistic regression model using forward stepwise procedures. The estimated coefficients (β) and the related statistics from the logistic regression model which can be used to calculate the probability of a trainee passing their examinations at the first attempt can be found in Table 5.3

Table 5.3: Logistic regression - trainees progressing from an honours degree

Variable[5]	β	Level of Significance	Exp (β_n)
Honours classification	-1.2080	0.0000	3.3469
Number of hours spent each week on interests at school	0.2442	0.0298	0.7833
Number of subjects retaken at Higher to improve the grade	-0.7243	0.0483	2.0633
Number of resits in second year at University	-1.4740	0.0557	4.3665
Relevance of Degree	-0.6830	0.0715	1.9797
Constant	3.7002	0.0000	

Model chi-square 55.376 ($p = 0.0001$) with 5 degrees of freedom
Overall prediction classification 72.68% (for a further breakdown see Table 5.5)

[5] For an explanation of how each variable was coded see Appendix 6.

The model consists of four academic variables and a commitment variable. Ranking these in order of significance, Table 5.3 indicates that the honours classification at University is by far the most important variable, followed by, in descending order, the number of hours spent per week on interests etc. at school (commitment variable), the number of subjects retaken at Higher to improve the grade, the number of resits in second year and finally the relevance of the degree.

The resulting model can then be used to calculate the probability of a trainee passing their ICAS examinations at the first attempt. Taking into consideration the coding of each of the variables contained within the model, it follows that the better the classification of degree and the more hours spent each week on interests at school, the higher is the probability of passing first time. The greater are the number of subjects retaken at Higher to improve the grade and the greater the number of resits in second year at University, the lower is the probability of passing first time. Finally if a trainee undertakes a relevant degree, the probability of passing first time is higher.

The relative importance of coefficient n is measured by exp (β_n) which denotes the factor by which the odds ratio increases for a one unit change in the variable. For example, if the exp (β_n) score for honours classification is considered (3.3469), *ceteris parabis*, a lower classification at University, say for example a lower second instead of an upper second class degree, will reduce the odds[6] of the student passing by 3.3469. A subject retaken at Higher to improve the grade would only reduce

[6] The odds of an event occurring are defined as the ratio of the probability that it will occur to the probability that it will not.

the odds of the student passing by 2.0633. On this basis, the most salient measures of the model are the number of resits in second year at University, closely followed by the honours classification, with the number of subjects retaken at Higher to improve the grade, the relevance of the degree and the number of hours spent each week on interests at school ranking third, fourth and fifth respectively.

Utilising fictitious trainee profiles to demonstrate the model, the probabilities of different trainees passing their ICAS examinations would be as follows:

Trainee A achieved a 1st class degree in Accountancy. No subjects were retaken at Higher grade to improve the grade at school, no resits were encountered at University and 5 hours were spent on interests at school per week. The probability of passing the ICAS examinations first time would be 89% (the odds of this student passing first time would be 8.09). However if trainee B revealed the same profile but with a 2.1 degree, the probability would be reduced to 70% (the odds of this student passing first time would be reduced to 2.33[7]). Trainee C only achieved a 3rd class degree in Mathematics at University, having experienced 2 resits in 2nd year. No outside interests were undertaken at school and 2 subjects were retaken at Higher to improve the grade. The probability for this student is only 1% of passing the ICAS examinations without resits (the odds of this student passing first time are 0.01).

[7] The reduction in the odds between Trainee A and Trainee B arising from the reduction in the degree class from a 1st to a 2.1 can be computed by dividing the odds of student A , 8.09, by 3.3469 which is the relative importance of the degree classification variable. This will result in the odds of Trainee B being 2.41. The difference between the 2.41 and the calculated odds of 2.33 arises due to rounding adjustments.

The relative importance of each of the variables is also demonstrated in Table 5.4 through the examination of the impact that a change in one of the variables will have on the overall probability of a student passing their examinations without any resits.

Table 5.4: Illustrative honours graduates' profiles

	Graduate A	Graduate B	Graduate C	Graduate D	Graduate E	Graduate F
Honours classification	2.1	2.2	2.1	2.1	2.1	2.1
Number of hours spent each week on interests at school	15	15	10	15	15	15
Number of subjects retaken at Higher to improve the grade	0	0	0	1	0	0
Number of resits in second year at University	0	0	0	0	1	0
Relevance of degree	R	R	R	R	R	NR
Probability of passing first time	79%	53%	75%	65%	47%	66%

It can be seen from Table 5.4 therefore that although the honours classification is the most statistically significant variable, the biggest impact on the probability of a student's success is that relating to the number of resits in second year at University, which is demonstrated by the fall in probability from 79% of student A to 47% for student E. The next most important variable in terms of the impact that a change will have on the overall probability is that of the honours degree classification, with little to differentiate between the variables which consider the number of subjects retaken at Higher to improve the grade and the relevance of the degree. The smallest impact on the overall probability occurs with a change in the number of hours spent each week on interests at school.

The model Chi-square of 55.376 reported in Table 5.3 measures the extent to which the variables have explanatory power is significant at the 1% level. This suggests that the combination of the variables contained in the model can be significantly related to the ICAS examination performance.

As the ultimate objective of the model is selection, further information is required on the overall prediction classification of 72.68% which is the probability of correctly classifying a trainee. This prediction classification is a derivative of the classification matrix which uses the criterion: predict trainee 'a' as successful if the probability of trainee 'a' > 0.5, otherwise predict trainee 'a' as unsuccessful. However, if the optimal cut-off is calculated, as discussed in the methodology chapter, Figure 5.1 reveals that 0.50 is only one of the optimal cut-off points for the classification of trainees.

Figure 5.1: Optimal cut-off point for honours graduates

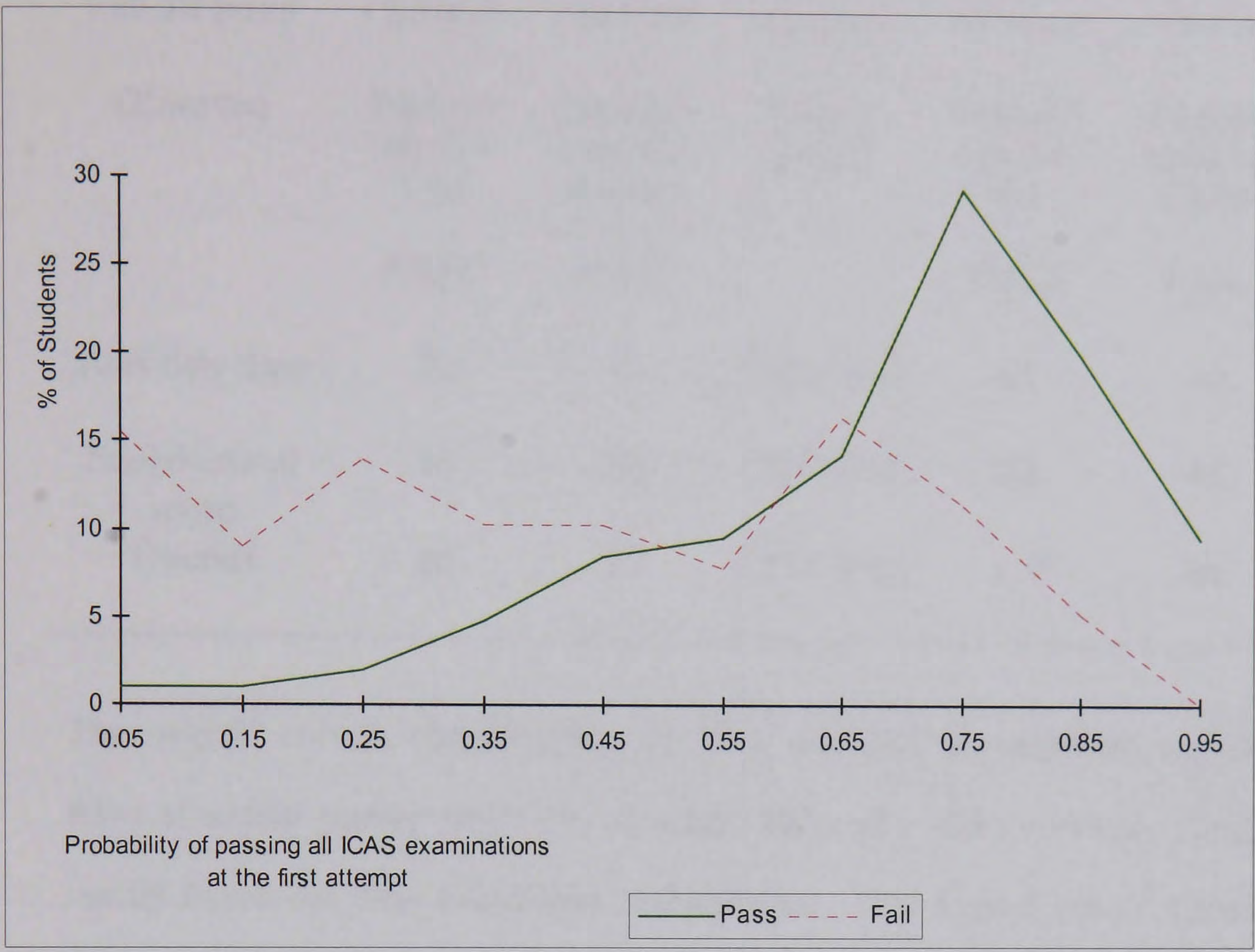


Figure 5.1 reveals that there are three optimal cut-off points. At each of these points the optimum classification of trainees would occur, although the balance of correctly classified 'pass' and 'fail' trainees would alter in each case. As the cut-off point at 0.66 is the final point were the 'pass' line crosses the 'fail' line and is therefore the point at which there is a consistent difference in the probabilities of the two groups of students, it was decided to utilise 0.66 as the optimal cut-off point. The classification of the honours trainees based on both the optimal cut-off and the arbitrary cut-off is contained in Table 5.5.

Table 5.5: Classification table for honours graduates - based on the optimal cut-off point of 0.66 and the arbitrary cut-off point of 0.5

Cut-off point	Optimal	Optimal	Optimal	Arbitrary	Arbitrary	Arbitrary
Observed	Predicted pass first time	Predicted failed one or more	Percent Correct	Predicted pass first time	Predicted failed one or more	Percent Correct
	PASS	FAIL		PASS	FAIL	
Pass first time	70	35	105 (67%)	87	18	105 (83%)
Failed one or more	16	62	78 (79%)	32	46	78 (59%)
Overall	86	97	183 (72%)	119	64	183 (73%)

The overall correct classification of 73%[8] utilising the arbitrary cut-off represents 83% of actual passes and 59% of actual fails who were correctly classified by the model based on their calculated probabilities. The Type I errors[9] (predicting a fail when in fact there was a pass outcome) are therefore 17% and Type II errors[10] (predicting a pass when in fact there was a fail outcome) are 41% respectively.

[8] The number of students correctly predicted as pass students based on random selection is calculated as (119x105)/183 = 68, likewise the number of students correctly predicted as failure students based on random selection is (64x78)/183 = 27. The overall chance of classification of correctly classifying a student can therefore be computed as follows: (68+27)/183 = 52% The difference between the correct classification and the chance classification is statistically significant as demonstrated by the Pearson $\chi^2 = 34.4$ (p=0.0001).

[9] The Type I error is the probability of rejecting the null hypothesis wrongly, which in this case is predicting a fail when in fact the student passed.

[10] The Type II error is the probability of accepting the null hypothesis wrongly, which is in this case predicting a pass when in fact the student failed.

Although the overall classification remains very similar when the optimal cut-off point is used, with a correct overall classification of 72%[11], the Type I and II errors are now 33% and 21% respectively. There is now a more balanced classification of trainees which for a graduate selection model may be more acceptable. Whilst there is an actual cost in respect of a Type II error whereby a firm could recruit a student who then fails, there is an opportunity cost for a Type 1 error, as the firm could reject a student who would have been successful. The utilisation of the optimal cut-off point has therefore resulted in a saving of Type II errors (a movement from 41% to 21%). However, this has been partially offset by an increase in the Type I error from 17% to 33%.

To enable comparison with other studies, the tetrachoric correlation coefficient (r_t) can also be calculated and the resulting correlation rounded to two decimal places of 0.65 for the classification based on the arbitrary cut-off point and 0.66 for the classification based on the optimal cut-off point are impressive. However, the utility of the honours graduate model is dependent on the ability of that model to correctly classify trainees who have not been used to develop the model in the first instance. It is necessary therefore to validate the model on another data set.

5.4 The honours graduate holdout sample

It is expected that a model which has been developed on a particular data set will perform well in the classification of subjects making up the developmental group. The real value of any model is therefore assessed by the ability of the model to perform on a new data set. It is necessary therefore to apply the exploratory model to a different

---

[11] The number of students correctly predicted as pass students based on random selection is calculated as (86x105)/183 = 49, likewise the number of students correctly predicted as failure students based on random selection is (97x78)/183 = 41. The overall chance classification of correctly classifying a student is therefore (49+41)/183 = 49%. The difference therefore between the overall correct classification and the chance classification is statistically significant as demonstrated by the Pearson χ^2 of 38.3 (p=0.0001).

data set in order to validate the model's predictive ability. The model was therefore validated on trainees who qualified in the years 1993 and 1994[12] (this group of trainees are also used to develop further models which are discussed later). From the data collection exercise of the 1993 and 1994 trainees, 227 completed questionnaires were received from honours graduates who had undertaken Highers at school. The ICAS examination statistics for this group noted that 60.8% (138 out of 227) passed first time and 39.2% (89 out of 227) experienced resits. However as one of the honours graduates who had encountered a resit did not provide information for all the pertinent variables included within the honours graduate model, the number of honours' graduates who had incurred resits for the holdout sample was reduced to 88.

Once again, a classification will be undertaken utilising both the optimal cut-off, as derived from the developmental sample, and the arbitrary cut-off point. The classification matrices for the holdout sample are contained in Table 5.6.

[12] Whilst it is recognised that this holdout group of students would in the main have only undertaken the new system of education and training within ICAS, it is still a useful exercise to determine whether the model developed on the hybrid system of education does in fact predict performance under the new system - this is discussed later in the chapter.

Table 5.6: Classification table for honours graduates - holdout sample

Cut-off point	Optimal	Optimal	Optimal	Arbitrary	Arbitrary	Arbitrary
Observed	Predicted pass first time	Predicted failed one or more	Percent correct	Predicted pass first time	Predicted failed one or more	Percent correct
	PASS	FAIL		PASS	FAIL	
Pass first time	49	89	138 (36%)	76	62	138 (55%)
Failed one or more	18	70	88 (80%)	33	55	88 (63%)
Overall	67	159	226 (53%)	138	88	226 (58%)

Table 5.6 reveals that the overall prediction classification of 58%[13] based on the arbitrary cut-off point of 0.5 is a combination of 55% correct pass predictions and 63% of correct fail predictions. The resulting Type I and Type II errors are therefore 45% and 37% respectively. The overall classification of 53%[14] based on the optimal cut-off point derived from the developmental sample not only reveals a reduction in the overall prediction classification but also shows a further increase in the Type I error to an unacceptable level of 64% (from 45%) and a reduction in the Type II error to 20% (from 37%). This would suggest that the optimal cut-off point as derived from the developmental group is not relevant for the hold-out group, and that a new optimal cut-off point should be calculated. The results are shown in Figure 5.2.

[13] The number of students correctly predicted as pass students based on random selection is calculated as (109 x 138)/226 = 67, likewise the number of students correctly predicted as failure students based on random selection is (117 x 88)/226 = 46. The overall chance classification of correctly classifying a student can therefore be computed as follows: (67 + 46)/226 = 50%. The difference between the correct classification and the chance classification is statistically significant as demonstrated by the Pearsonχ^2 = 6.65 (p=0.10).

[14] The number of students correctly predicted as pass students based on random selection is calculated as (67x138)/226 = 41, likewise the number of students correctly predicted as failure students based on random selection is (67x138)/226 = 41. Likewise the number of students correctly predicted as failure students based on random selection is (159x88)/226 = 62. The overall chance classification of correctly classifying a student can therefore be computed as follows: (41+62)/226 = 46%. This is statistically significant difference as evidenced by the Pearson χ^2 of 5.8 (p=0.016).

Figure 5.2: Optimal cut-off point derived from the validation sample

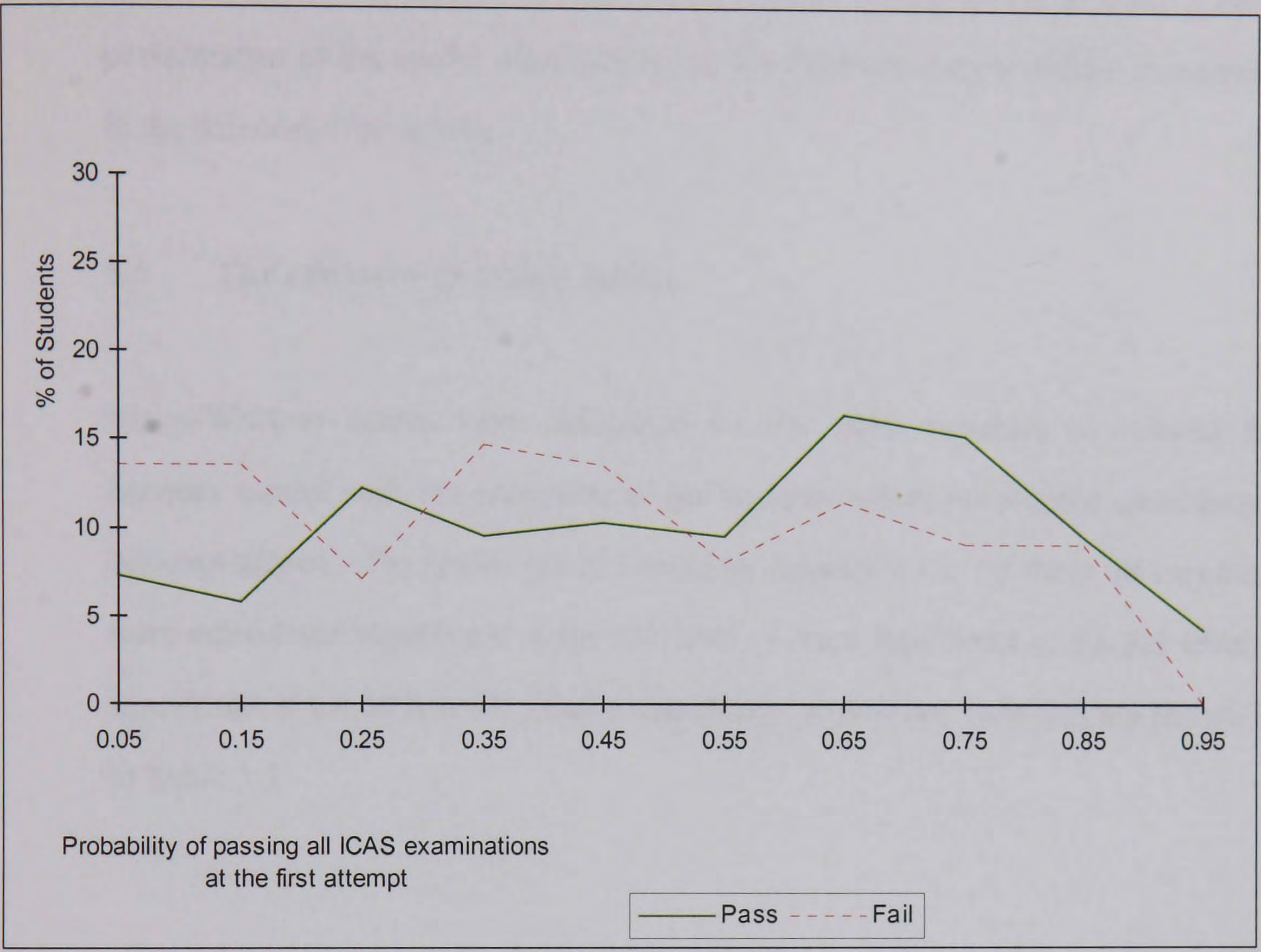


Figure 5.2 reveals that although there are several optimal cut-off points, the point at which there is a consistent difference between the 'pass' and 'fail' lines is 0.52 and this is broadly similar to the arbitrary cut-off point and substantially short of the optimal cut-off point as derived from the developmental sample. It would therefore appear that there is an instability in the optimal cut-off point based on this model when it is applied to the hold-out group. This obviously has implications for the utility of the model as a training provider would need to be able to identify the base point at which the prediction classification is relevant.

Notwithstanding the apparent instability of the optimal cut-off point there is also a disappointing reduction in the overall prediction classification from 73% in the developmental data set in comparison to 58% for the validation data set. The r_t also shows a significant reduction, with a relatively poor correlation of 0.27. The poor performance of the model when applied to the hold-out sample will be examined later in the discussion of results.

5.5 The ordinary graduate model

Mann-Whitney scores were calculated for the same variables as utilised for the honours model with the exception of the variable which considered classification of honours degree. The results are presented in Appendix 10. Of these 38 variables, 10 were considered significant at the 1% level, 4 were significant at the 5% level and 3 significant at the 10% level. These statistically significant variables are shown below in Table 5.7.

Table 5.7: Significant background factors - ordinary graduates

Background factor	Absolute Z score	Level significance
Number of A grades at O Grade	5.1323	0.0000***
O Grade score[15]	4.4897	0.0000***
Number of UCAS points obtained at Higher	4.1749	0.0000***
Number of resits in second year at University	3.4855	0.0005***
Number of resits in third year at University	3.1968	0.0014***
Number of resits in first year at University	3.1351	0.0017***
Higher grade in English	3.1068	0.0019***
No of subjects retaken at Higher to improve the grade	2.9526	0.0032***
Higher grade in Mathematics	2.8229	0.0048***
Language Higher score[16]	2.5948	0.0095***
Respondent's gender	2.4417	0.0146**
Number of language Highers	2.4248	0.0153**
Took French Higher	2.2870	0.0222**
Type of University	2.2024	0.0276**
Science Higher score[17]	1.8266	0.0678*
Whether sports/interests undertaken at University	1.6915	0.0907*
Number of sports/interests undertaken at school	1.6557	0.0978*

***= significant at the 1% level, **= significant at the 5% level,
*= significant at the 10% level

The Spearman correlation coefficients were then calculated for these 17 significant variables to determine multicollinearity. (See Appendix 11). As discussed in the methodology chapter, pairwise correlations of greater that 0.70 were identified and a decision taken on the exclusion of these variables. Not surprisingly, the O grade score and number of O grades passed at A grade were very highly correlated with a coefficient of 0.9097. Similarly, the UCAS point score attributable to language Highers and the number of language Highers studied were also closely related with a

[15] Based on 3 points for an A pass, 2 points for a B pass and 1 point for a C pass.
[16] Based on 6 points for each A pass, 5 points for each B pass, 4 points for each C pass and 3 points for each pass with no grade, 2 points for each D pass and 1 point for an E pass in French, German, Latin or other secondary language.
[17] Based on the same scores for language Highers: 6 points - A grade etc. in Biology, Chemistry and Physics.

coefficient of 0.9817. On a similar theme, the variable which considered whether French was taken as a Higher subject or not, and both the language Higher score and the number of language Highers taken, were also correlated with scores of 0.8696 and 0.8861 respectively. From each of these pairings, one of the highly correlated variables needs to be excluded from any further modelling. As the number of A grades at O level achieves a slightly higher absolute Z score of 5.1323, in comparison to 4.4897 for the O grade score (See Appendix 11), the O grade score variable was excluded. The language Higher score variable (Z score of 2.5948) was retained at the expense of both the number of language Highers (Z score of 2.4248) and the took French Higher variable (Z score of 2.2870).

It should also be noted that the gender variable achieved an absolute Z score of 2.4417 which was significant at 5%. This implies that gender does have an impact on performance[18], although recruiting firms would not be allowed to discriminate on the grounds of sex, irrespective of the differential in performance. If gender differences do exist however it is necessary to control for these differences in further modelling. As the gender variable is not highly correlated with any of the other statistically significant variables (see Appendix 11), gender would not appear to have an impact on the other variables. However it was decided to develop the model with both the gender variable included and excluded in order to ascertain any differences. The resulting models using the forward stepwise approach were exactly the same. Therefore although gender was a statistically significant variable from the univariate analysis, it was excluded from the model by the stepwise procedure as it did not add any further significance to the overall model. This is hardly surprising when the

[18] Taking into consideration the coding of the variable, females perform better than their male counterparts.

significance levels of the background factors are considered in Table 5.7. The gender variable was only significant at 5%, with 10 other variables attracting a significant level of 1%. The resulting model can be found in Table 5.8, which follows the same format as the honours model, identifying estimated co-efficients (β) of each variable, the level of significance of each variable and the relative importance of each variable (Exp (β_n)).

Table 5.8: Logistic regression - trainees progressing from an ordinary degree

Variable	β	Level of Significance	Exp (β_n)
Number of resits in second year at University	-0.7221	0.0013	2.0588
Number of A grades at O level	0.1453	0.0187	0.8648
Total UCAS points	0.0418	0.0178	.9591
Number of subjects taken to improve the grade at Higher	-0.5325	0.0314	1.7032
Constant	-1.8291	0.0003	

Model chi-square 41.165 (p=0.0001) with 4 degrees of freedom
Overall prediction classification 64.48% (for a further breakdown see Table 5.10)

The model consists of four academic variables and, ranking these in order of significance, Table 5.8 reveals that the number of resits in second year at University is the most important variable, followed by, in descending order, the number of O levels at A grade, the total UCAS points achieved and the number of subjects retaken at Higher to improve the grade.

Once again taking into consideration the coding of each of the variables as identified in Appendix 6, it follows that the greater is the number of O grades at A pass and the greater is the number of UCAS points, the greater is the probability of passing first time. In a similar fashion to the honours graduate model, the greater is the number of subjects retaken at Higher to improve the grade and the greater is the number of resits in second year, the lower is the probability of passing first time.

As discussed in the previous model, the exp (β_n) reveals the proportion by which the odds ratio increases for a unit change in variable n. For example, if the exp (β_n) score for number of resits at University is considered (2.0588), *ceteris parabis*, an additional resit in year 2 at University will increase the odds of the student failing by 2.0588. On this basis (conditional on all the other predictor values remaining unchanged) the number of resits in second year at University is the most salient measure, followed by the number of subjects retaken at Higher to improve the grade, with the total number of UCAS points and number of A grades at O level ranking third and fourth.

The model can best be demonstrated by considering the illustrative profiles of various trainees. If trainee A encountered no resits in second year at University, achieved 8 A grades at O level, achieved 25 UCAS points and did not resit any subjects at Higher to improve the grade, the probability of this trainee passing their examinations first time would be 59% (the odds of this student passing first time would be 1.43). However if trainee B revealed the same profile with the exception of the number of resits in second year at University, whereby one resit was experienced, the probability would be reduced to 41% (the odds would be reduced to 0.69[19]). At the other end of the spectrum, trainee C encountered 2 resits at University in 2nd year, achieved 3 A grades at O level, achieved 18 UCAS points and resat 2 subjects at Higher to improve the grade. This trainee would have the very low probability of passing their ICAS examinations first time of 4% (the odds of this student passing first time would be 0.04). Table 5.9 is a further presentation of illustrative trainee profiles. The information contained in the Table however also demonstrates the impact that a change in one of the variables will have on the overall probability of a student passing their ICAS examinations at the first attempt.

Table 5.9: Illustrative ordinary graduates' profiles

	Graduate A	Graduate B	Graduate C	Graduate D	Graduate E
Number of resits in second year at University	0	1	0	0	0
Number of A grades at O Grade	7	7	6	7	7
Total UCAS points	22	22	22	21	22
Number of subjects taken to improve the grade at Higher	0	0	0	0	1
Probability of passing first time	53%	35%	49%	52%	40%

[19] The reduction in the odds between Trainee A and Trainee B arising from the resit encountered at 2nd year at University can be computed by dividing the odds of student A , 1.43, by 2.0588 which is the relative importance of the 2nd year resit variable. This will result in the odds of Trainee B being 0.69.

Table 5.9 reveals the impact that a change in one of the variables will have on the overall probability of a student passing their examinations without any resits. It can be seen that the biggest impact on the probability of a student's success is that relating to the number of resits in second year at University, which is demonstrated by the fall in probability from 53% of student A to 35% for student B. The next most important variable in terms of the impact which a change will have on the overall probability, is that of the number of subjects taken to improve the grade at Higher. There is little to differentiate between the variables which consider the number of A grades at O grade and the total number of UCAS points, whereby a one point or one subject difference will have a minimal impact.

Once again the χ^2 of 41.165 is a demonstration of the overall fit of the model. As this statistic is significant at the 1% level, this demonstrates that the variables as identified in the model can be significantly related to examination performance.

As the objective of the model is for selection purposes, further information is required on the overall prediction classification of 64.48%, which is the probability of correctly classifying a trainee. This prediction classification is a derivative of the classification matrix which uses the criterion: predict trainee 'a' as a successful trainee if the calculated probability of trainee 'a' > 0.5, otherwise predict trainee 'a' as unsuccessful. However, the optimal cut-off point should be calculated in order to evaluate whether the arbitrary figure of 0.5 is appropriate. The results are contained in Figure 5.3.

Figure 5.3: The optimal cut-off point for the ordinary graduates

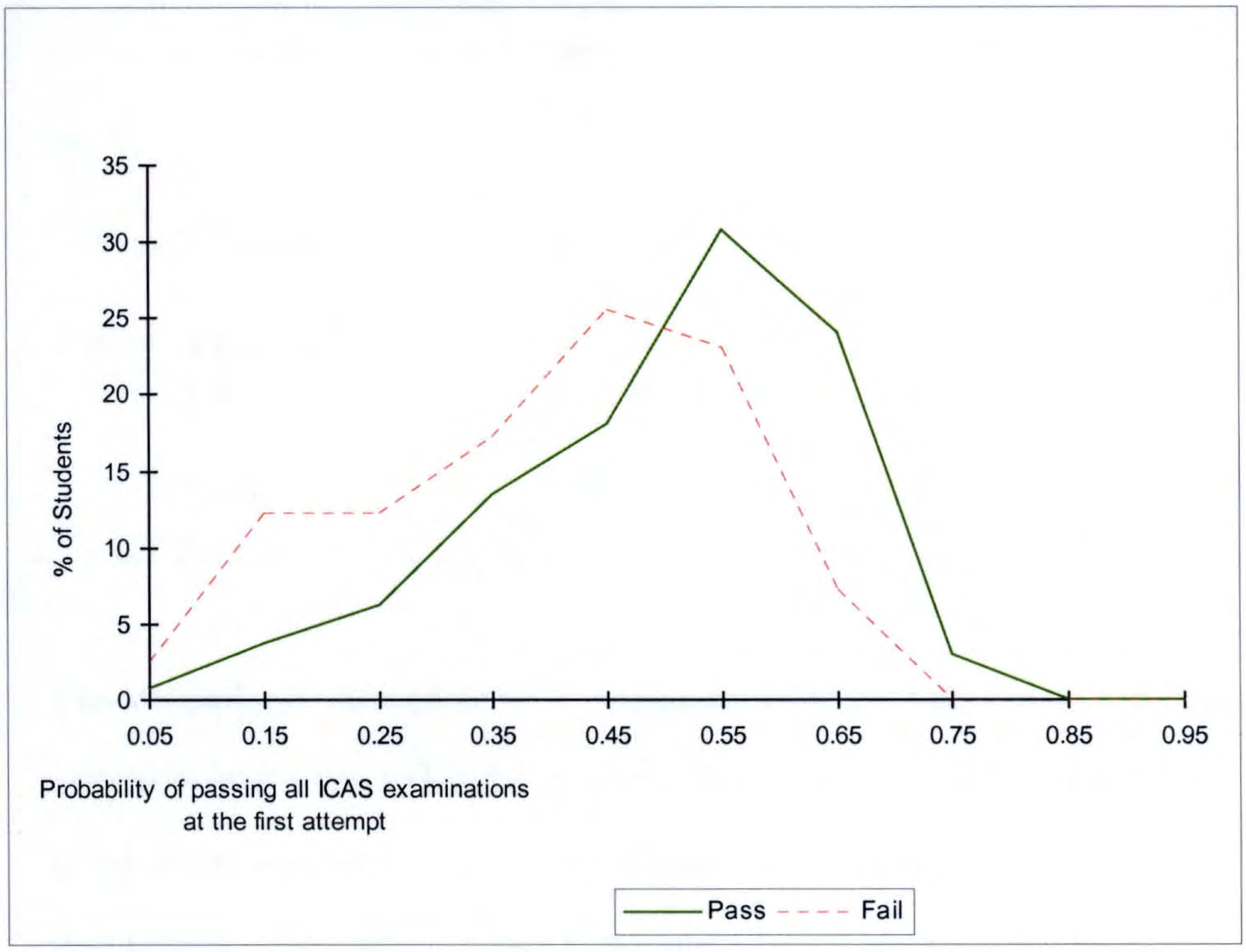


Figure 5.3 demonstrates that 0.5 is indeed the optimal cut-off point and it is therefore appropriate to proceed with the classification of trainees based on this cut-off. The results are contained in Table 5.10.

Table 5.10: Classification table for ordinary graduates

Observed	Predicted pass first time PASS	Predicted failed one or more FAIL	Percent correct
Pass first time	94	68	162 (58%)
Failed one or more	62	142	204 (70%)
Overall	156	210	366 (65%)

The overall hit rate of 65%[20] represents 58% of actual first time pass trainees as correctly classified and 70% of actual fail trainees correctly classified. Type I errors (predicting a fail when in fact there was a pass outcome) are 42% and Type II errors (predicting a pass when in fact there was a fail outcome) of 30%.

The r_t of the ordinary graduate model is 0.43 and whilst this is not so impressive as the r_t as reported for the honours graduate model, it is still a commendable correlation. This will be discussed later in the discussion of the models.

5.6 The ordinary graduate holdout sample

In a similar fashion to the honours graduate model it is necessary to apply the exploratory model to a different data set in order to validate the model's predictive

[20] The number of students correctly predicted as pass students based on the random selection is calculated as (156x162)/366 = 69, likewise the number of students correctly predicted as failure students based on random selection is calculated as (210x204)/366 = 117. The overall chance classification of correctly classifying a student can therefore be computed as follows: (69 + 117)/366 = 50.8%. The difference between the probability of correct classification and correct classification based on random selection is statistically significant as reported by the Pearson χ^2 =28.2 (p=0.0001).

ability. The model was therefore also validated on trainees who qualified in the years 1993 and 1994. From the data collection exercise of the 1993 and 1994 trainees, 267 completed questionnaires were received from ordinary graduates who had undertaken Highers at school. The ICAS examination statistics for this group identified that 52.4% (140 out of 267) passed first time and 47.6% (127 out of 269) experienced resits. However as 14 of the ordinary graduates (7 of these had passed first time and 7 had encountered resits) who completed questionnaires did not provide information for all the pertinent variables included within the ordinary graduate model, these graduates were therefore excluded from the holdout sample, reducing the numbers to 133 who passed first time and 120 who had incurred resits.

The classification matrix for the holdout sample is contained in Table 5.11.

Table 5.11: Classification table for ordinary graduates - holdout sample

Observed	Predicted pass first time PASS	Predicted failed one or more FAIL	Percent correct
Pass first time	85	48	133 (64%)
Failed one or more	59	61	120 (51%)
Overall	144	109	253 (58%)

Table 5.11 reveals that the overall prediction classification is 58%[21] which is a combination of 64% of actual passes which are correctly classified and 51% of actual fails who are correctly classified. The resulting Type I and Type II errors are

[21] The number of students correctly predicted as pass students based on random selection is calculated as (144 x 133)/253 = 76, likewise the number of students correctly predicted as failure students based on random selection is (109 x 120)/253 = 52. The overall chance classification of correctly classifying a student can therefore be computed as follows: (76 + 52)/253 = 50%. The difference between the correct classification and the chance classification is statistically significant as demonstrated by the Pearson $\chi^2 = 5.6$ (p=0.018).

therefore 36% and 49% respectively. Although there has been a small movement in the Type I error from the developmental sample to the holdout sample, with a reduction from 42% to 36%, there is a large rise in the Type II error from 30% to 49%. This would suggest that, whilst the model does successfully classify the students at a better than chance rate, the model is not very effective in the prediction of the performance of the failed trainees in the holdout sample. The weak dicriminatory powers of the model are also reflected in the lower r_t of 0.23.

The stability of the optimal cut-off point can also be examined by calculating the optimal cut-off point based on the hold-out sample. The results are contained in Figure 5.4.

Figure 5.4: Optimal cut-off point for ordinary graduates - the hold-out sample

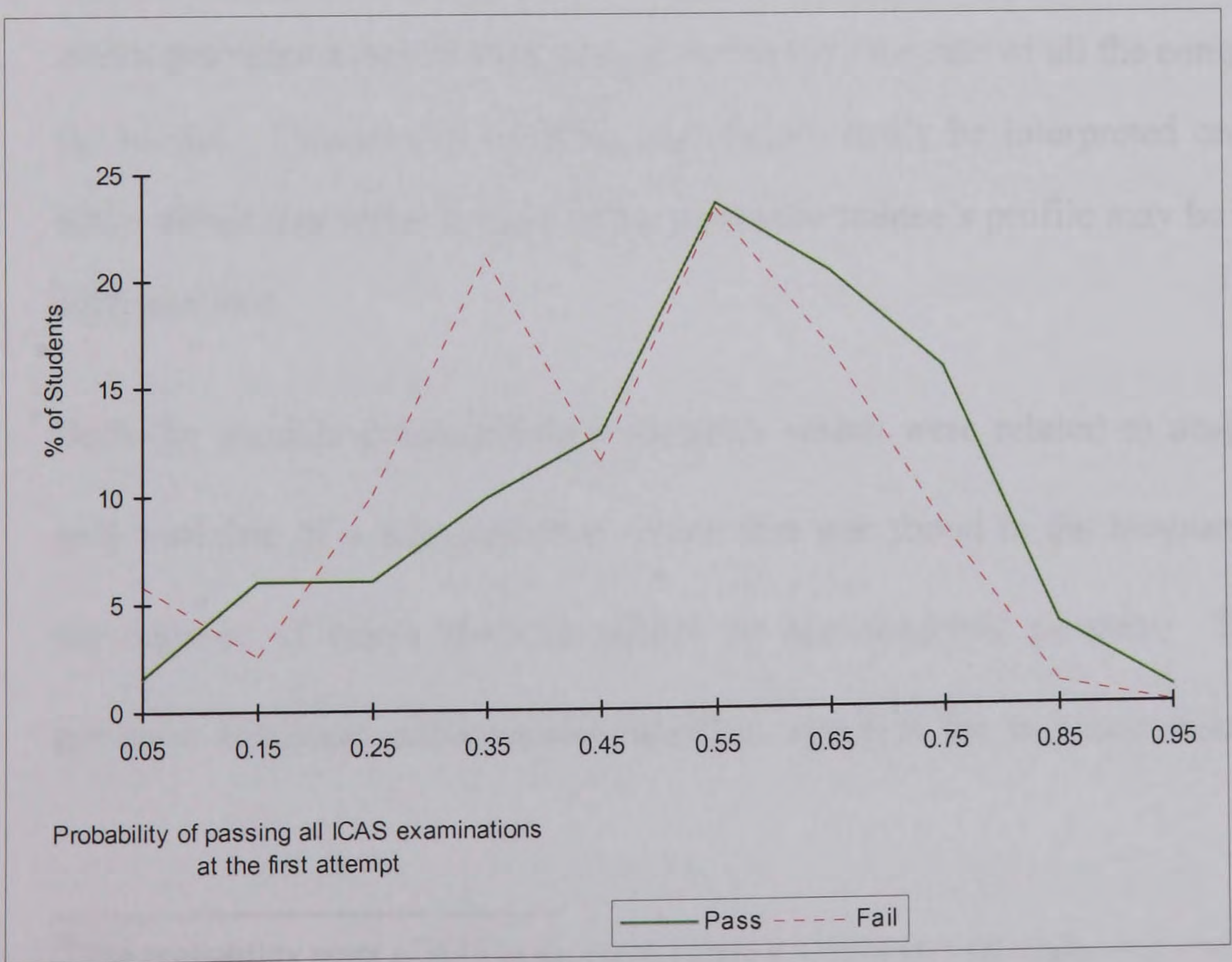


Figure 5.4 shows that the optimal cut-off point whereby there is a consistent difference between the 'pass' and 'fail' line is at 0.55. However it should be noted that there is almost a mirror image of the two lines between 0.45 and 0.55 which suggests that similar percentages of pass and fail students are calculated to have probabilities in the region of 40 - 60%[22]. It should also be noted that the highest percentage of both pass and fail students are found in the decile of 50 - 60%. This would suggest that the model results in probabilities which are bunched in this region irrespective of performance and therefore fails to differentiate students in any meaningful manner. This is reflected in the marked deterioration in the ordinary model's predictive ability when applied to a different data set, with a reduction in the r_t from 0.43 for the developmental group down to 0.23 for the hold-out group.

5.7 Discussion

Before a discussion of the models takes place it is necessary to stress that a multivariate approach combines a number of independent variables simultaneously, which provides a model with greater power than the sum of all the component parts of the model. Component variables should not really be interpreted on an individual basis, albeit that some insight into a particular trainee's profile may be ascertained by such analysis.

Both the models contained four variables which were related to academic issues. The only variable of a non-academic nature that was found in the honours model related to the number of hours spent at school on non-academic pursuits. The importance of previous academic achievement therefore supports the previous research as identified

[22] The probability point of 0.45 as shown in Figure 4.4 represents the decile of probabilities which range from 40 - 50%. Likewise the probability point of 0.55 represents the decile of probabilities from 50 - 60%.

earlier. Of particular interest are those elements of previous academic history which appear to be most important in the relationship with successful ICAS examination performance.

5.7.1. Common features of the honours and ordinary models

5.7.1.1. School performance

It is interesting to note that school performance (however defined) is not the most significant variable in either model, which suggests that other elements of background history are more important for the prediction of ICAS examination success. Recent academic achievement as in University performance has more relevance, as evidenced by the statistical significance of University achievement factors than earlier school performance as evidenced by the number of UCAS points for example. Both models, ordinary and honours, include a variable however which considers the number of subjects retaken at Higher to improve the grade. The greater is the number of subjects taken, the less is the likelihood of passing the ICAS examinations first time. This variable identifies those trainees who resat their higher subjects in 6th year with a view to achieving a better grade. It may be that pupils who followed this approach were dissatisfied with their original grade and by applying more effort the resit could result in an enhanced performance. If this were the case then the suggestion is made that this variable is a motivational measure in that students who have applied themselves for the initial sitting would not gain any additional benefit by undertaking the subject once more.

On the other hand, this variable may simply be a reflection of academic ability, whereby trainees who resat some of their 5th year Higher subjects again in 6th year in order to obtain better grades are weaker candidates than those who achieved an acceptable grade at the first attempt.

5.7.1.2. University performance

A university related variable common to both models is that which considers the number of resits encountered at second year University level. This would demonstrate that second year resits at University have an impact on professional examination performance, with the greater number of resits in second year at University suggesting the less is the likelihood of passing the ICAS examinations first time. Although the variables which considered resits in both first and third year (no resits are allowed in the fourth and final honours year at University) were also significant in the Mann-Whitney analysis, neither the first year resit or third year resit variables were found in the models, which suggested that these background history factors were less relevant in the determination of ICAS examination success. One explanation could be that resits in the first year are often caused, not by an academic inability of the student, but by the inability of the student to adapt to University life. By the second year of a University degree however, students should have adjusted to the new style of learning and failure at this level may be more indicative of an inability to cope with this higher level work. This may be of particular relevance for students on fully-accredited degree programmes. If they are struggling with technical accountancy related subjects which are then deemed to be assumed knowledge for TPC1 of their ICAS examinations, this could have an impact on future performance.

5.7.2. Variables unique to the honours model

The most significant variable in the honours model is the honours classification, suggesting that the better is the honours degree class, the greater is the likelihood of incurring no resits in the professional examinations. This variable supports the findings of Harvey-Cook (1995) who also found that honours classification was the most significant in her study. It can be argued that this is a quantifiable determination of recent academic ability. This is not however available in respect of the ordinary graduates and the training providers are faced with the problem of differentiating in the selection process between a commendable or merely adequate ordinary performance.

The other academic variable in the honours model is concerned with the relevance of the undergraduate degree. Although the ICAEW results suggest that non-relevant students perform better in the ICAEW system than the relevant graduates (Kakar, 1992), this may be due to the shortage in England and Wales of relevant graduates available for training places. As this is not the case in Scotland, there is the expectation that relevant honours graduates will perform better than non-relevant honours graduates in the ICAS system. This indeed is the case as the model demonstrated that having a relevant degree is a positive background factor for ICAS examination success. Care however needs to be exercised here as there was a significant change to the training and examination system for non-relevants in 1988 as discussed previously, and this appears to have had an impact on the examination performance of non-relevant graduates who were recruited after this change. This will be discussed further in Chapter 6. This background factor may therefore not be relevant for a population of students who are educated entirely via the 1988 education system and this may be the reason for the relatively poor performance of the honours graduate model when applied to the holdout sample who were indeed all educated under the new system.

The remaining variable in the honours model is that concerned with the number of hours spent per week on interests during school. It may be expected that the greater is the number of hours spent on interests at school, suggesting a lack of commitment on behalf of the individual to their academic work, the smaller is the chance of success in the professional examination system. The model however revealed that the greater is the number of hours spent on interests at school, the greater is the likelihood of passing the ICAS examinations first time. This result is contrary to expectations. One possible explanation however could be as follows: consider two candidates with similar UCAS point scores; one who spends many hours on non-academic activities, thus necessitating a balance of time spent between academic and other interests and the other with no non-academic interests therefore concentrating solely on academic work. It could be argued that the UCAS point score of the former is not necessarily a true indication of academic ability, and that these students are not comparable in academic terms.

5.7.3. Variables unique to the ordinary model

The number of A grades at O grade and the total UCAS point score, both school related variables, are found in the ordinary model and this is similar to the Marcus Dunn and Hall (1984) study. Both these variables are notable omissions from the honours model where honours classification appears to supersede earlier performance. Harvey-Cook (1995) also found the number of A grades at the equivalent of the Scottish O grade a significant predictor in their model, despite the inclusion of a variable for honours classification. The coding of the honours variable in the ICAEW study was different however in that it simply considered whether graduates had achieved at least a 2.1 degree classification or not, as opposed to differentiating between each particular degree class.

5.7.4. Notable omissions

Despite the importance of the high school grade in Mathematics and English in the determination of undergraduate accounting performance, as suggested by Clark and Sweeney (1985), Eskew and Faley (1988), Gul and Fong (1993), the variables relating to the grade in English and Mathematics obtained at Higher are not included in either model. Likewise, the type of school attended, as found significant by Harvey-Cook (1995) and Gul and Fong (1993) in the determination of undergraduate and professional accountancy success, was also not included. The grade in Higher Mathematics was seen as a significant individual background factor for both the honours and ordinary graduates and the grade in Higher English a significant factor only for the ordinary graduates.

However in the model building exercise these variables were excluded as they did not contribute in any significant manner to the profile of variables which predicted ICAS examination performance. Firms which therefore look for specific grades in these subjects may not be using the most effective factors to determine the ICAS examination performance of their applicants. The type of school attended was not a statistically significant variable for either the honours or ordinary graduates and was therefore not entered into the model building exercise.

5.8 Summary

Although there have been studies identifying the relationship between candidate attributes and job success, there is very little research relating this to the field of accountancy, particularly within the United Kingdom. Using the multivariate statistical technique of logistic regression, two models were developed which describe the relationship between passing the ICAS examinations first time and the biodata of trainee accountants. Separate models were developed for ordinary and honours graduates in order to account for the Scottish higher education system.

The first model examined honours graduates and resulted in a model $\chi 2$ which was significant at the 1% level. This model contained five variables, three relating to academic performance at University, one relating to school performance and the only non-academic variable relating to the number of hours spent on outside interests whilst at school. The honours classification appeared to supersede school performance as measured by the UCAS point score achieved at school, which was a notable omission from the honours model.

The second model concentrated on ordinary graduates and resulted in a model χ^2 significant at the 1% level. The model contained four variables, all of which were related to academic performance. Three of the variables related to school performance but the most significant variable was concerned with the University performance as demonstrated by the number of resits encountered in the second year of a degree programme.

It would therefore appear that the most recent quantifiable academic information about a candidate has more relevance than the earlier school performance, although certain aspects of this school performance supplements the details from the University.

These results support earlier studies as discussed in the literature review, which identified the importance of previous academic performance. However, the significance of these models is that they consider the particular aspects of previous achievement which determine the ICAS examination success. These results suggest that the technique of using biodata to predict future ICAS examination success could be of use to the training providers and the variables included in the models raise questions as to the current criteria set by many of the accountancy firms, for example, setting an UCAS point score cut-off or requiring a particular grade in English and Mathematics to be achieved. If a logistic regression model is developed using the three variables of number of UCAS points, grade in Higher English and grade in Higher Mathematics, the resulting model achieves a poor model χ^2 of only 23.5, which does not compare favourably with either the honours graduate or ordinary graduate model.

There is however a disappointing reduction in the classification of trainees when the model is applied to a different data set and this is reflected in the poor tetrachoric correlation coefficients for the hold-out samples in both models. Table 5.12 highlights the reduction in the r_t from the developmental group to the holdout group for both models.

Table 5.12: Tetrachoric correlations for the honours and ordinary graduate models

Model	Derivation sample	Holdout sample
Honours graduate model	0.65	0.27
Ordinary graduate model	0.43	0.23

There are two possible reasons for the apparent reduction in the ability of the model to differentiate between those students who pass their ICAS examinations at the first attempt and those who experience failure. The first could be as a result of the fundamental change which took place in the ICAS system of education during the time the Phase I trainees were undertaking their ICAS examinations. This meant that the Phase I developmental group comprised trainees who undertook the 'old' system, trainees who undertook transitional arrangements and trainees who undertook the 'new' system. The hold-out group on the other hand solely comprised of trainees who had undertaken the 'new' system It will therefore be necessary to consider the impact that these changes will have on the development of any further models based purely on the new system. This will be further discussed in Chapter 6.

The second reason may be as a result of the methodology adopted. As discussed in the methodology chapter, an empirical approach was utilised for this Phase I Study. The selection and entry of variables were considered on the grounds of the statistical analysis, albeit that the variables were derived from questions commonly found in training provider application forms, with a post-hoc rationalisation of why each variable was included in the different models. In this type of approach it may be likely that a reduction is experienced in the explanatory powers of the model where variables have been included which are idiosyncratic to the developmental sample and have little or no relevance to a different data set.

The value of this exploratory exercise however is that it provides a very useful spring board from which to develop further models. In light of the paucity of research within the area of professional accountancy examination success, particularly within a Scottish context, the findings of this exercise are useful. Combining this information with the results from other studies as discussed in the literature review chapter, the nature of the future analysis will be shaped. This information will be used to drive the hypotheses for the main study and construct a framework from which to develop more meaningful models. Adopting this more rational approach within the context of a stable educational environment will hopefully result in models which will retain their validity when applied to a different data set.

The next chapter will consider both the educational changes and any related impact by examining the reference group before setting up a logical framework from which to develop the models in a more rational manner. The following chapter will then develop and discuss the models for the Phase II Study.

CHAPTER 6

THE DEVELOPMENT OF THE LOGISTIC REGRESSION MODELS FOR PREDICTING EXAMINATION SUCCESS - THE PHASE II STUDY

6.1 Introduction

The Phase I Study was based on accountants who qualified in the years 1988 to 1992 and developed exploratory models which identified significant variables in the determination of examination success for both honours and ordinary graduates. The models, however, did not perform adequately when applied to a different data set. Two possible explanations were offered for this reduction in performance; the lack of stability in the reference group and the methodology adopted which utilised an atheoretical approach. This chapter will attempt to address the limitations of the Phase I Study and try to develop the objectives of the research in relation to ICAS examination performance.

6.2 The objectives of the study

In order to appreciate the implications of the Phase II Study to the research process, it is worthwhile reiterating the specific objectives of the study in relation to ICAS examination performance.

Two main objectives are to:

1. Critically evaluate the effectiveness of biodata in the differentiation of ICAS trainees between those who successfully negotiate their professional accountancy examinations without resits and those who experience failure.

2. Identify the key determining background factors which influence ICAS examination success and could be used in a selection environment.

The Phase II Study will attempt to achieve these objectives by the formulation of *a priori* hypotheses which should provide a greater understanding of the factors determining ICAS examination performance and will therefore add to the understanding of the predictive qualities of certain items. Through the utilisation of this more theory driven approach, a useful selection tool should be developed which could have practical benefits for the recruiting training firms.

The chapter will begin by considering the reference group for the Phase II Study, which is based on accountants who qualified in 1993 and 1994. The chapter will then endeavour to identify the underlying reasons for ICAS examination success and failure for each subset of students within the reference group. It will therefore attempt to construct a coherent framework from which the models can be developed by formulating hypotheses about the characteristics of those trainees who pass their ICAS examinations at the first attempt in contrast to those trainees who experience failure. This framework evolves from the accumulation of evidence derived both from the literature review and also from the Phase I Study. It is therefore a combination of a logical and empirical process.

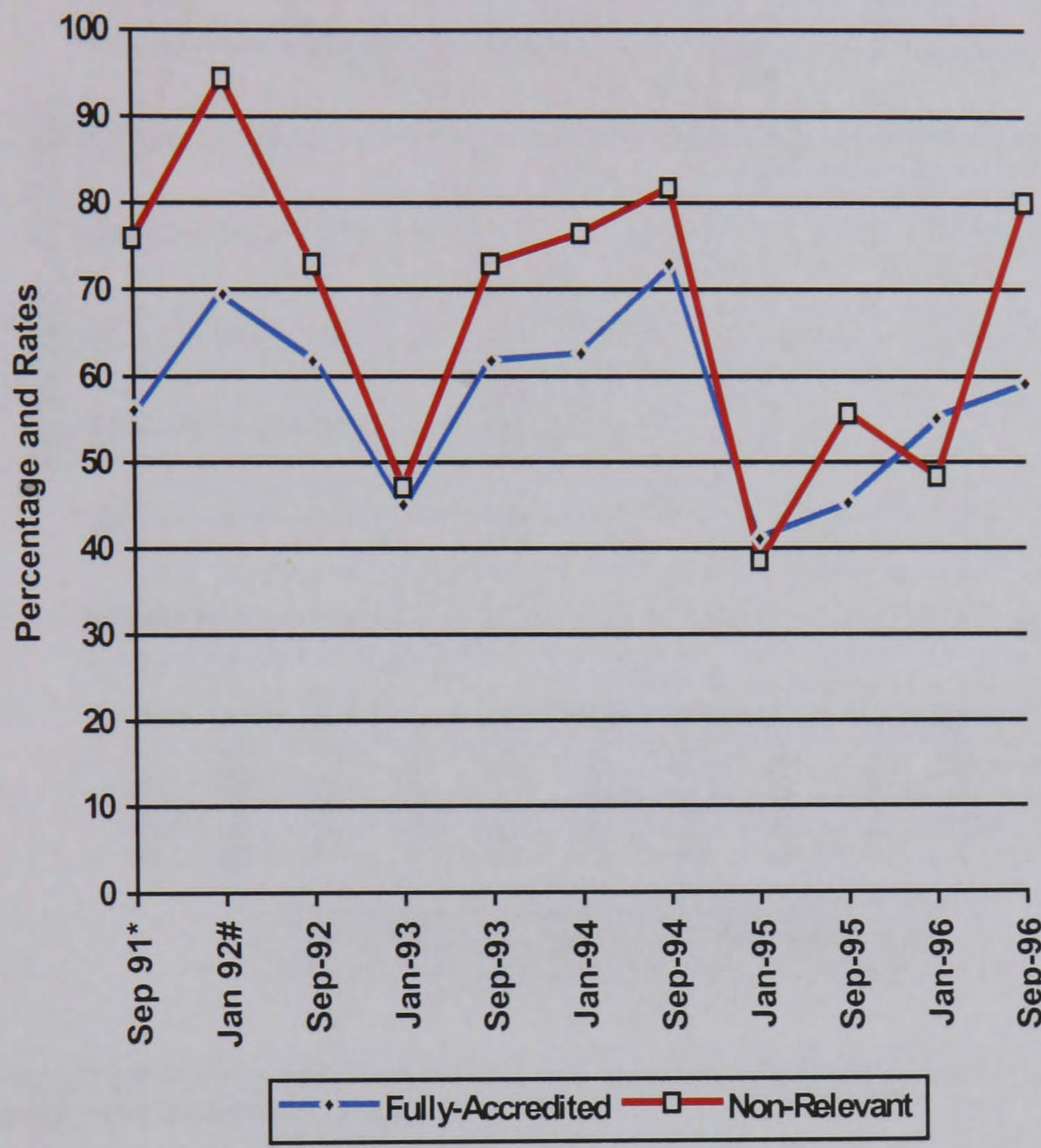
6.3 The reference group

6.3.1 Background information on the reference group

The fundamental change in the ICAS examination system which took place in 1988 was outlined in the first Chapter and it was also suggested that there may be a difference in the examination performance of fully-accredited and non-relevant graduates depending on the type of examination system which the graduates undertook. Unfortunately there are no data available from ICAS on the examination performance of students categorised into different degree types prior to 1991.

However the examination results for TPC 1 and 2 from 1991 to 1996 can be found in Figures 6.1 and 6.2.

Figure 6.1: Pass rates at TPC I (expressed in % terms)



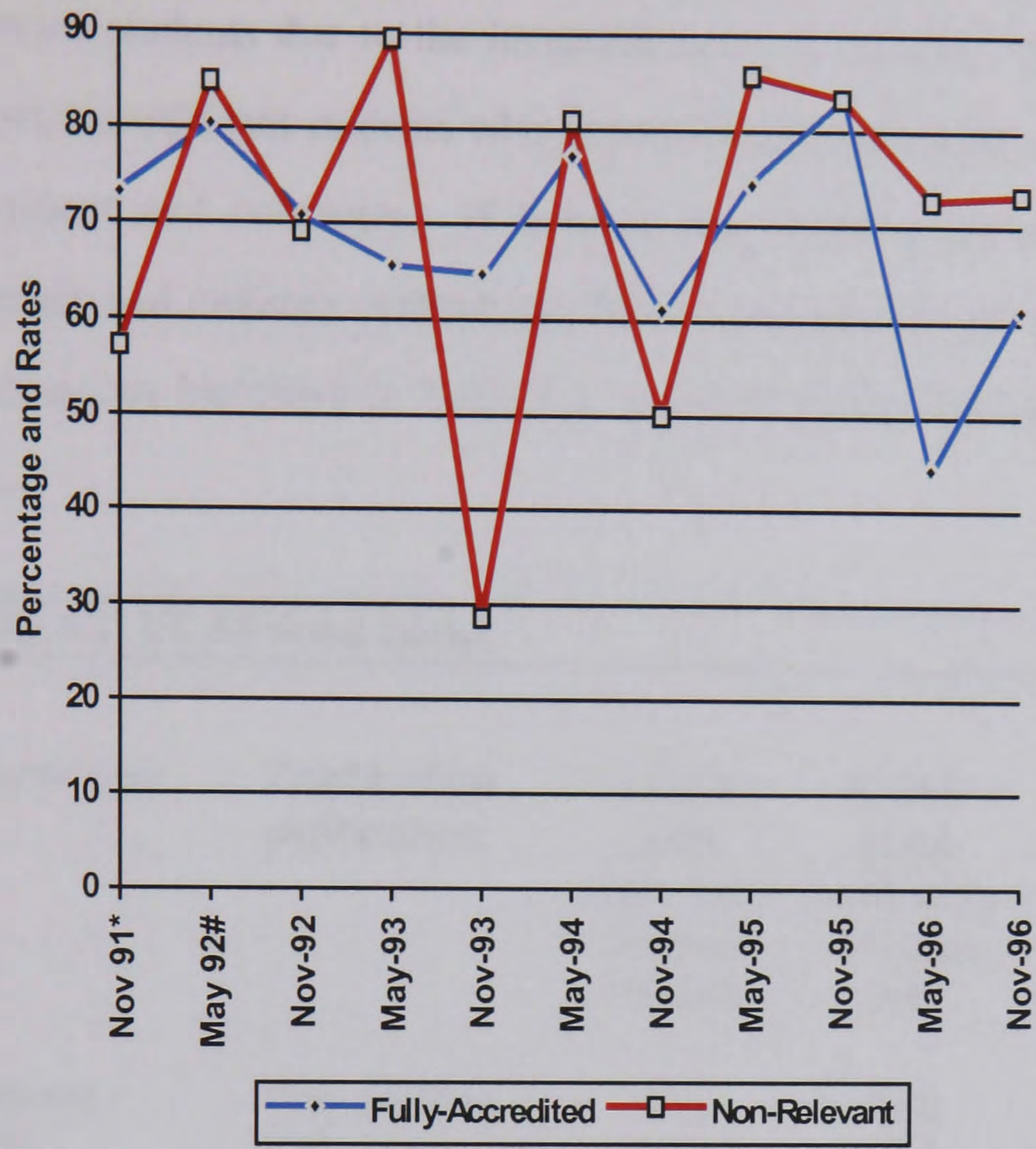
Notes

* The September sitting is the first diet for both the Fully-Accredited and Non-Relevant students.

The January sitting is the resit diet.

Source: ICAS examination statistics as supplied by the Education Department of ICAS

Figure 6.2: Pass rates at TPC II (expressed in % terms)



Note

* The November sitting is the first diet for the Fully-Accredited graduates who sit this examination 27 months into their training contract.

The May sitting is the first diet for the Non-Relevant graduates who sit this this examination 33 months into their training contract.

Source: ICAS examination statistics as supplied by the Education Department of ICAS

With very few exceptions, Figure 6.1 reveals that since 1991 higher percentages of non-relevant students pass TPC 1 than of their fully-accredited counterparts. Figure 6.2 is however more difficult to interpret as the non-relevant students sit their TPC2 examination for the first time with the resit diet of the fully-accredited students, although once again it would appear that the non-relevant graduates perform better than graduates who have undertaken fully-accredited degrees.

One possible explanation for this variation in the performance of graduates may be due to the fact that recruiting firms are being very selective in their choice of non-relevant students due to the increased costs of training. They may therefore only select non-relevant students who possess a very high level of academic achievement at school and university. If however the UCAS point means calculated for the honours and ordinary students are further categorised into fully-accredited and non-relevant, as identified in Table 6.1, it would appear that this is not necessarily the case.

Table 6.1: UCAS point means

Degree type	Examination performance	UCAS point score from 5th year 1993/94	UCAS point score from 5th year 1995	UCAS point score in total 1993/94	UCAS point score in total 1995
Honours - fully-accredited	Pass 1st time	22.3	23.0	34.4	35.5
	Fail one or more	19.9	19.4	31.3	30.2
Honours - non-relevant	Pass 1st time	22.3	22.9	38.7	42.0
	Fail one or more	19.7	19.5	31.4	29.3
Ordinary - fully-accredited	Pass 1st time	21.7	23.3	33.7	34.2
	Fail one or more	20.9	19.4	29.3	31.0
Ordinary - non-relevant	Pass 1st time	20.2	23.3	29.1	24.7
	Fail one or more	19.3	24.4	26.1	33.3

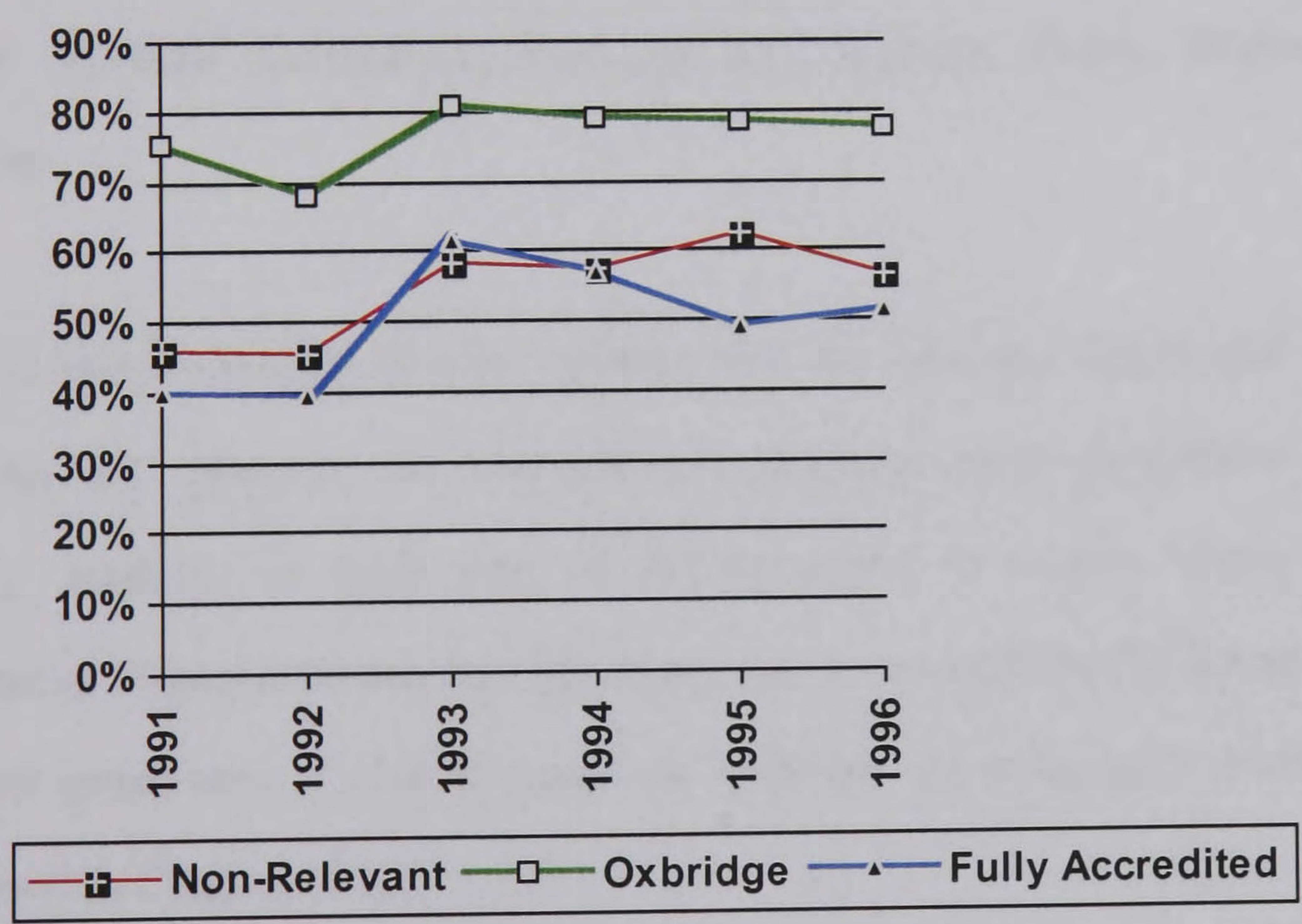
There is very little to differentiate between the fully-accredited and non-relevant students in terms of their UCAS point scores when only the 5th year scores are considered, although the honours non-relevant students who pass first time display a higher mean for the UCAS point score in total than compared to their fully-accredited counterparts. Care must be exercised here, however when interpreting this finding, as the apparent difference may simply be a derivative of the proportion of students who undertook a 6th year at school as opposed to a higher quality academic performance. Another interesting point is the fact that the mean UCAS point score in total for the failed, ordinary fully-accredited students is in fact higher than the comparative figure for the ordinary, non-relevant students who pass first time. However due to the small numbers of non-relevant ordinary students (n=29), it is difficult to draw any meaningful conclusion. The failed group in the ordinary non-relevant sample from 1995 also demonstrate a higher total UCAS point score than their successful counterparts. However with a sample of only 6, it is dangerous to draw any conclusions from this finding.

An alternative interpretation, frequently expressed by members of the ICAS Education Committee, suggests that non-relevant students perform better in the examination system as they spend additional time within the office before they undertake the TPC 1 and 2 examinations. Non-relevant students sit the TPC 1 examination 12 months, and the TPC 2 examination 6 months, after their fully-accredited counterparts. Whilst the additional six months practical work experience may prove beneficial for the TPC 2 examination which is case study based and is designed to test the candidate's ability to put into practice the theoretical knowledge and work experience gained during the training contract. The argument is less persuasive for the TPC 1 examinations, which are very technically orientated and cover the four subject areas of Auditing, Financial Reporting, Taxation and Information Systems.

Due to the technical orientation of these examinations however, the timing of the study of these subjects by students could be critical. The non-relevant students will have studied the "assumed knowledge" material for TPC1 during their professional level examinations and this will have been undertaken in the twelve months preceding TPC1. The material should therefore be current and fresh in the trainee's mind. Fully-accredited students on the other hand will have studied the assumed knowledge material at university and, in certain instances, some of this material, for example tax, could have been studied during their second year at university. This timing difference in a period of technical change could have an adverse impact on the performance of the fully-accredited students and this is indeed one of the areas that ICAS is currently examining via a degree accreditation working party.

Similar differences are found in the ICAEW system where the non-relevant graduates outperform the fully-accredited graduates[1]. A summary of the ICAEW examination statistics for 1991-1996 can be found in Figure 6.3 (the equivalent of the TPC 1 examination) and Figure 6.4 (the equivalent of the TPC 2 examination).

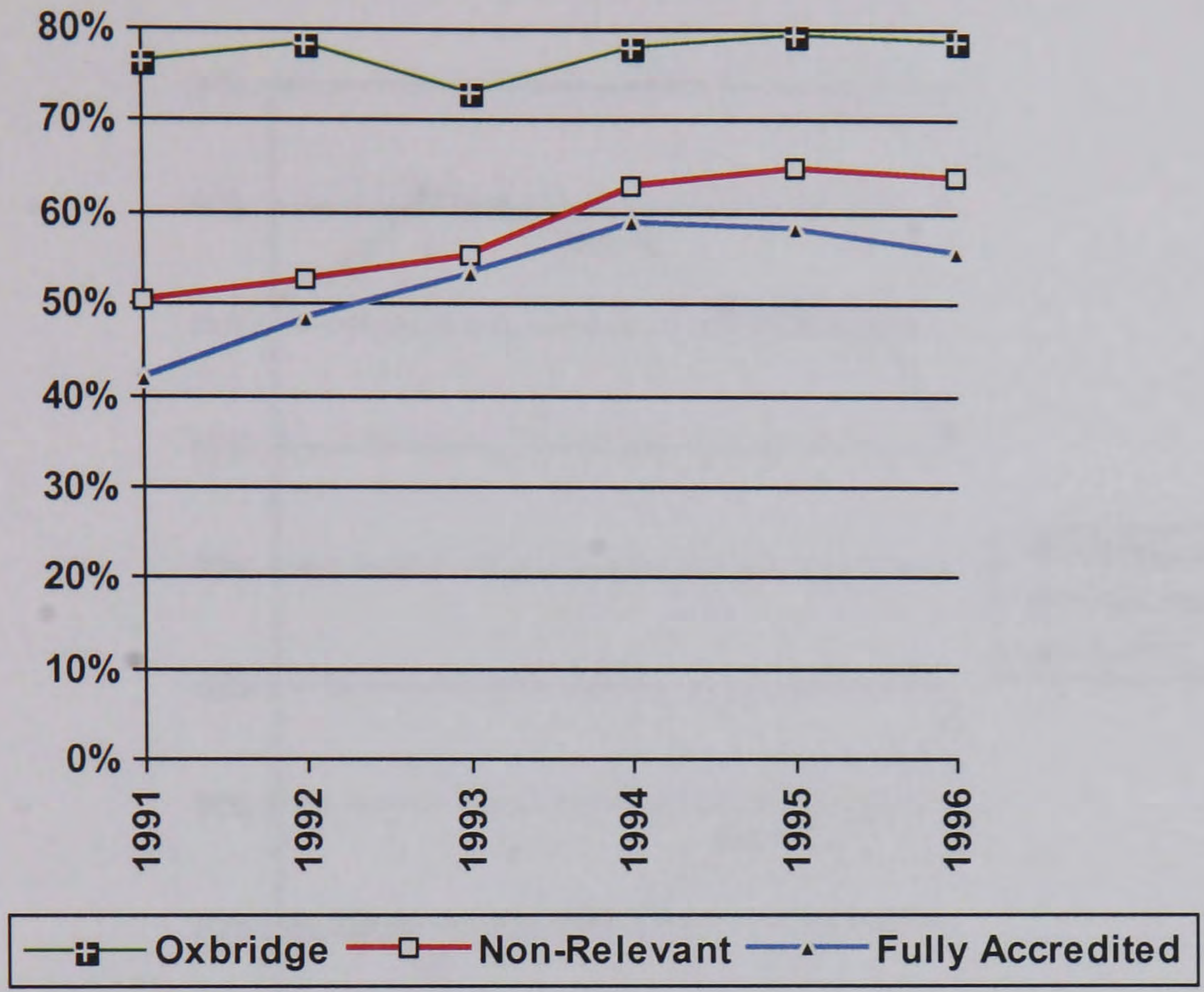
Figure 6.3: Analysis of graduate candidates taking PEI/Intermediate (both sessions)



Source: ICAEW Education, Training and Student Salary Statistics, 1990/91 - 1995/96.

[1] Referred to by ICAEW as relevant graduates.

Figure 6.4: Graduate candidates taking PE2/Final (both sessions)

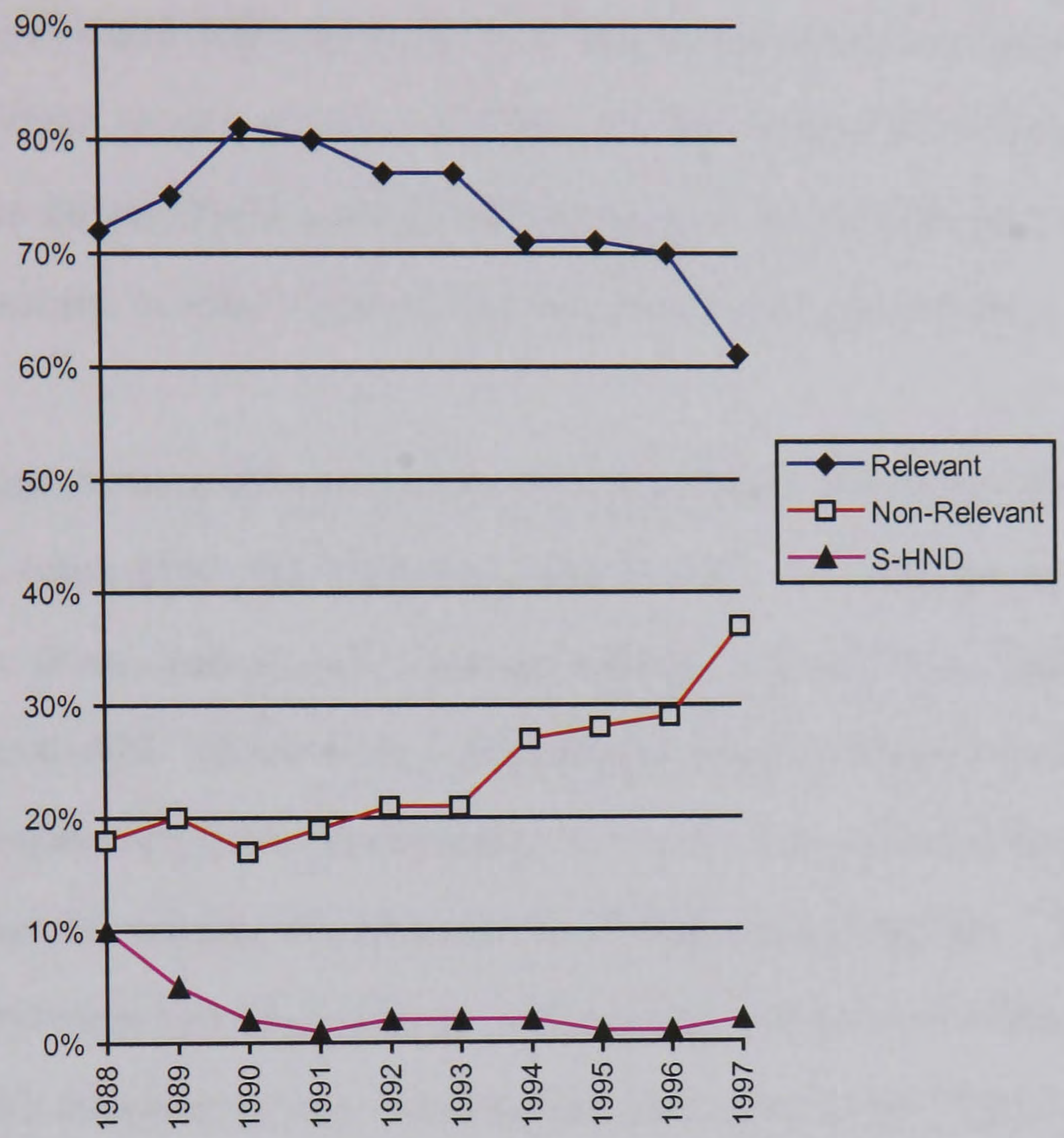


Source: ICAEW Education, Training and Student Salary Statistics, 1990/91 - 1995/96.

Even if the Oxbridge results (which will be entirely comprised of non-relevant students) are ignored, the non-relevant students have performed better than the relevant students in both sets of examinations in nearly every instance. This differential in performance has led many recruiters of ICAEW trainees to select non-relevant graduates at the expense of relevant or fully-accredited candidates (as discussed in Chapter One).

This situation is also starting to manifest itself in the recruitment of ICAS trainees where there has been a shift in recent years to the selection of more non-relevant graduates. The recent intake of fully-accredited and non-relevant graduates can be found in Figure 6.5.

Figure 6.5: Analysis of student intake (expressed in % terms)



Source: ICAS statistics provided by the Education Department.

Figure 6.5 certainly reveals a shift towards the recruitment of more non-relevant graduates and, whilst there appeared to be a levelling out of the movement, with a balance of around 70/30 fully-accredited to non-relevant between 1994 and 1996, a further movement has taken place in 1997 with only 61% of that year's intake progressing from a fully-accredited degree. It will be interesting to see if a continued change in the recruitment of non-relevant graduates takes place in the future.

6.3.2 The impact of these changes on the reference group

As the reference group for the Phase II Study is based on trainees who qualified in the years 1993 and 1994, with the hold-out group based on trainees who qualified in 1995, there should not be a stability problem within the reference group. All the trainees for the Phase II Study should have undertaken the new system of education and training, in other words, commenced their training contract in 1988 or later.

The total number of responses to the questionnaire for the accountants who qualified in the years 1993 and 1994 amounted to 549. In a similar manner to the Phase I Study, those students who had undertaken A levels were excluded, reducing the sample to 503. However as 2 respondents failed to identify their ICAS examination performance on their questionnaire, they were also excluded from the sample which reduced the number of responses for further analysis to 501. The sample was also split between honours graduates and ordinary graduates in order to accommodate the Scottish education system (as discussed previously in the Phase I Study). There were 7 missing observations for this filter variable and therefore these respondents were also excluded from the analysis. The final numbers included in the sample were therefore 227 honours and 267 ordinary graduates. The ICAS examination performance of both these groups can be found in Table 6.2.

Table 6.2: Examination performance of honours and ordinary graduates - Phase II

Background	Pass first time	Fail one or more	Total
Honours graduates	138 (61%)	89 (39%)	227
Ordinary graduates	140 (52%)	127 (48%)	267

In light of an increasing proportion of non-relevant graduates hired by the recruiting firms and the apparent differential in performance between these two groups, the sample of both the honours and ordinary graduates was further divided into sub-samples of fully-accredited and non-relevant candidates.

It was decided that these students should be considered as two distinct groups because the type of university education will have differed. For example, a fully-accredited student may have an honours degree in Accountancy and a non-relevant student may have an honours degree in Politics and French. Clearly this could have an impact on the type of background that will be indicative of ICAS examination success as different aspects of background history may be relevant dependent on the academic route from which the trainees have progressed from.

Out of the 227 honours graduates, 226 indicated the status of their degree. The division between honours and ordinary graduates can be found in Table 6.3.

Table 6.3: Analysis of graduates by degree type and ICAS status - Phase II

ICAS status	Honours degree	Ordinary degree	Total
Fully-accredited	153 students (68%)	238 students (89%)	391 students (79%)
Non-relevant	73 students (32%)	29 students (11%)	102 students (21%)
Total	226 students	267 students	493 students

Table 6.3 reveals that 79% of the sample were fully-accredited and, when it is considered that the vast majority of these students would have commenced their training contracts between 1988 and 1990, this sample would appear to be broadly representative of the population that was recruited during this time (see figure 6.5).

However, on examination of the non-relevant honours group (n=73), it was discovered that included within this group were 12 trainees who had actually undertaken the Diploma in Accountancy (the conversion course as discussed previously in the first Chapter), which in effect meant that they were products of the 'old' system of education. Therefore, although these students did not have a fully-accredited degree, they were not required to sit any of the subjects at the professional stage. It was therefore decided to exclude this group of students from any further analysis as its inclusion in the non-relevant sample could call into question the homogeneity of the sample which could adversely affect the statistical integrity of the estimated model. It would also, for the same reasons, not be appropriate to include these twelve students as part of the fully-accredited sample.

The examination performance of the honours graduates categorised by degree type can be found in Table 6.4 and the information relating to the ordinary students in Table 6.5. The information has been provided both for the group who qualified in 1993 and 1994, the data from which will be used for the developmental sample, and also for the group who qualified in 1995 and which will be used for the holdout sample.

Table 6.4: Examination performance of honours graduates split between degree type - Phase II

Background	Pass first time	Fail one or more	Total
Fully-accredited graduates - 1993/94	102 (67%)	51 (33%)	153
Fully-accredited graduates - 1995	41 (55%)	34 (45%)	75
Non-relevant graduates - 1993/94	32 (52%)	29 (48%)	61
Non-relevant graduates - 1995	29 (67%)	14 (33%)	43 (100%)

Table 6.5: Examination performance of ordinary graduates split between degree type - Phase II

Background	Pass first time	Fail one or more	Total
Fully-accredited graduates - 1993/94	127 (53%)	111 (47%)	238 (100%)
Fully-accredited graduates - 1995	49 (50%)	50 (50%)	99 (100%)
Non-relevant graduates - 1993/94	13 (45%)	16 (55%)	29 (100%)
Non-relevant graduates - 1995	3 (50%)	3 (50%)	6 (100%)

Tables 6.4 and 6.5 show that higher percentages of the fully-accredited graduates, both from the honours route and the ordinary route, pass all their ICAS examinations first time as trainees who qualified in 1993 or 1994. This would appear to be contradictory to the information contained in Figure 6.1. However it must be borne in mind that this thesis is examining individuals who pass all examinations without resits whereas the examination performance data supplied by ICAS only considers the

performance of all students categorised by degree type, irrespective of the diet at which examinations were taken. However, the trend has reversed, as evidenced by the results for the trainees who qualified in 1995 when a higher percentage of the non-relevant honours students passed their ICAS examinations at the first attempt, compared to their fully-accredited counterparts. From the information contained in Figure 6.1, it would appear likely that this trend has continued.

There is however a bigger differentiation between the examination performance of the fully-accredited honours students compared to the honours non-relevant students, than between that experienced by the ordinary graduates. This is also demonstrated by the Mann-Whitney scores which considered whether the accreditation of the degree differentiated in a statistically significant manner between the group which passed their examinations first time and those who experienced resits. For the honours graduate sample, the Mann-Whitney score was 2.78 which was significant at the 1% level, whereas for the ordinary sample the Mann-Whitney score was only 0.87 which was indeed insignificant. It would therefore appear that the degree type has less relevance for the ordinary than the honours students in the determination of ICAS examination success. However, in order to maintain a homogeneous group, it was decided to proceed with the ordinary sample, restricted to fully-accredited graduates thereby excluding the non-relevant students. In light of the small numbers of non-relevant ordinary students (n=29), it was not felt appropriate to undertake any further analysis with the non-relevant ordinary graduates as there would be insufficient numbers and hence data.

It was therefore decided to develop three separate models for the reasons of:

1. differential in ICAS examination performance between honours and ordinary graduates.
2. differential in ICAS examination performance between fully-accredited and non-relevant graduates.
3. prediction that differing aspects of background history will be important dependent on type of university education.

The first model will therefore be based on fully-accredited honours graduates. The second on non-relevant honours graduates and the third on the fully-accredited ordinary graduates.

6.4 General background areas

In an attempt to construct a coherent framework from which the models can be developed, eight broad areas of background history were identified. These areas were as follows:

1. personal background.
2. academic performance at school.
3. academic performance at university.
4. experiential activities at school and university.
5. social background.
6. involvement in extracurricular activities at school and university.
7. holding positions of responsibility during school and university.
8. University background.

General propositions were then formulated by way of hypotheses, setting out the predictions that these general background areas would be indicative of ICAS examination performance. Within these broad areas, individual background factors which are thought relevant and suitable for inclusion in the models are highlighted, examining why other individual items within the general area that was hypothesised to predictive are to be rejected. Other general background areas which have not been hypothesised to determine ICAS examination success are discussed in turn.

6.5 The fully-accredited honours graduate model

Several hypotheses will now be formulated for fully-accredited honours graduates in an effort to identify the constructs that underlie success or failure in the ICAS examinations.

6.5.1 Academic performance at school

Hypothesis 1: Academic performance at school will be indicative of success in the ICAS examinations

There is little disagreement in the literature that academic ability, measured by some dimension of academic performance at school, is indicative of academic performance in undergraduate accountancy courses (Dockweiler and Willis, 1984; Clark and Sweeney, 1985; Eskew and Faley, 1988; Gul and Fong, 1993; Tho, 1994). However, there are discrepancies over the type of academic performance that would appear to be of relevance for success in future accounting studies. Studies which examined success in the professional accountancy examinations (Marcus Dunn and Hall, 1984; Harvey-Cook, 1995) also point to the importance of previous academic performance, although it was recognised that school performance was only one aspect of scholastic ability and university performance was also of importance. The Phase I Study also supported the literature by identifying aspects of school performance which would appear to be important in the determination of ICAS examination success. However, although there is obviously a theme prevalent in these previous studies, there is no definitive answer as to which particular aspects of school performance are important. It is therefore necessary to consider several aspects of school performance in an effort to identify the most salient measures for future performance.

In light of the apparent importance of the variable, from the Phase I Study, which considered the number of Highers retaken to improve the grade, another variable should be developed for the UCAS point score in 5th year only as opposed to the UCAS point score overall. The latter was the overall academic performance variable that was used in the Phase I exercise. Restricting the overall performance measure to 5th year only should be more relevant as it will compare academic performance over a stable time frame. This is in contrast to comparing the UCAS point score of a trainee who left in 5th year with the UCAS point score of a trainee who continued into 6th year and undertook additional Highers or CSYS.

In respect of subsets of the UCAS point score variable, demonstrations of ability in analytical and numerical Highers were not felt to have as much importance as the overall UCAS score in 5th year. This is based on the assumption that the fully-accredited students will have already identified a strength in these pertinent areas before pursuing a degree in an Accountancy based course. Likewise, the performance in an Accountancy Higher is also felt to have little relevance, as ability in the subject area may be more appropriately assessed at university where it will be studied at a far higher level. Despite the reliance that training providers place on both the grade in Mathematics and English at Higher level, these variables were also not included in the model building process as the Phase I Study suggested that these variables had little relevance in the determination of ICAS examination performance.

It is also felt that the O grade performance would be superseded by the Higher performance whereby a broad range of ability is still being assessed but in a more rigorous and in depth manner. This conflicts with the Harvey-Cook (1995) study, which suggested that the number of A grades at 'O' level was the most important variable in the determination of ICAEW success. However, it should be borne in mind that the English school system is different to that in Scotland as discussed in the Phase I Study and that the Harvey-Cook (1995) model was developed on non-relevant graduates.

The number of Highers retaken at school to improve the grade was deemed a motivational variable in the Phase I Study and this may still be relevant. However, it must be recognised that this variable may be dependent on school policy. Some schools may encourage students not to attempt certain Highers and spread the load over two years while other schools encourage students to attempt a wide range of Highers in 5th year and then retake subjects in 6th year if the original grade was disappointing. It is therefore recognised that this variable may not be measuring the motivation of a candidate but instead may be dependent to a certain extent on the school policy prevalent within a student's particular educational establishment. It was therefore felt more appropriate to simply take the UCAS point score in 5th year as this should measure both academic performance and any lack of motivation on behalf of a student, recognised by a lower 5th year UCAS score.

The only variable to be entered into the fully-accredited honours graduate model in respect of school performance will therefore be **the number of UCAS points achieved in 5th year at school**. It should be noted, however, from the results in the Phase I model, that school performance is generally superseded by university performance particularly where this can be quantified as in an honours classification. Therefore whilst school performance may be of relevance, its value in the determination of ICAS examination success for fully-accredited honours students will not be as significant as university performance factors.

6.5.2 Academic performance at university

Hypothesis 2: Academic performance at university will be indicative of success in the ICAS examinations

As discussed in the literature review, it would appear that university performance is indicative of future professional examination performance (Marcus Dunn and Hall, 1984; Harvey-Cook, 1995). These findings were also supported by the results of the Phase I Study. The honours classification from a fully-relevant degree is envisaged to be very important in the determination of success in the ICAS examinations as it is suggested that this is a recent quantification of academic ability in a relevant area. The inclusion of this variable does however pose a problem. Whilst this variable may give a better understanding of the background factors which predict success, its inclusion is flawed on the grounds of practicality. At the time of under-graduate selection by the training providers (usually in the October/November preceding the August start date), honours classifications are not known. This is an area which will be discussed further in Chapter 7.

It is also suggested that failure at university could indicate that a student has a particular problem with a subject area. The rationale for this theory arose from the Phase I model for honours graduates whereby a variable which considered the number of resits in second year at university was included. However, as the majority of subjects that attract accreditation are taught in either the second or third year of an academic programme in accountancy, resits in either of these years may be pertinent in the determination of future accounting examination performance. The variable for the Phase II Study was therefore expanded to consider both second and third year subject resits.

The two variables which are to be included for academic performance at university will therefore be: **the honours award achieved in the fully-accredited course** and **the total number of resits in second and third year at university.**

6.5.3 Experiential activities at school and university

Hypothesis 3: Experiential activities at school and university will be indicative of success in the ICAS examinations

Studies predicting undergraduate success suggest that previous related experience (Eskew and Faley, 1988) and previous knowledge of accounting (Gul and Fong, 1993) were significant for the prediction of student performance at the accountancy undergraduate level. It is therefore anticipated that trainees who have undertaken a job, particularly at university, which relates to chartered accountancy, will be better prepared for the office environment. These trainees may therefore not suffer from the same disillusionment that many trainees experience. This could presumably impact on their examination performance. Students who have also experienced a chartered accountancy related job whilst at school should also be more aware of the job and career prospects and therefore should be more motivated if they continue to pursue a fully-accredited degree and a chartered accountancy training contract. A variable will therefore be entered into the model which considers both job experience at school and at university. This is therefore a combination of the two variables initially developed.

Similarly, students who have undertaken a work placement during their university course will also have experienced business life which will prepare them for a professional work environment. However, as placements tend to only be offered on courses at 'new' universities where the calibre of students as measured by UCAS points is generally poorer than at traditional universities, the inclusion of this variable may be in doubt for the final model. Indeed there is only one university degree course which is fully-accredited and incorporates a placement, and this variable is therefore a proxy for a particular university. Therefore, as any work experience related to chartered accountancy should have already been picked up by the variable which considered relevant experience, a variable considering placement was not included.

Students who take a break between their fully-accredited degree course and their ICAS examination process may be at a disadvantage. The technical areas which they have covered at university, and which are treated as assumed knowledge, may be out of date and no longer fresh in the trainee's memory when he or she commences ICAS examination process. It is expected that this may be a pertinent factor and a variable which considers the influence of a break between the completion of the fully-accredited degree and the commencement of the training contract will be entered into the model.

To conclude this section, it is not felt that any break between school and university, nor any part-time jobs undertaken either at school or university, will have an impact on ICAS examination performance.

The two variables which will be entered into the fully-accredited honours graduate model in respect of experiential activities at school or university are **job experience related to chartered accountancy whilst at school or university** and **the choice of a break taken between the completion of the fully-accredited honours degree programme and commencing ICAS training.**

To summarise, there are three general areas of an individual's background which have been hypothesised to determine success in the ICAS examinations and, from these three broad areas, five variables have been identified. These are the variables which will be used for the model development in Chapter 7.

6.6 Background factors not considered for the fully-accredited honours model

A discussion will now take place of the remaining five broad areas of a person's background that have not been hypothesised to determine ICAS examination success. The following sections will explain why these areas have been dismissed from the model development for the fully-accredited honours model. Each of these areas will be discussed in turn, namely personal background, social background, extracurricular activities at school and university, holding positions of responsibility at school and university and university background factors.

6.6.1. Personal background

Although there is evidence in the literature that the academic performance of females is better than males in an accounting environment (Fraser et al, 1978; Hanks and Shivaswamy, 1985; Mutchler et al, 1987; Bayes and Nash, 1989; Tyson, 1989; Gammie and Gammie, 1995), many of the differences found within these studies are not statistically significant. Gender however will be an issue that requires addressing. Although the inclusion of gender in a model may explain why people do better than others in the ICAS examination system, from a legal view, firms will not be allowed to discriminate on the grounds of sex in their quest to recruit students who will perform well in the ICAS examination process. A variable which considers gender could therefore not be included. However if there are gender differences in the criterion, in other words if gender is highly correlated with examination success, then the model will not be restricted specifically to the criterion of examination success as there will be an inherent sex bias in the model which could result in positive discrimination. It will therefore be necessary to undertake a further analysis of the gender issue. First, it will be necessary to determine whether gender is significantly correlated with the criterion and then examine whether the developed model has an adverse impact on the different sex groupings. This will be further discussed in Chapter 7.

Age at the start of the training contract, marital status and the number of children may also have an effect on ICAS examination performance, although there are arguments for and against each of these background factors. The recent graduate at early twenties, who has progressed directly from school to university and then to ICAS training, may be well equipped to deal with the stresses of working full-time and studying in the evening. A more mature student, who is married with children, may find that their priorities in the evening and at the weekends are not necessarily their ICAS studies. On the other hand, it may be argued that the more mature student will be highly motivated to succeed as the risks attached to failure in the ICAS examinations which will ultimately determine job security are too great. It would therefore appear that the jury is out on this issue and for one of these factors to be included in a model may be quite misleading. Traditionally there are only small numbers of mature students taken on for ICAS training contracts and, whilst one cohort of students may comprise mature students who are very well motivated, in a subsequent cohort, the mature students may find it difficult to balance their personal lives with the rigours of the ICAS examination system. The exclusion of these variables is also supported by the finding of Chapter 2 whereby no other accounting studies discussed in the literature review included any of these factors. These are also areas that the Equal Opportunities Commission do not recommend for use in selection.

Serious illnesses may also be a controversial factor. This may be detrimental to future examination success as the illness may affect the ability of the student to undertake the heavy workload associated with studying for ICAS examinations. On the other hand it may indicate that, if the applicant has managed to achieve either an adequate school performance or a degree whilst under the influence of this illness, their academic performance to date is not an accurate reflection of their ability. Once again only a few trainees identify on their application forms the suffering of any serious illness and this is a factor which should not be included in any model. Asking applicants to identify their state of general health is a very subjective question and it is unlikely that they will respond in anything other than a positive manner. It is therefore not envisaged that this background factor will differentiate between trainees who pass their examinations at the first attempt with those who experience resits.

The other background factors to be considered in this area are concerned with birth order and number of siblings. Despite evidence that these factors can be indicative of job performance (Herriot, 1984) and may therefore add to an understanding of the factors which predict ICAS examination success, the inclusion of these questions on an application form would be intrusive and hence not acceptable. These factors have therefore not be included in the model development.

6.6.2 Social background

The Harvey-Cook (1995) model includes the type of school as a variable suggesting that those trainees who attended a fee-paying school were more likely to pass their ICAEW examinations. A similar variable was also included in the Marcus Dunn and Hall (1984) study. Harvey-Cook (1995), suggests that this may be a proxy for social class or that it may reflect better exam preparation training in fee-paying schools. The latter argument would only hold true if this training continued to hold power over the non fee-paying students throughout their university and professional examination careers. This argument could, however, be reversed and indicate that attending a fee-paying school could be detrimental to future examination success. For example, two students may have the same UCAS point scores, with one from a fee-paying school having received the benefit of this superior exam preparation and the other from a non fee-paying school who has achieved the same point score despite the lack of this training. The UCAS point score of the fee-paying student is a true reflection of ability whereas the non fee-paying student could have so much more to offer, if given a training environment synonymous to the fee-paying student.

Although students are frequently requested to provide information on an application form as to the number of times spent abroad, there would appear to be no rational reason why there should be a link with this experience and the ability to pass ICAS examinations. Likewise, the level and type of employment undertaken by an applicant's parents is also frequently requested at the application form stage. Whilst this may be a reflection of genetic inheritance, suggesting that if your father is a successful accountant then the offspring will also make a successful accountant, it could be argued that this is a proxy for social class and would therefore not be appropriate for inclusion in any model used to predict ICAS examination performance. Whilst genetic inheritance may develop an understanding of the factors that predict ICAS examination performance, the inclusion of variable which considered this type of information would not be acceptable for selection purposes.

6.6.3 Involvement in extracurricular activities at school and university

The results of the Phase I Study suggested that those trainees who were able to balance outside interests with an adequate academic performance were more equipped to deal with the pressures of studying in the evening and that their UCAS point score may not be a true reflection of their academic ability. However out of all the variables identified in the Phase I Study, the inclusion of this extracurricular variable is the most contentious variable and any connection could be a spurious link, insufficiently supported with any theoretical base. Indeed, no other accountancy studies discussed in the literature identified this variable as pertinent to accountancy examination performance. There would therefore appear to be insufficient reasoning behind the ability to balance outside interests with an academic life and it is therefore suggested that variables which consider any extracurricular activities are excluded from the model building exercise.

6.6.4 Holding positions of responsibility during school and university

In the Harvey-Cook (1995) model, holding the position of headboy or girl was found to be a significant variable in the models to predict both ICAEW examination and recruitment success. She suggests that this variable is important as positions of responsibility can be regarded as commitment variables and that they are positive evidence of management potential. They can therefore be used to predict the likely commitment to the organisation and the chartered accountancy profession. Whilst this argument may be accepted for the recruitment model, the link in the prediction of examination success is less justifiable. However, Harvey-Cook argues that pupils, who are chosen by their school to hold the position of headboy or girl, will have the ability to contribute positively to the running of the school, whilst maintaining an adequate study program. The same may be argued for the position of a prefect, although this may be dependent on the type of school attended. Many comprehensive schools, for example, have small numbers of students in their 6th year, and all the pupils are made prefects. At many private schools however, only a small proportion of their final year students are given a position of responsibility. The majority of schools also only award positions of responsibility for 6th year pupils which mean that those students who leave after 5th year are denied the opportunity of achieving the responsible position. As trainees who have undertaken their secondary education in England will have undertaken a 6th year in order to complete their A level studies, variables which consider positions of responsibility will differentiate students solely on this criterion. Within the Scottish context however, this is not the case as students who choose to leave their secondary education at the end of 5th year will not have received the opportunity to undertake these roles. These variables could therefore be contaminated by the date when a trainee left their secondary schooling. Variables reflecting position of responsibility were therefore not included in the model development.

6.6.5 University background factors

Although it is expected that graduates in general from 'traditional' universities will perform better in the ICAS examination process than graduates from 'new' universities, as evidenced by examination statistics issued by ICAS, it is suggested that this may be due to the differential in quality of student intake, as measured by UCAS points, between the different types of institution, and not to any 'value added' furnished by a particular type of institution. The current UCAS point rates required for entry into accountancy courses at 'traditional' universities are in the main higher than at the 'new' universities. As any differential in performance arising from the difference in scholastic academic ability will have been taken into consideration in the first hypothesis, another variable which considers type of university is not necessary.

6.7 The non-relevant honours graduate model

Although the same eight general background areas will be identified in relation to the non-relevant honours graduates, the same hypotheses will not necessarily be formulated for the non-relevant honours graduates. Likewise, it is also expected that some of the background factors within these general areas will be slightly different from those factors which were highlighted for the fully-accredited graduates. The changes from the fully-accredited graduate model will be discussed below, both in relation to the hypotheses and also in relation to the groupings of background factors which have been excluded.

6.7.1 Academic performance at school

Hypothesis 1: Academic performance at school will be indicative of success in the ICAS examinations

In a similar vein to the fully-accredited honours sample, it is expected that school performance will have an influence in the determination of ICAS examination success. However, for the non-relevant student it is anticipated that different facets of performance may be of relevance. Whilst the UCAS point score achieved in 5th year should be considered for the same reasons as discussed above, the significance of performance in numeric and analytical type subjects, such as Mathematics and Economics, may become apparent. As the non-relevant student may not be required to demonstrate these skills at university, for example in a language degree, it is necessary that ability in these skills are measured elsewhere and hence at school. It is expected therefore that the grade in Higher Mathematics and the UCAS point score for analytical type subjects may be of relevance as this information will act as a proxy for ability in this type of area. However, as it is likely that trainees who chose a non-relevant degree will have followed their interests at school, they would not have necessarily chosen many of the analytical type of subjects at Higher level at school. Mathematics, however, is really a core subject taken by nearly all students who undertake Highers and therefore it was decided to only include the grade in Higher Mathematics as a demonstration of numerical or analytical ability.

The two variables to be included in respect of academic performance at school for non-relevant graduates will therefore be: **the number of UCAS points obtained in 5th year at school** and **the grade in Higher Mathematics**

6.7.2 Academic performance at university

Hypothesis 2: Academic performance at university will be indicative of success in the ICAS examinations

Whilst it is envisaged that the honours degree classification is a recent quantification of academic ability, the classification of a non-relevant degree will have far less importance than that of a fully-accredited degree, particularly where the degree is not of an analytical nature. For example, it is predicted that the honours classification of, say, a degree in Politics will not have the same statistical significance as, say, the honours classification of a degree in Accountancy and Finance. Therefore although a variable which considers the degree award is included in the model development for non-relevant graduates as a proxy for academic ability, it is not anticipated that this variable will have the same statistical impact for the non-relevant students as it will have for the fully-accredited students. Likewise, resits at university will also have far less relevance for non-relevant students as it is unlikely that any resits experienced at university will be in subjects which are subsequently studied at ICAS, for example a resit in International Relations will not have the same relevance as a resit in Taxation. It was therefore decided not to include any variables which considered resits at university as these background factors would not be pertinent for the non-relevant graduates in the determination of ICAS examination success.

The only variable to be included in respect of university performance is therefore the one which considers **degree classification.**

6.7.3 Experiential activities at school and university

Hypothesis 3: Experiential activities at school and university will be indicative of success in the ICAS examinations

Although experiential activities at both school and university which were related to either accountancy or business were anticipated to be of relevance for the fully-accredited students, it is not foreseen that students on non-relevant degree programmes will undertake these activities. Any placements undertaken at university will be related to the degree programme studied and will hence be unlikely to be relevant to accountancy. Vocational work in accountancy offices for non-relevant students is also extremely rare. However, it must be noted that these graduates from non-relevant backgrounds may have changed their career path from that originally intended when they embarked on their degree programme. Graduates who have therefore undertaken jobs which relate to chartered accountancy whilst at university, and have thereafter decided to pursue a career in this field, should have a more realistic indication of the future. It is therefore suggested that chartered accountancy related experience at university will have a positive impact on ICAS examination performance and a variable which considers this activity should be included. In light of these graduates undertaking a non-relevant degree, however, jobs which relate to chartered accountancy whilst at school was not felt to have any relevance as, despite this experience, the student then embarked on a non-relevant degree programme. This is in contrast to the fully-accredited graduate model whereby this type of experience was predicted to be useful.

Any break taken between a non-relevant degree course and the ICAS examination process will also have a minimal impact as there will not be the same problem with the dating and the freshness of the technical areas which would have been covered at university on the fully-accredited course. Therefore it is not necessary to include a variable which considers a break and this is again is in contrast to the fully-accredited model.

As in the fully-accredited model, it is not felt that any break between school and university, nor any part-time jobs undertaken either at school or university, will have an impact on ICAS examination performance.

Therefore, the only variable to be included in the non-relevant honours model in respect of experiential activities is that which relates to **number of jobs undertaken at university which related to chartered accountancy.**

6.7.4 University background factors

Hypothesis 4: University background factors will be indicative of success in the ICAS examinations

Whilst it is not expected that the type of university will have any relevance in the determination of ICAS examination success, there are two background factors contained within this general hypothesis that may have relevance for the non-relevant students but which were not important for the fully-accredited graduates. The first factor considers whether a post-graduate qualification was undertaken. There is concern amongst the profession that many bright, non-relevant students drift into chartered accountancy in their quest to obtain gainful employment. Those students who undertake a post-graduate qualification before embarking on an ICAS qualification would appear to demonstrate a lack of focus and it is suggested that these students will therefore be less committed to the rigorous training and examination process than those who have focused their attention on chartered accountancy training after completion of their first degree. It should be noted here that the post-graduate qualifications obtained by this group of students will not be the conversion course in accountancy which was the course that was taken by the some of the trainees in the Phase I Study under the 'old' system of ICAS education. This is because the Phase II respondents who undertook the Diploma in Accountancy and yet have also undertaken the new system of education which was introduced by ICAS in 1988 have been excluded from any further analysis (as discussed previously). However, once the Diploma in Accountancy post-graduate trainees have been removed, there were only three students who had undertaken a post-graduate qualification. It was therefore decided to exclude this variable for the model building exercise on the grounds of the small numbers.

The second factor considers the type of non-relevant degree undertaken. It is anticipated that trainees who have undertaken an analytical type of degree, albeit of a non-relevant nature, will cope better with the ICAS examinations, particularly at TPC1 where the subjects tend to be of a technical nature, than those graduates who have studied non-analytical subjects such as languages or arts. Further evidence for the inclusion of this variable is provided by the work of Harvey-Cook (1995) who found that the more subjects that a student took at the professional stage, which is in effect a proxy for the relevance of their degree, the lower was the probability of the ICAEW student passing their ICAEW examinations at the first attempt. A variable which considers type of degree will therefore be entered.

The only variable in connection with university background for non-relevant graduates is that which considers whether **the degree taken was of an analytical nature.**

6.8 Background factors not considered for the non-relevant honours graduates

Following the same general areas that were discussed for the fully-accredited honours graduates, an identification has been made of background factors which have been excluded.

6.8.1 Personal background

There should be little to differentiate between the fully-accredited and non-relevant students in respect of personal background factors and it is therefore not envisaged that any personal factors need to be included within the model. However once again gender will be an issue that has to be addressed. This will be further considered in Chapter 7.

6.8.2 Social background factors

It was suggested that social background factors would not be indicative of ICAS examination success for fully-accredited students and, as there is no reason for the social background factors for the non-relevant students to be any different from their fully-accredited counterparts, no social background factors will be included in the non-relevant honours model either.

6.8.3 Involvement in extracurricular activities at school and university

For the same reasons as discussed in the fully-accredited model, variables which consider any extracurricular activities will be excluded from the model building exercise.

6.8.4 Holding positions of responsibility during school and university

As above, variables which consider holding positions of responsibility will also be excluded from the non-relevant model building exercise.

6.9 The fully-accredited ordinary graduate model

Once again the same general background areas will be identified for the fully-accredited ordinary graduates. These will either be hypothesised to be indicative of ICAS examination success or will be discussed in the section which deals with excluded factors.

6.9.1 Academic performance at school

Hypothesis 1: Academic performance at school will be indicative of success in the ICAS examinations

In the same vein as both the honours models, the number of UCAS points obtained in 5th year at school should be indicative of future performance. In light of the results of the Phase I Study and the Harvey-Cook (1995) model, it was also decided to include a supplementary school variable which would consider the number of O levels or Standard grades obtained at A pass or grade 1.

The two variables to be included in the model for ordinary fully-accredited graduates will therefore be: **the number of UCAS points obtained in 5th year at school** and **the number of O levels or Standard grades achieved with an A pass or grade 1.** However, again it is predicted that university performance will supersede that of the school performance and, whilst these variables will contribute to the explanatory power of the model, the school performance background factors will not be as significant as the university performance variables in the model.

6.9.2 Academic performance at university

Hypothesis 2: Academic performance at university will be indicative of success in the ICAS examinations

Although there is no honours degree classification on which to evaluate an applicant's capability in the subject area of accountancy, resits in both 2nd and 3rd year will be an indicator of ability in the subjects which attract accreditation. In the absence of a quantification of academic output therefore, it is anticipated that a resit variable, again considering both 2nd and 3rd year resits, will be the most significant factor in the model. The only variable to be entered into the fully-accredited ordinary model is that which considers **the number of resits in second or third year of a fully-accredited degree.**

6.9.3 Experiential activities at school and university

Hypothesis 3: Experiential activities at school and university will be indicative of success in the ICAS examinations

One of the variables as identified in the fully-accredited honours graduate model will be entered into the fully-accredited ordinary graduate model, namely **the number of jobs related to chartered accountancy whilst at school and university.** However, the variable which considered whether a trainee had progressed directly from university to CA training included in the honours model was excluded from the ordinary model. This variable was excluded from the fully-accredited ordinary model as it was recognised that the time lag variable may not have the same relevance as for the honours candidates. The rationale was that the ordinary students have not undertaken an honours year which, in the main, comprises of courses that are not accredited and therefore are not part of the "assumed knowledge" for TPC I. If an ordinary student was to therefore take a year out after the completion of a degree before commencing their training contract, they would be in a similar time lag position with respect to the accredited subjects as an honours student who had progressed directly from their degree. A break between completion of the university degree to the commencement of the CA training was not therefore felt to have the same importance.

6.10 Background factors not considered for the fully-accredited ordinary model

As there are no other differences envisaged for the fully-accredited ordinary graduates in comparison to their honours counterparts, the same exclusions are made for the other background factors. No variables relating to personal factors, social factors, involvement in extracurricular activities, or holding positions of responsibility were therefore entered into the model. It will be necessary to investigate any gender differences which will be discussed in Chapter 7.

6.11 Summary

This chapter discussed the reference group which is to be used for the development of the Phase II models and highlighted the fundamental educational changes which took place during the Phase I Study. In order to preserve homogeneity within the new reference group and reflect the different types of university education, it was decided to develop three separate models for the distinct samples of fully-accredited honours graduates, non-relevant honours graduates and fully-accredited ordinary graduates. A framework was then formulated for the development of each of the models by setting up general hypotheses from which individual variables were identified for inclusion in the relevant models. Areas of background history which have been excluded were also discussed. The next chapter develops the three models.

CHAPTER 7

THE PHASE II STUDY

7.1 Introduction

The previous chapter attempted to devise a coherent framework from which the statistical models could be developed. This chapter will now undertake the statistical model building, once again using logistic regression, for fully-accredited honours students, non-relevant honours students and fully-accredited ordinary students respectively.

7.2 Model building technique

The Phase I Study could be described as an empirical, fact finding mission whereby several variables were considered. It highlighted variables which were statistically significant in their differentiation of trainees into the group who passed their ICAS examinations at the first attempt and those who experienced resits. These statistically significant variables were then entered using a forward step-wise regression procedure to reduce the number of variables to a manageable level. Whilst this methodology has resulted in models which appear to work reasonably well for the data set on which they were developed, as measured by the model chi-square (χ^2), there was a disappointing reduction in the ability of the model to differentiate trainees from a different data set, evidenced by the fall in the tetrachoric correlation coefficient (r_t) from the development sample to the hold-out sample. Two reasons were suggested for this diminution in the ability of the model to correctly classify and hence predict ICAS examination performance. One reason was in respect of the instability of the reference group. The other was a methodological reason. It is possible that variables which are statistically significant, and hence are entered via the step-wise procedure, may have no logical base for inclusion. Whilst their inclusion may improve the model χ^2 which is based on the developmental group, such variables which are simply a characteristic of this particular group will adversely affect the ability of the model to correctly classify trainees from a different data set.

The method utilised therefore for the Phase II model building exercise, is the highlighting of those variables from the formulated hypotheses in the previous chapter. The selected variables are then entered into the model without using any statistical technique (such as forward stepwise into the regression technique), in order to reduce the number of variables originally entered.

7.3 The fully-accredited honours graduate model

The first step in the exercise is to investigate whether there are any differences in the criterion performance according to gender as this could cause problems for the practical utility of the model. If, for example, women performed significantly better in the ICAS examination process than their male counterparts, any model developed to predict the same examination performance could result in positive discrimination in favour of women. However, as the Mann-Whitney significance level for the gender variable was only 0.9706, gender is not a differentiating variable for ICAS examination success and the criterion should therefore not be distorted with gender differences. The model will therefore be based on the 153 students who have progressed from a fully-accredited degree. The implications for the developed model on gender will be considered later in the Chapter.

Arising from the hypotheses set out in the previous chapter, five variables have been recognised as pertinent in the determination of ICAS examination success for fully-accredited honours graduates. The variables are identified in Table 7.1, together with their expected sign as determined by the coding used for each of the variables (see Appendix 9), where a high value is 'good' for a '+' sign and a low value is 'good' for a '-' sign. In other words, applicants who score high values for background factors which have a positive sign and score low values for background factors which have a negative sign, will achieve a better probability of passing their examinations first time than those trainees who score low values for factors with a positive sign and high values for factors with a negative sign.

Table 7.1 Variables to be included in the model classified by the hypothesis deriving the variable

Hypothesis from which the variable has been derived	Variable	Expected sign
Strong academic performance at school will be indicative of success in the ICAS examinations	Number of UCAS points obtained at Higher in 5th Year	+
Strong academic performance at university will be indicative of success in the ICAS examinations	Honours award	-
	Number of resits in second and third year at university	-
Experiential activities at school or university will be indicative of success in the ICAS examinations	Number of jobs related to chartered accountancy whilst at school and university	+
	Whether progressed directly from university to ICAS training	+

Although the total number of cases was 153, there were four which had incomplete data for one of the variables identified above. These were therefore removed from the model building exercise and the remaining 149 cases were then used for the analysis.

Before the five variables were entered into the model however, it was necessary to check for multicollinearity in order to identify any variables which were too highly correlated with each other and could hence invalidate the resulting model. Spearman correlation coefficients were therefore calculated for the five variables (the results are contained in Appendix 12) and were found to be below the multicollinearity cut-off of 0.7 as discussed in the methodology chapter. No variables were therefore excluded and all five variables were entered into the model.

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

The resulting model can be found in Table 7.2. It can be used to calculate the probability of passing examinations at the first attempt for a trainee who has progressed from a fully-accredited degree.

Table 7.2: Logistic regression - trainees progressing from a fully-accredited honours degree

Variable	β	Level of significance	Exp (β_n)
Honours award	-1.3956	0.0005	0.2477
Number of jobs related to chartered accountancy whilst at school and university	1.1218	0.0033	3.0704
Whether progressed directly from university to ICAS training	1.6708	0.0450	5.3164
Number of resits in second and third year at university	-0.4032	0.4566	0.6682
Number of UCAS points obtained at Higher in 5th year	0.0181	0.6013	1.0183
Constant	1.5421	0.3104	

Model chi-square 35.573(p=0.0001) with 5 degrees of freedom
Overall prediction classification 74.50% (see Table 7.3 for a further breakdown)

In examining each of the variables entered into the model in order of their statistical significance and in light of the results in the Phase I Study, it is unsurprising to note that the honours award variable is the most significant. This demonstrates that the higher is the degree classification obtained from a fully-accredited degree programme, the greater is the chance of passing the ICAS examinations at the first attempt. The second most significant variable was the number of jobs related to chartered accountancy and experienced whilst at school and university. This suggests that the greater is the number of jobs undertaken which relate to chartered accountancy, the higher is the chance of passing the examinations at the first attempt. The next variable, which examined whether a trainee had progressed directly from university to CA training, demonstrated that those students who progressed directly performed better in the ICAS examination process. The final two variables, although forced into the model, are not individually significant. The first referred to the number of resits in second and third year at university. The impact of resits at university would therefore appear to have declined from the Phase I Study, where the number of resits in second year at university was significant albeit at the 10% level. A possible explanation for this may be that many Universities offering fully-accredited degrees have lowered their pass marks from 50% to 40% which has resulted in higher progression rates and a reduced number of resits. Performance in the second and third years of an honours degree is therefore more difficult to assess. The final variable, which is also not statistically significant, relates to the UCAS point score obtained in 5th year at school. This lack of statistical significance is not very surprising based on the Phase I Study, where it was noted that more recent academic performance has far more relevance than earlier school performance.

Although the strength of the Phase II model χ^2 is only 35.6 (p=0.0001%) in comparison to the Phase I model χ^2 of 55.4 (p=0.0001%), it should be noted that the methodology for variable selection has altered. Therefore although the new model would not appear to have the same explanatory power as the Phase I model, the Phase II model χ^2 is still statistically significant at the 0.0001% level. However, the crucial test for any model which is to be used for predictive purposes is the ability of the model to predict. The utility of the model will therefore be based on the ability of the model to classify correctly not only the subjects in the developmental group but also and more importantly, the subjects in the hold-out group.

Before the classification of trainees takes place it is necessary to calculate the optimal cut-off point (as discussed in the methodology chapter) as it may not be appropriate to classify trainees based on an arbitrary cut-off of 0.5. The results are contained in Figure 7.1.

Figure 7.1: Optimal cut-off point for fully-accredited honours graduates

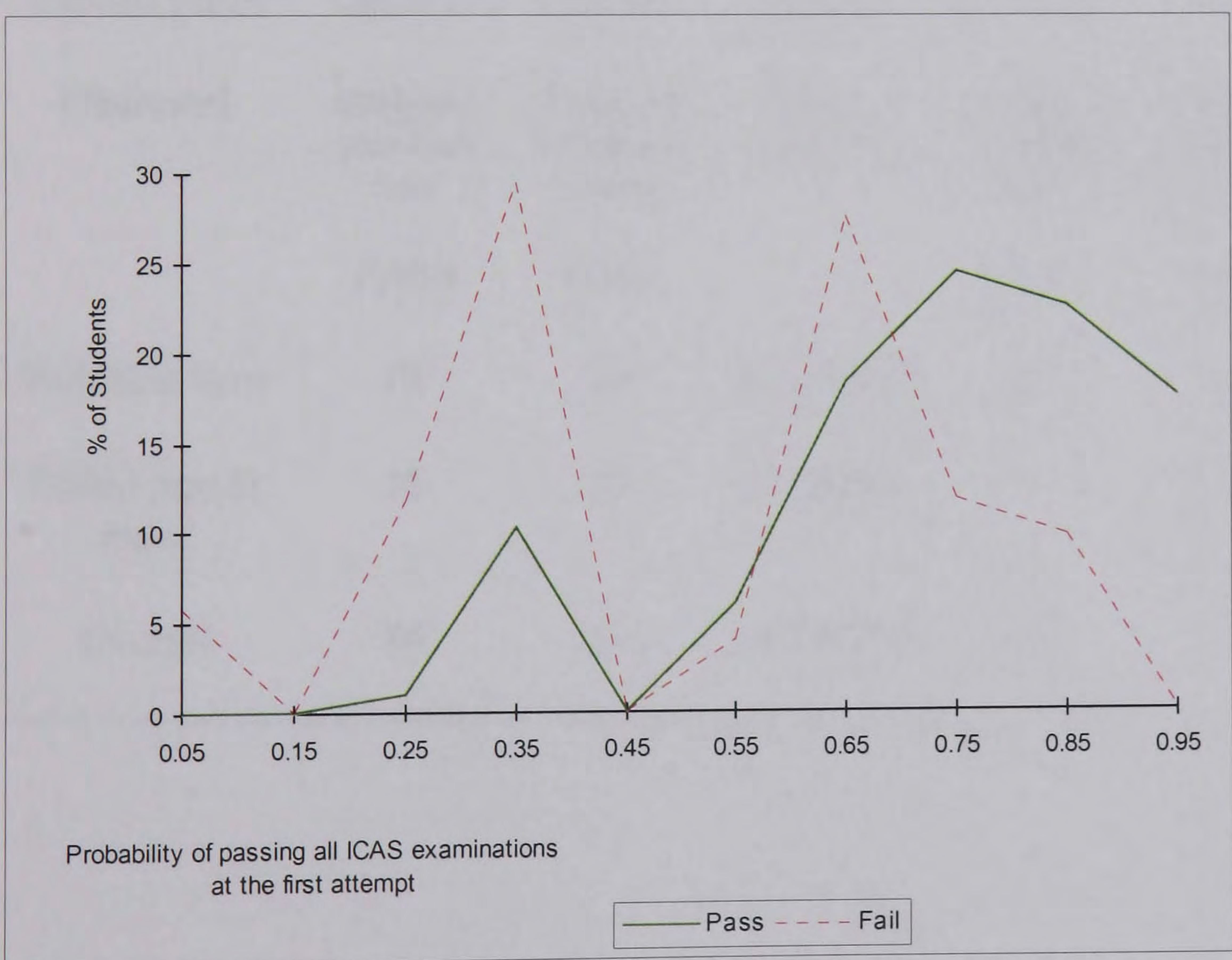


Figure 7.1 reveals that there are two optimum cut-off points, one at 0.57 and the other at 0.685. On examination of the probabilities calculated for this developmental

sample, it was decided to set the optimum cut-off at 0.685 as this was the point at which there appears to be the greatest amount of observed and consistent distinction between the two groups. A classification was therefore undertaken based on classifying trainees as 'pass' trainees if their calculated probabilities were 0.685 or higher and 'fail' trainees if their calculated probabilities were less than 0.685. The results of the classification of the trainees based on this criterion are contained in Table 7.3. The classification figures are also provided based on the arbitrary cut-off point.

The classification of the trainees in the developmental group are shown in Table 7.3.

Table 7.3: Classification table for fully-accredited honours graduates

Cut-off point	Optimal	Optimal	Optimal	Arbitrary	Arbitrary	Arbitrary
Observed	Predicted pass first time	Predicted failed one or more	Percent Correct	Predicted pass first time	Predicted failed one or more	Percent Correct
	PASS	FAIL		PASS	FAIL	
Pass first time	68	30	98 (69%)	87	11	98 (89%)
Failed one or more	16	35	51 (69%)	27	24	51 (47%)
Overall	84	65	149 (69%)	114	35	149 (75%)

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

Table 7.3 reveals that the overall prediction classification of 75%[1] as reported by the model in Table 7.2 is based on the arbitrary cut-off point of 0.5. This represents an excellent 89% of correct classifications of actual passes, but a poor 47% of correct classifications of actual fails. Therefore, based on this arbitrary cut-off point, whilst the model does appear to correctly detect those trainees who are successful, it does not identify students who in fact fail. On the other hand, if the optimal cut-off point is utilised, although the overall prediction classification falls by 6% to 69%[2], the model now classifies both successful and failed students in a more even manner, with 69% of correct classifications in both categories. Although the Type I error[3] has increased from 11% to 31%, the Type II error has reduced from 53% to 31% based on the optimal cut-off point. There is now a more balanced classification of trainees which may be more acceptable for a selection model.

7.4 The hold-out sample - fully-accredited honours graduate model

As in the Phase I Study, the value and utility of the model can only be assessed through an evaluation of the model's ability to perform on a different data set. The model has therefore been applied to trainees who qualified in the year 1995. A total

[1] The number of students correctly predicted as pass students based on random selection is calculated as (114x98)/149=75. Likewise the number of students correctly predicted as failure students based on random selection is (35x51)/149=12. The overall chance classification of correctly classifying a student can therefore be computed as follows: (75+12)/149=58%. The difference between the correct classification of 75% and the chance classification of 58% is significantly different as demonstrated by the Pearson χ^2 of 23.97 (p = 0.0001).
[2] The number of students correctly predicted as pass students based on random selection is calculated as (84x98)/149=55, likewise the number of students correctly predicted as failure students based on random selection is (65x51)/149=22. The overall chance classification of correctly classifying a student can therefore be computed as follows: (55+22)/149=52%. The difference between the correct classification of 69% and the chance classification of 52% is significantly different as demonstrated by the Pearson χ^2 of 19.71 (p = 0.0001)
[3] based on the null hypothesis that the student will pass.

of 76 questionnaires were received from honours graduates who held fully-accredited degrees. One of the respondents failed to disclose their ICAS examination results. However the examination performance of the remaining 75 was as follows: 54.7% (41 out of 75) passed first time and 45.3% (34 out of 75) experienced resits. However as one of the trainees who had encountered resits did not provide information for all the relevant variables, the holdout sample number was reduced to 74, comprising 41 trainees who had passed first time and 33 who had experienced resits.

The classification results for the holdout sample are contained in Table 7.4. The classifications are based on the arbitrary cut-off point of 0.5 and the optimal cut-off of 0.685.

Table 7.4: Classification table for fully-accredited honours graduates - the holdout sample

Cut-off point	Optimal	Optimal	Optimal	Arbitrary	Arbitrary	Arbitrary
Observed	Predicted pass first time PASS	Predicted failed one or more FAIL	Percent Correct	Predicted pass first time PASS	Predicted failed one or more FAIL	Percent Correct
Pass first time	30	11	41 (73%)	35	6	41 (85%)
Failed one or more	14	19	33 (58%)	24	9	33 (27%)
Overall	44	30	74 (66%)	59	15	74 (59%)

Table 7.4 demonstrates that the overall prediction classification is 59%[4], which follows a similar pattern to the developmental group whereby 85% of actual passes are correctly classified but only 27% of actual failures are correctly classified. Based on this arbitrary cut-off, the model does not work very efficiently as it fails to identify those trainees who fail their ICAS examinations. Indeed, the overall prediction classification is not significantly different from that as calculated by chance. However, if the optimal cut-off point as identified from the developmental sample is used, the overall classification increases to 66%.[5] This is a combination of 73% of actual pass trainees and 58% of actual fail trainees who are correctly classified. Utilisation of the optimal cut-of point, as derived from the developmental sample, results in a more even balance of correct classifications when applied to the hold-out sample. It also results in an overall prediction classification which is statistically different from chance.

7.5 The discussion of the fully-accredited honours model

In order to evaluate the model, the tetrachoric correlation coefficient (r_t) has been calculated for both the derivation and holdout samples for the fully-accredited honours graduate models. The results can be found in Table 7.5. These correlation

[4] The number of students correctly predicted as pass students based on random selection is calculated as (59x41)/74=33. Likewise the number of students correctly predicted as failure students based on random selection is (15x33)/74=7. The overall chance classification of correctly classifying a student can therefore be computed as follows: (33+7)/74=54%. which is demonstrated by the Pearson χ^2 of 1.807 which is not significant.

[5] The number of students correctly predicted as pass students based on random selection is calculated as (44x41)/74=24. Likewise the number of students correctly predicted as failure students based on random selection is (30x33)/74=13. The overall chance classification of correctly classifying a student can therefore be computed as follows: (24+13)/74=50%. which is demonstrated by the Pearson χ^2 of 7.17 (p= 0.008).

coefficients have been calculated on the classification matrices based on both the arbitrary and optimal cut-off point as derived from the derivation group which was highlighted in Figure 7.1. as 0.685.

Table 7.5: Tetrachoric correlations for the fully-accredited honours graduates

Model	Derivation sample	Holdout sample
Honours - fully-accredited graduate model based on the arbitrary cut-off	0.65	0.30
Honours - fully-accredited graduate model based on the optimal cut-off	0.56	0.48

Whilst the classification table based on the arbitrary cut-off results in a high overall classification of 75% (see Table 7.3) which is recognised by the r_t of 0.65, this was as a result of very low Type I errors and rather high Type II errors. The optimal cut-off point redressed the balance however, albeit at the expense of the overall prediction classification, which reduced to 69% (see Table 7.3) and is reflected in the lower but still impressive r_t of 0.56. When the model is applied to the hold-out group however, the utilisation of the optimal cut-off point becomes more critical. Based on the arbitrary cut-off point of 0.5, the r_t is 0.3, which increases to 0.48 when the cut-off point is raised to the optimal point of 0.685.

In light of the importance of the cut-off, if firms were to use this model for the selection of applicants it would be necessary evaluate whether the optimal cut-off is stable from one sample to another. A fluctuating optimal point could have an adverse impact on the classification of the trainees from the model and hence affect the utility of the model in a selection environment. Whilst it would appear that the optimal cut-off point of 0.685 is relatively stable between the two groups of trainees, an optimal cut-off exercise was carried out on the hold-out group in order to ensure that this is indeed the case. The results are contained in Figure 7.2.

Figure 7.2. Optimal cut-off for fully-accredited honours graduates based on the hold-out sample

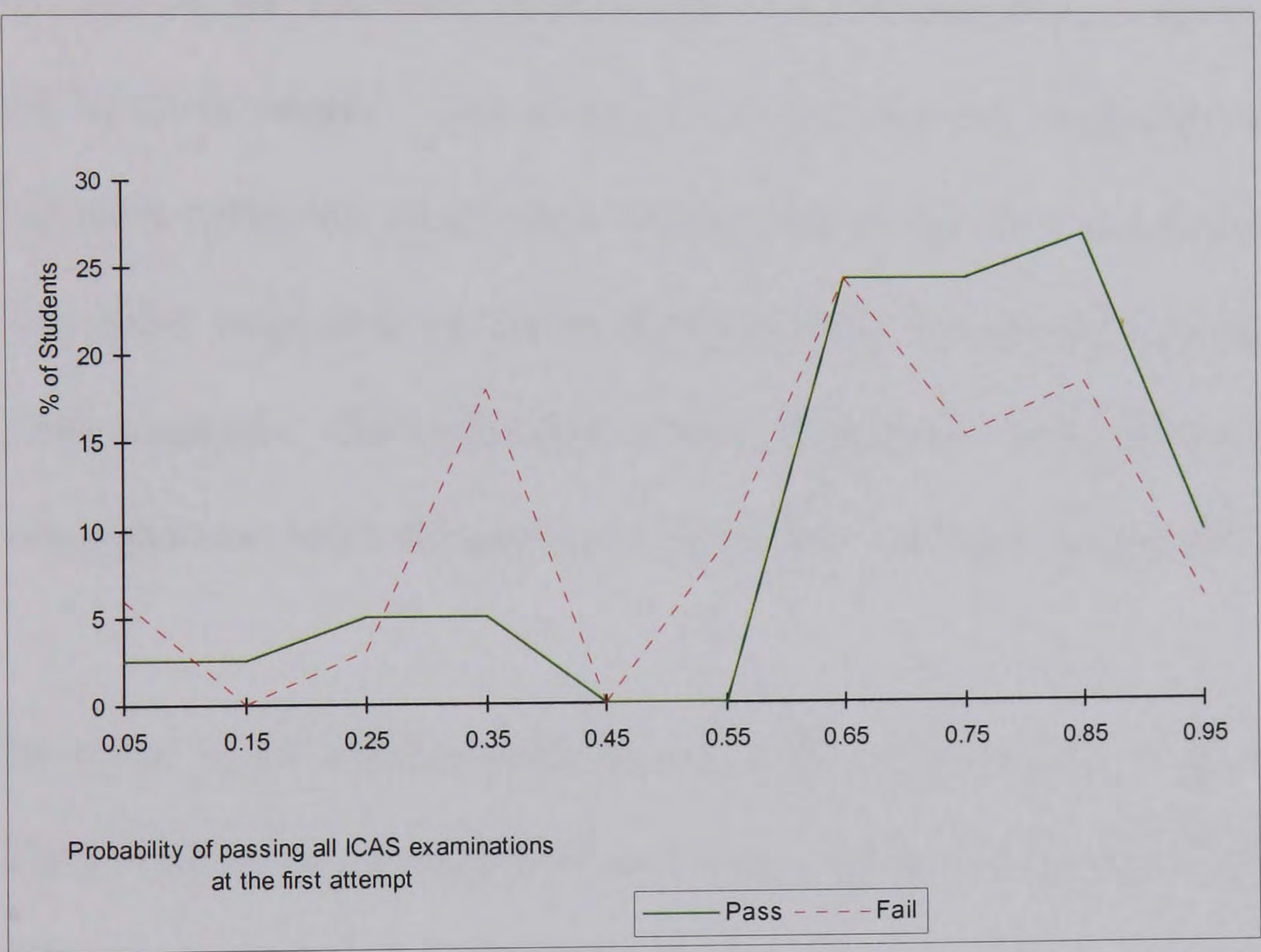


Figure 7.2 would suggest that ignoring the cut-off which arises when both groups have no trainees falling within that category, there are three optimal cut-off points. Whilst the overall classification would be the same for each of these points, the profile of classification will be quite different. The point at which the pass line crosses over the fail line and remains above the fail line will be taken as the optimal

cut-off as this is the point at which there is the greater amount of observed and consistent distinction between the two groups. Figure 7.2 reveals that the optimal cut-off point for the hold-out sample is 0.65. This would therefore suggest that the optimal cut-off point of 0.685 as identified in the derivation sample has been relatively stable within the hold-out group. It is therefore appropriate to report the r_t based on the optimal cut-off point of 0.685.

Although the r_t of 0.56 calculated from the derivation sample is of interest, this does not indicate the true value of the model as it will generally be higher than the r_t from the hold-out sample. This is due to the fact that the weightings of the individual variables within the model have been arrived at based on that developmental group. The utility value of the model is therefore the r_t of 0.48 which is calculated from the holdout sample. The implication of these tetrachoric correlation co-efficients will be discussed later in the Chapter when the models are compared to other studies.

However, in the selection environment of the recruiting firm, it is most likely that if firms were to use the models to pre-select candidates from their application forms in order to proceed to the next stage of their selection procedure, the firms would rank the applicants based on their probability of success as calculated by the model. A further exercise has therefore been carried out, both on the developmental group and the hold-out group, identifying the number of trainees who fall within certain percentage bands. The results are contained in Table 7.6 for the developmental group and Table 7.7 for the hold-out group. The trainees who have experienced failure have been further categorised in each of the tables into those who only encountered one resit and those who encountered two or more resits. This latter group, who struggled through the examination process, could be seen by the employer as a poor selection as two or more resits can be quite disruptive to the trainee's day-to-day work performance.

Table 7.6: Ranking of fully-accredited honours graduates based on their model probabilities - developmental group

Probability of passing first time	Number who passed first time	Number who failed one or more exams	Number who passed first time cumulative (%)	Number who failed one or more exams cumulative (%)	Number who failed only one exam cumulative (% of total)	Number who failed more than one exam cumulative (% of total)
90-100	17	-	17 (17%)	-	-	-
80-90	22	5	39 (40%)	5(10%)	4(3%)	1(1%)
70-80	24	6	63 (64%)	11(22%)	10(7%)	1(1%)
60-70	18	14	81(83%)	25(49%)	21(14%)	4(3%)
50-60	6	2	87(89%)	27(53%)	22(15%)	5(3%)
40-50	-	-	87(89%)	27(53%)	22(15%)	5(3%)
30-40	10	15	97(99%)	42(82%)	31(21%)	11(7%)
20-30	1	6	98(100%)	48(94%)	36(24%)	12(8%)
10-20	-	-	98(100%)	48(94%)	36(24%)	12(8%)
0-10	-	3	98(100%)	51(100%)	38(25%)	13(9%)
Total	98(66%)	51(34%)	98	51	38(25%)	13(9%)

Table 7.6 ranks the students in order of their calculated probabilities. The majority of students passed their ICAS examinations at the first attempt (66%) with the remaining 34% failing at least one examination. The students who experienced failure can be further classified into those who incurred only one resit (25%) and those who experienced more than one resit (9%). If firms were to calculate probabilities for all the students and then consider, say, the top 50% for the next stage in the selection

process, all students who obtained probabilities of at least 70% would be considered[6]. In this category, it is noted that 63 students passed first time which identifies 64% of all the students who passed. On the other hand, 11 students have failed, which represents only 22% of the failures. Of these 11 students, 10 incurred one resit, and only 1 experienced more than one resit. Therefore although 34% of the sample incurred resits (51 out of 149) and 9% incurred more than one resit (13 out of 149), taking the top 50% of students as calculated by their probabilities from the model, only 15% (11 out of 74) incurred resits with only 1% incurring more than one resit.

Ranking the students in this manner, based on their calculated probabilities from the model, provides further evidence that the model does in fact differentiate between those students who passed their ICAS examinations at the first attempt with those who experienced failure. However, it should be noted that only 9% of the sample actually incurred more than one resit. This would suggest that this group of fully-accredited honours trainees, as a whole, performed well in the ICAS examination process.

[6] 50% of the sample is calculated by 149/2 = 74, and 74 students scored probabilities of at least 70%.

Table 7.7: Ranking of fully-accredited honours graduates based on their model probabilities - hold-out

Probability of passing first time	Number who passed first time	Number who failed one or more exams	Number who passed first time cumulative (%)	Number who failed one or more exams cumulative (%)	Number who failed only one exam cumulative (% of total)	Number who failed more than one exam cumulative (% of total)
90-100	4	2	4(10%)	2(6%)	2(3%)	-
80-90	11	6	15(37%)	8(24%)	5(7%)	3(4%)
70-80	10	5	25(61%)	13(39%)	10(14%)	3(4%)
60-70	10	8	35(85%)	21(64%)	14(19%)	7(9%)
50-60	-	3	35(85%)	24(73%)	15(20%)	9(12%)
40-50	-	-	35(85%)	24(73%)	15(20%)	9(12%)
30-40	2	6	37(90%)	30(91%)	20(27%)	10(14%)
20-30	2	1	39(95%)	31(94%)	20(27%)	11(15%)
10-20	1	-	40(98%)	31(94%)	20(27%)	11(15%)
0-10	1	2	41(100%)	33(100%)	21(29%)	12(16%)
Total	41(55%)	33(45%)	41	33	21(29%)	12(16%)

Table 7.7 indicates that a higher percentage of the hold-out group experienced failure with 45% (33 out of 74) of the sample experiencing at least one resit as opposed to 34% of the developmental sample. In addition, a greater proportion of students who failed actually incurred more than one resit, with 16% (12 out of 74) resitting more than once in comparison to the developmental sample whereby only 9% had more than one resit. However, if only the top 50% of students were to be considered for the next stage in the selection process, then again only students with probabilities of at least 70% would be considered[7]. By pre-selecting the 38 trainees who achieved these probabilities, 61% of all pass students and 39% of all fail students would be pre-selected. Of the 13 trainees who experienced at least 1 resit, 10 students (14% of the

[7] 50% of the sample is calculated by 74/2 = 37. As 38 students fall into the 70+ category, these students will be taken as the top 50%.

total sample) only incurred one resit, with the remaining 3, which represents only 4% of the total sample incurring more than one resit. The model therefore does appear to continue to differentiate between the two groups of student, namely those who pass first time and those who fail, when applied to the hold-out sample. It is worth noting however from Table 7.7 that if students with probabilities in the region of 60-70% were also to be considered for the selection process, although an additional 24% of pass students would now be included, this would result in the identification of 85% of all pass students. This, however, has to be traded off against the rise in the erroneous identification of 25% of fail students, resulting in 64% of fail students who are now also included in the selection pool.

7.6 The non-relevant honours graduate model

Once again it is necessary to investigate any gender differences in this group of trainees in order to eliminate the risk of distortion of gender on the criterion measure. As the significance of the Mann-Whitney score on the gender variable was only 0.3889 which is not significant, this would suggest that gender is not a differentiating factor in the determination of whether a non-relevant honours graduate trainee passes their ICAS examinations at the first attempt. No sex discrimination should therefore result from the developed model.

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

Table 7.8 Variables to be included in the model classified by the hypothesis deriving the variable

Hypothesis from which the variable has been derived	Variable	Expected sign
Strong academic performance at school will be indicative of success in the ICAS examinations	Grade in Higher Mathematics	-
	Number of UCAS points obtained in 5th year at school	+
Strong academic performance at university will be indicative of success in the ICAS examinations	Honours award	-
Experiential activities at school or university will be indicative of success in the ICAS examinations	Number of jobs related to chartered accountancy whilst at university	+
university background factors will be indicative of success in the ICAS examinations	Whether the degree was of an analytical nature or not	-

Table 7.8 details the explanatory variables to be used for the model development, highlighting the expected sign of each component variable dependent on the coding utilised as identified in Appendix 9. Although the total number of cases was 61, there were six cases which had incomplete data for at least one of the variables identified above. These six cases were therefore removed from the model building exercise and the remaining 55 cases were then used for the analysis.

Spearman correlation coefficients were also calculated in order to highlight any variables which were too highly correlated with each other. The results (contained in Appendix 12) demonstrate that there is not a multicollinearity problem with the identified variables and all five variables were therefore entered into the model.

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

The resulting model developed to calculate the probability of a trainee who has progressed from a non-relevant degree passing their ICAS examinations at the first attempt can be found in Table 7.9.

Table 7.9: Logistic regression - trainees progressing from a non-relevant honours degree

Variable	β	Level of significance	Exp (β_n)
Number of jobs related to chartered accountancy whilst at university	-1.0549	0.2612	0.3482
Grade in Higher Mathematics	-0.3621	0.4226	0.6962
Honours award	-0.3691	0.4528	0.6913
Whether degree of an analytical nature or not	-0.1889	0.5922	0.8279
Number of UCAS points obtained in 5th year	-0.0006	0.9882	0.9994
Constant	2.0419	0.2569	

Model chi-square 3.174 (p=0.6731) with 5 degrees of freedom
Overall prediction classification of 61.82%

Table 7.9 reveals a very weak model, that includes no statistically significant variables and therefore unsurprisingly has very little explanatory power as demonstrated by the poor model χ^2 (3.174) which is not statistically significant. It can therefore be concluded that the developed model has no statistical meaning and is not valid for the differentiation between non-relevant honours graduate trainees who pass their ICAS examinations at the first attempt and those who experience failure.

7.7 The discussion of the non-relevant honours graduate model

The issue that requires to be addressed in respect of this model is its inability to predict examination performance from the background variables. There are two possible reasons for this. The first is that the model fails to identify those particular aspects of past history which are determinants of ICAS examination performance. This could either mean that other hard items of biodata which have not been entered into the model are in fact significant in the differentiation between the two types of student or that hard biodata items do not differentiate between the two groups and the inclusion of soft data items may be necessary. The second reason is that these particular trainees may not be representative of the non-relevant honours graduate in the chartered accountancy trainee population. Each of these will be dealt with in turn.

In order to identify the aspects of previous background history which do appear to differentiate between the 'pass' trainees and the 'fail' trainees, Mann-Whitney scores were calculated for all the variables derived from the questionnaire, both for the developmental and the hold-out sample[8]. The results are contained in Appendix 13. Those variables however which were statistically significant have been identified in Table 7.10 below.

[8] A total of 44 questionnaires were received from the 1995 cohort of trainees who were honours graduates with non-relevant degrees. As none of these trainees had undertaken the Diploma in Accountancy, no further reduction in the data set was required in order to obtain a homogenous group. Whilst one of the respondents failed to disclose their ICAS examination results, the examination performance of the remaining 43 was as follows: 67.4% (29 out of 43) passed first time and 32.6% (14 out of 43) experienced resits.

Table 7.10: Significant Mann-Whitney scores for non-relevant honours graduates

Developmental sample

Absolute Z Score	Level of significance	Variable name	Explanatory variable
2.5637	0.0104**	Jobs.sch	Number of jobs undertaken whilst at school
1.9267	0.0540*	UCAS.tot	Number of UCAS points obtained at Secondary School
1.8505	0.0642*	Placement	Whether degree incorporated a placement
1.8219	0.0685*	Illness	Any serious illness suffered
1.6684	0.0952*	No.CSYS	Number of Certificate in 6th year Studies undertaken

Hold-out sample

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
2.5785	0.0099***	UCAS.tot	Number of UCAS points obtained at Secondary School
2.5529	0.0107**	No.child	Number of children
2.4100	0.0160**	Fail.6yr	Number of subjects failed in 6th year at school
2.0601	0.0394**	Resit 1year	Number of resits in first year at university
1.7053	0.0881*	Noschool	Number of secondary schools attended
1.6968	0.0897*	Hons.awd	Honours award[2]

Note:
***=significant at 1%, **=significant at 5%, *=significant at 10%

Table 7.10 suggests that there are very few statistically significant variables in the determination of ICAS examination passing potential and in the developmental sample the highest level of significance is at the 5% level. Notwithstanding the lack of any theoretical underpinning to some of the variables, if all the significant variables were to be entered into a model, the resulting model would still not achieve a particularly impressive model χ^2 with a score of only 14.84 (p=0.0111). There is also a lack of conformity between the significant variables in the developmental sample and in the hold-out sample. The only variable, which is included in both, is that related to the total number of UCAS points obtained at school. Therefore although the model χ^2 is significant, in light of the apparent differences of the variables which individually are significant, it is obvious that this model would not perform well when applied to a different data set. It would therefore appear that other 'hard' items, which were not originally hypothesised to predict ICAS examination performance, are also unsuccessful in the prediction of the criterion. It is therefore concluded that information commonly found in an application form would not appear to capture those factors which differentiate between the two groups of students.

This therefore leads on to the other possibility for the poor performance of the model. Are the non-relevant honours students identified in the sample representative of this type of graduate in general? It is necessary in the development of a biodata instrument to have a sufficient data set in order to develop a valid model. As there are only 61 non-relevant honours graduates who took the professional level of examinations at ICAS, there are almost insufficient numbers on which to undertake the model building. It may be therefore that with a greater data set it would be possible to highlight background factors which differentiate between the two groups of trainees.

On a related theme, it is worth considering at this juncture the apparent inability of the honours classification variable to determine ICAS examination success, particularly in light of the importance of this variable, both in the fully-accredited honours graduate model and the Harvey-Cook (1995) study which was based on non-relevant graduates. Could it be predictive that, the weakness of this variable is due to the fact that the model has been developed on trainees who have already been accepted for a CA training contract and that training providers have been able to select those non-relevant trainees with good honours classifications[9]? In other words, is the honours classification based on a limited range of awards? Frequency analysis was therefore undertaken on the honours award variable for both the fully-accredited and non-relevant honours graduate trainees. The results are contained in Table 7.11.

Table 7.11: Honours classification frequencies

Honours classification	Fully-accredited	Non-relevant
First class	16 (10%)	6 (10%)
Upper second	88 (57%)	37 (61%)
Lower second	49 (32%)	18 (29%)
Total	153	61

Table 7.11 suggests that there is a similar spread of honours classifications for both the fully-accredited and non-relevant students and it would therefore appear that the reason for the lack of explanatory power of the honours award variable in the non-relevant honours graduate model is not explained by any restriction of range of this variable.

To conclude the non-relevant honours graduate section therefore, it would have to be stated that a valid model has not been developed and further development work

[9] Any differences in UCAS point scores between the fully-accredited and non-relevant honours graduates has already been discussed in Chapter 6.

would be necessary in this area before training providers have a model which could be applied to non-relevant honours graduate applicants.

7.8 The fully-accredited ordinary graduate model

As in the honours graduate category, it was necessary to investigate the possibility of gender distortion of the criterion. However, as the Mann-Whitney significance level for the gender variable was only 0.9780, it is evident that gender was not a differentiating factor in the determination of ICAS examination success. The impact that any developed model will have on gender will however be discussed more fully later in the Chapter.

The variables to be used in the model estimation procedure for ordinary graduates, together with their expected sign as determined by the coding utilised (see Appendix 9) are detailed in Table 7.12, where a high value is 'good' for a '+' sign and a low value is 'good' for a '-' sign.

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

Table 7.12 Variables to be included in the model classified by the hypothesis from which the variable has been derived

Hypothesis from which the variable has been derived	Variable	Expected sign
Strong academic performance at school will be indicative of success in the ICAS examinations	Number of A passes or grade 1 passes at O level or standard grade	+
	Number of UCAS points obtained in 5th year at school	+
Strong academic performance at university will be indicative of success in the ICAS examinations	Number of resits in second or third year at university	-
Experiential activities at school or university will be indicative of success in the ICAS examinations	Number of jobs related to chartered accountancy whilst at university	+

Although the number of trainees with fully-accredited ordinary degrees was 240, there were 15 respondents who had missing data for at least one of the variables identified above. This therefore reduced the available sample to 225 trainees.

The next step was then to identify multicollinearity and Spearman correlation coefficients were calculated for each of the intended variables. No variables were found to have a high correlation with each other (the results are contained in Appendix 12) and therefore all four variables were entered into the model.

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

The resulting model can be used to calculate the probability of passing examinations at the first attempt for a trainee, who has progressed from a fully-accredited ordinary degree. The results can be found in Table 7.13.

Table 7.13: Logistic regression - trainees progressing from a fully-accredited ordinary degree

Variable	β	Level of significance	Exp (β_n)
Number of jobs related to chartered accountancy whilst at school and university	0.6545	0.0074	1.9241
The number of resits in second and third year at university	-0.7143	0.0096	0.4895
The number of A passes or grade 1 passes at O level or standard grade	0.1239	0.1201	1.1319
Number of UCAS points obtained in 5th year	0.0148	0.5270	1.0149
Constant	-0.9816	0.0939	

Model chi-square 21.375 (p=0.0003) with 4 degrees of freedom
Overall prediction classification of 61.33% (see Table 7.14 for further analysis)

Discussing each of the variables in order of their statistical significance, it can be seen that the most significant of these variables is the variable which considers that the greater is the number of chartered accountancy jobs undertaken whilst at school and university then the more likely is success in the ICAS examinations. This variable was also significant in the fully-accredited honours model.

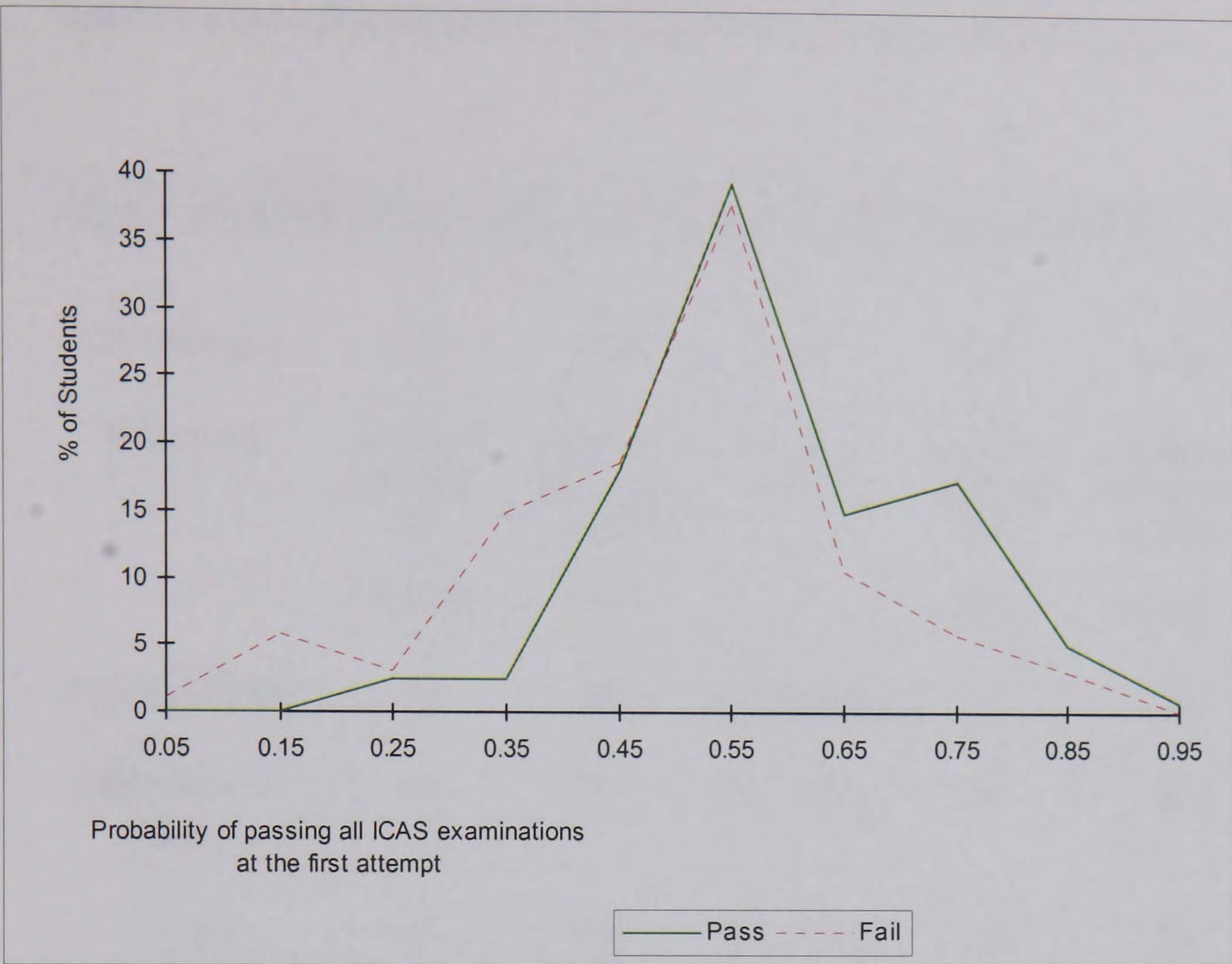
Resits during the second and third year of a fully-accredited degree programme is the next most statistically significant variable. This suggests that the more are the number of resits experienced at university, the less is the likelihood of passing the ICAS examinations at the first attempt. The significance of this variable supports the model as developed in the Phase I Study. It is also worth considering why resits in second and third year have more significance for the ordinary than for the honours students whereby the variable was not statistically significant (see Table 7.2). In general, it tends to be the weaker university students who progress down the ordinary route and Universities may encourage students who have experienced resits in the earlier years of a course to bypass the honours degree. Therefore fewer honours graduates will have experienced failure at university. There is also no real quantification of university performance as there is no honours award with which to differentiate different levels of performance and resits at university therefore become more salient. It should be noted however that, in both the fully-accredited honours and ordinary models, some measure of university performance has the most significance.

Both final two variables, which are not statistically significant, relate to academic school performance. The first suggests that the greater is the number of A passes or Grade I passes at O level or Standard grade, the better is the chance of passing. The final variable indicates that the more UCAS points which are obtained at Higher, then the better is the chance of success. The lack of statistical significance of these variables supports the findings of the fully-accredited honours model and suggest that once again school performance does not have a significant impact on the determination of ICAS examination success. This contrasts slightly with the Phase I model whereby three school related variables were statistically significant at the 0.5% level.

Once again, there is a fall in the strength of the model as measured by the model χ^2, whereby the Phase I model reported a model χ^2 of 41.165 (p=0.0001) with the Phase II model only achieving a model χ^2 of 21.375 (p=0.0001). This would suggest that the explanatory power of the model has diminished although, as the method for selection of the variables entered into the model has changed (as discussed previously), this will obviously have an impact on this statistic. However, the relevant question, for a model designed to be used for predictive purposes, is not necessarily the explanatory power but rather the potential to correctly classify subjects both in the developmental group and more pertinently the hold-out group. Therefore a classification exercise will be carried out.

Although the model has reported an overall prediction classification of 62%, this is based on an arbitrary cut-off point of 0.5. It is necessary therefore to calculate the optimal cut-off point. The results are shown in Figure 7.3.

Figure 7.3: Optimal cut-off point for fully-accredited ordinary graduates



It is very difficult from Figure 7.3 to identify the optimal cut-off point for the fully-accredited ordinary students as there is almost an identical path followed by both the 'pass' and 'fail' trainees from the 0.45 to 0.55 points which suggests that there is a cluster of both types of students with probabilities in the range of 0.4 to 0.6. Nevertheless, the point at which the two lines intersect would appear to be around the 0.5 mark. However, the adoption of the cut-off point of 0.50 will result in a high classification of 'pass' trainees but at the expense of a low classification of 'fail' trainees. If the cut-off is set at 0.55, which is the point after which there is the most consistent differential between the two lines, a more balanced classification should occur. Two classifications have therefore been undertaken, the first classifying trainees as 'pass' trainees if their calculated probabilities were 0.55 or higher and 'fail' trainees if their calculated probabilities were less than 0.55, and the second based on a cut-off point of 0.5. The results are contained in Table 7.14.

Table 7.14: Classification table for fully-accredited ordinary graduates

Cut-off point	0.55	0.55	0.55	0.50	0.50	0.50
Observed	Predicted pass first time	Predicted failed one or more	Percent correct	Predicted pass first time	Predicted failed one or more	Percent correct
	PASS	FAIL		PASS	FAIL	
Pass first time	73	49	122 (60%)	94	28	122 (77%)
Failed one or more	30	73	103 (71%)	59	44	103 (43%)
Overall	103	122	225 (65%)	153	72	225 (61%)

The overall prediction classification of 61%[10], as reported in the model based on the cut-off point of 0.5, represents 77% of correct classifications of actual passes with a poor 43% of correct classifications of actual failures. The utilisation of the 0.55 cut-off, however, increases the overall prediction classification to 65%[11]. This is a combination of 60% of correct classifications of actual pass students and 71% of

[10] The number of students correctly predicted as pass students based on random selection is calculated as (153x122)/225=83. Likewise the number of students correctly predicted as failure students based on random selection is (72x103)/225=33. The overall chance classification of correctly classifying a student can therefore be computed as follows: (83+33)/225=51%. The difference between the correct classification of 61% and the chance classification of 51% is significantly different as demonstrated by the pearson χ^2 of 10.03 ($p = 0.002$).

[11] The number of students correctly predicted as pass students based on random selection is calculated as (103x122)/225=56. Likewise the number of students correctly predicted as failure students based on random selection is (122x103)/225=56. The overall chance classification of correctly classifying a student can therefore be computed as follows: (56+56)/225=50%. The difference between the correct classification of 65% and the chance classification of 50% is significantly different as demonstrated by the pearson χ^2 of 21.11 ($p = 0.0001$).

correct classifications of failure students. By moving the cut-off point from 0.5 to 0.55, there is now a more balanced classification of trainees.

7.9 The hold-out sample - ordinary graduate model

As in the Phase I Study, the value and utility of the model can only be assessed through an evaluation of its ability to perform on a different data set. The model has therefore been applied to trainees who qualified in the year 1995. From the data collected for the 1995 trainees, 99 questionnaires were received from ordinary graduates who held fully-accredited degrees. The examination performance of this group was as follows: 49.5% (49 out of 99) passed first time and 50.5% (50 out of 99) experienced resits. However as two trainees, one who had passed first time and one who had encountered resits, did not provide information for all the variables in the model, the holdout sample numbers were reduced to 97, which comprised 48 trainees who had passed first time and 49 who had experienced resits.

The classification matrices for the holdout sample, based on both the cut-off point of 0.5 and the cut-off point of 0.55, are contained in Table 7.15.

Table 7.15: Classification table for fully-accredited ordinary graduates - the hold-out sample

Cut-off point	0.55	0.55	0.55	0.5	0.5	0.5
Observed	Predicted pass first time PASS	Predicted failed one or more FAIL	Percent Correct	Predicted pass first time PASS	Predicted failed one or more FAIL	Percent Correct
Pass first time	29	19	48 (60%)	38	10	48 (79%)
Failed one or more	21	28	49 (57%)	27	22	49 (45%)
Overall	50	47	97 (59%)	65	32	97 (62%)

Table 7.15 demonstrates that the overall prediction classification based on the cut-off of 0.5 is 62%[12], which follows a similar pattern to that of the developmental group whereby 79% of actual passes were predicted to pass but only 45% of actual fails predicted to fail. Although the classification based on the cut-off of 0.55, is more balanced with 60% of actual passes accurately predicted and 57% of actual fails accurately predicted, the overall classification of 59%[13] is not significantly different from the chance classification of 51%. This would therefore suggest that the fully-

[12] The number of students correctly predicted as pass students based on random selection is calculated as (65x48)/97=32. Likewise the number of students correctly predicted as failure students based on random selection is (32x49)/97=16. The overall chance classification of correctly classifying a student can therefore be computed as follows: (32+16)/97=49%. This is significantly different from the overall prediction classification which is demonstrated by the Pearson χ^2 of 6.352 (p= 0.012).

[13] The number of students correctly predicted as pass students based on random selection is calculated as (50x48)/97=25. Likewise the number of students correctly predicted as failure students based on random selection is (47x49)/97=24. The overall chance classification of correctly classifying a student can therefore be computed as follows: (25+24)/97=51% which is not significantly different from the overall chance classification as demonstrated by the Pearson χ^2 of 2.34 (p = 0.126).

accredited ordinary graduate model, based on the cut-off point of 0.55 does not adequately perform and this calls into question the use of the 0.55 cut-off point for this new group of trainees. The optimal cut-off point was therefore calculated for the hold-out sample and the results are contained in Figure 7.4.

Figure 7.4: Optimal cut-off point for fully-accredited graduates based on the hold-out sample

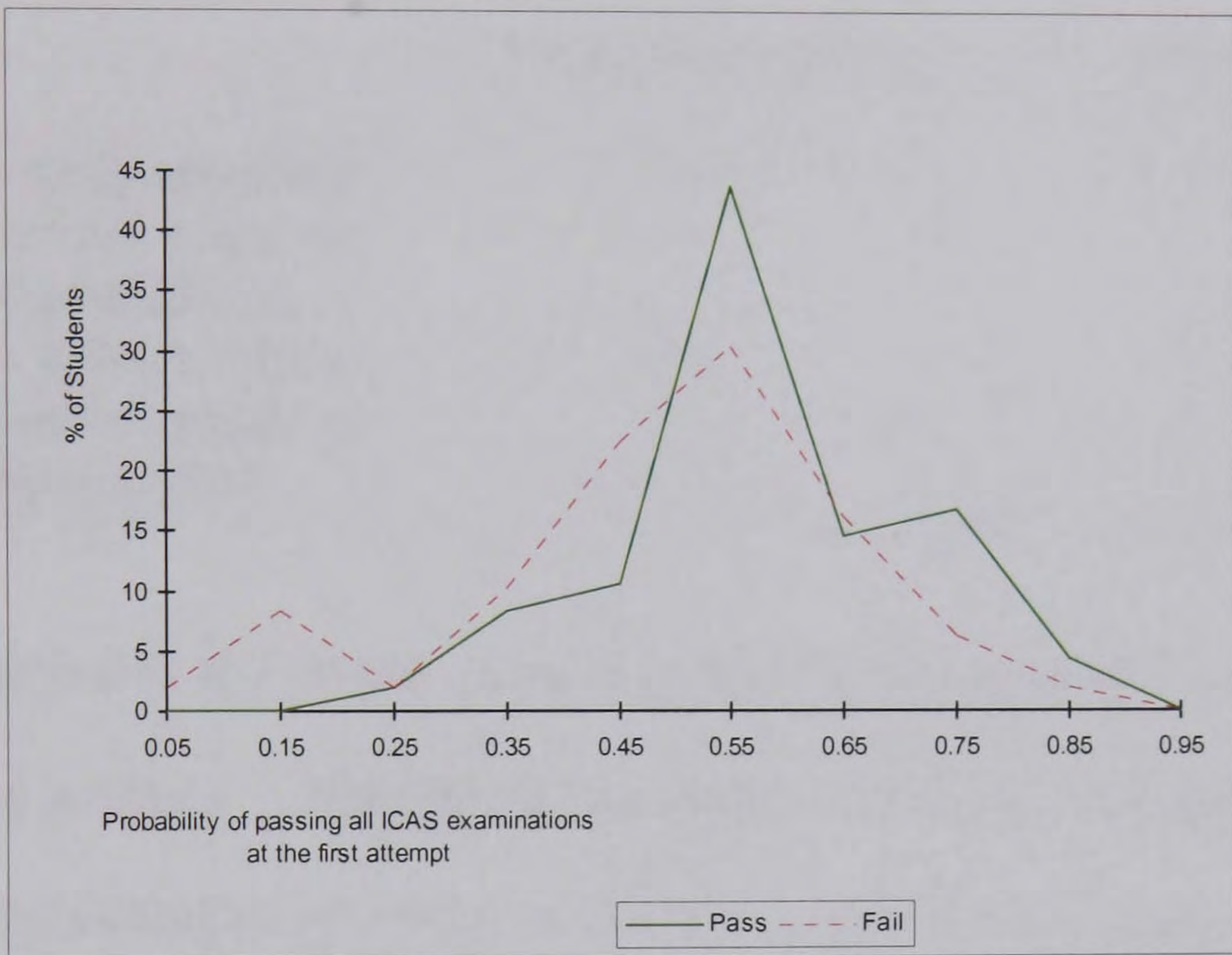


Figure 7.4 reveals that although there are several optimal cut-off points, 0.50 is the point at which there are relatively stable increased probabilities for the 'pass' ordinary students in comparison to their colleagues who failed at least one of their ICAS examinations. Once again however there appears to be a bunching of probabilities in the region of 0.5 to 0.6 which suggests that, although the model does appear to differentiate between the two groups, there are several students who are border-line cases, some of who successfully pass their ICAS examinations at the first attempt and others who fail.

7.10 Discussion of the fully-accredited ordinary graduate model

The tetrachoric correlation coefficients (r_t) were calculated for both the developmental and hold-out samples, using both the cut-off points of 0.5 and 0.55. The results are contained in Table 7.16

Table 7.16: Tetrachoric correlation coefficients

Model	Derivation sample	Holdout sample
Ordinary - fully-accredited graduate model based on the cut-off point of 0.55	0.47	0.27
Ordinary - fully-accredited graduate model based on the cut-off point of 0.5	0.35	0.42

The allocation of the cut-off point is critical in the evaluation of the model as determined by the r_t. Although the adoption of the 0.5 cut-off point results in an excellent classification of correct actual pass students, this is at the expense of the correct classification of actual fail students who do not fare so well in the classification process. There is however a similar trend in the calculated probabilities for the developmental group and the hold-out group, as evidenced by Figures 7.3 and 7.4, which reveal a grouping of trainees with probabilities in the 50% banding irrespective of their ICAS examination results. Notwithstanding the misclassification of students around this mid-point, 0.50 will be taken as the optimal cut-off point as this was in fact one of the optimal cut-off points as identified in Figure 7.3 which was supported by the results in Figure 7.4. The utility of the model can therefore be expressed by the r_t based on the cut-off point of 0.5, which is 0.42.

The collection of trainees with borderline probabilities around the 0.5 mark however should not invalidate the utility of the model as it is expected that firms would rank the students for the next stage in the selection process based on their calculated probabilities derived from the model. A ranking exercise has therefore been carried out on the fully-accredited ordinary graduates. The results for the developmental group are contained in Table 7.17 and the hold-out group contained in Table 7.18.

Table 7.17: Ranking of fully-accredited ordinary graduates based on their model probabilities - developmental group

Probability of passing first time	Number who passed first time	Number who failed one or more exams	Number who passed first time cumulative (%)	Number who failed one or more exams cumulative (%)	Number who failed only one exam cumulative (% of total)	Number who failed more than one exam cumulative (% of total)
90-100	1	-	1(1%)	-	-	-
80-90	6	3	7(6%)	3(3%)	1(-%)	2(1%)
70-80	21	6	28(23%)	9(9%)	5(2%)	4(2%)
60-70	18	11	46(38%)	20(19%)	14(6%)	6(3%)
50-60	48	39	94(77%)	59(57%)	35(16%)	24(11%)
40-50	22	19	116(95%)	78(76%)	46(20%)	32(14%)
30-40	3	15	119(98%)	93(90%)	55(24%)	38(17%)
20-30	3	3	122(100%)	96(93%)	57(25%)	39(17%)
10-20	-	6	122(100%)	102(99%)	60(27%)	42(19%)
0-10	-	1	122(100%)	103(100%)	60(27%)	43(19%)
Total	122(54%)	103(46%)	122	103	60(27%)	43(19%)

Table 7.17 reveals that 54% of the developmental group (122 out of 225) passed first time, with the remaining 46% experiencing at least one resit. Out of the total sample, 19% of trainees experienced more than one resit (43 out of 225). This suggests that a higher percentage of ordinary trainees experienced real difficulty with the ICAS

examination process than that of their fully-accredited honours counterparts (see Table 7.6). However, if the top 50% of students were to be pre-selected for the next stage in the selection process, then 112 students would be considered. Although in the majority of the students, 66 are those with scores of at least 60% and the remaining 46 students would come from the 50-60% category. By incorporating students from this band, an increase in the number of students who pass would include 77% of all pass students. This however is at the expense of an increase in the number of fail students to 57% of all fail students. If firms were only to consider, say, trainees who achieved probabilities from the model of at least 60%, only 30% (20 out of 66) of these would have incurred any resits and from within these numbers, 9% (6 out of 66) would have incurred more than one resit. On the other hand, if firms were to consider trainees who achieved probabilities of at least 50% (n=153), then 39% (59 out of 153) would have incurred resits and 16% (24 out of 153) of the sample would have incurred more than one resit. This would suggest that, based on the calculated probabilities from the model, it does in fact differentiate between those students who pass their ICAS examinations at the first attempt and those who experience failure. It must be noted however that, for this developmental group, the lower the cut-off point is set for the pre-selection process, the less power has the model to differentiate.

Table 7.18: Ranking of fully-accredited ordinary graduates based on their model probabilities - hold-out group

Probability of passing first time	Number who passed first time	Number who failed one or more exams	Number who passed first time cumulative (%)	Number who failed one or more exams cumulative (%)	Number who failed only one exam cumulative (% of total)	Number who failed more than one exam cumulative (% of total)
90-100	-	-	-	-	-	-
80-90	2	1	2(4%)	1(2%)	-	1(1%)
70-80	8	3	10(21%)	4(8%)	3(3%)	1(1%)
60-70	7	8	17(35%)	12(24%)	10(10%)	2(2%)
50-60	21	15	38(79%)	27(55%)	19(20%)	8(8%)
40-50	5	11	43(90%)	38(78%)	28(29%)	10(10%)
30-40	4	5	47(98%)	43(88%)	32(33%)	11(11%)
20-30	1	1	48(100%)	44(90%)	32(33%)	12(12%)
10-20	-	4	48(100%)	48(98%)	34(35%)	14(14%)
0-10	-	13	48(100%)	49(100%)	34(35%)	15(16%)
Total	48(49%)	49(51%)	48	49	34(35%)	15(16%)

Table 7.18 reveals that although a slightly higher percentage of trainees failed their examination in the hold-out sample with 51% incurring at least one resit in comparison to 46% in the developmental sample, a smaller percentage, namely 16% (15 out of 97), actually incurred more than one resit (compared to 19% in the hold-out sample). This is more in line with the fully-accredited honours graduates (see Table 7.7), where 16% of trainees incurred more than one resit although a smaller percentage of fully-accredited honours graduates failed in total, with only 45% failing as opposed to 51%. It is apparent that the greatest number of students obtain probabilities in the region of 50-60% irrespective of whether they passed their ICAS examinations at the first attempt. However, if only those students who achieved probabilities in excess of 60% were selected, 29 students would progress to the next

stage in the selection process. Whilst this is broadly equivalent to the top 30% of the sample, the model identifies 35% of the total pass students and only 24% of the total fail students. Although 41% of this group (12 out of 29) experienced resits, it is interesting to note that only 7% (2 out of 29) incurred more than one resit. This is further evidence that the model does differentiate between those trainees who pass and those who fail their ICAS examinations. Caution needs to be exercised by the training providers, however, if students with probabilities in the region of 50-60% are pre-selected. Whilst this increases the identification of the total pass students to 79% this has been achieved at the expense of an increase in the inclusion of total fail students which now has risen to 55%.

7.11 Comparison of the fully-accredited honours and fully-accredited ordinary models with other studies

Due to the dichotomous nature of the dependent variable, it is difficult to compare model performance with studies which utilise other modelling techniques that report validity coefficients based on the Pearson product moment correlation coefficient, identifying the relationship between the predictor score and the criterion (r^2). The goodness of fit of a logistic regression model is examined by the model chi-square statistic (as discussed in the methodology chapter). The only true comparison can therefore be made with the Harvey-Cook (1995) results. Neither of the ICAS related models would appear to perform as well as the examination performance of the Harvey-Cook model (χ^2) = 71.93, with the ICAS fully-accredited honours model achieving a $\chi^2 = 35.573$(p=0.0001) and the fully-accredited ordinary model achieving a $\chi^2 = 21.375$ (p = 0.0003). Harvey-Cook (1995) however developed her model on those students who had passed their examinations first time and those who had experienced failure in **both** the first two levels of ICAEW examinations. The model therefore ignored the intermediary group of students who had for example experienced only one resit. It is intuitively more straightforward to develop and report on this type of model as the profiles of these two polarised groups are more likely to be different. She also adopted the methodology utilised in the Phase I Study whereby all the variables which were statistically significant were entered into the model using a forward stepwise procedure, with an adhoc rationale for their ultimate inclusion in the model.

It should also be noted that the model χ^2 reports the predictive ability of the model based on the sample on which it is derived. The methodology adopted by Harvey-Cook (1995) and also by the Phase I Study should therefore result in a high model χ^2. By identifying statistically significant variables within one data set, the consequence should be impressive explanatory powers based on the developmental group. However this may be at the expense of the model's effective ability on another data set. The utility of the model should therefore be evaluated based on the ability of the model to correctly predict another group of students. Therefore, if it is accepted that the tetrachoric correlation can produce a coefficient which is numerically equivalent to a Pearson r and hence can be regarded as an approximation to it, an evaluation of the predictive ability of the model on a holdout sample can be conducted and comparisons with other studies may be carried out. From Table 7.5 the tetrachoric correlation co-efficient calculated for the fully-accredited honours graduates based on the hold-out sample was 0.48 and from Table 7.16 the tetrachoric correlation co-efficient calculated for the fully-accredited ordinary graduates was 0.42.

The key issue is their comparison with the Harvey-Cook model and other studies. Harvey-Cook (1995) also calculated an estimated validity coefficient in her study and found that for her validation sample, which is the equivalent of the holdout sample, the point biserial correlation coefficient was 0.318 for her model which was solely concerned with examination performance and this fell to 0.272 for the model which also considered some element of practice work performance. It would therefore appear that both the honours and the ordinary graduate models perform better than both the Harvey-Cook models.

Both models also compare well with other studies concerned with entry level selection methods. For example, Hunter and Hunter's (1984) meta-analytical study, as discussed previously in Chapter 2, revealed the highest mean validity of 0.53 for the composite scores on ability tests, which was followed by 0.44 for job try-outs with a very poor validity of only 0.14 for interviews. However, the more recent meta-analyses suggest that the interview, especially structured interviews, are considerably more valid than that reported by the earlier studies. Anderson (1997) reviews recent meta-analytic evidence relating to interview predictive ability and reveals that unstructured interviews range from 0.20 (Huffcutt and Arthur, 1994) to 0.33 (McDaniel et al 1994). This would suggest that both models would perform better than the unstructured interview. However when a structure is introduced into the interview process, the validity coefficient can rise to 0.67 for a highly structured and 0.56 for a moderately structured interview (Conway et al, 1995), with similar improvements found by Huffcut and Arthur (1994) and McDaniel et al (1994). It would therefore appear that both the models fall short of the performance of the structured interview. It should be reiterated here that Harvey-Cook and Taffler (1987) found that the majority of firms did not use a structured interview approach although this may have changed in the intervening years. The model validities should therefore be compared with the validities of the unstructured interview. However, even this is not a valid comparison as it is suggested that the model could be used to filter application forms before any interviewing takes place and not as a replacement for the interview. Unfortunately it is impossible to evaluate the validity of this pre-sift of application forms as the studies are obviously carried out on those candidates who successfully negotiated the complete selection procedure.

The findings of the meta-analysis are also for average coefficients based on a wide range of studies which have wide-ranging distributions. To compare the model r_t with other validity coefficients assumes that the accountancy firms will achieve the mean validities calculated whereas in fact this may not be the case. Indeed, each individual firm may be producing either higher or lower predictive ability based on their own practice and, for the comparison to be relevant, it should drawn between each firm's own validated procedures and the ability of the model, (Murphy, 1997).

Therefore whilst the comparisons are of interest, too much emphasis should not be placed on the comparative results.

7.12 Limitations of the honours graduate model

There is no doubt as to the significance of the fully-accredited degree honours classification as a determinant of ICAS examination success. However, at the time of recruitment of trainees during October/November in the year preceding the commencement of the training contract, the vast majority of potential trainees will only be in the first term or semester of their final honours year. The honours classification will not therefore be known. Taffler et al (1995) suggested that one possible strategy would be to use expected degree class which the prospective trainees are often required to indicate on their application form. They found that this proxy was correlated at $r = 0.41$ (significant at better than $\alpha = 0.01$) with actual degree class. Unfortunately there is no additional information as to whether the differences are due to optimistic or pessimistic indications or indeed a combination of both. They also suggest a superior approach whereby training providers could work backwards using the appropriate logit model.

> *'it may well be that even were the potential recruitees not to obtain an upper second degree, his or her scores on other component variables would still predict a high probability of success.'* (p29)

Another approach suggested by Taffler et al (1995) is to offer a place conditional on the prospective trainee achieving a particular degree classification although this may not necessarily be practical as it may result in firms recruiting less than the desired number of trainees.

A more radical approach may be to include a section on the application form which will be completed by the university, predicting the student's honours classification. Many Universities already furnish firms with this information at the reference stage but this would involve the Universities at an earlier stage in the selection procedure. This would not be dissimilar to the UCAS system whereby schools provide Universities with predicted Higher and A Level grades. Unfortunately there are apparently no studies testing the validity of the Universities' prediction and further work would be required in this area. However it is difficult to envisage that, based on detailed knowledge of academic ability of three years within the university, a valid prediction of the student's honours classification could not be made by the relevant year tutor/course leader. It was therefore decided to conduct a small scale study on the final year of the Accounting and Finance degree at the Robert Gordon University in order to calculate the correlation between the actual student performance and the predicted performance from a variety of sources. There were 41 students in the final honours year and each student was given during their first semester a form in which to predict their honours degree classification before any feedback on final year performance was given. The students were told to reflect what they would have put on an application form if they had been required to provide this information by a prospective employer. Four members of staff from the Accountancy Department were also asked to predict each final year student's honours classification, again before any work had been submitted by the students for assessment. The detailed results are contained in Appendix 14, with a summary identified in Table 7.19.

Table 7.19: Honours predictions - percentage of correct predictions

Honours classification	No	Student prediction	Course Leader prediction	4th Year tutor prediction	3rd Year lecturer prediction	4th Year lecturer prediction
1st class	8	13%	50%	50%	38%	75%
Upper second	15	93%	73%	73%	60%	73%
Lower second	13	55%	46%	62%	85%	77%
Third	1	100%	0%	0%	0%	100%
Unclassified	1	-	100%	0%	100%	0%
Transferred	3					
	41					
Spearman correlation coefficients		0.6757	0.8098	0.8268	0.8191	0.8351

Three students were advised to transfer to the ordinary degree at the end of the first semester based on their performance in the first semester of their fourth year. These students were therefore excluded from the correlation analysis although it is worthwhile to note that these three students all predicted that they would obtain middle of the range upper second class degree (n=2) or a border-line lower second/third class degree (n=1). The members of staff predicted that they would either fail and be awarded an unclassified degree, achieve a third or a border-line lower second/third class degree.

Table 7.19 indicates that there is little to differentiate between the Spearman correlation co-efficients for the predictions of the academic staff, which range from 0.81 to 0.84, although these are better than the student correlation co-efficient of 0.68. The good students would appear to under-estimate their abilities (only one student thought that they would achieve a first class honours degree) whilst the poorer students achieving lower second class honours degrees, over-estimate their abilities. Although the majority of lower second class students accurately predicted their final classification (55%), the remainder all predicted that they would achieve an upper second. The misclassifications by the staff however were far more balanced with both over and under estimates in each category (see Appendix 14). These high correlations between academic staff predictions and student performance in the Accounting and Finance degree at the Robert Gordon University lend weight to the fact that it is possible for academic staff to predict, with some degree of certainty, honours degree classification at the time of student recruitment. It must be noted, however, that this was a small piece of empirical work and the results obtained within one university will not necessarily be replicated in another environment. Further work is needed in this area.

7.13 Gender issues

The Equal Opportunities Commission advocate that the intention of all those involved in carrying out selection for recruitment should be to ensure that their selection procedures are fair, unbiased and objective. The Commission goes on to suggest that some selectors will be concerned because of the moral issues, others do not wish to break the law and many others will simply realise that failure to select the best candidates will result in lower effectiveness of the employing organisation. The Commission then proceeds to provide advice directed specifically at avoiding sex bias in selection, although it is stressed that most of the suggestions are demonstrations of good personnel practice and should be adopted for general efficiency reasons. For example, it is suggested that questions which deal with families, marital status, children and intimate personal questions should not be asked. This has been recognised by excluding these personal background factors from any model development. The Commission also suggests that shortlisting should be done systematically. Calculating probabilities from the developed models and pre-selecting on the grounds of these probabilities are the essence of a systematic method of selection. The models have the advantage that they will produce a numerical score which does not depend upon opinions or subjective interpretations and would appear therefore to exclude sex bias. This, however, is not necessarily the case and some safeguards are advisable although not mandatory. There are no regulatory guidelines in Britain. There is no guidance in the Sex Discrimination Act 1975 and that in the Equal Opportunities Commission's code of conduct is very general. The code of conduct recommends that, if a selection test is used, then it should be specifically related to the job and/or career requirements and that the test should be reviewed regularly to ensure that it remains relevant and free from an unjustifiable bias. In the United States, however, the US Equal Employment Opportunities Commission stipulates precise procedures by which an employer should validate the use of tests. One of these is to examine the accept and reject rates of both men and women as determined by the test and ensure compliance with the 4/5ths rule. This rule advocates that the acceptance rate of one gender must be at least the equivalent of 4/5ths of the acceptance rate of the other gender. In other words if 100% of men were accepted on the grounds of their biodata score, at least 80% of women should also be accepted.

A gender exercise was therefore carried out on the two models which would appear to have some use for the training provider, namely, the fully-accredited honours graduate model and the fully-accredited ordinary graduate model.

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

7.13.1. Fully-accredited honours graduate model

Of the 149 cases used in the developmental group for the fully-accredited honours graduate model, 59% were male (n=88) and 41% were female (n=61). Similar percentages of both groups passed first time, namely, 66%. This would therefore suggest that gender is not an influence on the criterion measure or in other words, the ability to pass the ICAS examinations at the first attempt. This is also supported by the Mann-Whitney score on the gender variable as discussed earlier in the Chapter. However, it is necessary to consider the accept and reject rates of the model dependent on gender. The results are contained in Table 7.20.

Table 7.20: Accept/reject rates based on the fully-accredited honours graduate model utilising the optimal cut-off point

Developmental group			Hold-out group		
	Number	%		Number	%
Accept men	50	57	Accept men	22	56
Reject men	38	43	Reject men	17	44
	88	100		39	100
Accept women	34	56	Accept women	22	63
Reject women	27	44	Reject women	13	37
	61	100		35	100

In the developmental group, similar percentages of men (57%) and women (56%) are accepted by the model utilising the optimal cut-off point of 0.685. There would therefore appear to be no sex bias in the model for the developmental group, although a higher percentage of women (63%) are accepted in the hold-out group than that of the men (56%). The acceptance rate of the men is 89% of that of the women. This is within the parameters of the 4/5ths rule. It can therefore be concluded that there is no sex bias in the fully-accredited honours graduate model.

7.13.2. Fully-accredited ordinary graduate model

There were 225 cases in the developmental group for the fully-accredited ordinary graduates. Of these trainees, 57% were male (n=128) and 43% were female (n=97). In a similar fashion to the fully-accredited honours graduate trainees, the same proportions of males and females passed their ICAS examinations at the first attempt with 55% and 54% achieving this criterion respectively. It would therefore appear that gender is not an influence on the ability to pass the ICAS examinations. This is also supported by the Mann-Whitney score on the gender variable as discussed earlier in the Chapter. Once again, the accept rates of the trainees based on their calculated probabilities will be considered dependent on gender. The results are contained in Table 7.21.

Table 7.21: Accept/reject rates based on the fully-accredited ordinary graduate model utilising the cut-off point of 0.5

Developmental group	Number	%	Hold-out group	Number	%
Accept men	76	60	Accept men	33	66
Reject men	52	40	Reject men	17	34
	128	100		50	100
Accept women	75	77	Accept women	32	68
Reject women	22	23	Reject women	15	32
	97	100		47	100

Table 7.21 reveals that a higher percentage of women would be accepted in comparison to that of the men if all those with probabilities of at least 50% proceeded to the next stage in the selection procedure. In the developmental sample, there is a marked difference in the acceptance rate of women (77%) to that of men (60%). Indeed, men have only achieved 78% of the acceptance rate of the women as opposed to the 80% required under the 4/5th ruling. In the hold-out sample, there is no such problem with 68% of women and 66% of men being accepted by the model. Whilst it is recognised that there is a borderline failure to meet the 4/5th rule in the developmental sample, there is no apparent sex bias in the model when applied to the hold-out sample. Bearing in mind that this 4/5th rule is an American requirement and not one required in the United Kingdom, there is insufficient evidence to suggest that there is a sex bias problem in the fully-accredited ordinary model which would preclude using the model in an operational setting in the United Kingdom. It would however be recommended that the impact of the model on gender be constantly reviewed and monitored in the future.

7.14 A methodological comparison

The fully-accredited honours and ordinary graduate models developed in this chapter utilised a rational approach. This resulted in a more conservative derivation key as evidenced by the lower model χ^2 reported by each model[14] in comparison to both the Phase I[15] and the Harvey-Cook (1995) work[16] which both employed an empirical

[14] fully-accredited honours model, $\chi^2 = 35.6$; fully-accredited ordinary model, $\chi^2 = 21.4$
[15] honours model, $\chi^2 = 55.4$; ordinary model, $\chi^2 = 41.2$
[16] examination performance model, $\chi^2 = 71.9$; overall performance model, $\chi^2 = 44.1$

approach. However, as these rationally derived models suffered less shrinkage than that experienced by the Phase I models, as evidenced by the decrease in the tetrachoric correlation coefficients[17], these results tentatively support the work of Stokes and Reddy (1992) who suggested that rational models retain their validity in a superior manner to that of empirically derived models. However, a fundamental change took place in the ICAS education system during the period of development for the Phase I study which resulted in a lack of stability in the reference group during this time (as discussed in Chapters 5 and 6). This renders the evidence for the support of adopting a more rational approach on the grounds of stability as inconclusive. The fall in validity may be due to the lack of stability in the reference group as opposed to the methodology adopted in the development of the key (see Chapter 5). In order to test whether or not empirically derived models do in fact experience more shrinkage than models developed via a more rational approach, then it is necessary to remove the possible contamination of the results arising from the instability of the reference group. It was therefore decided to develop empirical models on the same fully-accredited honours and ordinary graduates used for the rational derivation, then apply these empirical models to the same holdout group and compare the fall in the tetrachoric correlation coefficients in each case.

In order to be consistent with the Phase I approach, the same empirical methodology was utilised. In other words, non-parametric analysis was initially carried out through the calculation of Mann-Whitney scores in order to identify those background factors which appear to differentiate between those trainees who passed their ICAS examinations at the first attempt and those who experienced failure. Spearman correlation coefficients were then calculated to identify any pairwise correlations of a

[17] The honours graduate model tetrachoric correlation fell from 0.65 as reported in the derivation sample to 0.27 for the holdout sample. A similar decrease was evident in the ordinary graduate model with a fall from 0.43 for the derivation sample to 0.23 for the holdout sample.

magnitude large enough to cause concern in respect of multicollinearity, namely greater than 0.70. After exclusion of any highly correlated variables, a forward stepwise approach was adopted in order to identify the best fitting model to describe the relationship between the explanatory variables significant enough to be included and the ability to pass the ICAS examinations at the first attempt.

7.14.1. The fully-accredited honours model

Mann-Whitney scores were calculated for 72 variables developed from the questionnaire responses (see Appendix 15). Only 10 of these background factors were significant on an individual basis and these are identified in Table 7.22.

Table 7.22: Significant Mann-Whitney scores for fully-accredited honours graduates

Absolute Z Score	Level of significance	Variable name	Explanatory variable
3.8998	0.0001***	Hons.awd	Honours award
3.1740	0.0020***	Jobacs	Number of jobs related to chartered accountancy whilst at school and university
3.0511	0.0023***	Jobacs.u	Number of jobs related to chartered accountancy whilst at university
2.5008	0.0124**	UCAS.5yr	Number of UCAS points obtained at Higher in 5th year
2.1620	0.0306**	Uni.CA	Whether progressed directly from university to ICAS training
2.0066	0.0448**	Resit 3yr	Number of resits in third year at university
1.8947	0.0581*	H.Maths	Grade in Higher Mathematics
1.8809	0.0588*	Dad.Job	Father's occupation
1.8409	0.0657*	Jobres.s	Number of jobs at school with responsibility for others
1.7917	0.0732*	Placement	Whether degree incorporated a placement

Note:
***=significant at 1%, **=significant at 5%, *=significant at 10%

When the pairwise correlations were examined by calculating Spearman correlation coefficients (see Appendix 16), two variables were very highly correlated with each other. Unsurprisingly, the variable which considered the number of jobs related to chartered accountancy whilst at school and university was highly correlated (0.985) with the variable which considered the number of jobs related to chartered accountancy whilst at university only. The variable which considered both school and university was retained as a higher absolute Z score was recorded by that particular background factor. The model building therefore took place on the remaining 9 variables. The results are contained in Table 7.23.

Table 7.23: Logistic regression utilising an empirical approach - trainees progressing from a fully-accredited honours degree

Variable	β	Level of significance	Exp (β_n)
Honours award	-1.6813	0.0001	0.1861
Number of jobs related to chartered accountancy whilst at school and university	1.1200	0.0043	3.0648
Number of jobs at school with responsibility for others	-1.7019	0.0087	0.1823
Whether progressed directly from university to ICAS training	1.7914	0.0404	5.9979
Constant	2.6399	0.0152	

Model chi-square 42.247(p=0.0001) with 4 degrees of freedom
Overall prediction classification 75.17% (see Table 7.24 for a further breakdown)

Table 7.23 reveals that the explanatory power of the fully-accredited honours model improves with the adoption of an empirical approach. The model χ^2 is now 42.2 (p=0.0001) as opposed to the model χ^2 of 35.6 (p=0.0001), achieved using the more rational approach (see Table 7.2). The overall prediction classification however is very similar with the empirical approach, recording 75.17% of the sample correctly classified as opposed to the 74.50% obtained with the rational approach. As these percentages are however based on the arbitrary cut-off point of 0.50, an optimal cut-off point calculation was also carried out. The results are contained in Figure 7.5.

Figure 7.5: Optimal cut-off point for fully-accredited honours graduates utilising an empirical approach

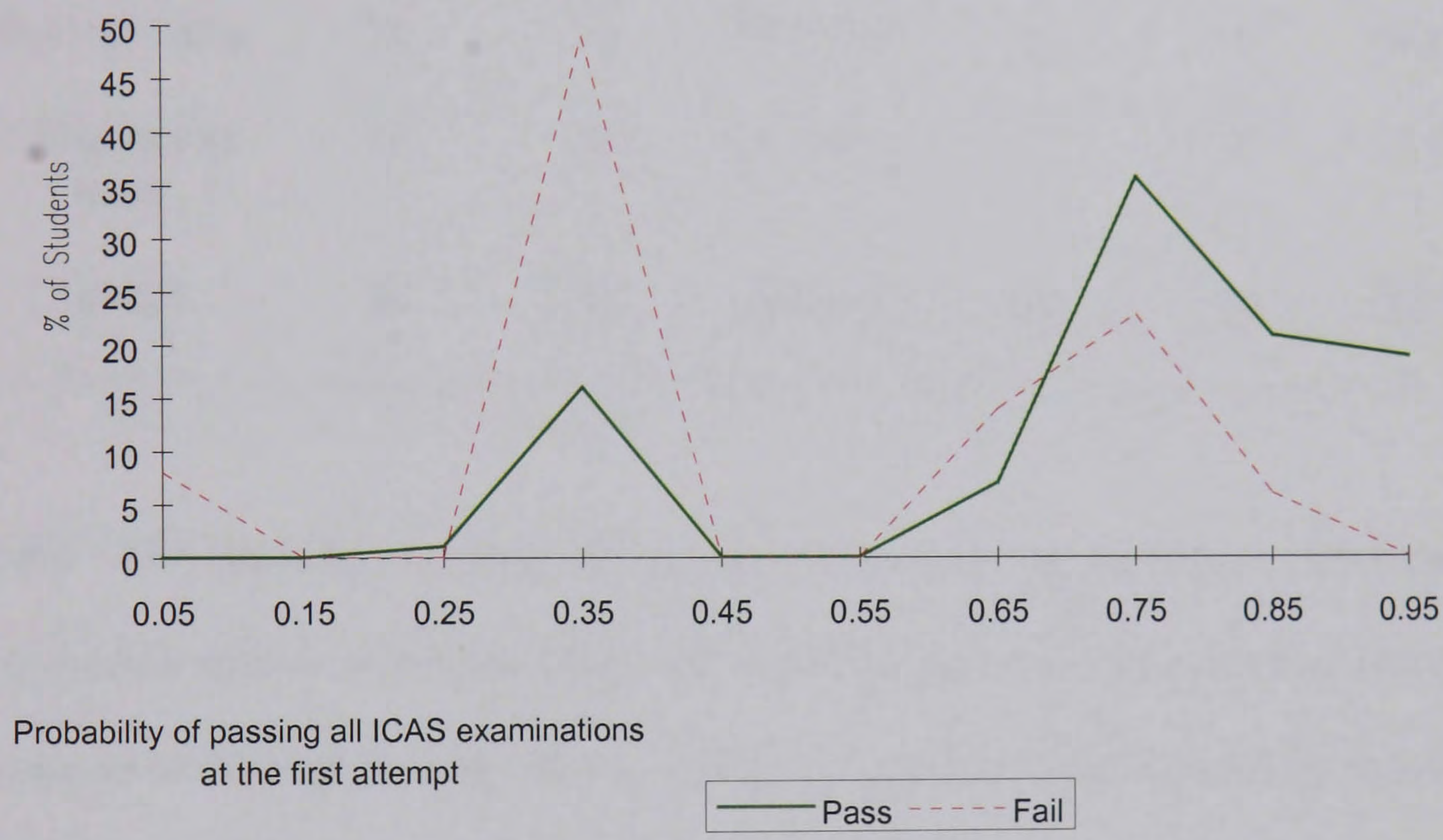


Figure 7.5 suggests that the optimum cut-off point of 0.685 as calculated for the rational model is also appropriate for the empirically derived model sample and the classification was therefore undertaken based on this revised cut-off. The results are contained in Table 7.24.

Table 7.24: Classification table for fully-accredited honours graduates utilising an empirical approach

Cut-off point	Optimal	Optimal	Optimal	Arbitrary	Arbitrary	Arbitrary
Observed	Predicted pass first time	Predicted failed one or more	Percent Correct	Predicted pass first time	Predicted failed one or more	Percent Correct
	PASS	FAIL		PASS	FAIL	
Pass first time	76	22	98 (78%)	83	15	98 (85%)
Failed one or more	15	36	51 (71%)	22	29	51 (57%)
Overall	91	58	149 (75%)	105	44	149 (75%)

Table 7.24 demonstrates that, whilst the utilisation of the optimum cut-off point results in a similar overall prediction classification, there has been a movement in the make up of the overall score. By moving the cut-off point in an upwards direction the Type II error has been reduced from 43% to 29% although this has been at the expense of an increase in the Type I error from 15% to 22%.

It is interesting to note the similarity of background factors included in the empirical model. Three out of the four variables, specifically honours award, number of jobs related to chartered accountancy whilst at school and university and whether a trainee progressed directly from university to CA training, were also incorporated in the rational model, albeit that the logistic coefficients have changed slightly. The remaining two variables in the rational model, specifically the number of resits at university and the number of UCAS points obtained at Higher in 5th year, were not found in the empirical model, despite the Mann-Whitney scores of both the 5th year UCAS point variable and 3rd year university resit variable being significant at the 5% level. A new variable included in the empirical model is, however, one which considers the number of jobs at school with responsibility for others. Taking into consideration the coding of this variable (see Appendix 9), the model identifies that the greater is the number of jobs held at school with responsibility for others the lower is the probability of passing the ICAS examinations at the first attempt. Whilst it is difficult to identify any particular rationale for this type of background factor, irrespective of its direction, being indicative of ICAS examination performance, the significance of the variable in the determination of examination success cannot be ignored in an empirical approach. Care needs to be exercised however, that the inclusion of this variable with no obvious theoretical underpinning is not a function of a very small number of trainees who held jobs with responsibility for others whilst at school. If only a few trainees undertook this type of job, and they all failed to pass their ICAS examinations at the first attempt, then this background factor could be identified as significant in the model. This could result in a particular background factor having an unduly high influence which could dictate the whole model and would obviously have implications for the ability of the empirical model to correctly classify trainees in another data set. However as 11% of the sample (16 out of 149) held jobs with responsibility for others whilst at school, there should be adequate numbers not to render the background factor invalid on the grounds of insufficient data. It was therefore decided to leave the model as developed and to proceed to the area of particular interest in this comparison of methodologies, namely, the ability of the empirically derived model to retain its validity when applied to a holdout group. The model was therefore applied to the same 1995 trainees as used earlier in the rational approach[18]. The classification results utilising both the optimal and arbitrary cut-off points are contained in Table 7.25.

Table 7.25: Classification table for fully-accredited honours graduates utilising an empirical approach - the hold-out group

Cut-off point	Optimal	Optimal	Optimal	Arbitrary	Arbitrary	Arbitrary
Observed	Predicted pass first time	Predicted failed one or more	Percent Correct	Predicted pass first time	Predicted failed one or more	Percent Correct
	PASS	FAIL		PASS	FAIL	
Pass first time	31	10	41 (75%)	32	9	41 (78%)
Failed one or more	19	15	34 (44%)	22	12	34 (35%)
Overall	50	25	75 (61%)	54	21	75 (59%)

Table 7.25 demonstrates that the overall prediction classification utilising the arbitrary cut-off point is 59% which is identical to that achieved by the rational model (see Table 7.4). When the optimal cut-off point is utilised however, there is a reduction in the overall prediction classification from 66% as recorded by the rational model (see Table 7.4) to 61%. This apparent shrinkage also manifests itself in the tetrachoric correlation coefficients, the results of which are contained in Table 7.26.

[18] As data was available for all the 1995 respondents, the hold-out group comprised of 75 trainees, which represented 41 trainees who had passed first time and 34 who had experienced resits.

Table 7.26: Tetrachoric correlations for the empirically derived fully-accredited honours graduate model

Model	Derivation sample	Holdout sample
Rational method		
Honours - fully-accredited graduate model based on the arbitrary cut-off	0.65	0.30
Empirical method		
Honours - fully-accredited graduate model based on the arbitrary cut-off	0.66	0.26
Rational method		
Honours - fully-accredited graduate model based on the optimal cut-off	0.56	0.48
Empirical method		
Honours - fully-accredited graduate model based on the optimal cut-off	0.69	0.30

The results in Table 7.26 suggest that the rationally derived model appears to have less explanatory power than the empirical model as evidenced by the lower r_t particularly when the optimal cut-off point is utilised. However, the rational model would appear to experience less shrinkage than the empirically derived model and this is particularly evident again where the optimal cut-off point is used. The r_t arising from the empirical model applied to the holdout sample fell to 0.30 whereas the r_t from the rational model applied to the holdout sample only fell to 0.48.

7.14.2. The fully-accredited ordinary model

Mann-Whitney scores were calculated for the same variables as used in the honours model with the exception of the variables concerned with the honours award and the number of resits in 4th year at university, as these background factors were not relevant for ordinary graduates (see Appendix 17). Eleven of these background factors were significant on an individual basis and these are identified in Table 7.27.

Table 7.27: Significant Mann-Whitney scores for the fully-accredited ordinary graduates

Absolute Z Score	Level of significance	Variable name	Explanatory variable
3.1518	0.0016***	Uniresit	Number of resits at university in second and third year
2.5816	0.0098***	Jobacs.u	Number of jobs related to chartered accountancy whilst at university
2.5447	0.0109**	Resit2yr	Number of resits in second year at university
2.5308	0.0114**	Jobacs	Number of jobs related to chartered accountancy whilst at school and university
2.2482	0.0246**	Resit 3yr	Number of resits in third year at university
2.1027	0.0355**	H.Acs	Whether took Higher Accounts or not
2.0273	0.0426**	Acaprize	Number of academic prizes during secondary school education
1.7927	0.0730*	Uni.CA	Whether progressed directly from university to CA training
1.7861	0.0741*	Score O	O grade, standard grade and GCSE score[19]
1.6983	0.0894*	Respon.u	Number of positions of responsibility whilst at university
1.6545	0.0980*	Sport.s	Whether sports/interests were undertaken at school

Note:
***=significant at 1%, **=significant at 5%, *=significant at 10%

When the pairwise correlations were examined by calculating Spearman correlation coefficients (see Appendix 18), the variables which considered the total number of resits at university in second and third year were highly correlated with the two variables which considered the number of resits in each individual year. The variables which considered the number of resits in second year and the number of

[19] Based on 3 points for an A pass, 2 points for a B pass and 1 point for a C pass

resits in third year on an individual basis were excluded from further analysis as their absolute Z score was less than that of the composite variable. In a similar fashion to the honours model, the variable which considered the number of jobs related to chartered accountancy whilst at school and university was highly correlated (0.955) with the variable which considered the number of jobs related to chartered accountancy whilst at university only. However, in this instance, the variable which only considered jobs whilst at university was retained as a higher absolute Z score was achieved for this particular background factor. The model building therefore took place on the remaining 8 variables. The results are contained in Table 7.28.

Table 7.28: Logistic regression utilising an empirical approach - trainees progressing from a fully-accredited ordinary degree

Variable	β	Level of significance	Exp (β_n)
Number of resits in second and third year at university	-1.1328	0.0010	0.3221
Whether progressed directly from university to ICAS training	-2.6344	0.0075	0.0718
Number of academic prizes awarded at school	0.1708	0.0315	1.1862
O grade, standard grade and GCSE score	0.0712	0.0337	1.0738
Number of jobs related to chartered accountancy whilst at university	0.5655	0.0346	1.7604
Constant	1.0116	0.3818	

Model chi-square 37.144(p=0.0001) with 5 degrees of freedom
Overall prediction classification 66.22% (see Table 7.29 for a further breakdown)

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

Table 7.28 demonstrates that the ordinary graduate analysis follows a similar pattern to that obtained for the honours graduates. The explanatory power of the model improves with the adoption of an empirical approach. The model χ^2 is now 37.1 (p=0.0001) as opposed to the model χ^2 of 21.4 (p=0.0001), achieved using the more rational approach (see Table 7.13). There has also been an increase in the overall prediction classification, with the empirical approach achieving a classification of 66.22% in comparison to the 61.33% achieved with the rational method. Further work was then conducted to ascertain the optimal cut-off point as this could have an impact on both the overall prediction classification and the tetrachoric correlation coefficient. The results are contained in Figure 7.6.

Figure 7.6: Optimal cut-off point for fully-accredited ordinary graduates utilising an empirical approach

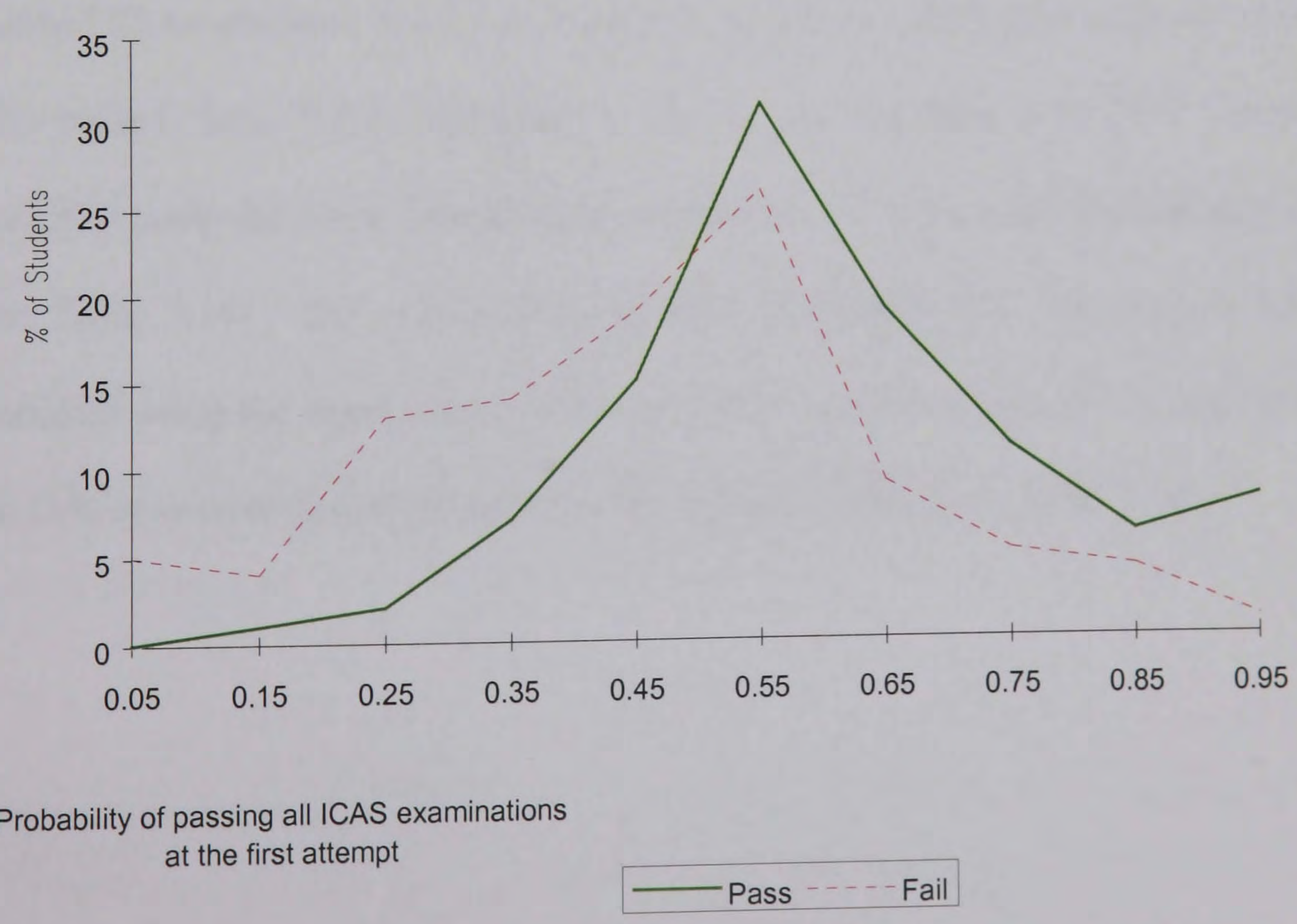


Figure 7.6 identifies that the arbitrary cut-off point is also the optimal cut-off point. The classification of trainees broken down into the correct identification of those trainees who actually passed first time and those trainees who actually experienced at least one resit will therefore be carried out only using the 0.5 cut-off point. The results are contained in Table 7.29.

Table 7.29 Classification table for fully-accredited ordinary graduates utilising an empirical approach

Observed	Predicted pass first time PASS	Predicted failed one or more FAIL	Percent correct
Pass first time	93	29	122 (76%)
Failed one or more	47	56	103 (54%)
Overall	140	85	225 (66%)

Table 7.29 reveals that there is a similarity in the correct prediction of those trainees who passed their ICAS examinations at the first attempt, with 76% correctly identified using the empirical approach compared to 77% using the rational approach (see Table 7.14). The correct identification of trainees who experienced failure increased using the empirical approach with 54% correctly classified as opposed to the 43% of correct classifications under the rational method (see Table 7.14).

It is interesting to note that there is only one variable that is included in both approaches; namely, the number of resits in second and third year at university. The empirical approach does however contain two variables which are similar to the background factors identified by the rational method. These are the number of jobs related to chartered accountancy whilst at university[20] and the O grade, standard grade and GCSE score[21]. There are also two completely new variables included in the empirical model; the number of academic prizes awarded at school and whether a trainee had progressed directly from university to ICAS training. The inclusion of the first of these would suggest that the greater is the number of academic prizes awarded at school, the greater is the probability of passing the ICAS examinations at the first attempt. This would appear a logical variable to include as academic prizes could be seen as an indication of academic ability which would be of relevance to successful ICAS examination performance. The inclusion of the variable, with a negative sign, which considered whether a break had been taken between completing a university degree and progressing to ICAS training, would suggest that students who **do not** progress directly from university to CA training have a higher probability of passing their ICAS examinations at the first attempt. This is the exact opposite of the rational fully-accredited honours graduate model which indicated that a break would be detrimental to the probability of passing the ICAS examinations at the first attempt. As discussed in Chapter 6 however, trainees who undertake fully-accredited honours degrees are most likely to study the subjects contributing to the fully-accredited status

[20] The rational model considered the number of jobs related to chartered accountancy whilst at school and university

[21] The rational model considered the number of A passes of grade 1 passes at O grade or standard grade

in the second and third year of the programme. These trainees will therefore have already experienced at least a one year break between studying these accredited subjects and commencing their ICAS studies. This will not be the case for the ordinary graduates who complete their studies at the end of three years. A break for these students may not be detrimental and indeed the evidence presented by this empirical work would suggest that such a break could, in fact, be beneficial. Care needs to exercised here however, that it is not a small number of trainees that fall into this category and are causing undue influence on the model. As 7% of the sample (16 out of 225) used for the model derivation did in fact have a break between the completion of their degree and commencing their ICAS training, there are sufficient numbers to leave the variable within the model and recognise the significance of the background factor in this empirical approach. The only variable included in the rational approach which is not included in the empirical model was that relating to the number of UCAS points obtained in 5th year.

As in the honours graduate work however, the area of particular interest is the ability of the empirically derived model to retain its superior validity over the rational approach when applied to a different data set. The model was therefore applied to the same holdout group that was used for the rational model, namely, the 1995 trainees who completed fully-accredited ordinary degrees[22]. The classification of these trainees can be found in Table 7.30.

[22] As a further two trainees who did not pass their ICAS examinations at the first attempt in the holdout group had missing data for the background factors included in the empirical approach, the holdout group was reduced to 95 trainees. This represented 48 trainess who had passed first time, and 47 who had experienced failure before subsequently passing their ICAS examinations.

Table 7.30 Classification table for fully-accredited ordinary graduates utilising an empirical approach - the holdout group

Observed	Predicted pass first time	Predicted failed one or more	Percent correct
	PASS	FAIL	
Pass first time	35	13	48 (73%)
Failed one or more	29	18	47 (38%)
Overall	64	31	95 (56%)

Table 7.30 highlights the point that the empirical model utilising a cut-off point of 0.5 achieved a lower overall classification of 56% in comparison to the classification of 62% for the rational model (see Table 7.15). The breakdown of the classification in the empirical model however, did follow a similar trend to the rational model, with a correct identification of 73% of 'pass' trainees and 38% of 'fail' trainees in comparison to the 79% and 45% recorded by the rational model. It can therefore be seen that the rational approach achieves a better prediction of both 'pass' and 'fail' trainees and this should be reflected in a superior tetrachoric correlation coefficient, the results of which are presented in Table 7.31.

The phase II models for prediction of ICAS examination success - trainees who qualified in the years 1993- 1994, validated on trainees who qualified in the year 1995

Table 7.31: Tetrachoric correlations for the empirically derived fully-accredited ordinary graduate model

Model	Derivation sample	Holdout sample
Rational method		
Ordinary - fully-accredited graduate model based on 0.5 cut-off point	0.35	0.42
Empirical method		
Ordinary - fully-accredited graduate model based on 0.5 cut-off point	0.49	0.20

The results of Table 7.31 support the honours graduate results and indicate that although the explanatory power of the empirical approach is superior in the derivation sample to that of the rational model, more shrinkage is experienced through the adoption of an empirical approach when applied to a different hold-out group.

7.14.3. Discussion

The results in Tables 7.26 and 7.31 support the commentary of Mumford and Owens (1987) who suggested that a more rationally driven approach to model development leads to a more conservative model in explanatory terms. This is evidenced by the lower r_t for the rationally derived models. However, the most interesting finding for models which are designed to be used in a selection environment and will hence be applied to a different data set is the fact that the rational models do appear to retain their validity and experience less shrinkage than the models derived using an empirical approach, thus supporting the work of Stokes and Reddy (1992). It would therefore appear that any increase in the explanatory power afforded by an empirical approach for the developmental sample is insufficient to compensate for the additional shrinkage experienced by utilising such an approach.

7.15 Summary

This chapter has demonstrated that a more rational approach could result in the development of biodata models designed to predict whether a trainee passed their ICAS examinations at the first attempt. The models, for both fully-accredited honours graduates and fully-accredited ordinary graduates, retained their predictive ability when applied to a different data set and this suggests that these models could be used in the pre-selection of trainee chartered accountants. This was also supported by comparing the predictive ability of these models, as demonstrated by the tetrachoric correlation coefficients, to other types of selection procedures utilised by the training providers. The implications of these models for the accounting profession who wish to recruit trainees to undertake the ICAS system of education will be discussed further in the final Chapter.

Unfortunately, the model developed to predict non-relevant honours graduate performance demonstrated very weak explanatory powers and failed to differentiate between the students who passed their ICAS examinations at the first attempt and those who experienced failure. It has therefore not been possible from 'hard' items of biodata to develop a model which could be used by training providers for the pre-selection of non-relevant honours trainees.

Notwithstanding the advances that have now been made in the furtherance of understanding of the background factors that do differentiate ICAS examination performance, together with the development of practical models which could be used for pre-selection purposes, the ability to pass ICAS examinations at the first attempt is not the end of the story. In Chapter 1, it was highlighted that, whilst this is a valid performance criterion on which to select graduates, there is also a concern amongst the profession about the tenure of employment of a trainee after completion of the training contract. A trainee who passes all their ICAS examinations at the first attempt will not necessarily be seen as a sound investment by a training provider if they subsequently leave the firm as soon as they qualify. The next chapter will address this issue by developing a model designed to predict whether a trainee remains with their training provider for at least 18 months post-qualification.

CHAPTER 8

TENURE OF EMPLOYMENT AFTER COMPLETION OF THE TRAINING CONTRACT

8.1 Introduction

The previous chapter has demonstrated that it is possible to develop and validate a biodata model to predict ICAS examination success for both the fully-accredited honours and ordinary graduates. However, as identified in the first chapter, those trainees who leave their training provider, irrespective of whether they pass their ICAS examinations at the first attempt, will not necessarily be a sound investment for the firms as the benefit of training these students will only be reaped if they remain post qualification. Referring to Chapter 1, some of the multinational accountancy firms estimate that the investment in an individual trainee contract is in the region of £100,000 and the pay back period for a fully-accredited graduate was around 17 months post qualification. This rose to 20 months for a non-relevant graduate. It was therefore decided to define those trainees who remained with their training provider for at least 18 months post qualification as rewarding investments, and those who left before this time as unrewarding investments. This chapter will therefore attempt to develop a model for determining whether a trainee will remain with their training provider for at least 18 months after completion of their training contract in order to establish a tool that could be used in the selection process for the identification of students who are likely to remain with their training provider. As discussed in Chapter 2, there have been validity studies undertaken in the field of tenure and these have been combined in the meta-analytical reviews undertaken in the 1980s. Whilst the reported validity coefficients were low for tenure in comparison to some of the other criterion measures such as training success, the validity coefficients for the biodata studies were better than that reported for other predictors. Although some studies have been undertaken in the accountancy profession examining the turnover rates within professional accountancy firms, there appears to be a paucity of work undertaken to identify the background attributes that predispose an individual to remain with their training provider. However, the studies reported in Chapter 2 suggest that there is evidence to offer that biographical details can be used to differentiate between trainees who remain with their training provider and those who leave. This evidence will be used to formulate hypotheses about the general background factors for the determination of tenure of employment post qualification and these will be outlined later in this chapter. A rational framework for the evolution of the models will therefore be identified before a statistical model using logistic regression is developed.

8.2 The objectives of the study

Before the discussion of the tenure development takes place, the general objectives of the research in relation to tenure post qualification will be reiterated.

The Phase II model for the prediction of tenure of employment after completion of the training contract -developed on trainees who qualified in the years 1993-1994

There are two main objectives:

1. To analyse the effectiveness of biodata in the differentiation of trainees who remain with their training provider for at least 18 months post qualifying and those who leave before this time

2. To identify the key determining factors, which could be used in a selection environment, influencing tenure of employment after completion of the training contract.

8.3 The reference group

For the development work in examination success, the reference group was split initially into honours and ordinary students and subsequently into fully-accredited and non-relevant students. This differentiation into homogeneous groups dependent on degree type, was undertaken to accommodate the educational differences and hence address the impact of these differences on the explanatory background factors. For the tenure of employment after completion of the training contract work, however, the reference group will be treated as one homogenous sample irrespective of degree type. The reason for amalgamating the groups in this manner is the fact that all trainees should be synonymous on qualification, irrespective of their previous educational differences. These education differences may however be pertinent in the determination of which trainees remain with their training provider. The degree type could therefore provide an explanatory variable as to why some people remain within or leave the profession. This will be discussed later in the chapter. The analysis was therefore undertaken on the complete sample of trainees who qualified in the years 1993 and 1994, using the same questionnaire responses as for the Phase II examination success study (n = 549). However, as in the examination prediction work, those students who had undertaken A levels were excluded, reducing the number of responses for further analysis to 503[1]. As one trainee did not identify whether they remained with their training provider for 18 months post-qualification, the sample was further reduced to 502.

Out of this number (n = 502), only 43% (n = 217) remained with their training provider 18 months after qualification and, on examination of the reasons cited by those who left within the 18 months (n = 285), it was discovered that 59 of these trainees were either made redundant or were not provided with a job on expiry of their training contract. These students were therefore excluded from any further analysis as they did not necessarily choose to leave their training provider but were in fact forced to leave. The exclusion of these students who involuntarily left their training provider addresses the difference between voluntary and involuntary withdrawal, as advocated by Stokes and Cooper (1994), and reduces the sample of trainees to those who voluntarily left (n = 226). It is worth mentioning here the work of Drakeley et al (1988) with Royal Naval officers, which differentiated between commitment related withdrawal that was voluntary and ability related withdrawal that was non-voluntary. A further analysis of the 59 trainees whose departure from their

[1] The exclusion of the A level trainees was to permit the investigation of the relevance of particular Highers.

training provider was not voluntary will be carried out later in the chapter in an attempt to ascertain whether in fact there was an underlying reason why these particular trainees were made redundant and to explore whether their withdrawal was indeed more of an ability issue.

The number who chose to leave their training provider was 226 and a break down of this figure, together with those who remained, that were categorised dependent on size of training organisation can be found in Table 8.1.

Table 8.1: Analysis of trainees who remained with their training provider 18 months after qualification categorised by size of training firm

	Multinational	Large	Medium	Small	TOPPS	Total
Remained with training provider for at least 18 months	139 (52%)	23 (37%)	33 (42%)	18 (51%)	4 (100%)	217
Left training provider within 18 months of qualifying	125 (48%)	39 (63%)	45 (58%)	17 (49%)	- (-%)	226
Total number of trainees who chose whether to remain or not	264	62	78	35	4	443
Made redundant or no further work provided on completion of training contract	25 (9%)	15 (19%)	11 (12%)	8 (19%)	-	59
Total	289	77	89	43	4	502

Table 8.1 suggests that the TOPPS employers have the highest retention rates with all their trainees remaining for at least 18 months post-qualification. However, due to the very small numbers of trainees falling into this category, it is dangerous to draw any meaningful conclusion from this. In respect of those trainees who trained in the profession, the multinational firms retained the greatest percentage followed by the small, medium and large firms respectively. Of the 226 students who left their training provider, 224 cited a reason, the details of which are revealed in Table 8.2.

Table 8.2: Analysis of reasons cited by trainees for leaving their training provider within 18 months of qualification

Reason for leaving	Multinational	Large	Medium	Small
Lack of further challenges or career progression	41 (33%)	22(57%)	23(53%)	13(76%)
Wanted to move into Industry	47 (38%)	6 (15%)	5 (12%)	1 (6%)
Offered another job	13(10%)	4 (10%)	5 (12%)	2 (12%)
Bad working conditions	9 (7%)	3 (8%)	4 (9%)	-
Other	15 (12%)	4 (10%)	6 (14%)	1 (6%)
Total	125	39	43	17

Table 8.2 suggests that there would appear to be differences in the reasons why trainees leave their training provider dependent on the size of training organisation

with which they undertook their training. The greatest percentage of students who trained with either a small, medium or large firm leave their training provider on account of either the lack of further challenges offered or of career progression within the firm. This is not the case however for the trainees who undertook their training with a multinational firm. The largest percentage of these students (38%) left as they wished to pursue a career in industry[2], albeit that a third (33%) left due to a lack of future prospects or career progression.

On account of the 44% (99 out of 224) of trainees who left their training provider due to lack of opportunities, it was decided to undertake some further analysis. If trainees move within the profession to another chartered accountancy firm, it is suggested that these trainees are not necessarily poor investments as they are not lost to the profession. Although training firms may lose some of their newly-qualified trainees, they will be able to recruit other recently qualified trainees who are seeking employment outwith their training organisation but still within the profession. The poor investments for the training provider are those trainees who have simply used the CA training as a vehicle to further a career outside of the profession. Trainees who remained in the profession irrespective of their training organisation were therefore separated from those trainees who had not remained within the profession for 18 months. The number of trainees who remained within the profession 18 months after qualifying amounted to 323 (64%), with the remaining 179 (36%) leaving the profession within the 18 month period. However as 39 of those students

[2] This move to industry is not necessarily a career change but rather a move to continue an accountancy or finance role within industry.

who left the profession within the 18 month period were either made redundant or not offered any additional work on completion of their training contract, these were excluded from any further analysis, reducing the sample to those who voluntarily left to 140. The student numbers classified by career movements, and by size of training organisation can be found in Table 8.3.

Table 8.3: Analysis of trainees who remained within the profession 18 months after qualification categorised by size of firm with which they trained

	Multinational	Large	Medium	Small	TOPPS	Total
Remained within profession for at least 18 months	171 (64%)	44 (67%)	66 (80%)	38 (93%)	N/A	319
Left profession within 18 months of qualifying	98 (36%)	22 (33%)	17 (20%)	3 (7%)	N/A	140
Total number of trainees who chose whether to remain	269	66	83	41	4	463
Made redundant or no further work provided on completion of training contract	20 (7%)	11 (14%)	6 (7%)	2 (5%)	-	39
Total	289	77	89	43	4	502

Table 8.3 reveals quite a shift from Table 8.1, with notable movements for the small, medium and large firm trainees. The highest percentages of trainees who trained with small, medium and large firms appear to remain within the profession albeit not necessarily with their training provider. This would suggest that trainees leaving their training providers due to lack of opportunity are not seeking employment outside the profession but continue to pursue a career in its ranks. The lowest percentage of trainees who remained within the profession were in fact trained by the multinational firms which would suggest that either trainees are simply using their CA qualification and "Big Six" training to gain entry to the industry or that they have been offered such excellent job opportunities to change their allegiance. It was therefore decided to also categorise the reasons why trainees left their training organisation and indeed the profession, by the size of their training firm. Out of the 140 trainees who did not remain within the profession for 18 months post qualification, 138 cited reasons for leaving their particular training provider. The results are contained in Table 8.4.

Table 8.4: Analysis of reasons cited by trainees for leaving their training provider and who left the profession within 18 months of qualification - categorised by size of training firm

Reason for leaving	Multinational	Large	Medium	Small
Lack of further challenges or career progression	27 (28%)	8 (36%)	5 (33%)	2 (67%)
Wanted to move into industry	46 (47%)	6 (27%)	4 (27%)	1 (33%)
Offered another job	8 (8%)	4 (18%)	2 (13%)	-
Bad working conditions	7 (7%)	3 (14%)	3 (20%)	-
Other	10 (10%)	1 (5%)	1 (7%)	-
Total	98	22	15	3

The results contained in Table 8.4 support the findings of Table 8.2 which suggest that the highest percentage of multinational trained students who leave the profession do so in order to obtain a career in industry. Although 27% of both large and medium sized firm students who leave the profession cite a career in industry as the incentive to move, the highest percentages in both categories of firms continued to leave due to lack of opportunities within their firm. As only three students who trained within a small training office environment left the profession, it is difficult to draw any meaningful conclusion from this.

It would therefore appear that the main problem of retention of trainees after completion of the training contract for the small, medium and large firms is the inability of these organisations to offer further challenges or career progression and this forces their recently qualified students to seek employment elsewhere. These students however would appear to seek employment within the profession. The problem facing the multinational firms on the other hand would however appear to be the loss of trainees outwith the profession, with large numbers of students seeking employment within industry.

The decision was therefore taken to restrict the tenure model to the multinational trained students. This will enable a model to be developed on a homogenous group, as all the trainees will have been educated within a similar training environment, with similar career opportunities available on qualification. This will partially accommodate the unpredictable nature of the organisational factors as highlighted by Hunton and Wier (1996). It will also enable the model to focus on the apparent problem of the loss of recently qualified trainees outwith the profession which is encountered by the multinational firms. The model was therefore developed by comparing the profiles of the trainees who remained with their multinational training provider 18 months post qualifying (n=139) with those trainees who left their multinational training provider within this time frame (n=125).

8.4 The development of the multinational trainee's tenure model

Unlike the predictive model for ICAS examination success whereby there were various published studies which either predicted undergraduate accountancy success or professional accountancy examination success, there is a paucity of studies reported in the literature on tenure of employment in relation to an accountancy environment. Whilst other validity studies on tenure in a wider non-accounting environment have been reported in the literature (see Chapter 2), the lack of generalisability of biodata as discussed in Chapter 2 is an issue and studies developed within other professions will have limited value for this thesis. It is therefore intuitively more difficult to develop a framework from the literature by formulating hypotheses for trainees who train and remain with a multinational firm in an attempt to detect the constructs that underlie remaining with the training provider for at least 18 months post-qualification. This is exacerbated by the fact that there are several contributory factors aside from individual background factors which may influence the decision to leave the training provider (Rhode et al, 1976). These include the environment of the work-place, the nature of the work and the opportunities available elsewhere, either within or outwith the profession. These other contributory factors would also appear to be pertinent in this study if the reasons for leaving the multinational training provider are considered (see Table 8.2). Other work, however, (Mobley et al, 1979; Rasch and Harrell, 1990) suggested that personal characteristics or orientation will have an influence on stress and job satisfaction which will influence tenure of employment. Therefore if the personal characteristics can be identified which fit the professional accountancy environment it should be possible to identify those trainees who will stay with their firm, (Mael and Ashforth, 1995).

The work of Holland (1973) suggested that all accountants irrespective of their work environment are conventional although those who pursue a career in industry would also display enterprising characteristics not shown by those who remained in the profession. This would suggest that the model should focus on those trainees who remain with their training provider for 18 months with those who leave to pursue a career in industry. However, Aranya and Wheeler (1986) refuted Holland's findings, by stating that the personality types of accountants were similar irrespective of whether they were employed in industry or the profession. It was therefore decided to continue with the model, simply differentiating between those trainees who remained for 18 months and those trainees who left, irrespective of the type of organisation with which they were subsequently employed.

It should be borne in mind however that these studies examined personality types and orientation which could either be measured by a personality questionnaire or an appropriately designed 'soft' biodata questionnaire. This research exercise is however restricted to 'hard' biodata items (as discussed in Chapter 3) which may limit the ability of the model to successfully differentiate between those who remain and those who leave within 18 months. However, Rhode et al (1976) found that, in their empirically derived model, several 'hard' background factors such as university grade point average were meaningful predictors of staff turnover.

The Phase II model for the prediction of tenure of employment after completion of the training contract -developed on trainees who qualified in the years 1993-1994

Notwithstanding the apparent lack of published studies in relation to tenure in an accountancy environment, it was decided in light of the results of the Phase II Study examination success, to continue with the more rational methodology utilised and to set aside the more empirical approach adopted in the Phase I Study as it would appear that this type of approach results in a model that suffers less shrinkage than an empirically driven model. A conceptual framework will therefore be developed by citing the limited work that has been undertaken, utilising anecdotal evidence from informal discussions with training providers and contributing ideas derived from personal experience of a multinational training background. *A priori* hypotheses will therefore be formulated in order to identify specific background factors which are thought to be pertinent to the predictability of whether a trainee remains or leaves their training provider within 18 months of qualification. The eight broad areas of background history used for the development of the examination success work will also be used here, namely; personal background, academic performance at school, academic performance at university, experiential performance at school and university, social background, involvement in extracurricular activities at school and university, holding positions of responsibility during school and university and finally university background.

8.4.1. Academic performance at school

Hypothesis 1: Academic performance at school will be indicative of tenure of employment after completion of the training contract

Rasch and Harrell (1990), as discussed in Chapter 2, suggested that individuals who have a high achievement orientation will experience less work-related stress, greater job satisfaction and will hence have lower turnover intentions. It is suggested, therefore, that although an UCAS point score could be a proxy for basic intelligence, it could also be an indication of high achievement orientation. The number of UCAS points obtained in fifth year will therefore be considered as an indication of this type of behaviour. The inclusion of this variable is also supported by the work of Rhode et al (1976) who identified grade point average as a meaningful predictor of staff turnover in a public accounting environment. Whilst it is recognised that the number of academic prizes awarded during school could also be an indication of a competitive nature, it was felt that this background factor is more indicative of academic ability.

As the UCAS score in 5th year is an all encompassing variable in respect of academic performance, it was not felt necessary to include any other variables in respect of subsets of academic performance at school. The only variable which will be considered in respect of this general school hypothesis is **the number of UCAS points achieved in 5th year at school.**

8.4.2. Academic performance at university

Hypothesis 2: Academic performance at university will be indicative of tenure of employment after completion of the training contract

In a similar vein to the reasons outlined above in respect of academic performance at school, strong academic performance at university will be taken as a demonstration of high achievement orientation and/or a Type A personality. A trainee's choice to pursue an honours degree will be selected as a background factor as this variable could be an indication of a student seeking an environment where they are positively responsible for accomplishing difficult but feasible goals and where subsequent feedback on performance is provided (Rasch and Harrell, 1990), albeit that the choice of honours may also be determined by academic ability. The honours classification could also be considered as an indication of high achievement orientation as it suggested that students who achieve good honours classifications tend to be able to cope with the stress of the final degree assessments and possess a high degree of time urgency. However the degree class is more likely to be a demonstration of academic ability. Likewise, resits during a university career are not thought to be of relevance in the determination of tenure of employment as it is suggested that these are a recognition of the inability to cope with a particular academic area rather than demonstrations of high achievement orientation and/or a Type A personality.

Only one variable is therefore to be included in the model to determine tenure of employment after completion of the training contract and this relates to academic performance at university, **namely whether an honours degree was undertaken.**

8.4.3. Involvement in extracurricular activities at school and university

Hypothesis 3: Involvement in extracurricular activities at school and university will be indicative of tenure of employment after completion of the training contract

The literature review in Chapter 2 cited two studies in support of this hypothesis. Rhode et al (1976) testify to the importance of extracurricular activities in the determination of tenure of employment within a public accountancy environment and Rasch and Harrell (1990) indicate that a Type A personality as evidenced by competitive behaviour may predispose a trainee to less work-related stress[3], greater job satisfaction and hence lower turnover intentions. The importance of a trainee's involvement in extracurricular activities could also be a demonstration of Social Identity Theory (Mael and Ashforth, 1995) arising from the prevalent cultures developed with the multinational firms whereby trainees are encouraged not only to work together but also to socialise and play together. For example 'Friday nights at five' are sacred weekly social events and various sporting activities are regularly organised such as five-a-side football, skiing weekends, golf outings, ten pin bowling

[3] It should be noted that other studies, as outlined in chapter 2, suggest that individuals with Type A personalities actually experience more work related stress.

etc. Whilst it could be suggested that this is a rather masculine culture, many firms include, sometimes in a compulsory manner, all the female staff.[4] Trainees who were broad enough minded to become involved in many activities at university are also more likely to become involved within the office environment. Once trainees have been encapsulated within this all encompassing culture, it is more difficult to break away and seek employment elsewhere, as their office life becomes very entwined with their social activities which are undertaken with office colleagues.

Whilst there are many variations on the theme of extracurricular activities, it was decided to consider the number of sports/interests undertaken at school and university as a demonstration of involvement in these type of activities. The number of hours spent on these activities was not felt to have the same relevance as involvement in the activities although, in order to recognise the competitive nature of individuals, the number of athletic prizes awarded at school and university should also be considered. It must be recognised, however, that athletic performance is a function of athletic ability as well as a reflection of a competitive nature. Memberships of clubs, societies and or/teams at school will also be measured by the number of sports/interests variable and it was not felt necessary to include a variable on the specific theme of membership.

The two variables which will be entered into the model in respect of involvement in extracurricular activities at school and university will therefore be: **number of**

[4] I have first hand experience of this, playing in the ladies five-a-side football tournament and hacking my way round a golf course on the annual outing!

sports/interests undertaken at school and university and the **number of athletic prizes awarded at school and university.**

8.4.4. University background

Hypothesis 4: University background factors will be indicative of tenure on completion of the training contract

Rhode et al (1976) suggested that the College/University of the final degree was associated with turnover in a public accounting environment. This could be an example of the 'old boys network' which can be prevalent in many multinational accountancy firms (Gammie and Gammie, 1995). The rationale for the inclusion of this variable arises therefore from the Social Identity Theory whereby the trainee's previous university affiliation could strongly influence the propensity to define themselves in terms of their membership of a particular organisation, (Mael and Ashforth, 1995). For example, many senior members of staff within multinational firms will have progressed from the 'traditional' university sector and view the 'new' universities with caution. Trainees from similar university backgrounds to their superiors may relate more to the senior staff and perpetuate the differential in university education. Trainees from 'new' universities may feel the 'poor' relation and will therefore experience less social identity with the training firm. As the barriers between the two sectors break down, however, the potential impact of this variable will presumably diminish.

It is also envisaged that the type of degree will have an impact on tenure of employment. It could be suggested that students who have undertaken non-relevant degrees drift into the profession when it is realised that there are very limited career opportunities within their original degree choice without necessarily wishing to become professional accountants. They are therefore using the Chartered Accountancy training as a Curriculum Vitae building exercise and their multinational training as a spring board for a move outwith the organisation. It is envisaged that these students are far more likely to pursue a career outside their training environment.

Two variables will therefore be entered into the model in respect of university background: **the type of university attended** and **whether the degree was fully-accredited.**

8.4.5. Holding positions of responsibility whilst at school and university

Hypothesis 5: Holding positions of responsibility whilst at school and university will be indicative of tenure on completion of the training contract

Rasch and Harrell (1990) suggest that accounting professionals who have relatively strong power needs may be predisposed to lower turnover intentions than those individuals who do not possess a strong influence orientation. It is therefore necessary to include a variable which considers holding positions of responsibility whilst at school and university. Whilst there are many variations on the same theme, it was decided to combine the variables which considered positions of responsibility both outwith and within the sports/interests category. Two such variables would therefore be considered, one in relation to school and the other in relation to university. The two variables to be entered into the model in respect of positions of responsibility are therefore: **positions of responsibility whilst at school** and **positions of responsibility whilst at university.**

8.5 Background factors not considered for the tenure model

The remaining broad areas which have not been hypothesised to predict tenure after completion of the training contract will now be discussed, identifying why these areas have not been included in the model development.

8.5.1. Personal background

As outlined in the examination success model, it would not be possible to discriminate between candidates on account of their gender. Therefore whilst the inclusion of a gender variable may add to the body of knowledge of the background factors that do differentiate between those who stay for at least 18 months and those who leave, incorporating a gender variable in the model would invalidate the utility of the model for selection purposes. It will, however, be necessary to examine whether gender does differentiate on the criterion and also to consider the impact that the developed model has on the acceptance rates dependent on gender. This will be further discussed later in the chapter.

In a similar manner to the examination success work, the other personal background factors such as age, marital status and number of children have been excluded on the recommendation of the Equal Opportunities Commission. Likewise, illnesses, birth order and siblings have not been considered on the grounds of intrusive questioning.

8.5.2. Social Background

Whilst it could be argued that there is no theoretical rationale for the inclusion of a variable which considers the type of school attended in the determination of tenure, the social identity perspective arising out of the 'old boys network' as discussed above may have an impact. In other words, if an organisation is staffed with accountants who in the main have been educated through the private sector, trainees who have not received similar schooling may feel excluded as they do not belong to the salient group classification. If, however, type of school is a proxy for social class, as suggested by Harvey-Cook (1995), then again it would not be appropriate to select trainees on these grounds.

Despite evidence by Rhode et al (1976) that father's occupation, father's education and mother's occupation were associated with turnover during the first five years of public accounting careers in the US as discussed in Chapter 2, the inclusion of this type of information would not be acceptable on the grounds of fairness in a selection model.

8.5.3. Experiential activities at school and university

All the variables within this general hypothesis relate to work experience and gap year activities. Whilst there is evidence that trainees do suffer from Occupational Reality Shock (Dean et al, 1988) as discussed in Chapter 2, the impact that this has on trainee's tenure intentions is more tenuous after the first year of the training contract has been completed, (Wilson et al, 1997). As the training contract lasts for three years, the impact of any ORS should have minimised throughout the duration of the training contract. Work experience during school and university should not therefore have an impact on the tenure of employment within the multinational firm post qualification. Likewise there is no theoretical rationale why a gap year should have any impact on tenure.

8.6 The tenure model

Arising from the hypotheses set out above, eight variables have been highlighted as pertinent in the identification of multinational trainees who choose to remain with their training provider for at least 18 months post qualification. The variables are identified in Table 8.5, together with their expected sign as determined by the coding used for each of the variables (see Appendix 9).

Table 8.5 Variables to be included in the model classified by the hypothesis deriving the variable

Hypothesis from which the variable has been derived	Variable	Expected sign
Academic performance at school will be indicative of tenure of employment after completion of the training contract	Number of UCAS points obtained at Higher in 5th Year	+
Academic performance at university will be indicative of tenure of employment after completion of the training contract	Whether an honours degree was undertaken	-
Involvement in extracurricular activities at school and university will be indicative of employment after completion of the training contract	Number of sports/interests undertaken at school and university	+
	Number of athletic prizes awarded at school and university	+
University background factors will be indicative of tenure of employment after completion of the training contract	The type of university attended	_
	Whether the degree was fully-accredited	_
Holding positions of responsibility whilst at school and university will be indicative of tenure of employment after completion of the training contract	Positions of responsibility held whilst at school	+
	Positions of responsibility held whist at university	+

Although the total number of cases was 264, there were seven cases which had incomplete data for one of the variables identified above. These seven cases were therefore removed from the model building exercise and the remaining 257 cases were then used for the analysis.

The first step in the analysis was to ascertain whether there were any gender differences on the criterion measure. The Mann-Whitney score was therefore calculated for the gender variable that revealed a Z score of 0.5391 which is not significant. There would therefore appear to be no gender differences on the criterion measure and the model building can continue safe in the knowledge that gender has not contaminated the criterion.

Before the eight variables were entered into the model, however, it was necessary to check for multicollinearity in order to identify any variables which were too highly correlated with each other and could hence invalidate the resulting model. Spearman correlation coefficients were therefore calculated for the eight variables (the results are contained in Appendix 19) and were found to be below the multicollinearity cut-off point of 0.70 as discussed in the methodology chapter. No variables were therefore excluded and all eight variables were entered into the model.

The resulting model was developed to calculate the probability of a trainee remaining with the multinational training provider for at least 18 months post-qualification. This can be found in Table 8.6.

The Phase II model for the prediction of tenure of employment after completion of the training contract -developed on trainees who qualified in the years 1993-1994

Table 8.6: Logistic regression - multinational trainees who remain with their training provider for at least 18 months post-qualification

Variable	β	Level of significance	Exp (β_n)
Number of athletic prizes awarded at school and university	0.1679	0.0551	1.1828
Number of sports/interests undertaken at school and university	0.1230	0.0740	1.1309
Whether an honours degree was undertaken	0.2808	0.3235	1.3242
Number of UCAS points obtained at Higher in 5th Year	0.0164	0.4479	1.0165
Positions of responsibility held whist at university	-0.0495	0.5925	0.9517
Positions of responsibility held whilst at school	-0.0467	0.6141	0.9544
Whether the degree was fully-accredited	-0.1257	0.7129	0.8818
The type of university attended	-0.1866	0.7760	0.8298
Constant	-0.7710	0.4969	

Model chi-square 10.943(p=0.2050) with 8 degrees of freedom
Overall prediction classification 53.70%

The resulting model as identified in Table 8.6 demonstrates an extremely weak model χ^2 which is not significant. This suggests that the model is not able to differentiate between those trainees who remain with their multinational trainees and those who leave within 18 months post-qualifying. From the eight entered variables, only two are significant at the 10% level. These are the number of athletic prizes awarded whilst at school and university and the number of sports/interests undertaken whilst at school and university. Taking the coding of these variables into consideration (see Appendix 9) the higher are the number of athletic prizes and sports/interests undertaken whilst at school and university, the greater is the probability of remaining with the multinational training provider for at least 18 months post-qualification. Each of the remaining six variables will now be discussed, although it must be stressed that none of these are actually significant.

Table 8.6 reveals that only three of these variables have signs which follow the hypotheses direction. These variables are; the number of UCAS points obtained at Higher in 5th year, whether the degree was fully-accredited and the type of university attended. The model reveals that the greater is the number of UCAS points, the higher is the probability of remaining with the multinational training provider. Trainees who undertake fully-accredited degrees and who study at traditional universities also have a greater probability of remaining with their multinational training provider.

The other three variables, namely, the choice to pursue an honours degree, positions of responsibility held whilst at school and at university all contain signs in the model which are contrary to expectations. The models reveal that students who do not undertake an honours degree have a better chance of remaining with their training provider. Likewise, the greater is the number of positions of responsibility held whilst at school and university, the smaller is the probability of remaining with the multinational training provider. Whilst it was hypothesised earlier that students who undertake an honours degree were seeking an environment where they are positively responsible for accomplishing difficult but feasible goals, it may be that the choice of an honours degree is more a function of academic ability rather than the type of behaviour suggested by Rasch and Harrell, 1990 which determines tenure of employment. Similarly, in respect of the responsibility related variables, perhaps these variables do not capture the strong influence orientation behaviour suggested by Rasch and Harrell, 1990 which is important for the predisposition to lower turnover intentions.

The main finding however of this rationally driven model is that it does not appear to differentiate between those students who do remain with their multinational training provider for at least 18 months and those who leave. This raises the question as to whether this is a function of a misdirected identification of salient background factors, a consequence of the paucity of information contained in the literature in this area or the fact that it is very difficult to develop a tenure model from 'hard' items of biodata which fail to capture many of the softer issues that may be more pertinent in the determination of tenure.

It was therefore decided to revert back to the methodology adopted in the Phase I Study in an effort to determine whether it is possible in the first instance to develop an empirical model with a statistically significant explanatory power. Whilst it is recognised that this approach will not necessarily develop a clearer understanding of the background factors that determine tenure of employment after completion of the training contract, it could result in a statistically significant model which will differentiate between trainees who remain with their training provider and those who leave. A model developed in this manner could then provide a springboard from which a more rational model could be developed.

8.7 The empirically derived tenure model

Mann-Whitney scores were calculated for each of the variables derived from the questionnaire and those which significantly differentiated between the trainees who left their multinational training provider within 18 months and those who remained with their multinational training provider are shown in Table 8.7. A complete listing of the Mann-Whitney scores can be found in Appendix 20.

Table 8.7: Significant background factors - multinational trainees

Background factor	Absolute Z score	Level significance
Number of sports/interests undertaken at university	2.1473	0.0318**
Number of secondary schools attended	2.0978	0.0359**
Whether took Higher Accounts	2.0599	0.0394**
Number of Highers obtained at secondary school	1.9102	0.0561*
Number of children	1.8408	0.0656*
Whether sports/interests undertaken at university	1.7445	0.0811*
Number of non-analytical Highers taken	1.6507	0.0988*

**= significant at the 5% level, *= significant at the 10% level

Table 8.7 reveals that there were 7 significant variables, 3 of which were significant at the 5% level, the remaining 4 at the 10% level. The next step in the exercise was then to consider the issue of multicollinearity by identifying any variables that were too highly correlated with each other. Spearman correlation coefficients were therefore calculated for the seven variables. (The results are contained in Appendix 21). The Spearman correlation coefficient between the variable which considered the number of sports/interests taken at university and the variable which considered whether sports/interests were taken at university was 0.7338. This would suggest that a multicollinearity problem exists between these two variables. The variable with the lowest Mann-Whitney score was therefore excluded and this indicator considered whether sports/interests were undertaken. The remaining 6 variables were then entered into the logistic regression model building exercise using the same forward stepwise approach that was utilised in the Phase I Study. The resulting model is contained in Table 8.8.

Table 8.8: Logistic regression - multinational trainees

Variable	β	Level of Significance	Exp (β_p)
Number of sports/interests undertaken at university	0.3134	0.0083	1.3681
Number of secondary schools attended	-0.9109	0.0246	0.4021
Constant	0.6689	0.1603	

Model chi-square 13.206 ($p = 0.0014$) with 2 degrees of freedom
Overall prediction classification 57.41% (see Table 8.9 for further detail)

The Phase II model for the prediction of tenure of employment after completion of the training contract -developed on trainees who qualified in the years 1993-1994

Table 8.8 indicated that the model only contains 2 variables. The most significant is that which relates to the number of sports/interests undertaken at university. This variable indicates that the greater is the number of outside interests at university the higher is the chance of remaining with the multinational training firm. This supports one of the original hypothesis which was concerned with involvement in extracurricular activities at school and university.

The other variable suggests that the greater are the number of secondary schools attended the higher is the chance of remaining with the multinational training firm. Although this correlation is rather more spurious, trainees who have experienced the disruption of moving during their secondary school education may be more reluctant to move from the stable environment in which they trained.

There is however a very disappointing model χ^2 of only 13.206 (p=0.0014) which suggests that despite being significant, the model has very little explanatory power. As the utility of the model however is measured by its ability to correctly classify trainees into those who leave their multinational training provider within 18 months, and those who leave within this time, a classification matrix should be undertaken which will consider how the overall classification as reported in Table 8.8 is derived.

Once again the optimal cut-off point was calculated as the arbitrary cut-off point of 0.5 utilised for the overall prediction classification. This may not be appropriate. The results are contained in Figure 8.1.

Figure 8.1: Optimal cut-off point for multinational trainees

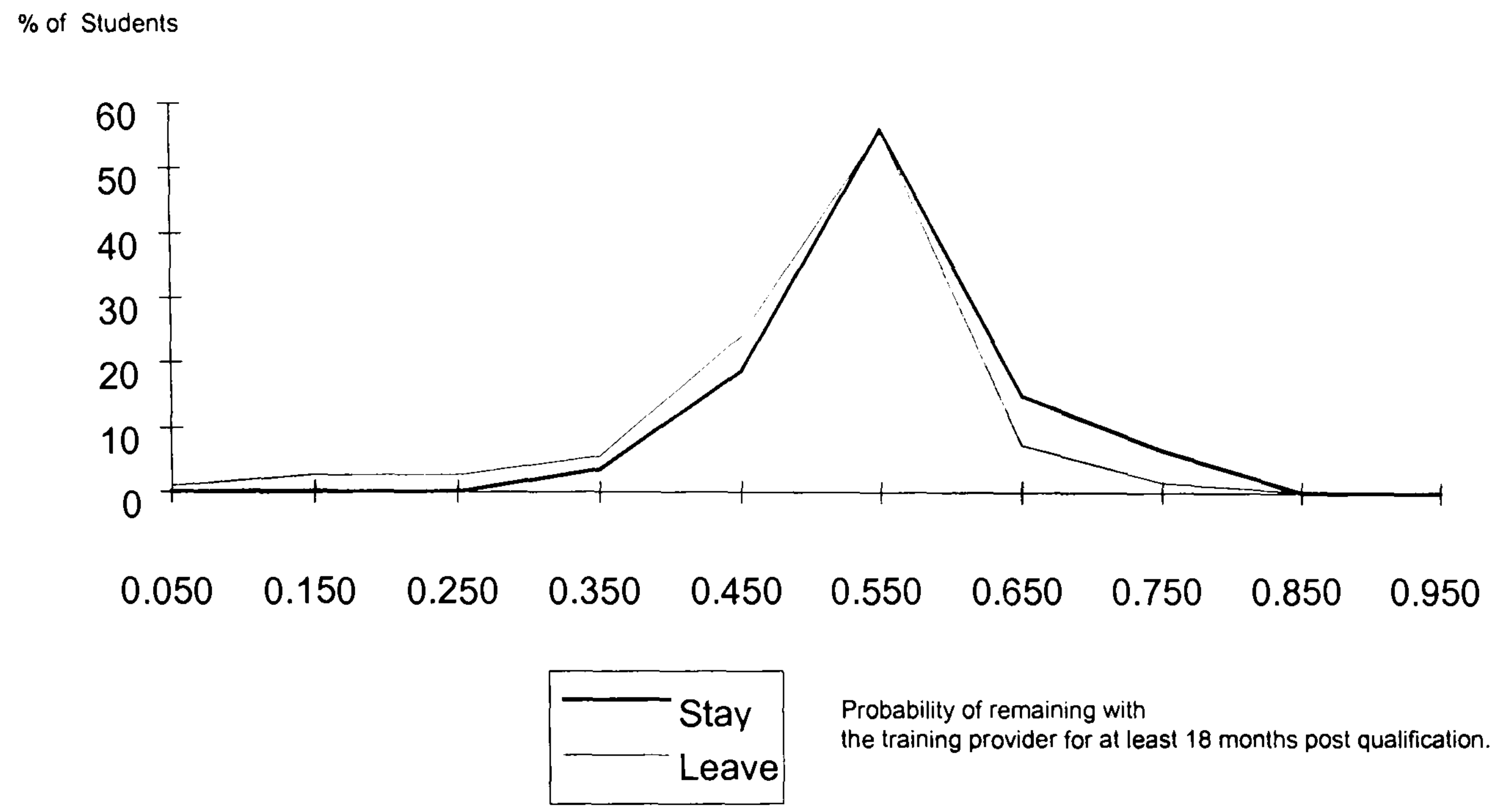


Figure 8.1 suggests that the optimal cut-off point is 0.55 although it should be noted that there is an obvious bunching of probabilities between 50 - 60% for both the trainees who remained with their multinational training provider and those who left. The classification matrix will therefore be drawn up based on both the arbitrary cut-off point of 0.50 and the optimal cut-off point of 0.55. The results are contained in Table 8.9.

Table 8.9: Classification table for multinational trainees - based on the optimal cut-off point of 0.55 and the arbitrary cut-off point of 0.5

Cut-off point	Optimal	Optimal	Optimal	Arbitrary	Arbitrary	Arbitrary
Observed	Predicted remain with training provider	Predicted leave training provider	Percent Correct	Predicted remain with training provider	Predicted leave training provider	Percent Correct
	REMAIN	LEAVE		REMAIN	LEAVE	
Remain for 18 months	60	79	139 (43%)	108	31	139 (78%)
Leave within 18 months	42	82	124 (66%)	81	43	124 (35%)
Overall	102	161	263 (54%)	189	74	263 (57%)

The overall correct classification 57%[5] utilising the arbitrary cut-off represents 78% of trainees who actually remain for at least 18 months correctly classified and a weak 35% of trainees who actually left within this time correctly classified, based on their calculated probabilities. The Type I errors[6] (predicting someone will leave when in fact they remained) are therefore 22% and Type II errors[7] (predicting someone will stay when in fact they left) are 65% respectively. Therefore although the model appears to correctly classify the trainees who remain, it fails to differentiate those trainees who in fact leave. Whilst the utilisation of the optimal cut-off point redresses the balance slightly, there is now a shift the other way with Type I errors amounting to 57% and Type II errors amounting to 34%. The overall prediction classification

[5] The number of students correctly predicted as remain students based on random selection is calculated as (189x139)/263 = 100, likewise the number of students correctly predicted as leave students based on random selection is (74x124)/263 = 35. The overall chance of classification of correctly classifying a student can therefore be computed as follows: (100+35)/263 = 51% The difference between the correct classification and the chance classification is statistically significant as demonstrated by the Pearson $\chi^2 = 4.964$ ($p=0.026$).

[6] The Type I error is the probability of rejecting the null hypothesis wrongly, where the null hypothesis is that a student will remain with their training provider for at least 18 months post qualifying

[7] The Type II error is the probability of accepting the null hypothesis wrongly, where the null hypothesis is that a student will remain with their training provider for at least 18 months post qualifying.

has also reduced slightly to 54%[8]. However in light of the cluster of probabilities between 50 - 60%, the cut-off point within this band could be critical.

The tetrachoric correlation based on the arbitrary cut-off is 0.24 and this falls to 0.15 for the optimal cut-off matrix. Considering that an empirical approach was adopted here, these low correlation figures would support the poor model χ^2 and suggest that the model does not adequately differentiate between those trainees who leave their training provider within 18 months and those who stay. There is no point therefore in continuing with the validation of this model on a different data set.

In light of this poor performance it was decided to undertake a further analysis, but this time restricting the sample to those trainees who remain with their multinational training firm together with those who left as they wished to pursue a career in Industry. This method would therefore appear to support the work of Holland (1973) who suggested that trainees pursuing a career in industry display different characteristics from those pursuing a career in the profession.

8.8 The empirically derived tenure model based on the multinational trainees who either stay or leave to pursue a career in industry

The developmental sample has now been reduced to 186 trainees, comprising the 139 who remained with their multinational training provider and the 47 who left within the 18 month period as they wanted to pursue a career in industry. Once again the

[8] The number of students correctly predicted as remain students based on random selection is calculated as (102x139)/263 = 54. Likewise the number of students correctly predicted as leave students based on random selection is (161x124)/263 = 76. The overall chance of classification of correctly classifying a student can therefore be computed as follows: (54+76)/263 = 49% The difference between the correct classification and the chance classification is not statistically significant as demonstrated by the Pearson $\chi^2 = 2.385$ (p=0.123).

Mann-Whitney scores have been calculated and can be found in Appendix 22, with the significant variables highlighted in Table 8.10.

Table 8.10: Significant background factors - derived from multinational trainees either remaining with their training provider or leaving to pursue a career in industry

Background factor	Absolute Z score	Level significance
Number of hours per week spent on sports/interests undertaken at university	2.4343	0.0149**
Number of sports/interests undertaken at university	2.4146	0.0158**
Whether sports/interests undertaken at university	2.1762	0.0295**
Number of UCAS points obtained from science Highers	2.1444	0.0320**
Number of academic prizes during secondary school	2.1066	0.0351**
Number of non-analytical Highers undertaken	1.9770	0.0480*
Number of secondary schools attended	1.8410	0.0656*
Number of memberships at university	1.8227	0.0683*
Number of children	1.7383	0.0822*

**= significant at the 5% level, *= significant at the 10% level

Table 8.10 reveals that there are 9 significant variables, 5 of which are significant at the 5% level and 4 of which are significant at the 10% level. However when Spearman correlation coefficients were calculated for these 10 variables, (the results are contained in Appendix 21), it was found that a possible multicollinearity problem existed for two pairings of variables. The variable which considered whether sports/interests were undertaken at university (Sport.U) was highly correlated with the variable which considered the number of sports/interests undertaken at university (No.Spo.U), having a Spearman correlation coefficient of 0.7284. There was also a high correlation between the variable which considered the number of sports/interests at university (No.Spo.U) and the variable which considered the number of memberships of clubs/societies and or teams (Noclub.U), with a Spearman correlation coefficient of 0.6617. It was therefore decided to exclude the Sport.U variable as the Mann-Whitney score for this variable was less than that of the No.Spo.U variable. The Noclub.U variable was also excluded on similar grounds. The remaining 6 variables were therefore entered into the logistic regression model building exercise and a forward stepwise procedure was again adopted to reduce the number of variables. As there was missing data for 6 out of the sample of 186, these cases were rejected and the model was therefore developed on the 180 cases remaining. The resulting model can be found in Table 8.11.

Table 8.11: Logistic regression - multinational trainees remaining with their training provider or leaving to pursue a career in industry

Variable	β	Level of Significance	Exp (β_p)
Number of sports/interests undertaken at university	0.4597	0.0083	1.5836
Number of secondary schools attended	-0.9992	0.0569	0.3682
Constant	1.5764	0.0110	

Model chi-square 11.220 (p = 0.0037) with 2 degrees of freedom
Overall prediction classification 76.67%

Table 8.11 includes the identical variables as those found in the previous model. There has however been a small reduction in the model χ^2 to 11.220 (p=0.0037) which once again suggests that this model has very little explanatory power. There is however a marked increase in the overall prediction classification to 77% which is impressive. On examination of the breakdown of this classification, 100% of those who remain were correctly predicted to stay, and only 7% of those who actually left were predicted to leave. Whilst this balance may be addressed slightly by adopting an optimal cut-off point as opposed to the arbitrary cut-off point used in the classification reported in Table 8.11, there is little point in light of the poor model χ^2.

8.9 Discussion

It would therefore appear from the results, both in relation to the model which considered those multinational trainees who left, irrespective of their reason (apart from those who were not offered additional work or were made redundant), and the model which considered those multinational trainees who left to pursue a career in industry, that it is not possible to develop a biodata model comprising of 'hard' biographical items collected in this study to predict tenure of employment after completion of the training contract. This is however not surprising when the literature is examined in this area. For example, Super's life-span life-space theory (Super, 1980) highlights the fact that personal influences are modified by experiences and the environment and that recent experiences supersede earlier ones. Unfavourable work environments as identified by Rhode et al (1977) and Pearson (1977) may therefore supersede any genetic or individual attributes which predispose individuals to remain with the training provider. This influence of organisational factors together with other environmental factors will interact (Hunton and Wier,

1996) resulting in a very unpredictable situation. Perhaps this is the reason that there is such a dearth of research work published on this area.

This chapter has however highlighted some interesting findings particularly in relation to the movement of trainees within types of training office and the reasons for leaving a particular training environment. This information should highlight some strategic implications for the training providers. However in order to ensure that similar trends, as identified earlier in the chapter in Tables 8.1 - 8.4, exist for another group of students and that the findings of the 1993/94 trainees are not specific to these qualification years, a similar analysis will be undertaken with the 1995 trainees (the hold-out group).

8.10 The hold-out group

Responses were received from 232 trainees who had qualified in 1995 and undertaken Highers at School and of that number 230 indicated whether they had remained with or left their training provider in the 18 month period post qualification. Similar percentages as the development group, remained with their training provider for at least 18 months with 40% (91 out of 230) of the hold-out group in comparison to 43% of the developmental group. Out of the 139 trainees who left their training provider within the 18 month period post qualification, 138 cited a reason for leaving. As 12 of this group (9%) were either made redundant or were not offered any further work on completion of their training contract, they were excluded from the analysis as these students in effect did not necessarily chose to leave. It should be noted that a far smaller percentage of students in this group were forced to leave than that experienced by the students in the developmental group whereby 21% (59 out of 285) were either made redundant or offered no further work on completion of their training contract. This could either be as a result of firms taking on less students with the intention of retaining the students on qualification or that there was an upturn in work for the professional accountancy firms which necessitated the retention of newly qualified trainees. A break-down of the students who remained and left categorised by size of training firm can be found in Table 8.12. It should be noted that as a further 3 respondents failed to indicate their training firm. The data set was reduced to 227, 90 remaining with their training provider for at least 18 months, 127 leaving within this period and 10 who were either made redundant or were not offered a job on completion of their training contract.

Table 8.12: Analysis of trainees remaining with their training provider 18 months after qualification categorised by size of training firm

	Multinational	Large	Medium	Small	TOPPS	Total
Remained with training provider for at least 18 months	49 (44%)	8 (31%)	10 (43%)	17 (36%)	6 (60%)	90
Left training provider within 18 months of qualifying	62 (56%)	18 (69%)	13 (57%)	30 (64%)	4 (40%)	127
Total number of trainees who chose whether to remain or not	111	26	23	47	10	217
Made redundant or no further work provided on completion of training contract	2 (2%)	- (-%)	6 (21%)	2 (4%)	-	10
Total	113	26	29	49	10	227

Table 8.12 would suggest that the multinational firms have experienced a bigger problem with the retention of staff from the trainees that qualified in 1995 as opposed to those who qualified in 1993 and 1994, with only 44% remaining 18 months after qualification as opposed to 52% (see Table 8.1). All the other categories of firms, with the exception of the medium sized also experienced a greater movement in their staff when the percentages who remained are compared with the percentages who remained in the earlier sample (see Table 8.1).

The Phase II model for the prediction of tenure of employment after completion of the training contract -developed on trainees who qualified in the years 1993-1994

Of the 127 trainees who left within the 18 month period post qualification, 126 trainees cited a reason and these have been classified according to the size of training organisation. The results are contained in Table 8.13.

Table 8.13: Analysis of reasons cited by trainees for leaving their training provider within 18 months of qualification

Reason for leaving	Multinational	Large	Medium	Small	TOPPS
Lack of further challenges or career progression	22 (36%)	6(33%)	8(62%)	16(53%)	3 (75%)
Wanted to move into industry	13 (22%)	6 (33%)	2 (15%)	5 (17%)	-
Offered another job	10(16%)	3 (17%)	- (-%)	1 (3%)	-
Bad working conditions	2 (3%)	1 (6%)	1 (8%)	3 (10%)	-
Other	14 (23%)	2 (11%)	2 (15%)	5 (17%)	1 (25%)
Total	61	18	13	30	4

Table 8.13 reveals that the main reason cited by the greatest percentage of students irrespective of type of training organisation is the lack of further opportunities or career progression. There is a noticeable reduction in the percentage of students who trained with a multinational firm wanting to move into industry (22%) compared to that experienced with the 1993/94 trainees (38% - see Table 8.1), although a similar movement the other way was experienced by the large firms with 33% of the 1995 trainees wishing a move into industry in comparison to 15% (see Table 8.1) for the 1993/94 trainees. However in light of the small numbers of trainees who trained with

large training organisations, care must be exercised in the interpretation of these results.

It is useful however, to undertake a similar exercise with this hold-out group of students in order to examine which students move out of the profession within this 18 month period. A similar percentage of trainees in the holdout group remained within the profession for at least 18 months post qualifying with 62% (143 out of 230) in comparison to the developmental group with 64% (as discussed earlier). The results again classified by size of training firm are contained in Table 8.14, which will again exclude the 3 trainees who failed to identify their training firm, and segregate out the trainees who were either made redundant or not offered additional work on expiry of their training contract.

Table 8.14: Analysis of trainees remaining within the profession 18 months after qualification categorised by size of training firm

	Multinational	Large	Medium	Small	TOPPS	Total
Remained within profession for at least 18 months	65 (59%)	15 (57%)	19 (76%)	36 (75%)	N/A	135
Left profession within 18 months of qualifying	46 (41%)	11 (43%)	6 (24%)	12 (25%)	N/A	75
Total number of trainees who chose whether to remain	111	26	25	48	10	220
Made redundant or no further work provided on completion of training contract	2 (2%)	- (-%)	4 (14%)	1 (2%)	-	7
Total	113	26	29	49	10	227

Table 8.14 reveals similar movements with the hold-out group as that experienced with the developmental group whereby, although the small, medium and large firms appear to experience problems retaining their staff, the recently qualified trainees would appear to move within the profession. The analysis of reasons cited by the 75 trainees for leaving their training provider and who also moved outwith the profession within the 18 month period is contained in Table 8.15.

Table 8.15: Analysis of reasons cited by trainees for leaving their training provider and who left the profession within 18 months of qualification

Reason for leaving	Multinational	Large	Medium	Small
Lack of further challenges or career progression	17 (37%)	2 (18%)	3(50%)	5 (42%)
Wanted to move into ndustry	13 (28%)	6 (55%)	2 (33%)	5 (42%)
Offered another job	6 (13%)	2 (18%)	- (-%)	1 (8%)
Bad working conditions	1 (2%)	- (-%)	- (-%)	- (-%)
Other	9 (19%)	1 (9%)	1 (17%)	1 (8%)
Total	46	11	6	12

In light of the small numbers in the large, medium and small categories, it is not appropriate to make any comment and draw any conclusions. However there has been an interesting shift in the responses of the multinational students who appear now to have left the profession to obtain better job opportunities and career progression (37%) as opposed to having the intention of pursuing a career in industry (28%). This is in comparison to the earlier students whereby only 28% moved to obtain further challenges (see Table 8.4) and 47% moved to pursue their career aspirations in industry (see Table 8.4).

8.11 Implications for the training providers

Although it has not been possible to develop a model using 'hard' biodata items which can predict whether a trainee will remain with their multinational training provider for at least 18 months, the analysis has revealed some interesting data that should be carefully considered by the training providers.

Whilst it is recognised that there is fierce competition for newly qualified accountants from outside the profession, and indeed the demand for ICAS CAs is high and currently exceeds supply (Hunter, 1998), firms need to take action if they wish to prevent the 'brain drain' from their organisations. In light of the 'train to retain' policies now adopted by many of these firms, it is necessary for firms to consider the steps that should be taken to try to prevent a move away from the training provider.

Although the number of trainees who undertook their chartered accountancy training with a TOPPS employer was small, the TOPPS employers had the highest retention rates for both the 1993/94 and 1995 trainees. It would therefore appear that these trainees are more satisfied with their training organisation and do not feel the need to move, although the majority of those who left did so due to the lack of further challenges or career opportunities. Whilst it may be very difficult to stem the flow of trainees who are choosing accountancy training as a means of either deferring their long term career decisions (Horowitz and Riley, 1990) or as a Curriculum Vitae development exercise, there must surely be lessons to be learned from the numbers who leave their professional firms due to a lack of opportunities. Whilst it may be very difficult for the smaller firms to compete on the international stage with the multinational firms, if the latter managed to retain their staff in a more efficient manner, the employment opportunities available to the smaller firm trained accountant may be reduced. A third of the 1993/94 multinational trainees cited lack of further challenges or career progression as their reason for moving (Table 8.2) and this rose to 36% for the 1995 trainees (Table 8.13). There was also a rise in the percentage of trainees who left as they were offered another job with 10% of multinational trainees citing this as a reason in the 1993/94 sample (Table 8.2) and 16% in the 1995 sample (Table 8.13). These figures would suggest that there were plenty of opportunities available outwith the training organisation and that many newly qualified trainees were in effect head hunted by other organisations.

8.12 Conclusion

The findings of this chapter are rather disappointing. However this is hardly surprising in light of the lack of published studies in this area, compounded by the recognition of other contributory factors affecting tenure such as the environment of the workplace and employment opportunities available on completion of the training contract. Interesting trends have emerged, however, in relation to the movement of trainees within different types of training organisation, with a valuable insight as to why trainees within particular training environments have actually left. It was not possible to develop a biodata model which differentiated between those trainees who remained with their multinational training provider for at least 18 months post qualifying with those who left within this time. The only conclusion that can be drawn from this is that it would not appear possible to predict from the information contained in an application form whether a trainee will remain for at least 18 months post-qualifying. However, before the tenure issue is dismissed, it is worth considering those students who were either made redundant or were not offered additional work on completion of their training contract (1993/94 - n = 59; 1995 - n = 10). An analysis was therefore undertaken on these students in an attempt to identify whether there was underlying reasons why these particular trainees were made redundant and to explore whether their involuntary withdrawal was more of an ability issue. The ICAS examination performance of these trainees was therefore analysed. Of the 59 students (1993/94) who were either made redundant or did not get offered a job on completion of their training contract, only 27% (n = 16) passed all their examinations first time. This is in comparison to the percentage of trainees who passed first time and were not forced to leave their training provider, namely 60%. Similar differences were found in the 1995 data set whereby 20% (n = 2) of the sample (n = 10) who did not voluntarily leave passed their examinations at the first attempt in comparison to the first time pass rate of 58% of those who were not made redundant or not offered a job on completion of the training contract. The inference that could be drawn from this information is that non-voluntary withdrawal is indeed an ability related issue as demonstrated by the ICAS examination performance differential between those who were forced to leave and those who were given the option to stay. This finding adds further weight to the utility of the examination performance models as developed in Chapter 7. If it is not possible to predict whether a trainee will choose to remain with their training provider from the application form and yet if it would appear to be possible to identify those students who have a high probability of passing their ICAS examinations at the first attempt, firms should at least pre-select on a criterion for which there is some degree of comfort. This is of particular relevance where there is evidence to suggest that trainees who do not perform well in the ICAS examination process are more likely to either be made redundant or not offered a job on completion of their training contract.

This completes the empirical work of this thesis with the following chapter providing a general discussion, making recommendations for the training providers and offering suggestions for further research in the area.

CHAPTER 9

DISCUSSION AND PLANS FOR FURTHER RESEARCH

9.1 Introduction

This thesis began by identifying the importance of selection to the accountancy profession. The cost of training an ICAS trainee to become a qualified Chartered Accountant was highlighted which led to a discussion of the importance of selecting students who have an ability to pass the ICAS examinations at the first attempt and also the selection of trainees who will remain with their training provider post-qualification. Chapter 1 deliberated the recruitment and selection procedures currently undertaken by the training providers of ICAS trainees and suggested that in the main a very traditional approach to selection was utilised, which relied on methods that are not viewed favourably in the research literature. A review of the primary criteria for accountancy trainee selection was then undertaken which identified previous academic achievement, extracurricular activities and work/vacation experience as the criteria used by the training providers in their selection process. The identification of these criteria however raised the question of the particular aspects of previous performance which are related to future performance. This led to the suggestion of adopting biodata as a method of pre-selection whereby the information contained in an appropriately designed application form is used actuarially and explicitly to predict future accountancy performance, as advocated by Harvey-Cook and Taffler (1987). Indeed Gratton (1989) suggested that the use of biodata is the best method for pre-selecting graduates for entry level jobs.

The review of literature supported the validity of biodata and demonstrated that it compares favourably with many other kinds of selection and assessment procedures of job applicants and employees. One of the main criticisms of biodata however is the atheoretical approach associated with the technique. The literature therefore also emphasised the theoretical advances that have been made in the 1980s and 1990s in the area of biodata, subsequent to the earlier work undertaken in the 1960s and 1970s which tended to focus purely on the maximisation of prediction without an explanatory focus on why biodata actually does predict. Other criticisms levelled at biodata were also highlighted, such as stability over time, fakeability, the fairness and legality of the technique, together with the practical problems associated with the development of a biodata model such as the time-consuming nature developing a valid model and the necessity for sufficient numbers within the developmental group. The literature concluded by considering the implications of the cited work for the development of biodata models in the context of the thesis. These implications were: to develop separate models for each criterion of interest, restrict the background factors to 'hard' biodata items, consider a more rational approach to model derivation, consider the fairness of the technique and evaluate the impact of the models on gender, and finally to identify any educational changes that may affect the reference group.

The aim of the thesis was therefore to critically evaluate whether biodata could be used as a valid tool in the pre-selection process of trainee chartered accountants undertaking their training within an ICAS training environment with particular reference to ICAS examination success and tenure of employment for at least 18 months post-qualifying.

Four specific objectives were then identified in relation to the aim. These were to:

1. Critically evaluate the effectiveness of biodata in the differentiation of ICAS trainees between those who successfully negotiate their professional accountancy examinations without resits and those who experience failure.

2. Identify the key determining background factors which influence ICAS examination success and could be used in a selection environment.

3. Analyse the effectiveness of biodata in the differentiation of trainees who remain with their training provider for at least 18 months post qualifying and those who leave before this time.

4. Identify the key determining factors which could be used in a selection environment, influencing tenure of employment after completion of the training contract.

This chapter concludes the thesis with a general discussion of the research findings before setting out the practical implications for the training providers. It will firstly consider the statistical significance and the validity of the models before discussing the component background factors included within each model, which should encourage training providers to evaluate their current practices in the screening of application forms. A discussion regarding the implications for the practical utility of the developed models for training providers who recruit students to undertake ICAS training is then undertaken. Finally the chapter will suggest potential areas that should be considered for future research.

9.2 General discussion of the research findings

The empirical work of the thesis is divided into three interrelated areas. The Phase I Study attempted to develop a model based on trainees who qualified in the years 1988-1992. Logistic regression was used to differentiate between those trainees who passed their ICAS examinations at the first attempt and those who experienced at least one resit. The second area was the Phase II Study which analysed trainees who completed their training contracts in 1993 and 1994. A slightly different methodology was adopted in the development of the Phase II model (see below). The third and final area was also part of the Phase II Study (1993-94 trainees) but was concerned with the prediction of tenure of employment after completion of the training contract.

Each of these areas will be dealt with in turn.

9.2.1. The Phase I model

In order to accommodate the Scottish higher education system, two separate models were developed, one on trainees who had graduated with an honours degree, the other on trainees who had graduated with an ordinary degree. An empirical approach to model development was undertaken. Non-parametric analysis was initially carried out on the range of background history items which had been collected from a questionnaire. This was undertaken in order to identify the particular background items that significantly differentiated between those trainees who passed all their ICAS examinations at the first attempt and those who experienced failure (England, 1971). This enables the number of individual variables to be reduced to a manageable level. The identified variables were then entered into a logistic regression model using a forward stepwise procedure along similar lines to that adopted by Harvey-Cook (1995).

The resulting models achieved commendable results in both explanatory power and overall prediction classification achieving 72.7% for the honours degree model and 64.5% for the ordinary degree model. The ability of the models to differentiate between those students who passed their ICAS examinations at the first attempt and those who experienced failure was also reflected in the tetrachoric correlation coefficients (r_t) of 0.65 (honours model) and 0.42 (ordinary model). It was highlighted, however, that the utility of any model should not be evaluated solely on the basis of within-sample performance but importantly should be judged in the light of its ability to differentiate and correctly predict another data set. Shrinkage was experienced when the model was applied to a hold-out sample which was drawn from trainees who qualified in the years 1993-94. The overall prediction classification dropped to 58% for both the honours and ordinary models with a corresponding reduction in the terachoric correlation coefficients. Two possible reasons for this were suggested. The first was concerned with the instability of the reference group whereby a significant change to the ICAS system of education took place during the developmental period for the Phase I Study, which could render the key ineffective (Thayer, 1977). The second related to the empirical approach adopted for the Phase I Study, which utilised a methodology comparable with other previous studies such as Harvey-Cook (1995). Whilst the background factors were derived from data commonly found on training provider application forms, the selection and entry of variables was based on the grounds of statistical analysis, with a post-hoc rationalisation of the reasons for including each background variable within each model. It was suggested that this approach may result in the inclusion of idiosyncratic variables pertinent to the developmental group which have little or no explanatory powers for another group of individuals, as suggested by Mael and Hirsch (1993).

The value of this Phase I Study has not therefore been to develop a valid model which could be used by the training providers in their selection process. The implication of the Phase I Study was rather to shape the nature of the analysis undertaken in the Phase II Study, which extended the methodological approach of the initial work. As some of the items identified as significant in the Phase I models were not felt to be vulnerable to changes in the education process, such as honours classification, it was envisaged that they would still be valid (Rothstein et al, 1990). In contrast, other background factors, such as relevance of degree, resulted in a different model being developed for non-relevant students in the Phase II work.

9.2.2. The Phase II model - examination success

Combining the information gleaned from the Phase I Study with the results from other relevant studies highlighted in the literature review, general hypotheses were set up in an attempt to construct a framework from which more meaningful models could be derived. Through the adoption of this more rational approach, within the context of a stable educational environment (the models were developed for trainees who qualified in the years 1993-94, and validated for trainees who qualified in 1995, all of whom undertook the 'new' system of ICAS training), the objectives of the thesis in relation to ICAS examination success were advanced.

In light of the 'new' system of education whereby non-relevant trainees now received all their accountancy education from ICAS, separate models were developed for fully-accredited and non-relevant graduates. As in the Phase I Study, the honours and ordinary graduates were also segregated. Three separate models were therefore developed; a fully-accredited honours graduate model, a non-relevant honours graduate model and a fully-accredited ordinary graduate model. It was not possible to consider non-relevant ordinary graduates as there were insufficient numbers on which to base the developmental work. Each of these models will be dealt with in turn.

9.2.2.1. The fully-accredited honours graduate model

Five variables were derived from the general hypothesis and these were entered into the model using logistic regression. Although the explanatory power of this model was slightly poorer than that of the Phase I Study honours graduate model, the overall prediction classification, based on the optimal cut-off point, was still acceptable at 69% and this was reflected in the r_t of 0.56. Although some shrinkage was experienced when the model was applied to the hold-out group of trainees who qualified in 1995, commendable results were still achieved. Utilising the same cut-off point which was deemed optimal for the developmental sample, the overall classification was 66%, with a r_t of 0.48.

9.2.2.2. The non-relevant honours graduate model

Five variables were derived from the general hypotheses and entered into the model. The resulting model however had very weak explanatory powers as evidenced by the insignificant model χ^2 and indeed none of the variables were individually significant.

Two suggestions were made as to why the non-relevant honours model failed to differentiate between those graduates who passed their ICAS examinations at the first attempt and those who experienced failure. It may be that the background history items which can differentiate have not been identified or that the students are not representative of the non-relevant graduate population. An examination of the other background variables, which were not hypothesised to predict and were not therefore entered into the model, revealed that there very few variables which were individually significant in the determination of examination success. When these significant variables weie entered into the model, a comparatively low level of significance was obvious. In addition, there was only one variable individually significant in both the developmental and hold-out samples, which would suggest that the developed model would have very little explanatory power for a different data set. It was concluded therefore that, for this group of students, the information commonly found in an application from would not appear to capture those factors which differentiate between the students who pass their ICAS examinations at the first attempt and those who do not. This leads on to a second suggestion which is that this particular group of students may not be representative of the non-relevant graduate population who undertake an ICAS training contract. As there were only 61 students in the developmental sample, there are almost insufficient numbers on which to undertake the developmental analysis. With greater numbers, it may be possible to identify background factors that do differentiate between the two groups of students (Mumford and Owens, 1987; Hogan, 1994).

9.2.2.3. The fully-accredited ordinary graduate model

Four variables were identified from the general hypotheses in respect of these students, and these were entered into the logistic regression model. In a similar fashion to the honours graduate model, a poorer model χ^2 was achieved in the Phase II Study when compared to the Phase I Study, with a reduction also experienced in the overall prediction classification to 61% and the r_t to 0.35. When the model was applied to the hold-out sample however (trainees who qualified in the year 1995) there was no shrinkage, with a recorded overall prediction classification of 62% and a r_t of 0.42. There is obviously a similar trend in the classification of trainees in both the developmental and hold-out groups, with the model performing well in the prediction of those students who actually pass (as demonstrated by the low percentage of Type I errors) and not so well in the prediction of those students who actually fail (as demonstrated by the higher percentage of Type II errors). It was recognised that this was due to the bunching of the probabilities calculated by the ordinary model around the 50% mark, which would suggest that many of the ordinary students were borderline with some passing and other failing the examinations.

9.2.2.4. The implications for the development of these examination success models

The results of the Phase II Study in relation to ICAS examination success demonstrate that it is possible to differentiate between those trainees who pass their ICAS examinations at the first attempt and those who experience failure, using a biodata key which has been restricted to 'hard' items of biodata. It should however be noted that it was only possible to develop a successful model on those trainees who progressed from either a fully-accredited honours or ordinary degree. There were insufficient numbers to undertake any developmental work on non-relevant ordinary trainees and the developed model did not appear to differentiate between the non-relevant honours students who were successful in their ICAS examinations and those who experienced resits.

This thesis has provided further evidence to support the technique of biodata. It has demonstrated that biodata is a valid tool for the prediction of work performance, which in this instance is the passing of the ICAS examinations at the first attempt. The thesis has therefore furnished the literature with an additional validation study for the technique of biodata in a context in which it has not previously been applied, namely the Scottish chartered accountancy profession. It therefore supports the work of Harvey-Cook 1995 who undertook a study within the ICAEW context. This validity study therefore lends weight to the appropriateness of the technique for pre-selecting graduates for entry level jobs, where training is done after recruitment and where there is a limited amount of work experience on which the candidates can be assessed (Gratton, 1989). This study is also of particular relevance for post-graduate study where further examinations and assessment take place, for example, in relation to the prediction of performance in specialist areas of medicine following the basic medical training. The evidence provided therefore leads to the tentative suggestion that the principle of biodata could be applied in other related contexts, although obviously any developmental and validation work would need to be undertaken within the particular context for which it is required (Gunter et al, 1993).

9.2.3. The Phase II model - tenure of employment post-qualification

Chapter 8 suggested that all trainees irrespective of educational differences should be treated as a homogenous group. Therefore all the trainees irrespective of degree background were treated as one data set for the model development. Students, however, who were either made redundant or were not offered a job on completion of their training contract were excluded from the analysis in order to restrict the leavers to those who left voluntarily. The data set was further restricted to trainees who undertook their training within a multinational environment because of differences in the reasons for trainees leaving non-multinational firms. This enabled the model to be developed on a homogeneous group of trainees who had been educated within a similar training environment and who would have had similar opportunities available on qualification. *A priori* hypotheses were set up and eight variables were predicted to differentiate between those students who remained with their training provider for at least 18 months post-qualifying and those who left within this time. The resulting model was insignificant. In order to identify whether this was a function of a possible misdirected identification of the salient background factors due to the limited information available to formulate the framework, an empirical approach was adopted. This was to evaluate whether it was possible, at least in the first instance, to achieve significant explanatory power from this methodology. Although the developed model was significant at the 5% level, the model chi-square was low in comparison to that achieved in the Phase I Study. In light of the shrinkage experienced with this type of methodology, when applied to a different data set, no further work was carried out as the model was insufficiently robust to warrant further investigation. Further developmental work was then carried out, restricting the trainees who left purely to those seeking to pursue a career in industry, as advocated by Holland (1973)[1]. The resulting model was also poor.

In relation to the objective which was concerned with the assessment of whether biodata could be used to differentiate between trainees who remain with their training provider for at least 18 months post-qualifying and those who leave before this time, it was concluded that it would not appear possible to develop a biodata model simply using 'hard' biodata items which could be collected at the time of application to the training provider. This result is not surprising however when one considers the influence that organisational and environmental factors may have on an individual's experiences throughout and after completion of the training contract.

9.3 Implications for current practice by the training providers

The results of the Phase II empirical work which was undertaken on trainees who qualified in 1993-94 and was validated on trainees who qualified in 1995 raise many issues that should be considered by the recruiting accountancy firms. In addition, the development and subsequent validation of the ICAS examination success models suggest that many training providers should re-evaluate their pre-selection techniques. The following section attempts to review some common practices adopted by the accountancy profession in the light of the component variables contained within the relevant examination success models.

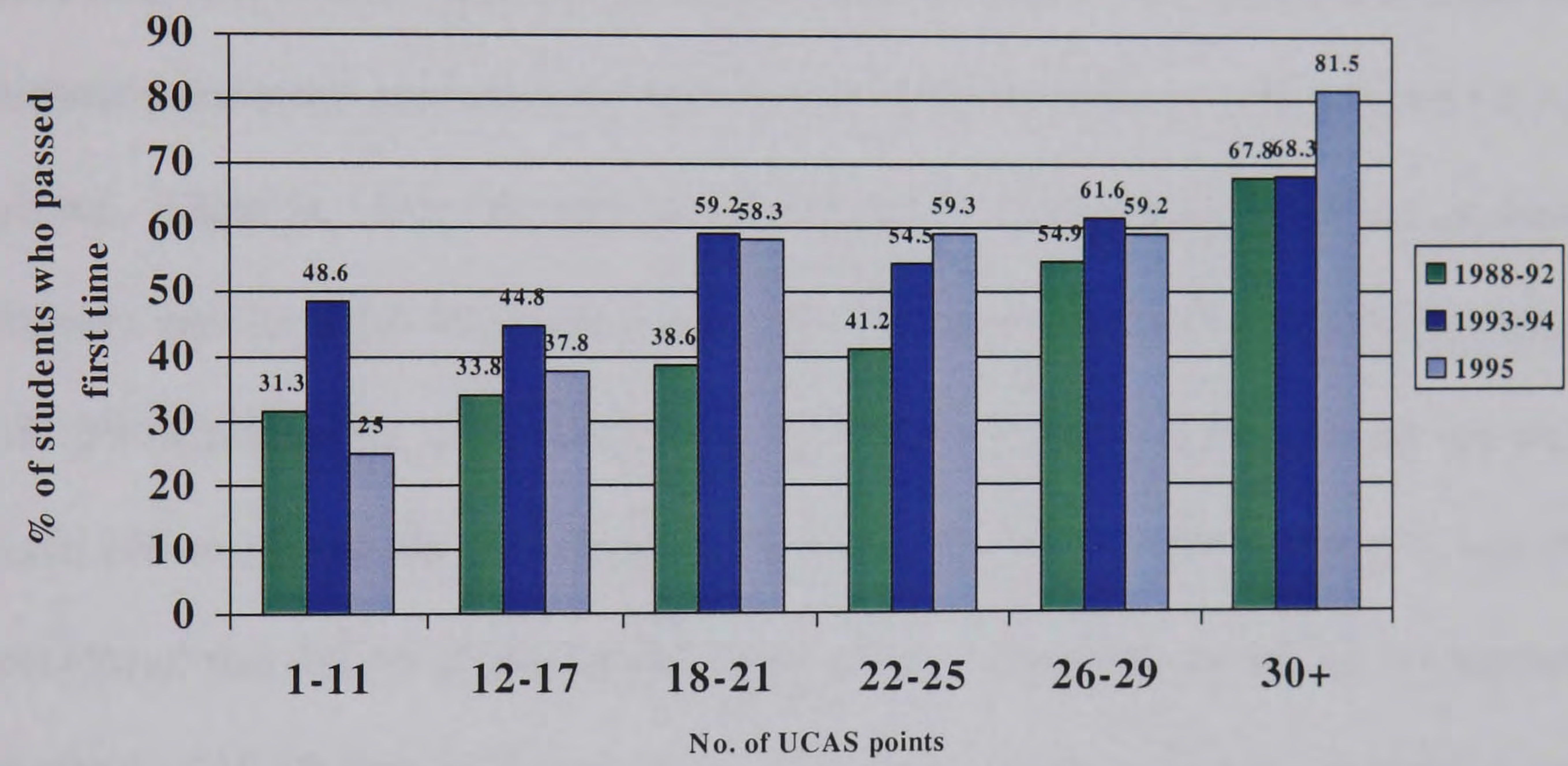
[1] The researcher suggested that trainees who pursue a career in industry display different characteristics from those who pursue a career in the profession.

9.3.1. School performance

It was identified in Chapter 1 that many firms utilise some form of pre-screening on the basis of a minimum UCAS points score or set minimum grades in higher subjects such as Mathematics and English. The results from the Phase I Study suggested that it would be useful to identify UCAS points achieved in 5th year as opposed to considering the overall UCAS point score which will include achievements from both 5th and 6th year. This would allow all students to be treated on an equal footing irrespective of whether or not they remained for a 6th year at school. However, although the number of UCAS points obtained at higher in 5th year at school was entered into each model, it was not statistically significant. Likewise, the two other variables which related to school performance namely the grade in Higher Mathematics (honours non-relevant model) and the number of A passes or grade 1 passes at O level or standard grade (fully-accredited ordinary degree), were also insignificant. Therefore whilst the models do suggest that the greater are the number of UCAS points and A passes and the better is the grade in Higher Mathematics then the greater is the chance of passing the ICAS examinations at the first attempt, these variables are not significant indicators of future performance.

It is necessary however at this juncture to refer back to the limitations of the study as identified in the Methodology chapter which recognised the fact that the analysis was undertaken on students who had already been selected by firms to undertake their ICAS training. If these students had been selected on the grounds of their UCAS point scores, then the analysis presented here has been undertaken on a limited range of UCAS point scores as students with low UCAS scores have already been sifted out of the process. This could be the reason for the apparent insignificance of school performance. Some further analysis was therefore undertaken of the relationship between UCAS point scores in bandings to ICAS examination success. The bandings adopted are those used by ICAEW in their published statistics on examination performance. The results are contained in Figure 9.1.

Figure 9.1: Percentage of students who passed their ICAS examinations at the first attempt categorised by their UCAS point scores



Note: the UCAS point score for the 1998 - 92 trainees is based on their score from all Highers irrespective of whether or not they were undertaken in 5th or 6th year. The UCAS point scores for the remaining trainees (those who qualified in the years 1993 - 1995) were those achieved in 5th year only. Therefore, a direct comparison should not necessarily be drawn between these two scores.

Figure 9.1 demonstrates that there is very little difference in ICAS examination performance between trainees who qualified in the years 1988-1992 and who have between 1-25 UCAS points. There is however a marked increase in performance for trainees with at least 26 UCAS points. Slightly different results are apparent for the trainees who qualified in the years 1993 and 1994. Whilst there is little to differentiate between trainees who have UCAS points within the bandings contained in the 1-17 range, there is a noticeable increase in the percentages of students that pass first time who achieve at least 18 UCAS points. Of particular interest, however, is the similarity in percentages of trainees that pass first time within each banding contained in the range of 18 - 29 UCAS points. Trainees who achieve 30+ UCAS points achieve the highest pass rates. The data for the trainees who qualified in the year 1995 follow a similar trend to the 1993/94 trainees. Figure 9.1 reveals that lower percentages of trainees pass first time who have between 1 - 11 UCAS points and the highest percentage pass rates are achieved by students who have at least 30 UCAS points. There is, however, little to differentiate between the performance of those trainees who have UCAS points in the different bandings contained within the range 18 - 29 UCAS points. If the 1988-92 figures are disregarded on the grounds that they have not measured the same performance as the 1993 - 1995 figures, it can be concluded that UCAS points in the range of 18 - 29 points are not an appropriate measure of ICAS examination success. This would suggest that the insignificance of the UCAS point score obtained in 5th year is not a function of restriction of range whereby the model was developed on trainees who had already been pre-selected on the grounds of their UCAS point scores but is in fact a direct result of this measure of performance having little influence in the determination of ICAS examination success.

This finding calls into question the common practice of training providers setting minimum numbers of UCAS points before they will consider an application. For example, Ernst and Young, in their 1997 recruitment drive, required 22 UCAS points if a trainee expected to achieve an upper second class degree and 24 points if they expected to only achieve a lower second class degree. The preceding observations suggest that if firms were to set a minimum number of UCAS point before considering an application then this should be set in the region of 18 points. It is interesting to note that, following a discussion with Jackie Wynn, national recruiting manager with KPMG, they have recently lowered the minimum number of UCAS points from 26 to 20 based on their findings of an internal study of over 1,000 trainees who have undertaken their CA training within the ICAEW context over the last five years. There would, however, appear to be a reluctance by training providers to abandon the use of UCAS scores in the pre-selection process, as found by Harvey-Cook (1995). When medium sized firms utilised the Harvey-Cook (1995) screening technique, they still insisted on using a minimum number of UCAS points and a minimum grade in 'O' level or GCSE Mathematics and English as their basic academic requirements despite evidence that this information was not relevant in the determination of examination success.

The inclusion of the school related variables in the models in this study should therefore provide some comfort to the training providers in that they are not being overlooked completely whilst giving the model validity in that the requisite weight has been assigned to the variables which consider these factors.

9.3.2. University performance

The honours graduates, in general, performed better in the ICAS examination process than their ordinary degree counterparts, with higher percentages of both relevant and non-relevant students passing at the first attempt for both datasets. Firms should therefore not treat these students as an homogenous group. In respect of the honours degree students who have undertaken fully-accredited degrees, the most salient indicator of ICAS examination success is the honours classification. It is therefore important that firms seek this information or the best estimate at the application form stage. Whilst it is recognised that the class of degree may not be available at the time of recruitment, it is suggested that firms develop a closer involvement with the universities for indicative degree classifications. The small scale empirical exercise conducted at the Robert Gordon University would suggest that academic staff can predict with some degree of certainty honours degree classification at the time of student recruitment, which is usually in the October preceding the summer that the training contract commences. There was also evidence that the academic staff predictions were more accurate than that of the students who were also asked to indicate the indicative honours classification they would enter on an application form.

It is recommended therefore that an appropriate section should be incorporated in the application form related to the expected honours classification. This would be very much in line with the information often supplied by school referees who predict A level or Higher results in a UCAS application form. It is worth mentioning that many firms request an indicative degree classification when following up on references which is undertaken after the pre-selection of the application forms. It is suggested however that, in light of the importance of this information in the determination of ICAS examination success, the timing of the request is too late in the selection process and the information should be sought at the earliest possible opportunity. This would enable students who have not performed well at school, as evidenced by their UCAS point score, but who have performed well at university to be selected at the first sift. It is the contention that many of these students are currently missing the first cut in the selection process[2].

It is worth noting here, however, that the importance of the honours degree classification is only relevant for the fully-accredited honours trainee. Although degree classification was entered into the non-relevant model, the variable was not significant within the model and would therefore appear not to be a significant indicator of ICAS examination success.

Whilst the fully-accredited ordinary model does not afford the luxury of the honours classification to determine ICAS examination performance, it still contains a

[2] For example, two outstanding students at the Robert Gordon University recently wished to pursue a Chartered Accountancy qualification within a "Big Six" environment. Both students failed to meet the minimum entry requirements in terms of their UCAS point scores, and were advised that it was not worth applying by the recruiting firms. Both students however, were predicted by academic staff to be in line for 1st class honours degrees, and in fact did achieve their 1st class degrees some 7 months after the application form stage. By attaching letters to their Application forms from their relevant Course Leader which indicated their outstanding performance at university, both students secured training contracts with a 'big six' firm of their choice. These outstanding students would have been lost to both the recruiting firm and the profession if this intervention had not taken place.

significant variable relating to university performance, namely, the number of resits in second and third year at university. This variable was also entered into the fully-accredited honours model, although in that case it was not significant. There are two possible reasons for this. Firstly, as the honours degree classification is such a strong indicator of ICAS performance, it really supersedes all other academic performance measures. Secondly, many students who experience difficulty in the early years of their degree courses, as evidenced by resits, are counselled not to undertake honours degrees as it is envisaged that they will not cope with the higher level work whereas others will choose to undertake the ordinary route in an effort to fast track into the profession. The number of resits during second and third year at university should therefore distinguish between different levels of performance where an honours classification is not known.

Many of the application forms do not at present specifically ask for details of any resits during a university course and this is information that should be sought at the pre-selection stage.

9.3.3. Experiential activities

The number of jobs related to chartered accountancy undertaken whilst at school and university were significant indicators of ICAS examination performance for both the fully-accredited honours and ordinary models. This information demonstrates at the application form stage whether a candidate is committed to a career in Accountancy as they have already experienced some relevant work and have continued to seek employment in this area. Surprisingly, those students who have undertaken non-relevant honours degrees and have been employed in an area related to chartered accountancy during their university career perform less well in the ICAS examination process than those who have no relevant experience. However, again this variable was insignificant.

Firms should however seek this information at the application form stage as it would appear relevant in the determination of ICAS examination success for fully-accredited trainees.

Another experiential variable found to be significant in the honours model was that which related to whether a trainee had progressed directly from their university course to CA training. This finding suggests that firms should be wary of applicants who have had a break between completion of their fully-accredited degree and commencing their training contract as they do not appear to perform as well in the ICAS examination process as those students who progress directly. Whilst it should be obvious from an application form whether an applicant has completed their university degree when applying or has still to complete their final year, it is suggested that firms ensure that this information is readily available from the application form.

The discussion above highlights the implications for the training providers in the future design of their application forms in order that they may seek out the relevant information in their quest to determine which background factors indicate an ability to pass their ICAS examinations at the first attempt. In respect of the objective to identify the background factors which determine ICAS examination success, it has been possible to pinpoint factors which could be used in a practical environment and which have an *a priori* rationale for inclusion. This however has only been possible for the fully-accredited graduates. The inability to identify background factors for the non-relevant students in this study is however also of significance. Specifically, not only does this point to the need for further work in the area which will be discussed later but it also highlights key differences in background factors found to be pertinent both in the fully-accredited developmental work and in the Harvey-Cook (1995) study which was actually developed on non-relevant graduates albeit within an ICAEW setting. This calls into question the transportability of a biodata key to another sample with a slightly different profile, albeit predicting the same selection criteria (Hunter and Hunter, 1984).

The direct consequence of 'hard' biodata items not differentiating between trainees who remain with their training provider for at least 18 months post-qualification and those who leave within this time is that it was not possible to identify the background factors which determine tenure of employment. The thesis has therefore failed to achieve the fourth objective. There is some value to be gleaned from the analysis however when the movement of trainees within different sizes of training office was considered, together with the reasons for leaving a particular training environment.

9.4 Implications for the practical utility of the model

Now that it has been determined that a rationally driven biodata model does differentiate between those fully-accredited honours and ordinary students who pass their ICAS examinations at the first attempt and those who experience failure, it is necessary to consider the overall aim of the thesis which was concerned with whether biodata is a valid tool in the pre-selection process of trainee chartered accountants undertaking their training within an ICAS training environment. Consequently, the final question that needs to be addressed is whether the estimated models could actually be used by training providers in their quest to select the most appropriate candidates for CA training. The practical utility of the model will therefore now be examined. This section will examine any moderating effects that the type of training environment may have on the developed models before attempting to compare the evidence provided by the models with other selection techniques currently utilised by the training providers. It will then reflect on both the criticisms of the technique, in the context of this study, and the limitations of the study in an attempt to evaluate whether these considerations would invalidate the practical utility of the model.

9.4.1. Moderating effects of the training environment

As the models in this thesis have been developed on all trainees, irrespective of the type of training environment within which they undertokk their training contract, it is necessary to consider whether the size of training firm has a determining effect on ICAS examination performance. If trainees from a particular type of firm perform better in the examination process, is this simply due to this type of firm attracting better graduates or is the examination performance linked to the type of training that the graduates receive? An examination of the pass statistics for the fully-accredited honours and ordinary graduates in the Phase II developmental group reveals that trainees in multinational firms achieve the best first time pass rates with 73% of honours graduates and 63% of ordinary graduates passing first time. This is in comparison to the overall pass rates of 67% for the honours graduates and 53% for the ordinary graduates. It is therefore not surprising to note that, the univariate analysis for the size of firm variable, as calculated by the absolute Z score, is significant at the 1% level for both types of graduates. If this differential in performance is simply due to a particular type of firm recruiting a better quality of trainee then it is envisaged that the model would already identify the better quality of graduate from the background factors included in the model. Entering a variable which considers the size of training firm would therefore fail to add anything to the explanatory power of the model, and the size of firm variable would therefore be insignificant in the model.

The fully-accredited honours graduate model was therefore run, including a variable which considered the size of training firm. This variable was entered as a dummy variable, treating the training environment as either multinational or other. The resulting model identified that the variable was not significant within the model which suggests that, any differential in performance by the multinational trainees is already explained within the model. This would indicate that the better performance of the multinational trainees in the ICAS examination process is a function of their background already measured by the variables contained within the model and is not as a result of the different training environment.

The same exercise was conducted for the fully-accredited ordinary graduates, and a size of firm variable was entered into the ordinary graduate rational model. In a similar fashion to the honours graduate analysis, the amended model incorporating the size of firm as a variable demonstrated that this background factor was not significant in the determination of ICAS examination success. This result would appear to support the honours graduate conclusion which suggested that the better performance of the multinational trainees is due to their personal background which has already been identified from the other variables contained within the model.

In many respects this finding is not surprising. The ICAS examinations, particularly at TPC1 (now referred to as The Test of Competence) tend to be technically orientated, and indeed, the work experience received in a smaller firm may, in fact, be beneficial for the successful negotiation of the examinations at this level. Working in a general practice department preparing accounts and tax computations for owner/managed business may be a more valuable experience than say working as part of a big audit team. The same may not be true for TPC2 however (now referred to as The Test of Professional Expertise) which is case study based and is designed to test the candidate's ability to put into practice the theoretical knowledge and work experience gained during the training contract. Trainees from a multinational background are more likely to have been involved in some of the areas which often arise in these case study questions, such as, due diligence, company reorganisations etc., which is unlikely for trainees working in the small firms. There is therefore no definitive argument as to which type of training environment is beneficial to trainees. It would appear from the results discussed above that the improved performance of the multinational trainees in the ICAS examination process is due to personal background factors at the time of their application to the training firm, which have already been measured in the relevant models, as opposed to any differences in work experience encountered during the training contract.

9.4.2. Comparison to other selection techniques currently utilised by the training providers

As discussed in Chapter 7, there is evidence to suggest that both the fully-accredited honours graduate model and the fully-accredited ordinary graduate model achieve correlation coefficients greater than that reported in studies which utilised unstructured interviews, although it was recognised that the reported correlations fell short of the results reported from structured interviews. It must however be stressed that these other studies were not conducted in the ICAS trainee selection environment and there is no evidence to confirm or challenge whether the reported correlation coefficients from these other studies would hold true for the samples in this thesis. When it is borne in mind, however, that most of the selection for ICAS training places will be conducted by accountants, many of whom have received either limited or indeed no formal training in the area, the expectation is that the correlation coefficients may be overstated for the accountancy profession in general. However, it is not the contention of this thesis that the use of these biodata models should be used in isolation but rather that they should be used at the first stage of the selection procedure, namely the application form filtering process. The comparison should therefore be drawn between the validity of current application filtering procedures and the validity of the estimated models. Unless some form of longitudinal study is undertaken, whereby students are tracked who apply to an organisation and the application decision taken by the firm is compared to that as suggested by the model (as undertaken by Harvey-Cook (1995))[3], it is inherently difficult to undertake this comparison. Even if a longitudinal study was undertaken a further difficulty would arise in that many current application forms do not seek the relevant information as required for the developed biodata key in this thesis. It was therefore decided to try to evaluate whether it was possible to support the practical implications of the estimated models. A comparison was therefore drawn between the explanatory powers reported, and a proxy for the explanatory powers offered by certain pre-selection criteria adopted by some training providers. Two models using logistic regression were developed. One was based on the variable which considered the number of UCAS points in total. The other was based on three variables, namely the number of UCAS points in total, the Higher grade in Mathematics and the Higher grade in English. This exercise was carried out for both the fully-accredited honours and ordinary graduate trainees. The results are contained in Table 9.1.

[3] The comparison by Harvey-Cook (1995) exposed the '*reality of the pre-selection function*' by demonstrating that the medium sized firms were failing to identify the high risk applicants as calculated by the model and were sifting out students which the model calculated to be high quality and low risk. It would have been an interesting exercise to follow the students which the model had recommended for acceptance through the system if indeed they ever achieved a training contract to ascertain whether in fact the model had correctly identified high quality trainees.

Table 9.1: Comparison of explanatory powers of the developed models to a proxy for current pre-sift practices

Model	Developed sample	Total UCAS point score	UCAS points, Higher Mathematics and Higher English grade
Fully-accredited honours graduates	35.6(p=0.0001)	2.5(p=0.1160)	4.5(p=0.2102)
Fully-accredited ordinary graduates	21.4(p=0.0003)	3.5(p=0.0598)	5.1(p=0.1659)

There is little doubt that, when compared to pre-sift strategies known to operate within the profession, the estimated models do appear to perform better. Hence it would appear that the developed models are more able to recognise those trainees who are likely to pass their ICAS examinations at the first attempt. Whilst it is accepted that some firms, particularly the 'Big Six' organisations, will have a more sophisticated method of pre-selecting students from their application forms than simply basing their decision on, *per se*, the number of UCAS points, this analysis does provide evidence that there could be value in the adoption of the models for the training organisations. On the theme of the 'Big Six' firms, many of whom employ occupational psychology professionals within their HRM function and pour resources into recruitment and selection, concern is raised that much of the work is undertaken in an English context which may not replicate or hold value when applied in the Scottish context when the differences in the education process, both at secondary school and higher education, are considered[4]. For example, Jackie Wynn, Graduate Recruitment Manager with KPMG, verbally reported results of a longitudinal study undertaken within the London office of KPMG on 1,000 trainees who have commenced their training contracts in 1994 onwards. The results of her analysis has produced a list of screening criteria for application forms, which indicate for example that the Mathematics grade at GCSE is the best indicator of ICAEW examination success. This screening criteria has been disseminated nationally. However, when the recruitment partner of the KPMG Glasgow office, John Clarke, was questioned on the use of this screening device developed within an English context, it became apparent that local amendments were made to it based on anecdotal evidence collated within each Scottish office. When a similar set of circumstances were echoed by a Scottish Price Waterhouse partner, it would appear that the models developed within this thesis could have value to all training organisations that recruit trainees who have been educated within a Scottish environment.

The recommendation of this thesis is that firms should evaluate the success rate of the models in terms of their own practices. Reporting the statistics from the hold-out group, the fully-accredited honours graduate model correctly identified, using the optimal cut-off point of 0.685, 73% of students who passed first time and 58% of the students who experienced failure[5]. The Type II error of predicting that a student will pass and hence selecting the student who then actually failed some of their ICAS examinations was 42% and this should be considered in light of the costs to the firm.

[4] As discussed in Chapter 1.
[5] See Table 7.4.

This includes not only the actual monetary cost of resit fees etc. but the opportunity costs of the student being absent from revenue generating activities and the non-quantifiable costs of staff re-scheduling, office/client routine and morale. These costs are exacerbated when a trainee fails on more than one occasion.

As firms may only interview around 10% of the applications received (Gammie, 1995), it is anticipated that firms using the estimated models will pre-select a certain number of candidates for the next stage in the selection process based on their calculated probabilities. However, it must be borne in mind that, as the analysis reported here was based on trainees who had actually secured a training contract and had indeed completed the ICAS educational process, many of the applications received and rejected from prospective trainees may never have secured a contract. Purely for illustrative purposes, therefore, if the top 50% of the students included in the hold-out sample were pre-selected on the grounds of their model probabilities, (and in this fully-accredited honours degree sample they would all have probabilities of at least 70% (38 out of 74)), then the Type II error has reduced slightly to 40%[6]. However, it should be borne in mind that this only includes 3 trainees who experienced more than one resit[7]. Therefore based on the calculated probabilities from the model, only 8% (3 out of 38) were really poor investment decisions in terms of their failure to pass their ICAS examinations. By only considering trainees at the top end of the probability scale, the Type II errors will be reduced and this will lower the monetary costs associated with these failure students. This reduction in the Type

[6] Out of the 33 students who actually failed, 60% (20 out of 33) achieved a probability of less than 70% - see Table 7.7.
[7] See Table 7.7.

II error is made however at the expense of an increase in the Type I error, which arises when the model predicts that a student will fail when in fact they actually pass. Although this type of error would not incur any actual costs, in terms of failure for the firm, it should be recognised as a recruitment opportunity cost in that good quality students have been lost to the organisation. The Type I error from the model based on the optimum cut-off point of 0.685 was reported as 27% and this increases to 40%[8] when only the top 50% of students are considered (those with probabilities of at least 70%).

A similar pattern is found with the fully-accredited ordinary model. Once again reporting the statistics from the hold-out group using the cut-off point of 0.5, the fully-accredited ordinary model correctly identified 79% of students who passed first time and 45% of students who experienced at least one resit. There is therefore a low Type I error of 21% with a correspondingly higher Type II error of 55%. If firms were only to pre-select students, *per se* the top 30% of ordinary students or in other words those with probabilities of at least 60%, then although the Type I error would increase to 65%[9] the Type II error would reduce to 24%[10]. It is also worth noting that although 41% (12 out of 29) would experience failure, only 7% (2 out of 29) would experience more than one failure and could hence be classified as a weak selection decision.

[8] Out of the 41 students who actually passed, 60% (25 out of 41) achieved a probability of at least 70% - see Table 7.7.
[9] Out of the 48 students who actually passed, only 35% (17 out of 48) had probabilities of at least 60% - see Table 7.18.
[10] Out of the 49 students who actually failed, 76% (37 out of 49) had probabilities of less than 60% - see Table 7.18.

It is important now to identify the implications for the training providers therefore of using these estimated models and selecting students based on their calculated probabilities. Individual firms should consider the ability of these estimated models to correctly classify trainees from another data set in terms of their own ability to successfully select those students who pass first time. They should also consider the incidence of selecting students who fail and in particular those students who experience more than one failure. In addition, if firms are going to select the top *x%* of candidates based on their calculated probabilities, they should be aware of the effect of doing so. By moving the cut-off for selection in an upwards direction from the optimal cut-off points as discussed in Chapter 7, the monetary costs associated with recruiting students who actually fail some of their examinations will be reduced, as the incidence of including students within the selected pool who fail will be reduced. This however has to be weighed up individually by each firm in terms of the lost opportunity in rejecting students who were below the requisite probability but who, in fact, successfully pass their ICAS examinations.

9.4.3. Criticisms of the technique

Before a recommendation is made to training providers to use these models in their selection process, it is worth reflecting on the criticisms of the technique as identified in Chapter 3. Each of these criticisms will be dealt with in turn.

9.4.3.1. The atheoretical approach to biodata

Chapter 6 attempted to develop a framework whereby general hypotheses were set up and discretion was used in the inclusion of the background variables which were entered into the model using the multivariate statistical technique of logistic regression. This hybrid approach, identified as a *'rainforest empiricism'* by Mael (1991), resulted in a more conservative derivation key. This was evidenced by the lower model χ^2 in the Phase II Study for the rational models, when compared to either the empirically derived models in the Phase II Study using the same data set or the Harvey-Cook (1995) study. Both of these utilised a different methodology by simply restricting the entered variables to background items commonly found on an application form before using a forward stepwise approach to narrow the number of variables in the final developed model. It is suggested, however, that the rational approach adopted in the Phase II Study, using the Mael (1991) methodology, resulted in a more meaningful derivation key as a rational argument was made at the outset for entering each of the variables into the model in the first instance. Consequently, according to Stokes and Reddy (1992), these more rational models should continue to hold validity when applied to a different data set. Indeed, this was evidenced by the tetrachoric correlation coefficients obtained for the hold-out group which, although demonstrated some shrinkage in the honours fully-accredited group, still resulted in co-efficients which compare favourably with other types of selection. The empirically derived Phase II models on the other hand experienced substantial shrinkage, resulting in disappointing tetrachric correlations for the hold-out group.

This thesis therefore supports the literature which suggested that, whilst a more rationally driven approach to the model development leads to a more conservative model in explanatory terms for the developmental sample (Mumford and Owens, 1987), the models appear to retain their validity and experience less shrinkage than those models developed using a more empirical approach (Stokes and Reddy, 1992). It would therefore appear that any increase in explanatory power from the use of an empirical approach in deference to the utilisation of a more rational approach is insufficient to compensate for the additional shrinkage experienced by the use of such an approach.

9.4.3.2. The lack of generalisability

Studies which were concerned with the lack of generalisability were discussed in Chapter 2. Although it was suggested that biodata is specific to the criterion used in their development (Drakeley et al, 1988), this should not cause concern to the training providers as the biodata models in this study have been developed on a specific criteria, namely the ability to pass the ICAS examinations at the first attempt. Of more concern is the evidence provided by Hunter and Hunter (1994) that biodata neither travels well from one job to another nor from one organisation to another. More recent work, Rothstein et al (1990) and Wilkinson (1993), suggests, however, that it is possible to develop a biodata key that is transportable from one organisation to another. Indeed, Harvey-Cook (1995) illustrated that a biodata model developed on a representative sample from medium sized chartered accountancy offices who employ ICAEW trainees may be applied to the whole population of medium sized accounting firms. However, no evidence was provided as to whether the model would be applicable to the smaller and larger firms. This thesis seeks to develop the Harvey-Cook (1995) work in that the estimated models were drawn from the data elicited from the whole population of ICAS training providers. The biodata keys are therefore transportable across the full range of training organisations who employ ICAS trainees. The results reported here therefore provide further evidence that it is possible to develop a biodata key which is not organisationally specific and hence support the work of Rothstein et al (1990). This is of particular benefit to the Scottish training providers who employ far smaller numbers of students in each office in comparison to their English counterparts which will preclude the Scottish offices undertaking their own development work as they would have insufficient numbers on which to base their analysis. This, however, raises another issue. Whilst the Harvey-Cook (1995) work was also concerned with a similar criterion, namely, the ability to pass the ICAEW examinations at the first attempt, the evidence provided by the inability of the non-relevant honours model to differentiate between those trainees who passed their ICAS examinations at the first attempt with those who experienced failure suggests that models developed in an English context would not transport to the Scottish environment. Whilst the Harvey-Cook model was not applied to the data sets in this thesis, the lack of significance in this study of the variables contained within the Harvey-Cook model suggest that models developed within an English setting may not be relevant in the ICAS context. This should cause concern for those firms that have undertaken their own selection criteria work which has been developed in an English context and is being disseminated nationally. The results of this work indicate that the vagaries of the Scottish educational system could invalidate accountancy trainee selection models developed in England where specific types of educational performance are important .

9.4.3.3. Stability over time

Chapter 3 raised the potential problem of instability in relation to a biodata key developed in one time frame, which is used for prediction purposes some time in the future. It was highlighted that biodata keys, especially those derived from an empirical procedure, need periodic updating. Although it was recognised that where objective background factors, such as the number of UCAS points achieved in 5th year, were used to predict a time-specific criterion such as passing the ICAS examinations at the first attempt (Harvey-Cook, 1995), the resultant models should not lose predictive validity over time. However any changes in the criterion, such as that experienced by Harvey-Cook (1995) in her validation work whereby a significant change in the ICAEW examination syllabus took place, may affect the ability of the model to perform in the future. This is also case where there is an instability in the reference group, as evidenced in the Phase I Study whereby ICAS changed the training procedure for non-relevant students. This change appears to have resulted in a different recruitment pattern by the training providers who have started employing higher percentages of non-relevant students. There has also been a noticeable increase in the examination performance of these particular students in the ICAS examination process.

The question that needs to be addressed therefore is whether the models developed on trainees who qualified in the years 1993 and 1994 and validated on trainees who qualified in 1995 will still be applicable in subsequent years. As the criterion measure for the ICAS examination success models is purely a performance measure based on an academic achievement, namely, the ability to pass the ICAS examinations at the first attempt, there should be no instability in the criterion measure. Likewise as the background data items included in the models are all hard biodata items and are in the main concerned with some form of previous standardised academic achievement such as the honours classification, there is little concern that the background data items will lose their predictive ability over time. The conclusion of this work therefore supports the conclusion of the Harvey-Cook (1995) who stated that

> *"Little change in the efficacy of Model 1*[11] *is expected over time"*
>
> (page 208).

It is worth mentioning however the changes that have taken place following the recent ICAS education review whereby the three stages of the ICAS examinations namely; the Professional level, the Test of Professional Competence I and the Test of Professional Competence II, were replaced in Academic Year 1997/98 with the Test of Competence, the Test of Professional Skills and the Test of Professional Expertise. Whilst these changes were designed to ensure that the ICAS education system

[11] The examination performance model.

focused on the development of skills, principles and judgement necessary for a qualified chartered accountant and that the core knowledge was examined during the training contract, the resulting changes to the syllabus and examinations were rather more of a repackaging of the original syllabus than a fundamental alteration. It is therefore not envisaged that these changes will have any particular impact on the models. However, further work would be required to confirm this view in terms of applying the models to trainees who qualify under this new system. Likewise, if any of the more fundamental changes as advocated by Hunter, 1998[12] were implemented by ICAS, then it would be necessary to re-evaluate the models in light of the changes.

9.4.3.4. Fakeability and accuracy

Notwithstanding the fact that there is no compelling evidence, as discussed in Chapter 3, to suggest that biodata forms are faked in practice, as the background data items in this study are all 'hard' biodata items and are hence verifiable, it is not anticipated that there would be a fakeability or accuracy problem. In addition, the data would all be collected from an appropriately designed application form, which is in effect the same type of document that is currently used by the training providers in their pre-selection process. Consequently, if firms are currently not concerned with applicants faking their application forms, then the situation should not necessarily change if the relevant biodata information required for the biodata key was extracted from these forms. In light of the suggestions made in Chapter 3, firms should, however, consider

[12] The proposals included the possibility of non-graduate entry with a training period of six years, an alternative four year training programme for graduates largely undertaken by distance learning, a three year graduate programme along similar lines to that currently in existence, and a scheme for two distinctive routes of training, one within and the other outwith public practice.

incorporating a comment on the application form that response verification will take place. Furthermore, it may be worth indicating that transcripts of university performance and school performance will be required to be produced at the first interview stage. This should eliminate the possibility of faking those factors which are concerned with previous academic performance. There does, however, remain a possibility that if the biodata key was to be exposed in the public domain, then students may fake their answers to the lesser verifiable variables such as the number of jobs related to chartered accountancy undertaken whilst at school or university. However, this could be overcome in the design of the application forms if firms were to request, for example, the names of the organisations where the employment was undertaken together with a contact name. This would demonstrate to the applicant the transparency of any verification and hence this threat may be enough to preclude any faking.

9.4.3.5. Fairness and legality

Chapter 3 highlighted the importance of ensuring that any model did not discriminate on the grounds of either race or sex and this was extended in Chapter 6 to ensure that any biodata item used in any developed model would not be deemed to be intrusive. For example, items that were a reflection of social class were not included, irrespective of any explanatory power that they may contain. Chapter 7 examined the impact that the models had on gender and it was concluded that there was no apparent sex bias in either model when applied to the relevant holdout samples. This was also the case for the fully-accredited honours graduate developmental sample, although the results were borderline (using a rather more stringent USA gender test than that applied in the UK) for the fully-accredited ordinary graduate sample. Whilst there would not appear to be a gender issue, it was recommended, however, that it would be prudent to continually monitor the impact of the models on gender in the future. No analysis was undertaken on race issues as there were insufficient numbers on which to draw any meaningful conclusion.

When compared to the apparent unsystematic current practices adopted by the training providers, where it is suspected that little verification is made as to the impact on gender and unacceptable discriminators, it is suggested that the more rationally derived biodata models would appear to be both fair and comply with the legislation.

9.4.4. Limitations of the study

Before this section on the implications for the practical utility of the model is completed, it is worth reflecting on the limitations of the study as identified in Chapter 4. The problem of restriction of range has already been alluded to earlier in this chapter when the range of UCAS points was considered. However, it must be stressed once more that the model was developed on a sample of trainees who had already been selected by a firm to undertake CA training and who had in fact actually qualified. Consideration has not been given to any trainees who started but then subsequently failed to complete their training contract. It could be argued that these students are the real recruitment failures and if their profiles were similar to the profiles of the students who passed their ICAS examinations at the first attempt, then the validity of the models would be in question. Whilst it was not feasible to undertake a large study of these 'drop-outs' due to the lack of relevant data, a small scale exercise was undertaken in an effort to provide some assurance that the complete failures would have also been identified by the model. The Student Education Department of ICAS were requested at the beginning of 1998 to undertake a data retrieval exercise in order to identify those students who had dropped out the system since 1994. This resulted in the identification of 64 students who had dropped out of the system during the period 1995 to 1998. The Phase II questionnaires were sent out to this population with an appropriately worded covering letter, but a poor response was expected and indeed achieved! Only 9 questionnaires were returned completed (a response rate of only 14%). An additional 11 questionnaires were returned marked 'gone away' and no response was received from the remaining 44 ex trainees. Whilst it is difficult and perhaps dangerous to draw any conclusion from such a small number, the 9 completed questionnaires revealed some interesting data. Only two students were in fact fully-accredited graduates and, of these, only one was an examination failure. In other words, the candidate was time barred from the ICAS examination process as a result of the number of resits undertaken. This 'failure' had undertaken a fully-accredited honours degree and had a calculated probability from the relevant model of passing their ICAS examinations at the first attempt of only 31%[13]. The other fully-accredited student had simply dropped out of their training. As this trainee had undertaken an ordinary degree it was decided to calculate the probability of this student passing their ICAS examinations at the first attempt to see whether they would have progressed in the pre-selection process. The calculated

[13] This candidate had a lower second honours degree, had undertaken no jobs related to chartered

probability was however only 16%[14]. Both these candidates would have therefore been rejected from the pre-selection process based on their calculated probabilities. Whilst it is recognised that this is very limited evidence, the results do appear to support the validity of the model. The remaining 7 completed questionnaires were completed by non-relevant trainees and six had dropped out of the system because a career in chartered accountancy did not match their expectations and one was an exam failure. Therefore it was not possible to undertake any further analysis of these students as a valid non-relevant graduate model had not been developed. However, the large numbers of non-relevant students in comparison to their fully-accredited counterparts raises a further research issue which should be considered and will be discussed later.

9.4.5. Conclusion on the practical utility of the models

To conclude this section on the implications for the practical utility of the models, it would appear that the type of training environment is not influencial in the determination of ICAS examination success. The improved examination performance of multinational trainees would appear to be due to their personal background factors at the time of their application to the training firm, which are identified within the relevant models, as opposed to any differences in work experience encountered during the training contract. The evidence presented throughout this thesis also

accountancy whilst at school or university, had progressed directly from university to CA training, had no resits at university and had 10 UCAS points.

[14] This candidate had incurred one resit at university, had no jobs which related to chartered accountancy whilst at school and university, had no A passes or Grade 1 passes at O level or Standard Grade, and had 4 UCAS points.

suggests that the models compare favourably with other types of selection processes reported in other general studies and certainly provide additional explanatory power to those pre-selection criteria known to exist within the Scottish chartered accountancy profession. Evidence has also been presented which suggests that any criticisms of the technique and limitations of the study do not invalidate the results. Hence, the final conclusion of this thesis is that developed models for the fully-accredited honours and ordinary graduates could be used in practice by the training providers in their quest to select the most appropriate candidates for CA training. By calculating the probability of an applicant passing the ICAS examinations at the first attempt, firms will be able to narrow down their field of applications to a level suitable for interview by selecting the relevant number of candidates with the highest probabilities of success. This method of sifting through the large quantities of application forms should be cost effective as it would be an objective task extracting the salient information from the application form and entering the data into the model. It should also be reliable because it is based on statistically significant evidence as opposed to anecdotal evidence so often used in practice. By providing the training providers with a screening technique which is systematic and reliable, the validity of the interview for the prediction of subsequent performance will not be so critical. This could reduce the importance of the assessment of likely competence from the interview and provide the interviewer with the task of conducting a cultural and social process. In other words, the interview is used to identify those candidates who match their organisational ethos.

The overall aim of the thesis, namely, to critically evaluate whether biodata is a valid tool in the pre-selection process of trainee chartered accountants undertaking their training within an ICAS training environment, has therefore been achieved. However, the models will only be appropriate for the fully-accredited portion of the applicant population and little progress has been made in relation to those applicants who have applied from a non-relevant background.

9.5 Suggestions for further research

Throughout this thesis, several areas that require further research attention have come to light and suggestions will now be made as to the additional work that should be undertaken.

9.5.1. Prediction of honours classifications

In light of the importance of the honours classification to the fully-accredited honours graduate model, further work is necessary to determine whether Universities in general can predict the final honours degree classification at the time of the milk round which takes place usually in October or November. The small scale study conducted at the Robert Gordon University suggested that it was possible for the course team to accurately predict honours classifications during the early part of a final honours year based on early university performance. However additional work is necessary, both at the Robert Gordon University and also within other institutions, to ensure that this is indeed the case. This work would not simply be of value to the training providers but would also be beneficial to the students who are contemplating whether to undertake an honours year or whether to simply exit with an ordinary degree. In light of student funding difficulties and the payments of fees the student would be able to evaluate in an informed manner the most appropriate choice for them if it were possible for a student to calculate their likely probability of achieving a particular degree class.

9.5.2. Specific marks in relevant subjects

In light of the importance of second and third year resits in fully-accredited degrees and the importance of university performance in general to the determination of ICAS examination success, further information on specific marks obtained within general subject areas whilst at university may be relevant and provide additional explanatory power. Whilst this information was not requested for this study, and indeed may be difficult to obtain as students may not necessarily remember their individual subject marks, additional modelling work should be conducted in this area. Indeed, this is an area that ICAS wish to consider in their evaluation of the accreditation process in an attempt to identify why some fully-accredited graduates appear to perform less well in the ICAS examinations when compared to their non-relevant counter-parts.

9.5.3. Non-relevant students

Further work is required for non-relevant students in an attempt to develop a model which will differentiate between those students who pass their ICAS examinations at the first attempt and those who experience failure. This would obviously be of benefit to the training providers who appear to be recruiting more of these non-relevant graduates. This should also be causing concern to the Universities which are operating fully-accredited degrees because, if training providers continue to move away from the traditional recruiting grounds for their chartered accountancy trainees, this may have an impact on school leavers choosing these fully-accredited courses in the first instance. Additional work is therefore required to determine why non-relevant students appear to perform better in the ICAS education process.

In addition, in light of the numbers of non-relevant students who dropped out of the system because chartered accountancy did not match their expectations it would be worthwhile for an analysis to be undertaken for all ICAS registered trainees who drop out of the system, akin to an exit interview.

9.5.4. Monitoring of the education changes

In light of the changes to the ICAS education system following the recent syllabus review, it will be necessary to ensure that the models retain their validity when applied to trainees who progress through the new system of education. Likewise if any of the more major changes proposed by Hunter (1998) were to be adopted by ICAS, then it would be necessary to undertake a fundamental review of the developed models.

9.5.5. Monitoring of the models in general

Although there was no apparent sex bias in the models it will be necessary to ensure that this continues to be the case. Gender issues should therefore be monitored along with the periodic reviews, say every 5 years, in the absence of any major changes which may affect the criterion, the explanatory variables or the reference group.

9.6 Conclusion

This thesis will close by considering the independent and original contribution to knowledge that has been made in the field of the pre-selection of chartered accountancy trainees who undertake their training with the Institute of Chartered Accountants of Scotland with particular reference to biodata.

1. The thesis has identified that biodata can be used to differentiate between those trainees who pass their ICAS examinations at the first attempt and those who experience failure, and has rationally identified the salient background factors which could be used in the identification of those who will succeed. The work has therefore provided training principals with a useful tool that could be employed in their pre-selection process.

2. This work provides an additional validity study for the technique of biodata, in a context in which it has not previously been applied, namely, the Scottish chartered accountancy profession.

3. The work also provides evidence that, while a more rationally driven approach to the model development leads to a more conservative model in explanatory terms for the development sample, the models do appear to retain their validity and experience less shrinkage than those models derived by means of a more empirical approach.

4. Finally, this work demonstrates that it is possible to develop biodata models that are transportable across the full range of ICAS training organisations irrespective of size. This provides further evidence that biodata can be generalisable from organisation to another. This is of particular relevance for organisations which do not recruit sufficient numbers on which to undertake their own development.

BIBLIOGRAPHY

Abrahamsen, M., (1990), *A comparison between the selection methods used in the UK and the methods used in Norway*, unpublished BSc dissertation, School of Management, UMIST, Manchester.

Agrawal, S.P. and Siegel, P.H., (1989), Significance of CIA certification, *Managerial Auditing Journal,* 4, 3.

Ahadiat, N. and Smith, K.J., (1994), A factor-analytic investigation of employee selection factors of significance to recruiters of entry-level accountants, *Issues in Accounting Education*, 9, 1, 59-79.

Ainsworth, P., Ott, R. and Donnelly, D., (1990), CPA firms recruiting of accounting students: A Faculty perspective, *CPA The Journal,* September, 82-85.

Allison, I.E., (1992), *Biodata as a predictor of occupational discontinuity,* unpublished doctoral dissertation, University of Georgia, Athens U.S.A.

Anastasi, A., Meade, M.J. & Schneiders, A.A., (1960), The validation of a biographical inventory as a predictor of college success, *Educational Testing Service,* 5,81 pp.

Anderson, N., (1992), Eight decades of interview research; A retrospective metareview and prospective commentary, *The European Work and Organisational Psychologist,* 2, 1-32.

Anderson, N., (1997), The validity and adverse impact of selection interviews, *Selection and Development Review,* 13, 5, 13-17.

Anderson, N. and Shackleton, V., (1986), Recruitment and Selection: A review of developments in the 80's, *Personnel Research,* 15, 4, 19-26.

Anderson, N. and Shackleton, V., (1994), Informed Choices, *Personnel Today,* November, 33 -34.

Aranya, N., Meir, E.I. and Bar-Ilan, A., (1978), An empirical examination of the stereotype accountant based on Holland's theory, *Journal of Occupational Psychology,* 51, 139-145.

Aranya, N. and Wheeler, J.T., (1986), Accountants' personality types and their commitment to organization and profession, *Contemporary Accountung Research*, 3, 1, 184-199.

Arvey, R.D. and Campion, J.E., (1982), The employment interview: A summary and review of recent research, *Personnel Psychology*, 35, 281-322.

Asher, E.J. & Gray, F.E., (1940), Relation of personal history data to college success. *Journal of Educational Psychology,* 31, 517-526.

Asher, J.J., (1972), The biographical item: can it be improved?, *Personnel Psychology,* 25, 251-69.

Baehr, M.E., Jones, J.W., Baydoun, R.B. and Behrens, G.M., (1994), Proactively balancing the validity and legal compliance of personal background measures in personnel management, *Journal of Business Psychology,* 8, 3, 345-354.

Baehr, M.E. and Williams, G.B., (1967), Underlying dimensions of personal background data and their relationships to occupational classification, *Journal of Applied Psychology*, 51, 481-90.

Baehr, M. E. and Williams, G. B., (1968), Prediction of sales success from factorially determined dimensions of personal background data, *Journal of Applied Psychology*, 52, 98-103.

Barge, B.N. and Hough, L.M., (1986), Utility of biographical data for predicting job performance, in Hough, L.M., (ed), *Utility of temperament, biodata, and interest assessment for predicting job perfomance; A review of the literature,* Alexandria, VA, U.S. Army Research Institute.

Barkman, A.I., Sheridan, J. E. and Peters, L.J., (1992), Survival models of professional staff retention in public accounting firms, *Journal of Managerial Issues,* 4, 3, 339-353.

Bayes, P.E. and Nash, J.F., (1989), *Gender differences in intermediate accounting and accounting and information systems*, presented at the 1989 Mid-Atlantic Regional Meeting of the American Accounting Association.

Becker, T. and Colquitt, A., (1992), Potential versus actual faking of a biodata form: An analysis along several dimensions of item type, *Personnel Psychology*, 45, 389-406.

Beets, S.D., Martin, D.R. and Tower, R.B., (1990), Improving the recruiting process, *Journal of Accountancy,* February, 113-114.

Bell, (1995), *Price Waterhouse vacancy information,* Price Waterhouse university pack.

Benveniste, I., Sherer, M. and Waring, R., (1986), *An evaluation of front end loaded education for ICAEW students,* University of Essex.

Bethel-Fox, C.E., Cureton, R.N. and Taylor, J.A., (1988), *The effectiveness of biodata in pre-selection for the Appointments-in-Administration Competition*, Civil Service Selection Board Report No 37.

Bevan, S., and Fryatt, J., (1988), *Employee selection in the UK*, IMS Report No 160.

Bliesener, T., (1992), Ist die validitat biographischer datum ein methodisches artefakt? *Zeitschrift fur Arbeits-u, Organisationspsychologie*, 1-10.

Bliesener, T., (1996), Methodological moderators in validating biographical data in personnel selection, *Journal of Occupational Psychology*, 69, 107-120.

Breaugh, J.A. and Dossett, D.L., (1989), Rethinking the use of personal history information: The value of theory-based biodata for predicting turnover, *Journal of Business and Psychology*, 3, 371-385.

Brown, S.H., (1978), Long-term validity of personal history item scoring procedure, *Journal of Applied Psychology*, 63, 673-6.

Buel, S.H., (1964), Voluntary female clerical turnover: The concurrent and predictive validity of a weighted application blank, *Journal of Applied Psychology*, 48, 180-2.

Buehlmann, D. M., (1975), ISU's use of the AICPA's college testing program, *Journal of Accountancy*, May, 93-96.

Cameron, E., (1991), *The recruitment of chartered accountancy trainees in Scotland*, unpublished honours thesis, Aberdeen University

Campbell, J.P., (1974), *A Monte Carlo approach to some problems inherent in multivariate prediction: With special reference to multiple regression*, Tech Rep No 2002, Arlington, VA, Office of Naval Research, Personnel and Training Research Programmes.

Campion, M.A., (1978), Identification of variables most influential in determining interviewers evaluations of applicants in a college placement centre, *Psychological Reports*, 42, 947-952.

Cascio, W.F., (1975), Accuracy of verifiable biographical information blank responses, *Journal of Applied Psychology*, 60, 767-769.

Carroll, S.J., (1966), Relationship of various college graduate characteristics to recruiting decisions, *Journal of Applied Psychology*, 50, 5, 421-423.

Chatman, A., (1991), Matching people and organisations: selection and socialisation in public accounting firms, *Administrative Science Quarterly*, 36, 459-484.

Chesney, M. and Rosenman, R., (1980), Type A behaviour in the work setting, in Copper, C. and Payne, R., (eds), *Current Concerns in Occupational Stress*. Chichester, J. Wiley and Sons, 187 - 212.

Chisnall, P., (1992), *Marketing Research*, London, McGraw-Hill.

Clark, R.L., and Sweeney, R.B., (1985), Admission to accounting programs: Using a discriminant model as a classification procedure, *The Accounting Review*, 60, 3, 508-518.

Cohen, J. and Lefkowitz, J., (1974), Development of a biographical inventory blank to predict faking on personality tests, *Journal of Applied Psychology*, 59, 404-405.

Connor, H., Strebler, M. and Hirsh, W., (1990), *You and your graduates: The first few years*, IMS Report No 191.

Conway, J.M., Jako, R.A. and Goodman, D.F., (1995), A meta-analysis of interrater and internal consistency reliability of employment interviews, *Journal of Applied Psychology*, 80, 565-579.

Coopers and Lybrand, (1996), *Coopers and Lybrand and you*, Coopers and Lybrand recruitment brochure.

Crosby, M.M., (1990), *Social desirability and biodata: Predicting sales success*, paper presented at the annual meeting of the Society for Industrial and Organisational Psychology, Miami Beach, FL.

Davis, K.R., (1984), A longitudinal analysis of biographical subgroups using Owens' developmental integrative model, *Personnel Psychology*, 37, 1-14.

Dean, R.A., Ferris, K.R. and Konstans, C., (1988), Occupational reality shock and organizational commitment: Evidence from the accounting profession, *Acounting, Organizations and Society*, 13, 3, 235-250.

Delaney, P.R., Keys, D. E., Norton, C. L. and Simon, J. R., (1979), An admission test for intermediate accounting, *The Accounting Review*, January, 155-162.

Dickinson, C., (1955), What employers look for in the college graduate, *Personnel and Guidance Journal*, 33, 460-464.

Dinius, S. H. and Rogow, R. B., (1988), Application of the Delphi method in identifying characteristics Big Eight firms seek in entry-level accountants, *Journal of Accounting Education*, 6, 83-101.

Dockweiler, R.C. and Willis C.G., (1984), On the use of entry requirements for undergraduate accounting programmes, *The Accounting Review*, 59, 3, 496 - 504.

Doll, R.E., (1971), Item susceptibility to attempted faking as related to item characteristic and adopted fake set, *Journal of Psychology*, 77, 9-16.

Doran, M. B., Bouillon, M. L. and Smith, C. G., (1991), Determinants of student performance in accounting principles I and II, *Issues in Accounting Education*, 6, 1, 74-84.

Drakeley, R. J., (1988), *Achievement, background and commitment: Classifications of biographical data in personnel selection,* unpublished doctoral dissertation, University of London.

Drakeley, R.J., (1989), Biographical Data Chapter 3.10, in Herriot, P. (ed), *Assessment and Selection in Organisations,* Chichester, J. Wiley and Sons.

Drakeley, R.J., Herriot, P. and Jones, A., (1988), Biographical data, training success and turnover, *Journal of Occupational Psychology,* 61, 145-152.

Dunnette, M.D., (1962), Personnel Management, *Annual Review of Psychology*, 13, 285-313.

Eberhardt, B.J. and Muchinsky, P.M., (1982a), An empirical investigation of the factor stability of Owens' biographical questionnaire, *Journal of Applied Psychology*, 67, 138-145.

Eberhardt, B.J. and Muchinsky, P.M., (1982b), Biodata determinants of vocational typology: an integration of two paradigms, *Journal of Applied Psychology*, 67, 714-27.

Eberhardt, B.J. and Muchinsky, P.M., (1984), Structural validation of Holland's hexagonal model: vocational classification through the use of biodata, *Journal of Applied Psychology,* 69, 174-81.

Efron, B., (1975), The efficiency of logistic regression compared to normal discriminant analysis, *Journal of the American Statistical Association*, 70, 892-898.

Emory, W.C., (1980), *Business Research Methods,* Illinois, Irwin Inc.

England, G.W., (1971), *Development and use of weighted application blanks,* Industrial Relations Centre, University of Minnesota.

Equal Opportunities Commission, *Fair and Efficient Selection,* Manchester, Equal Opportunities Commision.

Equal Opportunities Commission, *Avoiding Sex Bias in Selection Testing,* Manchester, Equal Opportunities Commision.

Ernst and Young, (1996), *Career opportunities for graduates: Picture your future,* Ernst and Young recruitment brochure.

Eskew, R.K. and Faley, R.H., (1988), Some determinants of performance in the first college level Financial Accounting course, *The Accounting Review,* 63, 1, 137-147.

Ferguson, E. amd Hatherly, D., (1991), The work environment in the accountancy firm: A comparison of student expectations and trainee perceptions, *British Accounting Review*, 23, 123-132.

Ferguson, L.W., (1961), The development of industrial psychology, in Gilmer, B., (ed), *Industrial Psychology,* New York, McGraw-Hill, 18-37.

Ferguson, L.W., (1962), *The heritage of industrial psychology,* Hartford, CT, author.

Ferris, K., (1982), Educational predictors of professional pay and performance, *Accounting, Organisations and Socieyt,*7, 3, 225-230.

Fraser, A., Lytle, R. and Stolle, C., (1978), Profile of female accounting majors: academic performance and behavioural characteristics, *The Woman CPA,* Oct, 19-21.

Furnham, A., (1997), *The psychology of behaviour at work: The individual in the organization*, Hove, Sussex, Psychology Press.

Gable, M., Hollon, C. and Dangello, F., (1989), The relationship of application form information and performance to managerial trainee turnover, *International Journal of Management,*

Galton, F., (1902), *Life History Album,* New York, Macmillan.

Gammie, E., (1996), Accountancy graduate selection procedures - a critical analysis, *Career Developement International,* 1, 2, 31-38.

Gammie, E, Allison, C.M., and MacDonagh, J., (1995), *Education Review 1994-95,* Internal ICAS Report.

Gammie, E. and Gammie, B., (1995), Women chartered accountants - progressing in the right direction?, *Women in Management Review,* 10, 1, 5-13.

Ghiselli, E.E., (1966), *The Validity of Occupational Aptitude Tests,* New York, J. Wiley and Sons.

Ghiselli, E.E., (1973), The validity of aptitude tests in personnel selection, *Personnel Psychology,* 55, 491-2.

Glass, G.V., (1976), Primary, secondary, and meta-analysis of research, *Educational Researcher*, 5, 3-8.

Goldsmith, D.B., (1922), The use of personal history blanks as a salesemanship test, *Journal of Applied Psychology,* 6, 149-55.

Goldstein, I.L., (1971), The application blank: How honest are the responses?, *Journal of Applied Psychology*, 55, 491-492.

Gratton, L., (1989), Work of the Manager, Chapter 4.2 in Herriot, P., (ed), *Assessment and Selection in Organisations,* Chichester, J. Wiley and Sons.

Guilford, J.P. and Fruchter, B., 1978, *Fundamental Statistics in Psychology and Education,* New York, McGraw-Hill.

Guilford, J.P. and Lacey, J.I., (1947), Printed classification tests, *AAF Aviation Psychology Research Program Reports,* Washington DC, US Government Printing Office.

Guion, R.M., (1965), *Personnel Testing,* New York, McGraw-Hill.

Guion, R.M. (1992), Personnel assessment, selection and placement, in Dunnette, M. and Hough, L.M., (eds), *Handbook of Industrial and Organizational Psychology*, Vol 2, California, CPP.

Gul and Fong, (1993), Predicting success for introductory accounting students: some further Hong Kong evidence, *Accounting Education,* 2, 1, 33-42.

Gunst, R.F. and Mason, R.L., (1980), *Regression analysis and its application,* New York, Marcel Dekker.

Gunter, B., Furnham, A. and Drakeley, R., (1993), *Biodata : Biographical indicators of business performance,* London, Routledge.

Guthrie, E, (1944), Personality in terms of associated learning, in J Hunt (ed), *Personality and Behaviour Disorders,* Vol. 1, New York, Ronald Press, 49-68.

Habbe, S., (1948), Employment of the college graduate, *Studies in Personnel Policy* (No89), New York, National Industrial Conference Board.

Habbe, S. (1956), Employment of the college graduate, *Studies in Personnel Policy* (No 152), New York, National Industrial Conference Board.

Hanks, G. and Shivaswamy, M., (1995), Academic performance in accounting: is there a gender gap?, *Journal of Business Education,* Jan, 154-156.

Harvey, M., (1991), Looking Ahead, *Certified Accountant,* Nov.

Harvey-Cook, J., (1995), *Graduate recruitment at professional entry level: clinical judgements and empirically derived methods of selection*, unpublished doctoral thesis, City University.

Harvey-Cook, J.E. and Taffler, R.J., (1987), Towards a recruitment revolution, *Accountancy*, February, 40-41.

Harvey-Cook, J.E. and Taffler, R.J., (1987), Graduate recruitment procedures in the UK accountancy profession: A preliminary study, *Accounting and Business Research*. Spring, 99-108.

Hassell, J. M. and Hennessey Jr., H. W., (1989), An examination of factors important in the CPA recruiting process, *Journal of Accounting Education*, 7, 217-231.

Hawksley, F., (1994), Prospects in practice improve, *Accountancy*, June, 54.

Henry, E., (1966), Conference on the use of biographical data in psychology, *American Psychologist*, 21, 247-9.

Herriot, P., (1984), *Down from the Ivory Tower : Graduates and their Jobs*, Chichester, J. Wiley & Sons.

Herriot, P., (1987), Graduate Recruitment - getting it right, *Employment Gazette*, February, 78-83.

Herriot, P., (1989), *Recruitment in the 90's*, London, Institute of Personnel Management

Herriot, P. and Rothwell, C., (1983), Organisational choice and decision theory: Effects of employer's literature and selection interview, *Journal of Occupational Psychology*, 54, 17-31.

Hogan, J.B., (1994), Empirical keying of background data measures, in Stokes, G.S., Mumford, M.D. and Owens, W.A.(eds), *Biodata Handbook*, California, CPP, 69-108.

Hogan, J.B. and Stokes, G.S., (1989), *The influence of socially desirable responding on biographical data of applicant versus incumbent samples: Implications for predictive and concurrent research designs*, paper presented at meeting of Industrial and Organizational Psychology, Boston, MA, April.

Holland, J.L., (1973), *Making Vocational Choices: A Theory of Careers*, Englewood Cliffs, NJ, Prentice-Hall.

Holland, J.L., (1976), in Dunnette, M.D., (ed), *Handbook of Industrial and Organisational Psychology*, Chicago, Rand McNally.

Horowitz, K. and Riley, T., (1990), How do students see us? *Accountancy*, September 75-77.

Hosmer, D.W. and Lemeshow, S., (1989), *Applied Logistic Regression*, Chichester, J. Wiley and Sons.

Hough, L.M., (1989), Development of personality measures to supplement selection procedures, in Fallon, B.J., Pfister, H.P. and Brebner, J., (eds), *Advances in industrial and organisational psychology*, Amsterdam, North Holland.

Hough, L.M., Eaton, N.K., Dunnette, M.D., Kamp, J.D. and McCloy, R.A., (1990). Criterion-related validities of personality constructs and the effect of response distortion on those validities, *Journal of Applied Psychology*, 75, 581-595.

Howard, A., (1986), College experience and managerial performance, *Journal of Applied Psychology,* 71, 3, 530-552.

Huffcut, A.I. and Arthur, W.Jr, (1994), Hunter and Hunter (1984) revisited: Interview validity for entry-level jobs, *Journal of Applied Psychology,* 79, 599-616.

Hughes, J., Dunn, J., and Baxter, B., (1956), The validity of selection instruments under operating conditions, *Personnel Psychology*, 9, 321-4.

Hunter, A.S., (1998), *A new approach to ICAS Education and Training*, The Institute of Chartered Accountants of Scotland discussion document.

Hunter, J.E. and Hunter, R.F., (1984), Validity and utility of alternative predictors of job performance, *Psychological Bulletin*, 96, 72-98.

Hunter J.E., Schmidt, F.L. and Jackson, G.B., (1982), *Meta-analysis; Cumulating Research Findings Across Studies,* Beverly Hills, California, Sage.

Hunton, J.E. and Wier, B., (1996), Performance of accountants in private industry: A survival analysis, *Accounting Horizons*, 10, 3, 54-77.

ICAEW, (1990), Recruitment in the 1990's - A Seller's Market - Report of the Recruitment Trends Study Group, *Accountancy,* February, 143.

ICAEW, (1992), *Training and Student Salary Statistics, 1990/91*, London, ICAEW Education Department.

ICAEW, (1993), *Training and Student Salary Statistics, 1991/92*, London, ICAEW Education Department.

ICAEW, (1994), *Training and Student Salary Statistics, 1992/93*, London, ICAEW Education Department.

ICAEW, (1995), *Training and Student Salary Statistics, 1993/94*, London, ICAEW Education Department.

ICAEW, (1996), *Training and Student Salary Statistics, 1994/95*, London, ICAEW Education Department.

ICAEW, (1997), *Training and Student Salary Statistics, 1995/96*, London, ICAEW Education Department.

ICAS, (1997), *The Institute of Chartered Accountants of Scotland Prospectus, 1997/98,* Edinburgh, ICAS Education Department.

IRS, (1997), *The State of Selection: an IRS Survey*, Employment Review 624, Employment Development Bulletin 85.

Ivancevich, J., Matteson, M. and Preston, C., (1982), Occupational stress, Type A behaviour and physical well being, *Academy of Management Journal*, 373 - 391.

Institute for Behavioural Research in Creativity, (1968), *Manual for Alpha Biographical Inventory,* Greensboro, N.C, Predictions Press.

Johnson, W.D. and Carmichael, (1996), Student Application Form

Kakar, S., (1992), Financial Times, 6 October, 8.

Keating, E., Paterson, D.G. and Stone, C.H., (1950), Validity of work histories obtained by interview, *Journal of Applied Psychology,* 34, 6-11.

Keenan, A. and Scott, R.S., (1985), Employment success of graduates : Relationship to biographical factors and job-seeking behaviours, *Journal of Occupational Behaviour*, 6, 305-311.

Keenan, A. and Wedderburn, A.A., (1980), Putting the boot on the other foot: Candidates' descriptions of interviewers, *Journal of Occupational Psychology* ,53, 81-89.

Kelsall, R.K., Poole, A. and Kuhn, A., (1972), *Graduates: The sociology of an elite*, London, Methuen.

Kirkpatrick, J.J., (1968), *A second cross-validation of an executive weighted application blank*, proceedings of the 76th Annual Convention of the American Psychological Association, 3, 581-582.

Klein, S.P. and Owens, W.A., (1965), Faking of a scored life history blank as a function of criterion objectivity, *Journal of Applied Psychology*, 49, 452-454.

Kluger A.N. and Colella, A., (1993), Beyond the Mean Bias: The Effect of Warning against Faking on Biodata Item Variances, *Personnel Psychology,* 46, 763-780.

Kluger, A.N., Reilly, R.R. and Russell, C., (1991), Faking biodata tests: Are option-keyed instruments more resistant?, *Journal of Applied Psychology,* 76, 889-896.

Knapp, C., (1980), Examining the turnover problem, *Journal of Accountancy*, Nov. 86-88.

KPMG, (1996), *Leadership,* KPMG recruitment brochure

Krystofik, A.T. and Fein, R. (1988), Does Your Firm Use the Right Approach in Hiring Famous Recruits? *Journal of Accountancy,* November, 166, 83-88.

Krzystofik, A.T. and Fein, R., (1989), Management of an accounting practice. *The CPA Journal,* August, 54-56.

Lautenschlager, G.J., (1994), Accuracy and faking of background data, in Stokes, G.S., Mumford, M.D., and Owens, W.A. (eds), *Biodata Handbook*, California, CPP, 391-420.

Leathers, P.E., (1972), Relationship of test scores to CPA examination performance, *Journal of Accountancy,* September, 101-102.

Leathers, P.E. and Sullivan, J.A., (1978), *Uniform Statistical Information Questionnaire 1975,* AICPA.

Lewis, D.T., Shimerda, T.A. and Graham, G., (1983), What the academic advisor needs to know about job placement, *Journal of Accounting and Education*, 6, 83-101.

Llewellyn, S., (1988), A course on graduate recruitment, *Accountancy*, September, 104-106.

Long, J.A. and Sandiford, P., (1935), *The validation of test items,* (Research Bulletin No 3), Toronto, Canada, University of Toronto, Department of Education.

Lykken, D.T. and Rose, R., (1963), Psychological prediction from actuarial tables, *Journal of Clinical Psychology,* 19, 136-51.

Maddala, G.S., (1992), *Introduction to Econometrics,* New Jersey, Prentice-Hall.

Mael, F.A., (1991), A conceptual rationale for the domain of attributes of biodata items, *Personnel Psychology,* 44, 763-792.

Mael, F.A. and Ashforth, B.E., (1995), Loyal from day one: biodata, organizational identification and turnover among newcomers, *Personnel Psychology*, 48, 2, 309-330.

Mael, F.A. and Hirsch, A.C., (1993), Rainforest empricism and quasi-rationality: Two approaches to objective biodata, *Personnel Psychology*, 46, 719-738.

Makin, P. J., (1989), Selection of professional groups, Chapter 4.32, in Heriot, P., (ed), *Assessment and selection in Organisations,* Chichester, J. Wiley and Sons.

Marcus Dunn, W. and Hall, T.W., (1984), An empirical analysis of the relationships between CPA examinations candidate attributes and candidate performance, *The Accounting Review*, 59, 4, 674-689.

Marxen, D.E., (1996), The Big 6 experience: A retrospective account by Alumni. *Accounting Horizons*, 10, 2, 73-87.

May, T., (1993), *Social Research - Issues, Methods and Process,* Buckingham, Open University Press.

McCormick, R.R., and Montgomery, J.B., (1974), The use of AICPA tests in evaluating transfer students at a University, *Journal of Accountancy*, August, 82-88.

McDaniel, M.A., Whetzel, D.L., Schmidt, F.L. and Maurer, S., (1994), The validity of employment interviews: A comprehensive review and meta-analysis, *Journal of Applied Psychology,* 79, 599-616.

Mendenhall, W. and Sincich, T., (1988), *Statistics for the Engineering and Computer Sciences,* Dallen Publishing Company, San Francisco, Collier MacMillan.

Mitchell, T.W., (1994), The utility of biodata, in Stokes, G.S., Mumford, M.D., and Owens, W.A. (eds), *Biodata Handbook*, California, CPP, 485-516.

Mitchell, T.W. and Klimoski, R.J., (1982), Is it rational to be empirical? A test of methods for scoring biographical data, *Journal of Applied Psychology,* 67, 4, 411-418.

Mobley, W.H.., Griffeth, R., Hand, H., and Meglino, B., (1979), Review and conceptual analysis of the employee turnover process, *Psychological Bulletin*, 493-522.

Mobley, W.H., (1982), *Employee turnover: Causes, consequences, and control,* Reading, MA, Addison-Wesley.

Molinero, C.M., (1984), University cuts and statistical information, *Journal of Operational Research Society,* 35,1, 37-47.

Mosel, J.M. and Cozan, L.W., (1952), The accuracy of application blank work histories, *Journal of Applied Psychology*, 36, 365-369.

Mumford, M.D. and Owens, W.A., (1984), Individuality in a developmental context: Some empirical and theoretical considerations, *Human Development*, 27, 84-108.

Mumford, M.D. and Owens, W.A. (1987), Methodology review: principles, procedures and findings in the application of background data measures, *Applied Psychological Measurement 2*, 1-31.

Mumford, M.S. and Stokes, G.S. and Owens, W.A., (1990), *Patterns of Life Adaption: The Ecology of Human Individuality,* Hillsdale, New Jersey, Lawrence Erlbaum.

Mumford, M.D. and Stokes, G.S., (1992), Developmental determinants of individual action: Theory and practice in the application of background data measures, in

Dunnette, M.D. and Hough, L.M. (eds) *Handbook of Industrial and Organisational Psychology,* Vol 111, California, CPP.

Murphy, K.R., (1997), Meta-analysis and validity generalization, in Anderson, N.R. and Herriot, P., (Eds), *International Handbook of Selection and Assessment,* Chichester, J. Wiley and Sons.

Mutchler, J.F., Turner, J.H. and Williams, D.D.,(1987), The performance of female versus male accounting students, *Issues in Accounting Education,* Spring 103-111.

Nelson, A.T., (1989), The human resource dilemma in accounting, *Journal of Accountancy,* August, 46-51.

Neiner, A.G. and Owens, W.A., (1982), Relationships between two sets of biodata with 7 years separation, *Journal of Applied Psychology,* 67, 146-50.

Neiner, A.G. and Owens, W.A., (1985), Using biodata to predict job choice among college graduates, *Journal of Applied Psychology*, 70, 1, 127-136.

Nevo, B., (1976), Using biographical information to predict success of men and women in the army, *Journal of Applied Psychology*, 61, 106-8.

Norusis, M. J., (1992), *SPSS for Windows Advanced Statistics Release 5,* Illinois, SPSS Inc.

Nunnally, J.C., (1978), *Psychometric Theory*, New York, McGraw-Hill.

O'Kane, B., (1989), Accountants: The facts and figures, *Accountancy Centenary Supplement*, 7, 9-15.

Oates, N., (1985), *Evaluation of a biographical sifting system for the Diplomatic Service,* Civil Service Selection Board, unpublished manuscript.

Oppenheim, A., (1992), *Questionnaire Design, Interview and Attitude Measurement,* London, Pinter.

Osipow, S.H., (1973), *Theories of Career Development,* Englewood Cliffs, NJ, Prentice-Hall.

Owens, W.A., (1968), Towards one discipline of scientific psychology, *American Psychology.* 23, 782-5.

Owens, W.A., (1971), A quasi-actuarial prospect for individual assessment, *American Psychologist,* 26, 992-9.

Owens, W.A., (1976), Background Data, in Dunnette, M.D., (ed), *Handbook of Industrial and Organisational Psychology*, Chichester, J. Wiley and Sons.

Owens, W.A. and Schoenfeldt, L.F., (1979), Towards a classification of persons (Monograph), *Journal of Applied Psychology,* 63, 569-604.

Pace, L.A. and Schoenfeldt, L.F., (1977), Legal concerns in the use of weighted applications, *Personnel Psychology,* 30, 159-66.

Palepu, K.G., (1986), Predicting Takeover Targets, *Journal of Accounting and Economics,* 8, 3-35.

Palmer, H.T. (1992), *An examination of individuals in managerial and non-managerial positions using biodata,* unpublished doctoral dissertation, University of Georgia, Athens, U.S.A.

Pannone, R.D., (1984), Predicting test-performance: A content valid approach to screening applications, *Personnel Psychology,* 37, 507-514.

Pasewark, W. R., Strawser, J. R. and Wilkerson Jr., J. E., (1988), Empirical evidence on the association between characteristics of graduating accounting students and recruiting decisions of accounting employers, *Issues in Accounting Education,* Fall, 388-401.

Pearson, M.A., (1977), Eight ways to increase staff turnovers, *Journal of Accountacy*, Oct, 50-52.

Pearson, R. and Pike, G., (1990), *The IMS Graduate Review,* IMS Report No. 192.

Pearson, R. et al (1989), *How Many Graduates in the 21st Century? The choice is yours,* IMS Report No. 177.

Pindyck, R.S. and Rubinfeld, D.L., (1987), *Econometric Models and Economic Forecasts, 2nd edition,* New York, McGraw-Hill.

Plumbley, P., (1991), *Recruitment and Selection*, London, Institute of Personnel Management.

Prediger, P.J., (1969), New procedures for scoring psychological measurements: development of moderated scoring keys for psychological inventories, *Research In Education,* 4, 5.

Price Waterhouse, (1996), *Directions for Graduates*, Price Waterhouse recruitment brochure.

Rasch, R.H. and Harrell, A., (1990), The impact of personal characteristics on the turnover behaviour of accounting professionals, *Auditing: A Journal of Practice and Theory*, 9, 2, 90-102.

Reilly, F.K. and Stettler, H.F, (1972), Factors influencing success on the CPA examination, *Journal of Accounting Research,* Autumn, 308-321.

Reilly, R.R. and Chao, G.T., (1982), Validity and fairness of some alternative selection procedures, *Personnel Psychology,* 35, 1-61.

Rhode, J.G., Sorensen, J.E. and Lawler, E.E., (1976), An analysis of personal characteristics related to professional staff turnover in public accounting firms, *Decision Sciences,* 7, 771-800.

Rhode, J.G., Sorensen, J.E. and Lawler, E.E., (1977), Sources of professional staff turnover in public accounting firms revealed by the exit interview, *Accounting, Orgainzations and Society*, June, 165-175.

Ritchie, R.J. and Boehm, V.R., (1977), Biographical data as a predictor of women's and men's management potential, *Journal of Vocational Behaviour*, 11, 363-8.

Roach, D.E., (1971), Double cross-validation of a weighted application blank over time, *Journal of Applied Psychology*, 55, 157-60.

Roberts, K., (1981), The sociologogy of work entry and occupational choice, in Watts, A.G., Super, D.E. and Kidd, J.M., (eds), *Career Development in Britain*, Cambridge, Hobsons Press.

Robertson, I.T., (1994), Personnel selection research: Where are we now? *The Psychologist,* January, 17-21.

Robertson, I.T. and Smith, M., (1989), Personnel Selection Methods, in Cooper C.L. and Robertson I.T., (eds), *International Review of Industrial and Organisational Psychology*, Chichester, J. Wiley and Sons.

Robertson, I.T. and Makin, P.J., (1986), Management selection in Britain : A survey and critique, *Journal of Occupational Psychology*, 59, 45-57.

Rose, H.A. and Elton, C.G., (1982), The relation of congruance, differentiation, and consistency to interest and aptitude scores in women with stable and unstable vocational choices, *Journal of Vocational Psychology,* 20, 162-174.

Rothstein, H.R., Schmidt, F.L., Erwin, F.W., Owens, W.A. and Sparks, C.P., (1990), Biographical data in employment selection: can validities be made generalizable? *Journal of Applied Psychology,* 75, 175-84.

Sanders, H.P., (1972), Factors in achieving success on the CPA examination, *Journal of Accountancy,* Dec, 85-88.

Sands, W., (1978), Enlisted personnel selection for the US Navy, *Personnel Psychology*, 31, 63-70.

Satterfield, M., (1991), The six most common recruiting mistakes. *Journal of Accountancy*, Feb., 171, 97-100.

Schaffer, G.S., Saunders, V. and Owens, W.A., (1986), Additional evidence for the accuracy of biographical data : Long-term retest and observer ratings, *Personnel Psychology,* 39, 791-809.

Schmidt, F.L. and Hunter, J.E., (1977), *Development of a general solution to the problem of validity generalisation,* Journal of Applied Psychology, 62, 529-540.

Schmidt, F.L. and Rothstein, H.R., (1994), Application of validity generalization to biodata scales in employment selection, in Stokes, G.S., Mumford, M.D. and Owens, W.A., (eds), *Biodata Handbook,* California, CPP, 237-260.

Schmitt, N., (1976), Social and situational determinants of interview decisions : Implications for the employment interview, *Personnel Psychology,* 29, 77-101.

Schmitt, N., Gooding, R.Z., Noe, R. and Kirsch, M., (1984), Meta-analysis of validity studies published between 1964 and 1986 and the investigation of study characteristics, *Personnel Psychology,* 27, 407-22.

Schneider, B. (1987), The people make the place, *Personnel Psychology,* 40, 3, 437-453.

Schneider, B. and Schneider, J.L., (1994), Biodata: An organizational focus, in Stokes, G.S., Mumford, M.D., and Owens, W.A., (eds), *Biodata Handbook*, CPP, California, 423-450.

Schrader, A.D. and Osburn, H.G., (1977), Biodata faking: Effects of induced subtlety and position specificity, *Personnel Psychology*, 30, 395-404

Schuh, A.J., (1967), The prediction of employee tenure: A review of the literature, *Personnel Psychology,* 20, 133-52.

Schultz, K.S., (1991), *Personality versus biodata: A review and preliminary models,* paper presented at annual meeting of The Society of Industrial and Organizational Psychology, St. Luis, Missouri, April.

Schwab, D.P. and Oliver, R.L., (1974), Predicting tenure with biographical data: exhuming buried evidence, *Personnel Psychology,* 27, 125-8.

Scott, N. and Taylor, D. (1997), *Biodata - Equal Opportunities and Psychometric Properties*, paper presented at The Second Test User Conference, British Psychological Society, Stratford

Shackleton, V. and Newell, S., (1991), Management selection : A comparative survey of methods used in top British and French companies, *Journal of Occupational Psychology*, 64, 23-36.

Shaffer, G.S., Saunders, V. and Owens, W.A., (1986), Additional evidence for the accuracy of biographical data: Long-term retest and observe rating. *Personnel Psychology*, 39, 791-809.

Sharf, J.C. (1994), The impact of legal and equal employment opportunity issues on personal history enquiries, in Stokes, G.S., Mumford, M.D., and Owens, W.A.. (eds). *Biodata Handbook*, CPP, California, 351-390.

Siegel, P.H., Leavins, J., and Agrawal, S.P., (1994), Factors affecting performance of CMA's and accountants in industry, *Accounting Educators Journal*, 6, 1, 78-87.

Simon, J. and Kedslie, M., (1997), *Survey of recruitment selectors of trainee chartered accountants in England and Wales*, paper presented at the British Accounting Association conference, Birmingham.

Sirken, R.M., (1995), *Statistics for the Social Sciences,* California, Sage Publications.

Smith, M. and Arahamsen, M., (1992), Patterns of selection in six countries. *The Psychologist,* 5, 5, 205-207.

Stanton, M., (1990), You're a what? Corporate recruiter, *Occupational Outlook Quarterly*, (USA), 34, 38-40.

Stokes G.S., (1994), Introduction and history, in Stokes, G.S., Mumford, M.D., and Owens, W.A., (eds), *Biodata Handbook*, CPP, California

Stokes, G.S. and Cooper, L.A., (1994), Selection using biodata: old notions revisited, in Stokes, G.S., Mumford, M.D., and Owens, W.A. (eds), *Biodata Handbook*, CPP, California, 311-350.

Stokes, G.S., Hogan, J.B. and Snell, A.F., (1993), Comparability of incumbent and applicant samples for the developement of biodata keys: The influence of social desirability, *Personnel Psychology,* 46, 739-762.

Stokes, G.S., Lautenschlager, G.J. and Blakley, B., (1978), *Sex differences in the component structure of a biographical questionnaire,* Athens, Georgia, Institute for Behavioural Research.

Stokes, G.S., Mumford, M.D. and Owens, W., (1989), Life history prototypes in the study of human individuality, *Journal of Personality,* 57, 509-549.

Stokes, G.S. and Reddy, S., (1992), Use of background data in organisation decisions, in Cooper, C. and Robertson, I.T., (eds), *International Review of Industrial and Organisational Psychology* ,7, Chichester, J.Wiley and Sons.

Strebler, M., (1990), *Biodata in Selection : Issues in Practice,* IMS Paper. No. 160.

Sudman, S. and Bradburn, N., (1982), *Asking Questions: a Practical Guide to QuestionnaireDesign,* San Francisco, Jossey-Bass.

Sullivan, D.J., (1961), Selection procedures for specific management trainee programs in 21 companies, *Dissertation Abstracts*, 21, 2200-01.

Super, D.E. (1980), A life-span life-space appraoch to career development, *Journal of Vocational Behavior,* 16, 282-298.

Taffler, R.J., Harvey-Cook, J.E. and Williams, A.P.O., (1995), *Improving the graduate trainee recruitment procedures of accounting firms using biodata,* paper presented at the 1995 British Accounting Association conference.

Thayer, P.W., (1977), Somethings old, somethings new, *Personnel Psychology*, 30, 513-524.

Tho, L. M., (1994), Some evidence on the determinants of student performance in the University of Malaya introductory accounting course, *Accounting Education*, 3, 4, 331-340.

Thomas, P and Thomas, R. E., (1989), Non-traditional scheduling: A vehicle for attracting and retaining "the Brightest and the Best", *CPA The Journal*, November, 74-79.

Thornton, G.C. and Gierasch, P.F., (1980), Fakability of an empirically derived selection instrument, *Journal of Personality Assessment*, 44, 48-51.

Tirbutt, E., (1989), Where have all the graduates gone? *Accountancy*, Dec. 165-166.

Tirbutt, E. (1990), Newly qualified, newly departed?, *Accountancy,* Jan., 135.

Touch Ross, (1995), *Consistently exceeding expectations,* Recruitment brochure.

Tyson, T., (1989), Grade performance in introductory accounting courses: Why female students outperform males, *Issues in Accounting Education*, Spring, 153-160.

Wake, D., (1988), Attracting and keeping the best people, *IJM,* 9, 6, 20-21.

Wanous, J.P., (1977), Organizational entry: Newcomers moving from outside to inside, *Psychological Bulletin*, 84, 4, 601-618.

Wanous, J.P., (1980), *Organizational Entry: Recruitment, Selection and Socialization of Newcomers,* Reading, Mass, Addison-Wesley.

Weisner, W. and Cronshaw, S., (1988), A meta-analytic investigation of the impact of interview fromat and degree of structure on the validity of the employment interview, *Journal of Occupational Psychology,* 61, 275 - 290.

Wernimont, P.F., (1962), Re-evaluation of a weighted application blank for office personnel, *Journal of Applied Psychology,* 46, 417-419.

Wernimont, P.F. and Campbell, J.P., (1968), Signs, samples and criteria, *Journal of Applied Psychology,* 52, 372-6.

Wilkinson, L.J., (1993), An Alternative View of Biodata: The Model, *Recruitment, Selection and Retention,* 2, 3, 23-29.

Wilkinson, L.J., (1997), Generalisable biodata? An application to the vocational interests of managers, *Journal of Occupational and Organisational Psychology,* 70, 49-60.

Wilson, R., (1989), How Great Expectations Founder at the End of the Recruitment Trail, *Accountancy Age*, 10, 18-19.

Wilson, R., (1995), *Determinants of early career success of accountants*, Working Paper, Ward Research Seminar, Glasgow University.

Wilson, R., Mason, C.L.J. and Coates, D., (1997), *Occupational reality shock and its consequences: the case of trainee chartered accountants,* presented at the 1997 British Accounting Association Conference, Birmingham.

Wingrove, J., Glendinning, R. and Herriot, P., (1984), Graduate pre-selection : A research note, *Journal of Occupational Psychology*, 57, 169-171.

Winter, B.C., Blyth, D.M. and Herriot, P., (1987), *You're in the army now?* British Psychological Society, Occupational Psychology Conference Proceedings, January 1987.

APPENDICES

Page no

APPENDIX 1

EXTERNAL TRAINING COST

The under training contract period is three years but the number and timing of examinations is dependent on the type of degree taken. Graduates from fully accredited degrees gain exemption from the Professional Stage[1] and progress directly to the Test of Professional Competence I (TPCI)[2] and subsequently to the Test of Professional Competence II (TPCII)[3]. Graduates from non-relevant degrees are required to undertake those subjects from which their degree offers no exemption in the Professional Stage before progressing to TPCI and TPCII.

Prior to each examination, students attend a series of block release classes, and an outline of the programme of classes and examinations is given in Table A1.1

Table A1.1 Course Programme

Academic Year (comm Sept)	**Fully-accredited graduates**	**Non-relevant graduates**
YEAR 1		
Classes	7 weeks (2-2-2-1)	up to 12 weeks
Exam	TPS (Sept)	TC (Dec & June)
YEAR 2		
Classes	2 weeks (1-1)	7 weeks (2-2-2-1)
Exam	-	TPS (Sept)
YEAR 3		
Classes	1 week	3 weeks (1-1-1)
Exam	TPE (Nov)	TPE (June)

(Source: The Institute of Chartered Accountants of Scotland Prospectus 1997/98)

[1] From the 1997/98 intake this level of examination has been renamed the Test of Competence (TC).
[2] From the 1997/98 intake this level of examination has been renamed the Test of Professional Skills (TPS).
[3] From the 1997/98 intake this level of examination has been renamed the Test of Professional Expertise (TPE).

In terms of actual costs, the fees payable to the Institute in respect of the various classes and examinations for 1997/98 is as follows:

Provision of Classes

Test of Competence costs £1950 for the complete course, although each subject may be purchased on a subject by subject basis, the fees ranging from £179 for Information Technology & Systems to £488 for Financial Accounting.

TPS	£1640
TPE	£ 850

Examination Fees

Test of Competence costs £308 for all subjects, although this cost is reduced if the candidate does not sit all subjects.

TPS	£390
TPE	£172

The resit fees follow a similar pattern, being £308, £420 and £177 respectively. In addition, the training contract requires to be registered at a cost of £349.

The total external training cost in cash terms of employing a trainee chartered accountant can therefore be easily quantified. Assuming that the student has a fully-accredited degree and that all the exams are passed first time, the cost is £3401, rising to £5659 if the student proceeds from a non-relevant degree and obtains no exemptions from the professional stage.

APPENDIX 2

TOTAL TRAINING COST AND PAY BACK PERIOD

The student from the fully-accredited degree will be absent from the office attending block release classes and this absence will be augmented by study leave and examination leave. The student from the non-relevant degree will necessitate further block release, study leave and examination leave. This additional time will obviously be dependent on the number of subjects taken at the professional (test of competence) stage. The normal career path for a chartered accountancy student to undertake during their training contract is to commence their employment as a junior trainee, progress to a senior trainee after twelve months, and ultimately to an accountant twenty four months after commencing employment. These promotions tend to be work/competency based, as opposed to examination qualified, although many firms offer bonuses to students who pass their examinations first time.

COST OF TRAINING AN ICAS TRAINEE, £

Academic Year	Status	Indicative Salary inclusive of Employers NIC	Indicative Charge Out Rate	Weekly Income (1)	Weekly Salary	Weekly Contribution to Overhead & Profits		Absence Classes	Study	Exams	Total	Cost in Salary Terms	Cost in Lost Contribution	Cost in fees to ICAS
YEAR 1	Junior Trainee	11,000	£25	656	212	444	(2) FAG	7	2	1	10	2120	4440	2379
							(3) NR	12	2	2	16	3392	7104	2258
YEAR 2	Senior Trainee	13,000	£27	709	250	459	FAG	2	-	-	2	500	918	850
							NR	7	2	1	10	2500	4590	2379
YEAR 3	Accountant	16,000	£34	893	308	585	FAG	1	2	-	3	924	1755	172
							NR	3	2	-	5	1540	2925	1022
								TOTAL FAG				3544	7113	3401
								TOTAL NR				7432	14619	5659

(1) Based on a 35 hour week and an average utilisation rate of 75%.

(2) Fully-accredited graduate.

(3) Non-relevant graduate.

TOTAL TRAINING COST	COST IN SALARY TERMS	COST IN LOST CONTRIBUTION	COST IN FEES TO ICAS	TOTAL
Fully-accredited graduate	3544	7113	3401	14058
Non-relevant graduate	7432	14619	5659	27710

WEEKS AVAILABLE FOR CONTRIBUTION

Year 1	FAG	NR	Year 2	FAG	NR	Year 3	FAG	NR	Year 4 onwards	FAG	NR
No of weeks	52	52	No of weeks	52	52	No of weeks	52	52	No of weeks	52	52
Block	(10)	(16)	Block	(2)	(10)	Block	(3)	(5)			
Holidays	(6)	(6)	Holidays	(6)	(6)	Holidays	(6)	(6)	Holidays	(6)	(6)
Internal training	(2)	(2)	Internal training	(2)	(2)	Internal training	(2)	(2)	Internal training	(2)	(2)
Induction	(5)	(8)									
Available	29	20	Available	42	34	Available	41	39	Available	44	44

TOTAL CONTRIBUTION WHILST TRAINING	Weekly contribution - £	Weeks available for contribution	Total contribution - £ Fully-accredited graduate	Total contribution - £ Non-relevant graduate
Year 1	444	FAG - 29 NR - 20	12876	8880
Year 2	459	FAG - 42 NR - 34	19278	15606
Year 3	585	FAG - 41 NR - 39	23985	22815
			56139	47301

CONTRIBUTION POST QUALIFICATION	Indicitive salary inclusive of employers NIC	Indicitive charge-out rate	Weekly income (1)	Weekly salary	Weekly contribution to overhead and profits	Annual contribution to overhead and profits
Senior accountant (0 - 12 months post qualification)	£22,000	£40	£1050	£423	£627	£627 x 44 = £27,588
Junior Manager (12- 24 months post qualification)	£25,000	£50	£1313	£481	£832	£832 x 44 = £36,608

ICAS TRAINING COST

	£
Fully-accredited graduate	14058
Non-relevant graduate	27710
Other ancillary costs such as books etc -say	500
On the job training costs - supervision by qualified accountants which is an opportunity cost of lost revenue	?
"Big Six" estimate of total training costs	£100,000

PAY BACK PERIOD

Total contribution	Fully-accredited graduate £	Non-relevant graduate £
Years 1-3	56,139	47,301
Year 4	27,588	27,588
Year 5	36,608	36,608
	120,355	111,497
Pay back period	17 months post qualifying	20 months post qualifying

APPENDIX 3

ANALYSIS OF QUESTIONS ASKED IN RECRUITING FIRMS' APPLICATION FORMS

	E & Y[1]	C & L[2]	D T[3]	PW[4]	Med[5]	Standard[6]
PERSONAL BACKGROUND						
Name	*	*	*	*	*	*
Date of birth	*	*	*	*	*	*
Place of birth	*	-	*	*	-	*
Nationality	*	*	*	*	-	*
Marital status	*	-	*	*	-	-
State of health	*	*	*	*	*	-
Disablement	*	*	*	-	*	*
Driving licence	*	*	*	*	*	-
Termtime address	*	*	*	*	*	*
Home address	*	*	*	*	*	*
Ethnic origin	*	*	*	*	-	*
SECONDARY EDUCATION						
Name of school	*	*	*	*	*	*
Location of school	*	-	*	-	-	-
GCSE/Equivalent						
Year	*	*	*	*	-	*
Subject	*	*	*	*	-	*
Grades	*	*	*	*	-	*
Number of attempts	*	*	*	-	-	-
A levels/Equivalent						
Year	*	*	*	*	*	*
Subject	*	*	*	*	*	*
Grades	*	*	*	*	*	*
Number of attempts	*	*	*	*	-	-
Language profiency	*	*	*	*	-	*
HIGHER EDUCATION						
Dates	*	*	*	*	*	*
University	*	*	*	*	*	*
Degree	*	*	*	*	*	*
Result/expected	*	*	*	*	*	*
Main subjects in each year	*	*	*	*	*	*
Results for each subject	*	*	*	*	*	*
Overall result for year	*	-	-	-	-	-
Identification of resits	-	-	*	-	-	-
Accreditation of degree	-	-	-	*	-	-

[1] Ernst and Young.
[2] Coopers and Lybrand.
[3] Deloitte Touche.
[4] Price Waterhouse.
[5] Medium firm based in the Aberdeen area - WD Johnston and Carmichael.
[6] Standard Application form issued by the Association of Graduate Recruiters.

	E & Y	C & L	D & T	PW	Med	Standard
POSTGRADUATE YEAR						
Dates	*	-	-	*	-	*
University	*	-	-	*	-	*
Course	*	-	-	*	-	*
Result	*	-	-	*	-	-
MISCELLANOUS ACADEMIC INFORMATION						
Academic results fair reflection of performance	*	-	-	-	-	-
Details of gap year	*	-	-	-	-	-
Academic distinctions	-	-	*	*	*	*
EXPERIENTIAL ACTIVITIES						
Full-time employment	*	*	*	*	*	*
Vacation work	*	*	*	*	*	*
Sandwich experience	*	*	*	*	*	*
Relevant courses	*	*	-	*	*	-
Recent travel abroad	-	*	-	*	-	-
POSITIONS OF RESPONSIBILITY						
Education	*	*	*	*	*	-
Work	*	*	*	-	*	*
Leisure	*	*	*	-	*	*
Personal contribution to	*	-	-	-	-	*
KEY INTERESTS AND PASTIMES						
Identification	-	*	*	*	*	*
Commitment	*	-	-	-	*	-
Achievements	*	-	*	-	-	-
PERSONAL QUALITIES AND SKILLS - soft data						
Personal qualities	*	-	-	-	-	-
Personal skills	*	-	-	-	-	-
Drive and intiative	-	*	-	-	*	-
Influence over people	-	*	-	-	*	-
Problem solving	-	*	-	-	*	-
Key role in a group	-	-	-	-	*	-
Commitment to business career	-	*	-	-	-	-
Why suited	-	-	*	-	-	-
Why accountant	-	-	*	-	*	-
What are career aims	-	-	-	-	*	-

	E & Y	C & L	D & T	PW	Med	Standard
GENERAL						
Connection with other staff	*	*	-	-	-	*
Previous application	*	*	*	*	-	-
How heard about organisation	-	*	-	-	-	-
Work permit	*	*	*	*	-	*
Referee details - 1	*	*	*	-	-	*
Referee details - 2	-	*	*	-	-	*
Referee details - 3	-	-	*	-	-	-

APPENDIX 4

THE PHASE II QUESTIONNAIRE

Background

1. Are you:

Male	☐	*Please Tick Relevant Box*
Female	☐	

2. What was your age on commencing your C.A. training contract? ____ years

School History

3. What Secondary School did you attend?

____

4. What type of School was this:

Comprehensive	☐	*Please Tick Relevant Box*
Grammar	☐	
Independent	☐	
Other (please specify)	☐	

5. Did you sit:

'O' Grades	☐	*Please Tick Relevant Box*
G.C.S.E.'s	☐	

6. Which grades did you achieve

	'O'Grades	G.C.S.E.'s
Accounting		
Arithmetic		
Biology		
Chemistry		
Economics		
English		
French		
Geography		
German		
History		
Latin		
Mathematics		
Physics		
Others (please specify)		

Please Enter Grade in Relevant Box

7. Did you sit:

Highers	
'A' Levels	
Other	

Please Tick Relevant Box

Please specify ____

____

8. Which grades did you achieve

	Highers	'A' Levels
Accounting		
Biology		
Chemistry		
Economics		
English		
French		
Geography		
German		
History		
Latin		
Mathematics		
Physics		
Others (please specify)		

Please Enter Grade
in
Relevant Box

9. Please identify any subjects, if any which were retaken, in order to improve the original grade:-

____

____

10. Please identify any sports/outside interests pursued during your school career, indicating on average how many hours per week during term time you spent on each activity:-

Activity	Hours Per Week

Higher Education History

11. Did you progress directly from School to University?

Please Tick Relevant Box

Yes	☐	Go to Question 15
No	☐	Go to Question 12

12. What were the reasons for not progressing directly?

____

____

____

13. How many months elapsed between finishing School and commencing University?

________ Months

14. How did you spend this time?

____

____

____

15. At which University or Polytechnic did you study for your first degree?

____

16. Which first degree did you study e.g. B.A. in Business Studies, M.A. in English?

____

17. How many resits, if any, were you required to take for your first degree?

1st Year		*Please Identify Number of Resits*
2nd Year		
3rd Year		
4th Year		

Which subjects, if any, were you required to resit?

____

____

18. Did you undertake an Honours Year?

Please Tick Relevant Box

Yes		Go to Question 19
No		Go to Question 20
Started but transferred to Ordinary degree		Go to Question 20

19. What Honours classification were you awarded?

Please Tick Relevant Box

1st Class	
2.1 Upper Second	
2.2 Lower Second	
3rd Class	
Awarded Ordinary	

Go To Question 21

20. Why did you not undertake Honours?

____

____

____

21. Did your degree offer a placement period?

Please Tick Relevant Box

Yes	☐	Go to Question 22
No	☐	Go to Question 25

22. How long was the placement period?

3 months	☐	
6 months	☐	
12 months	☐	*Please Tick Relevant Box*
Other (please specify)	☐	
	☐	

23. By what organisation/s were you employed?

____

____

24. What was your role within the above organisation/s?

____

____

____

25. Did you spend any vacations working in a financial environment?

Please Tick Relevant Box

Yes	☐	Go to Question 26
No	☐	Go to Question 28

For how many weeks in total were you employed? ___ weeks
(If you are not sure, please estimate)

26. In what organisation/s were you employed?

____

____

27. What was your role within the above organisation/s?

____

____

____

____

28. Did you also study for a postgraduate qualification?

Please Tick Relevant Box

Yes	☐	Go to Question 29
No	☐	Go to Question 31

29. Which University/College did you attend for this further qualification?

____

30. What postgraduate qualification did you receive?

____

31. Please identify any sports/outside interests pursued during your University years, indicating on average how many hours per week during term time you spent on each activity.

Activity	Hours Per Week
______________________________	__________
______________________________	__________
______________________________	__________
______________________________	__________
______________________________	__________

I.C.A.S. History

32. Did you progress directly from University to your C.A. training?

Please Tick Relevant Box

Yes	☐	Go to Question 36
No	☐	Go to Question 33

33. What were the reasons for not progressing directly?

____

____

____

____

34. How many months elapsed between finishing your University degree and commencing your C.A. training contract?

__________ Months

35. How did you spend this time?

____

____

____

36. Why did you choose to train as a Chartered Accountant with I.C.A.S.?

____

____

____

____

37. Was your degree or postgraduate qualification degree fully accredited with the Institute of Chartered Accountants of Scotland?

Please Tick Relevant Box

Yes	☐	Go to Question 38
No	☐	Go to Question 42

38. When did you commence your training contract?

Please Enter Year in Relevant Box

1983	☐)	
1984	☐)	Go to Question 39
1985	☐)	
1986	☐)	
1987	☐	Go to Question 40
1988	☐)	Go to Question 41
1989	☐)	

39. Please indicate the number of attempts taken at each level

Preliminary	☐	
Part I	☐	*Please Identify Number of Attempts*
Part II	☐	
Part III	☐	

Go to Question 44

40. Please indicate the number of attempts taken at each level

Preliminary	☐	
Part I	☐	*Please Identify Number of Attempts*
Modified T.P.C. I	☐	
T.P.C. II	☐	

Go to Question 44

41. Please indicate the number of attempts at each level

T.P.C. I	☐	
		Please Identify Number of Attempts
T.P.C. II	☐	

Go to Question 44

42. Which subjects were you required to sit at the Professional Stage?

Auditing	☐	
Business Finance	☐	
Business Law	☐	
Business Management	☐	
Economics	☐	*Please Tick Relevant Box(s)*
Financial Accounting I	☐	
Information Technology	☐	
Managerial Accounting	☐	
Mathematical Techniques	☐	
Taxation	☐	

43. Please indicate the number of attempts taken at each level

T.P.C. I	☐	
		Please Identify Number of Attempts
T.P.C. II	☐	

44. Please identify any sports/outside interests pursued during your Training Contract, indicating on average how many hours per week you spent on each activity.

Activity	Hours Per Week
______________________	________
______________________	________
______________________	________
______________________	________
______________________	________

Employer History

45. With which firm did you undertake your training contract?

____

46. Which interviewing techniques did your employer use?

One to one interview ☐
Panel interview ☐
Psychological testing ☐
Group exercise ☐
Social event ☐
Others (please specify) ☐
☐
☐
☐

Please Tick Relevant Box(es)

47. Apart from the Compulsory I.C.A.S. classes did your employer undertake further training courses?

Please Tick Relevant Box

Yes ☐ Go to Question 48
No ☐ Go to Question 49

48. On average, how many days per year did you attend additional training courses?

<3 days	☐	
3 days - 6 days	☐	
7 days - 10 days	☐	*Please Tick Relevant Box*
11 days - 14 days	☐	
15 days - 21 days	☐	
> 21 days	☐	

Thank-you for your co-operation in completing this questionnaire

APPENDIX 5

THE PHASE II QUESTIONNAIRE

THE FOLLOWING QUESTIONS RELATE TO PERSONAL AND HOME LIFE ITEMS.

1. Are you: Male ❑ Female ❑ *Please Tick relevant Box*

2. What was your age on commencing your CA training contract? .... years.

3. What is your nationality?

   Scottish ❑ *Please Tick relevant Box*

   English ❑

   Welsh ❑

   Irish ❑

   Other Please specify ....

The following questions should be answered based on your background at the <u>time of your application</u> to your training firm.

4. What was the area of your family residence at the time of application?.

   Scotland ❑ *Please Tick relevant Box*

   Reminder of the United kingdom ❑

   Other ❑

5. At the time of application, did you have any brothers or sisters?

   Yes ❑ Go to Q6

   No ❑ Go to Q8 *Please Tick relevant Box*

6. Please identify the number of each.

   Brothers .... Number

   Sisters .... Number

7. Please identify your birth order in your family (eg. first born/etc).

. . . .

. . . .

8. Please identify your parents main occupation at the time of application.

	Job occupation	Employed	SelfEmployed	N/A
Father	....	❑	❑	❑
Mother	....	❑	❑	❑

Please Tick relevant Box For Employment Status

9. What was your marital status when you applied to your training office?

Single ❑ ***Please Tick relevant Box***
Married ❑
Co-habiting ❑
Divorced ❑
Separated ❑

10. Did you have any children when you applied to your training office?

Yes ❑ ***Please Tick relevant Box***

Please specify how many ....

No ❑

11. Did you have a driving licence when you applied to your training office?

Yes ❑ Go to Q12

No ❑ Go to Q13 ***Please Tick relevant Box***

12. Was your driving licence clean at this time?

Yes ❑

No ❑ *Please Tick relevant Box*

13. Were you a car owner when you applied to your training office?

Yes ❑

No ❑ *Please Tick relevant Box*

14. Describe the state of your general health at the time of application to your training office.

Excellent ❑ *Please Tick relevant Box*

Good ❑

Satisfactory ❑

Poor ❑

15. Identify any serious illness that you had suffered either prior to or at the time of application.

....

....

....

THE FOLLOWING QUESTIONS RELATE TO SECONDARY SCHOOL EDUCATION.

16. **In relation to your Secondary Education Please identify; schools attended, the dates of attendance & the type of each school.**

School	Dates	Comprehensive	Grammar	Independent	Other

Please Tick relevant Box

17. Did you sit.

'O' Grades/Levels ❑ *Please Tick relevant Box*

Standard Grades ❑

GCSE'S ❑

Other Please specify ....

18. Which grades did you achieve?

	'O' Grades	Standard	GCSE'S	Other
Accounting				
Arithmetic				
Biology				
Chemistry				
Economics				
English				
French				
Geography				
German				
History				
Latin				
Mathematics				
Physics				
Others Please Specify				

Please enter grades in relevant box.

19. Did you remain at School for 6th year?

Yes ☐ *Please Tick relevant Box*

No ☐

20. Did you sit ☐ *Please Tick all relevant Boxes*

Highers ☐

'A' Levels ☐

CSYS

Other Please specify ....

21. Please specify which grades you obtained in each year at school.

	Highers 5th	Highers 6th	'A' Level 6th Year	CSYS 6th Year	Other 5th	Other 6th
Accounting						
Biology						
Chemistry						
Economics						
English						
French						
Geography						
German						
History						
Latin						
Mathematics						
Physics						
Other Please Specify						

Please enter grades in relevant box.

22. Please identify the number of subjects that you failed at school during the following years.

4th year .... Number

5th year .... Number

6th year .... Number

23. Please identify the number of subjects which at either Higher or 'A' level were retaken in order to improve the original grade. .... Number of Highers.

.... Number of 'A' Levels.

24. Please identify any academic prizes that you were awarded during your Secondary School Education.

Year (eg 5th year)	Prizes
....	....
....	....
....	....

25. Please provide details of any position of responsibility held by yourself during your Secondary School Education.

Year (eg 5th year)	Position of Responsibility
....	....
....	....
....	....

26. Please provide details of any jobs undertaken whilst at School..

Job Title	Organisation	Duration of Employment in months	Related to Chartered Accountancy Yes	Related to Chartered Accountancy No	Responsibilty for supervision of others Yes	Responsibilty for supervision of others No

Please Tick relevant Box

27. Please identify any sport/outside interest pursued during your Secondary Education School Career, identifying membership of clubs/societies/teams, whether positions of responsibility held and on average how many hours per week during term time was spent on each activity.

Activity	Membership of Club/Society Team Yes	Membership of Club/Society Team No	Position of Responsibility held Yes	Position of Responsibility held No	How many hours per week

28. Please identify any athletic prizes that you were awarded during your secondary school education.

Year (eg 5th year) Prize

....

....

....

29. Please identify the number of times that you were abroad during your secondary school education. .... Number of Times.

THE FOLLOWING QUESTIONS RELATE TO HIGHER EDUCATION.

30. Did you undertake a degree?

Yes ❑ Go to Q32

No ❑ Go to Q31 *Please Tick relevant Box*

31. Please describe briefly any qualifications/occupation that you undertook before commencing your C.A. training.

....

....

Please go to Q59

32. Did you progress directly from school to university?

Yes ❑ Go to Q36

No ❑ Go to Q33 *Please Tick relevant Box*

33. What were the reasons for not progressing directly?

....

....

....

34. How many months elapsed between finishing School and commencing Higher Education?

.... Months.

35. How did you spend this time?

....

....

36. At which University or Polytechnic did you study for your first degree?

....

37. Which first degree did you study e.g. B.A. in Business Studies, M.A. in English?

....

....

38. Was this degree fully accredited with ICAS?

Yes ❑

No ❑ *Please Tick relevant Box*

39. How many resits, if any were your required to take for your first degree?

1st year .... Number 2nd year .... Number

3rd year .... Number 4th year .... Number

Which subjects, if any were you required to resit?

....

....

40. Did you undertake an Honours year? *Please Tick relevant Box*

Yes ❑ Go to Q41

No ❑ Go to Q42

Started but transferred to Ordinary degree. ❑ Go to Q42

41. What Honours classification were you awarded? *Please Tick relevant Box*

1 st Class ❑ 3rd Class ❑

2.1 Upper Second ❑ Award Ordinary ❑ Go to Q43

2.2 Lower Second ❑

42. Why did you not undertake Honours?

....

43. Did your degree offer a placement period?

Yes ❑ Go to Q44

No ❑ Go to Q47

Please Tick relevant Box

44. What length of placement did you undertake?

3 months ❑

6 months ❑

12 months ❑

Please Tick relevant Box

Others please specify ....

45. By what organisation/s were you employed?

....

....

46. What was your role within the above organisation/s?

....

....

....

....

47. Apart from a formal placement period, please provide details of any job undertaken whilst at University.

Job Title	Organisation	Duration of Employment in months	Related to Chartered Accountancy		Responsibilty for supervision of others	
			Yes	No	Yes	No

Please Tick relevant Box

48. Did you also study for a postgraduate qualification?

Yes ❑ Go to Q49

No ❑ Go to Q51 ***Please Tick relevant Box***

49. Which University/College did you attend for this further qualification?

....

50. What postgraduate qualification did you receive?

....

51. Please provide details of any position of responsibility (other than sporting activities) held by yourself during your Higher Education career.

Year	Position of responsibility
....	....
....	....
....	....

52. Please identify any sport/outside interest pursued during your Higher Education career, identifying membership of clubs/societies/teams, whether positions of responsibility held and on average how many hours per week during term time was spent on each activity.

Activity	Membership of Club/SocietyTeam Yes	No	Position of Responsibility held Yes	No	How many hours per week

53. Please identify any athletic prizes that you were awarded during your Higher Education.

....

....

....

....

54. Please identify the number of times that you were abroad during your Higher Education .... Number.

THE FOLLOWING QUESTIONS RELATE TO PROFESIONAL EXAMINATION PERFORMANCE.

55. Did you progress directly from Higher Education to your C.A. training?

Yes ❑ Go to Q59

No ❑ Go to Q56 *Please Tick relevant Box*

56. What were the reasons for not progressing directly?

....

....

....

....

57. How many months elapsed between finishing your University Career and commencing your C.A. training contract? .... Months.

58. How did you spend this time?

....

....

....

59. In which year did you commence your training contract? .... year.

60. Were you required to undertake any subjects at the professional level?

Yes ❑ Go to Q61

No ❑ Go to Q63 *Please Tick relevant Box*

61. How many subjects were you required to sit at the professional level? .... Number.

62. Were you required to resit any of these professional level subjects?

Yes ❑ .... Number *Please Tick relevant Box & enter Number where appropriate.*

No ❑

63. Please indicate the number of attempts at each level?

TPC I .... Number

TPC II .... Number

THE FOLLOWING QUESTIONS RELATE TO THE TRAINING FIRM WITH WHICH YOU UNDERTOOK YOUR TRAINING CONTRACT.

64. With which firm did you undertake your training contract?

....

65. Apart from the Compulsory I.C.A.S. classes did your employer undertake further training courses?

Yes ❑ Go to Q66 *Please Tick relevant Box*

No ❑ Go to Q67

66. On average, how many days per year during your training contract did you attend additional training courses?

<3 days ❑

3 days - 6 days ❑ *Please Tick relevant Box*

7 days - 10 days ❑

11 days - 14 days ❑

15 days - 21 days ❑

> 21 days ❑

67. Which year did you become a member of the Institute of Chartered Accountants of Scotland? .... Year.

68. How many months have elapsed since you completed your training contract?

.... Months.

69. Are you still employed by your training provider?

Please Tick relevant Box

Yes ❑ Go to Q72

No ❑ Go to Q70

70. How many months did you remain with your training provider after completing your training contract? .... Months.

71. Please explain why you left your training provider?

....

....

....

Please provide details of your employment after leaving your training provider.

Job Title	Type of Organisation	Tenure of Employment
(eg Accountant)	(eg Oil Company)	(eg August 95 to date)
....	....	....
....	....	....
....	....	....
....	....	....

72. How long do you expect to remain with this employer?

Currently job seeking ☐

< 12 months ☐

13 - 24 months ☐

25 - 36 months ☐

> 36 months ☐

Please Tick relevant Box

Thank you for your co- operation in completing this questionaire

APPENDIX 6

EXPLANATORY VARIABLES FOR THE LOGISTIC REGRESSION MODELS

Variable	*Rationale for Inclusion*	*Method of Coding*
Background		
Gender	Differential performance dependent on sex	1-male: 2-female
Age on commencing training contract	Differential performance dependent on age	1-25 or younger: 2 - 26 or older
School History		
Type of School	Comp education versus non-comp (Taffler et al, 1995)	1- comprehensive: 2-noncomp
Number of O grades at A pass	(Taffler et al, 1995)	1-1 O grades at A grade: 2-2 O grades at A grade: etc etc
O grade score	Examination of early academic performance in all subjects	Based on 3 points for an A pass: 2 points for a B pass: 1 point for a C pass
Number of UCAS points obtained at Higher	Examination of later academic performance in all subjects	Based on 6 points for an A pass: 4 points for a B pass: 2 points for a C pass
Number of Highers obtained	Supplemetary variable to one above	1-1 Higher taken: 2-2 Highers taken: etc etc
Grade in Higher English[1]	Often used as a criterion for pre-selection (see also undergradaute accounting studies)	1-Grade A: 2-B: 3-C: 4-pass but no grade: 5-D: 6-E

[1] As English is a core subject in Scotland, the majority of trainees will have undertaken this subject and therefore it is the performance in the subject as opposed to the choice that may be of relevance.

Variable	*Rationale for Inclusion*	*Method of Coding*
Grade in Higher Mathematics[2]	Often used as a criterion for pre-selection (see also undergraduate accounting studies)	1-Grade A: 2-B: 3-C: 4-pass but no grade: 5-D: 6-E
Number of UCAS points obtained from analytical Highers	Performance in analytical highers only	Based on UCAS point score from Accounting, Economics, Mathematics and Engineering
Number of analytical Highers taken	Choice of analytical subjects at school (Taffler et al, 1995)	1-1 analytical Higher taken: 2-2 analytical Highers taken: etc etc
Number of UCAS points obtained from science Highers	Performance in science highers only	Based on UCAS point score from Chemistry, Biology, and Physics
Number of science Highers taken	Choice of science subjects at school (Taffler et al, 1995)	1-1 science Higher taken: 2-2 science Highers taken: etc etc
Number of UCAS points obtained from language Highers	Performance in language highers only	Based on UCAS point score from French, German, Latin and other secondary language
Number of language Highers taken	Choice of language subjects at school (Taffler et al, 1995)	1-1 language Higher taken: 2-2 language Highers taken: etc etc
Number of UCAS points obtained from non-analytical Highers	Performance in non-analytical highers only	Based on UCAS point score from English, History, Modern Studies, Art, Geography and other miscellaneous subjects
Number of non-analytical Highers taken	Choice of non-analytical subjects at school (Taffler et al, 1995)	1-1 non-analytical Higher taken: 2-2 non-analytical Highers taken: etc etc

[2] As Mathematics is a core subject in Scotland, the majority of trainees will have undertaken this subject and therefore it is the performance in the subject as opposed to the choice that may be of relevance.

Variable	*Rationale for Inclusion*	*Method of Coding*
Whether took Higher accounts or not	Choice variable as opposed to a performance related varaible due to large number of respondents who did not undertake this subject	0-did not take subject: 1-took subject
Number of subjects retaken at Higher to improve the grade	To identify impact on UCAS point score	1-1 subject retaken: 2-2 subjects retaken etc etc
Number of Certificate in Sixth Year Studies undertaken	Examination of ultimate performance at School	1-1 CSYS taken: 2-2 CSYSs taken
Whether sports/interests undertaken at school	Popular criterion used by recruiters (Gammie, 1996)	0-no: 1- yes
Number of sports/ interests undertaken at school	Development of variable above	1-1 interest: 2-2 interests etc etc
Whether undertaken team sports at school	Seen as a demonstration of ability to work in a team by the selectors	0-no: 1-yes
Number of hours per week spent on sports/ interests	Related variable to theme of outside interests	0- no interests: 1- 0-5 hours: 2- 6-10 hours: etc etc
Higher Education		
Whether progressed directly to University from School	Question that is often raised by the training firms in the application form	0-no did not progress directly: yes-did progress directly
Whether degree relevant or not	Determine differences in performance between relevant and non-relevant graduates	1-relevant: 2-nonrelevant

Variable	*Rationale for Inclusion*	*Method of Coding*
Type of University attended	ICAEW results suggest that graduates from traditional universities perform better	1-traditional: 2-new/polytechnic
Number or resits in first year at University	Past performance is indicative of future performance	1-1 resit: 2-2 resits: etc etc
Number of resits in second year at University	Past performance is indicative of future performance	1-1 resit: 2-2 resits: etc etc
Number of resits in third year at University	Past performance is indicative of future performance	1-1 resit: 2-2 resits:etc etc
Honours award[3]	Taffler et al (1995)	1-1st class: 2-2.1: 3-3.1: 4-3rd: 5-awarded ordinary
Whether degree incorporated a placement	Previous related experience found to be a significant predictor (Eskew and Faley, 1988)	0-no: 1-yes
Whether a vacational job was undertaken in a financial environment	A related variable to the one above	0-no: 1-yes
Whether sports/interests undertaken at University	Popular criterion used by recruiters (Gammie, 1996)	0-no: 1- yes
Number of sports/ interests undertaken at University	Development of variable above	1-1 interest: 2-2 interests: etc etc

[3] This variable was only included for the honours sample.

Variable	*Rationale for Inclusion*	*Method of Coding*
Whether undertaken team sports at University	Seen as a demonstration of ability to work in a team by the selectors of graduates	0-no: 1-yes
Number of hours per week spent on sports/ interests	Related variable to theme of outside interests	0- no interests: 1- 0-5 hours: 2 - 6-10 hours: etc etc

APPENDIX 7

HONOURS GRADUATES - COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
5.9247	0.0000***	HONAWAR	Honours classification
3.6006	0.0003***	RESITYR2	Number of resits in 2nd year at University
3.5798	0.0003***	POSTGRAD	Postgraduate qualification obtained
2.9790	0.0029***	NOSUBRET	Number of subjects retaken at Higher to improve grade
2.8199	0.0048***	TOTPTS2	Number of UCAS points obtained
2.8126	0.0049***	ACTHRWK	Number of hours spent on sports etc at School
2.6086	0.0091***	HMATHS	Higher grade in Mathematics
2.4802	0.0131**	RELDEGRE	Whether degree is relevant or not
2.4421	0.0146**	RESITYR1	Number of resits in 1st year at University
2.0207	0.0433**	RESITYR3	Number of resits in 3rd year at University
2.0654	0.0389**	ANALYTIC	Number of analytical Highers
1.8563	0.0634*	NOHOBBY	Number of sports or hobbies undertaken at School
1.7967	0.0724*	ACTHRW2	Number of hours spent on sports etc at University
1.7299	0.0836*	NONONAN	Number of nonanalytical Highers
1.6784	0.0933*	DONTHOB	Whether sports/interests undertaken at School
1.5106	0.1309	NOHOBB2	Number of sports/interest undertaken at University
1.4497	0.1471	SCHTOUNI	Whether progressed directly to University
1.3609	0.1735	AOGRADV	Number of A grades at O Grade
1.3627	0.1730	HENGLISH	Higher grade in English
1.1193	0.2630	TOOKACC	Took Higher Accounts
1.0728	0.2834	NOANALY	Number of nonanalytical Highers
0.9894	0.3324	CSYS	Number of SYS qualifications obtained
0.8867	0.3861	UNITYPE	Type of University
0.8386	0.4017	TOOKFR	Took French Higher
0.8019	0.4226	OGRADESC	O Grade score
0.7439	0.4569	DONTHOB2	Whether sports/interests undertaken at University
0.7075	0.4793	HIGHER	Number of Highers obtained
0.6702	0.5028	LANGUAGE	Language Higher score
0.6247	0.5321	AGECOMM	Age on commencing training contract
0.5422	0.5877	NONANAL	Nonanalytical Higher score
0.4957	0.6201	TEAM	Whether undertook team sports at School
0.3997	0.6894	VACFINEM	Vacational job in a financial environment
0.3219	0.7475	SCIENCE	Science Higher Score
0.3165	0.7517	NOLANGU	Number of language Highers taken
0.2695	0.7875	GENDER2	Respondent's gender
0.2363	0.8132	TYPESCH	Type of School
0.2031	0.8390	NOSCIENC	Number of Science Highers
0.1199	0.9045	PLACEMNT	Whether degree incorporated a placement
0.0624	0.9502	TEAM2	Whether undertook team sports at University

Note
*** = Significant at 1%, ** = Significant at 5%, * = Significant at 10%

APPENDIX 8

HONOURS GRADUATES
SPEARMAN CORRELATION COEFFICIENTS

	PFALL	HONAWAR	RESITYR1	RESITYR2	RESITYR3	POSTGRAD	NOSUBRET	TOTPTS2	RELDEGRE	NONONAN	ANALYTIC	HMATHS	ACTHRWK	ACTHRWK2	DONTHOB
HONAWAR	.4392														
RESITYR1	.1810	.1893													
RESITYR2	.2669	.2698	.1697												
RESITYR3	.1498	.0686	-.0413	.1165											
POSTGRAD	.2654	.1586	.1875	.2155	-.0705										
NOSUBRET	.2208	.1733	.1412	.1683	-.0524	-.0694									
TOTPTS2	-.2090	-.2903	-.2146	-.1333	-.1314	-.1745	-.1847								
RELDEGRE	.1838	.1156	.2370	.0968	-.0868	.6992	-.0704	.0138							
NONONAN	.1282	.1090	-.1332	.0780	-.0916	-.0094	.1026	.0643	-.0789						
ANALYTIC	-.1534	-.0771	-.1710	-.0790	.0235	-.3433	.0070	.3023	-.3917	-.0622					
HMATHS	-.1934	-.1889	-.1131	-.1664	-.1052	-.1314	-.2179	.5341	-.0089	-.2238	.3906				
ACTHRWK	-.2085	-.0745	.0325	.0088	.0786	-.1458	-.0125	.0339	-.0817	.0069	.0208	-.0887			
ACTHRWK2	-.1332	-.0093	-.0050	-.0013	.0567	-.1792	.0317	.0320	-.0952	.0236	.0045	-.0713	.5619		
DONTHOB	-.1244	-.0592	.0990	.0227	.0400	-.1071	-.0933	.0243	-.0007	-.0216	.0246	-.0823	.4996	.3115	
NOHOBBY	-.1376	-.0068	.0941	.0537	.0650	-.1490	.0129	.0620	-.0084	.0526	.0040	.0046	.6612	.3379	.5037

INDEPENDENT VARIABLES FOR THE LOGISTIC REGRESSION MODELS

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
	Background			
1 **GENDER**	Gender	Differential performance dependent on sex - Training provider application form	1 - male 2 - female	1
2 **AGESTART**	Age on commencing training contract	Differential performance dependent on age - Training provider application form	20 -20 years 21 -21 years 22 -22 years etc	2
3 **NATIONTY**	What is nationality	Differential tenure dependent on nationality - Training provider application form	1 - Scottish 2 - Other	3
4 **AREAHOME**	Area of family residence	Differential tenure dependent on nationality - Training provider application form	1 - Scottish 2 - Other	4
5 **SIBLINGS**	Any siblings	Herriot (1984)	1 - yes 2 - no	5
6 **NO SIBS**	Number of siblings	Herriot (1984)	1 - 1 2 - 2 3 - 3 etc	6
7 **BIRTHODR**	Birth Order	Herriot (1984)	1 - 1st born 2 - 2nd born etc	7
8 **DADJOB**	Father's occupation	Discussions with training providers	1 - self employed 2 - other	8
9 **DADLEVEL**	Level of father's occupation	Herriot (1984)	1 - professional 2 - semi-professional 3 - other	8
10 **MUM JOB**	Mother's Occupation	Discussions with training providers	1 - self employed 2 - other	8
11 **MUM LEVEL**	Level of mother's occupation	Mother's educational level achieved (Herriot,1984)	1 - professional 2 - semi-professional 3 - other	8

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
12 MARITAL	Marital status	Training provider application forms	1 - single or equivalent 2 - other	**9**
13 NO. CHILD	Number of children	Measure of commitment, trainees with children are less commited (Gammie and Gammie, 1995)	0 - 0 children 1 - 1 children 2 - 2 children etc	**10**
14 DIRV LIC	Driving Licence held	Training provider application forms	1 - yes 2 - no	**11**
15 LIC CLEAN	Driving Licence clean	Training provider application forms	1 - yes 2 - no	**12**
16 OWN CAR	Car Owner	Training provider application forms	1 - yes 2 - no	**13**
17 HEALTH	State of General Health	Training provider application forms, and Herriot (1984)	1 - excellent 2 - good 3 - satisfactory 4 - unsatisfactory	**14**
18 ILLNESS	Any serious illness suffered	Training provider application forms	0 - none 1 - 1 illness 2 - 2 illnesses etc	**15**
	School History			
19 NO. SCHOOL	Number of Secondary schools attended	Training provider application forms - several schools may have been disruptive to education, and hence school grades may not be accurate reflection of ability	1 - 1 2 - 2 3 - 3 etc	**16**
20 TYPE SCHOOL	Type of School	Comp education versus non-comp, Harvey-Cook (1995)	1 - comprehensive: 2 - noncomp	**16**
21 EXAM SAT 1	Did you six O-grades/ levels, standard grades or GCSEs?	Filter variable	1 - O-grades.levels 2 - standard grades 3 - GCSEs 4 - other	**17**

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
22 A PASS. O	Number of O levels, standard grades, GCSE's at A pass	Harvey-Cook, 1995	1 - 1 subject at A grade 2 - 2 subjects at A grade etc	**18**
23 SCORE. 0	O grade, standard grade and GCSE score	Examination of early academic performance in all subjects	Based on: 3 points for an A pass 2 points for a B pass 1 point for a C pass	**18**
24 SIXTH YEAR	Remain at School for 6th year	Training provider application form	1 - yes 2 - no	**19**
25 HIGHERS	Did you sit Highers?	Filter Variable	1 - yes 2 - no	**20**
26 EXAM SAT	Did you sit Highers, A-levels or both?	Filter Variable	1 - Highers 2 - A-levels 3 - both 4 - other	**20**
27 UCCA . 5 YR	Number of UCAS points obtained at Higher in 5th Year	Examination of later academic performance in all subjects	Based on: 6 points for an A pass 4 points for a B pass 2 points for a C pass	**21**
28 UCCA. TOT	Number of UCAS points obtained at Secondary School (ie total of 5th year, 6th year and night school)	Examination of later academic performance in all subjects	Based on: 6 points for an A pass 4 points for a B pass 2 points for a C pass at Higher, **and** based on: 10 points for an A pass 8 points for a B pass 6 points for a C pass 4 points for a D pass 2 points for a E pass at either A level or CSYS	**21**
29 NO. HIGHER	Number of Highers obtained at Secondary School	Supplemetary variable to one above	1 - 1 Higher obtained 2 - 2 Highers obtained etc	**21**

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
30 H. ENGLISH	Grade in Higher English[1]	Often used as a criterion for pre-selection (see also undergradaute accounting studies)	1 - Grade A 2 - B 3 - C 4 - pass but no grade 5 - D 6 - E	**21**
31 H. MATHS	Grade in Higher Mathematics[2]	Often used as a criterion for pre-selection (see also undergraduate accounting studies)	1 - Grade A 2 - B 3 - C 4 - pass but no grade 5 - D 6 - E	**21**
32 UCCA ANAN	Number of UCCA points obtained from analytical Highers	Performance in analytical highers only	Based on UCCA point score from: Accounting Economics Mathematics Engineering	**21**
33 NO. ANA	Number of analytical Highers taken	Choice of analytical subjects at school (Harvey-Cook, 1995)	1 - 1 analytical Higher taken 2 - 2 analytical Highers taken etc	**21**
34 UCCA SCI	Number of UCCA points obtained from science Highers	Performance in science highers only	Based on UCCA point score from: Chemistry Biology Physics	**21**
35 NO. SCI	Number of science Highers taken	Choice of science subjects at school (Harvey-Cook, 1995)	1 - 1 science Higher taken 2 - 2 science Highers taken etc	**21**
36 UCCA LAN	Number of UCCA points obtained from language Highers	Performance in language highers only	Based on UCCA point score from: French German Latin Other secondary language	**21**

[1] As English is a core subject in Scotland, the majority of trainees will have undertaken this subject and therefore it is the performance in the subject as opposed to the choice that may be of relevance.
[2] As Mathematics is a core subject in Scotland, the majority of trainnes will have undertaken this subject and therefore it is the performance in the subject as opposed to the choice that may be of relevance.

Variable Number & Name	Variable	Rationale for Inclusion	Method of Coding	Reference to Question Number
37 NO. LAN	Number of language Highers taken	Choice of language subjects at school (Harvey-Cook, 1995)	1 - 1 language Higher taken 2 - 2 language Highers taken etc	21
38 UCCA NA	Number of UCCA points obtained from non-analytical Highers	Performance in non-analytical highers only	Based on UCCA point score from: English History Modern Studies Art Geography Other miscellaneous subjects	21
39 NO. NA	Number of non-analytical Highers taken	Choice of non-analytical subjects at school (Harvey-Cook, 1995)	1 - 1 non-analytical Higher taken 2 - 2 non-analytical Highers taken etc	21
40 M.A.C.I.S.	Whether took Higher accounts or not	Choice variable as opposed to a performance related varaible due to large number of respondents who did not undertake this subject	0 - didn't take subject 1 - took subject	21
41 NO. CSYS	Number of Certificate in Sixth Year Studies undertaken	Examination of ultimate performance at School	0 - none 1 - 1 CSYS taken 2 - 2 CSYSs taken	21
42 FAIL 4 YR	Number of subjects failed in 4th year at school	Past performance is indicative of future performance	0 - no failures 1 - 1 failure 2 - 2 failures etc	22
43 FAIL 5 YR	Number of subjects failed in 5th year at school	Past performance is indicative of future performance	0 - no failures 1 - 1 failure 2 - 2 failures etc	22
44 FAIL 6 YR	Number of subjects failed in 6th year at school	Past performance is indicative of future performance	0 - no failures 1 - 1 failure 2 - 2 failures etc	22
45 HRE TAKEN	Number of subjects retaken at Higher to improve the grade	To identify impact on UCAS point score	1 - 1 subject retaken 2 - 2 subjects retaken etc	23

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
46 ACA PRIZE	Number of academic prizes awarded during secondary school education	Training provider application forms	0 - no prizes 1 - 1 prize 2 - 2 prizes etc	**24**
47 POS RES. S	Number of positions of responsibility held during secondary school education	Training provider application forms	0 - no positions 1 - 1 positions 2 - 2 positions etc	**25**
48 HEAD-SCH	Headboy or girl at secondary school	Headboys and girls perform better in the examination system (Harvey-Cook ,1995)	0 - no 1 - yes	**25**
49 JOBS SCH	Number of jobs undertaken whilst at school	Training provider application forms	0 - no jobs 1 - 1 job 2 - 2 jobs etc	**26**
50 JOB ACS.S	Number of jobs related to chartered accountancy whilst at school	Eskew and Faley (1988)	0 - no jobs 1 - 1 job 2 - 2 jobs etc	**26**
51 JOB RES. S	Number of jobs at school with responsibility for others	Training provider application forms	0 - no jobs 1 - 1 job 2 - 2 jobs etc	**26**
52 SPORT. S	Whether sports/interests undertaken at school	Popular criterion used by recruiters (Gammie, 1996)	0 - no 1 - yes	**27**
53 NO. SPO.S	Number of sports/ interests undertaken at school	Development of variable above	1 - 1 interest 2 - 2 interests etc	**27**
54 NO. CLUB.S	Number of memberships of clubs, societies and/or teams at school	Seen as a demonstration of ability to work in a team, (Harvey-Cook, 1995)	0 - none 1 - 1 membership 2 - 2 memberships etc	**27**
55 SPO RES.S	Positions of responsibility held in relation to sports/interests at school	Training provider application forms	0 - none 1 - 1 position 2 - 2 positions etc	**27**

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
56 SPO HRS.S	Number of hours per week spent on sports/ interests	Related variable to theme of outside interests	0 - no interests 1 - 0-5 hours 2 - 6-10 hours 3 - 11-15 hours 4 - 16-20 hours 5 - 21-25 hours 6 - 26-30 hours 7 - 31-35 hours 8 - 36-40 hours	**27**
57 ATH PRZ-S	Number of athletic prizes awarded at school	Training provider application forms	0 - none 1 - 1 prize 2 - 2 prizes etc	**28**
58 ABROAD-S	Number of times abroad during secondary school education	Training provider application forms	0 - none 1 - once 2 - twice 3 - 3 times etc	**29**
	Higher Education			
59 DEGREE	Whether undertook a degree or not	Filter variable	1 - yes 2 - no	**30**
60 OCC PRECA	Qualification/ occupation undertaken before commencing CA training	Eskew and Faley (1988)	1 - professional 2 - semi-professional 3 - other	**31**
61 SCHI-UNI	Whether progressed directly to university from school	Question is often raised by the training firms in the application forms	o - no, did not progress directly 1 - yes, did progress directly	**32**
62 SCH-OTHER	Reasons for not progressing directly from school to university	Supplementary variable to above	1 - unsure what wanted to do 2 - improving grades/grades not good enough 3 - wanted to work 4 - had another career first 5 - wanted to travel 6 - other	**33**

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
63 PERIOD SU	Months elapsed between finishing school and commencing Higher education	Supplementary variable	1 - 1 month, 2 - 2 months, 3 - 3 months etc.	**34**
64 TIME SU	How was this time spent	Supplementary variable	1 - travelling 2 - working 3 - improving grades 4 - other	**35**
65 TYPE UNI	Type of University attended	ICAEW results suggest that graduates from traditional universities perform better	1 - traditional 2 - new/polytechnic	**36**
66 TYPE DEG	Degree awarded	Harvey-Cook (1995)	1 - analytical 2 - non-analytical	**37**
67 DEG. ACCR	Whether degree fully accredited or not	Determine differences in performance between relevant and non-relevant graduates	1 - yes, 2 - no	**38**
68 RESIT YR	Number or resits in first year at University	Past performance is indicative of future performance	1 - 1 resit 2 - 2 resits etc	**39**
69 RESIT YR2	Number of resits in second year at University	Past performance is indicative of future performance	1 - 1 resit 2 - 2 resits etc	**39**
70 RESIT 3YR	Number of resits in third year at University	Past performance is indicative of future performance	1 - 1 resit 2 - 2 resits etc	**39**
71 RESIT YR4	Number of resits in fourth year at university	Past performance is indicative of future performance	1 - 1 resit 2 - 2 resits etc	**39**
72 HONS DEG	Was an honours degree undertaken	Filter variable	1 - yes 2 - no	**40**

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
73 **HONS AWD.**	Honours award[3]	Harvey-Cook (1995)	1 - 1st class 2 - 2.1 3 - 2.2 4 - 3rd 5 - awarded ordinary	**41**
74 **NOT HONS.**	Why Honours was not undertaken	Supplementary variable	1 - was not interested in subject 2 - not needed for CA/waste of time 3 - not available 4 - grades not good enough 5 - year out before starting work 6 - other	**42**
75 **PLACEMNT**	Whether degree incorporated a placement	Previous related experience found to be a significant predictor (Eskew and Faley, 1988)	0 - no 1 - yes	**43**
76 **TIME PLC.**	Length of placement period	Related variable to above	0 - no placement 1 - 1 month 2 - 2 months etc	**44**
77 **ORG. PLC**	Organisation employed by on placement	Supplementary variable	1 - CA professional firm 2 - industry/commerce	**45**
78 **ROLE PLC.**	Role in organisation during placement	Supplementary variable	1 - related to accountancy 2 - not related to accountancy	**46**
79 **JOBS UNI**	Number of jobs undertaken whilst at university	Training provider application forms	0 - no job 1 - 1 job 2 - 2 jobs etc	**47**

[3] This variable was only included for the honours sample.

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Questioi Number*
80 JOB A/CS - U	Number of jobs related to chartered accountancy whilst at university	Previous related experience found to be significant predictor (Eskew and Faley, 1988)	0 - no job 1 - 1 job 2 - 2 jobs etc	**47**
81 JOB RES - U	Number of jobs at university with responsibility for others	Training provider application forms	0 - no job 1 - 1 job 2 - 2 jobs etc	**47**
82 POST GRAD	Whether post graduate qualification undertaken	Training provider application forms	0 - no 1 - yes	**48**
83 UNI - PG	University/College attended	Differential in performance dependent on University	1 - traditional 2 - new/polytechnic	**49**
84 QUAL - PG	Postgraduate qualification received	Training provider application forms	1 - accountancy 2 - non-accountancy	**50**
85 RESPON - U	Position of responsibility (other than sporting activity) held during university	Training provider application forms	0 - no positions 1 - 1 position 2 - 2 positions etc	**51**
86 SPORT U	Whether sports/interests undertaken at university	Popular criterion used by recruiters (Gammie, 1996)	0 - no 1 - yes	**52**
87 NO. SPO - U	Number of sports/ interests undertaken at university	Development of variable above	1 - 1 interest 2 - 2 interests etc	**52**
88 NO CLUG - U	Number of memberships of clubs, societies and/or teams at university	Seen as a demonstration of ability to work in a team, Harvey-Cook (1995)	0 - none 1 - 1 membership 2 - 2 memberships etc	**52**

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
89 **SPOHRS - U**	Number of hours per week spent on sports/ interests at university	Related variable to theme of outside interests	0 - no interests 1 - 0-5 hours 2 - 6-10 hours 3 - 11-15 hours 4 - 16-20 hours 5 - 21-25 hours 6 - 26-30 hours 7 - 31-35 hours 8 - 36-40 hours	**52**
90 **SPORES - U**	Positions of responsibility held whilst at university	Training provider application forms	0 - none 1 - 1 position 2 - 2 positions etc	**52**
91 **ATHPRZ - U**	Number of athletic prizes awarded at university	Training provider application forms	0 - none 1 - 1 prize 2 - 2 prizes etc	**53**
92 **ABROAD - U**	Number of times abroad during university education	Training provider application forms	0 - none 1 - once 2 - twice 3 - 3 times etc	**54**
	ICAS Education			
93 **UNI - CA**	Whether progressed directly from university to ICAS training	Training provider application forms	0 - no 1 - yes	**55**
94 **UNI - OTHER**	Reasons for not progressing directly	Supplementary variable	1 - unsure what wanted to do 2 - went into another job 3 - year out/time out 4 - other 5 - did not have a contract	**56**

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
95 PERIOD UCTIME UC	Months elapsed between finishing university and commencing CA contract	Supplementary variable	1 - 1 month 2 - 2 months etc	57
96 TIME UC	How was this time spent?	Supplementary variable	1 - travelling 2 - working 3 - other	**58**
97 STARTCA	Year training contract commenced	For information only	88 - 1988 89 - 1989 90 - 1990 etc	**59**
98 PROF EXAM	Number of subjects required to be sat at the professional stage	Percentage of exemption for GCC at ICAEW (Harvey-Cook, 1995)	0 - none 1 - 1 subject 2 - 2 subjects etc	**60/61**
	Employer History			
99 SIZE FIRM	Size of firm undertook Training contract with	Identify whether type of firm determines tenure	1 - multinational 2 - large 3 - medium 4 - small	**64**
100 DAYS - TRN	Days per year during training contract on additional training courses	Identify whether commitment to training and staff development determines tenure	0 - none 1 - < 3 days 2 - 3-6 days 3 - 7-10 days 4 - 11-14 days 5 - 15-21 days 6 - >21 days	**66**
101 FINISH CA	Year became member of ICAS	Filter variable	93 - 1993 94 - 1994 etc	**67**
102 STILL EMPL	Still employed by training provider		1 - yes 2 - no	**69**

Variable Number & Name	*Variable*	*Rationale for Inclusion*	*Method of Coding*	*Reference to Question Number*
103 WHY LEFT	Reasons why left training provider	Supplementary variable	1 - lack of further challenges/career progression 2 - wanted to move to industry 3 - offered another job 4 - made redundant/contract not renewed 5 - bad working 6 - other	**70**
104 POST JOB	Number of jobs after completion of training contract		1 - 1 job 2 - 2 jobs 3 - 3 jobs etc	**71**

APPENDIX 10

ORDINARY GRADUATES - COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
5.1323	0.0000***	AOGRADV	Number of A grades at O Grade
4.4897	0.0000***	OGRADESC	O grade score[1]
4.1749	0.0000***	TOTPTS2	Number of UCAS points obtained at Higher
3.4855	0.0005***	RESITYR2	Number of resits in 2nd year at University
3.1968	0.0014***	RESITYR3	Number of resits in 3rd year at University
3.1351	0.0017***	RESITYR1	Number of resits in 1st year at University
3.1068	0.0019***	HENGLISH	Grade in Higher English
2.9526	0.0032***	NOSUBRET	No of subjects retaken at Higher to improve grade
2.8229	0.0048***	HMATHS	Grade in Higher Mathematics
2.5948	0.0095***	LANGUAGE	Language Higher score[2]
2.4417	0.0146**	GENDER2	Respondent's gender
2.4248	0.0153**	NOLANGU	Number of Language Highers
2.2870	0.0222**	TOOKFR	Took French Higher
2.2024	0.0276**	UNITYPE	Type of University
1.8266	0.0678*	SCIENCE	Science Higher score[3]
1.6915	0.0907*	DONTHOB2	Whether sports/interests undertaken at University
1.6557	0.0978*	NOHOBBY	Number of sports/interests undertaken at School
1.6392	0.1012	DONTHOB	Whether sports/interests undertaken at School
1.6039	0.1087	ACTHRWK	Number of hours spent on sports etc at School
1.5572	0.1194	NOHOBBY2	Number of spots/interests undertaken at University
1.5256	0.1271	NOANALY	Number of analytical Highers
1.5243	0.1274	TEAM2	Whether undertook team sports at University
1.4529	0.1462	ANALYTIC	Analytical Higher score
1.4529	0.1462	NONONAN	Number of nonanalytical Highers
1.4330	0.1519	TOOKACC	Took Higher Accounts
1.2214	0.2219	ACTHRW2	Number of hours spent on sports etc at University
1.1609	0.2457	RELDEGRE	Whether degree relevant or not
1.0996	0.2715	SCHTOUNI	Whether progressed directly to University
1.0922	0.2748	TYPESCH	Type of School attended
1.0083	0.3133	PLACEMNT	Whether degree incorporated a placement
0.9137	0.3609	TEAM	Whether undertook team sports at School
0.8688	0.3850	AGECOMM	Age on commencing Training Contract
0.6598	0.5094	HIGHER	Number of Highers obtained
0.5376	0.5908	NOSCIENC	Number of Science Highers
0.4440	0.6570	CSYS	Number of SYS qualifications obtained
0.3465	0.7290	VACFINEM	Vacational job in a financial environment
0.0273	0.9782	POSTGRAD	Postgraduate qualification obtained
0.0250	0.9800	NONANAL	Nonanalytical higher score

Note *** = Significant at 1%.
** = Significant at 5%
* = Significant at 10%

[1] Based on 3 points for an A pass, 2 points for a B pass and 1 point for a C pass.
[2] Based on 6 points for each A pass, 5 points for each B pass, 4 points for each C pass, 3 points for each pass with no grade, 2 points for each D pass and 1 point for an E pass in French, German, Latin or other secondary language.
[3] Based on the same score as for language highers: 6points - A grade etc in Biology, Chemistry& Physics.

APPENDIX 11

ORDINARY GRADUATES - SPEARMAN CORRELATION COEFFICIENTS

	PFALL	AOGRADL	OGRADESC	RESITYR1	RESITYR2	RESITYR3	TOTPTS2	NOSUBRET	HMATHS	HENGLISH	NOLANGU	TOOKFR	UNITYPE	SCIENCE	DONTHOB2	NOHOBBY	GENDER2
AOGRADL	-.2686																
OGRADSC	-.2370	.9097															
RESITYR1	.1641	-.0827	-.0954														
RESITYR2	.1824	.0031	-.0293	.3202													
RESITYR3	.1673	-.0884	-.0969	.1735	.2830												
TOTPTS2	-.2183	.3379	.2668	.0333	-.0204	-.0570											
NOSUBRET	.1545	-.2608	-.2126	-.0319	-.0030	.0790	-.1137										
HMATHS	-.1478	.2874	.2201	.1237	.0614	.0027	.5096	-.1900									
HENGLISH	-.1626	.2097	.1489	-.0143	-.0636	-.0129	.5895	-.0949	.2546								
NOLANGU	-.1269	.0922	.0322	.0365	-.0413	-.0169	.2341	-.1113	.0395	.1693							
TOOKFR	-.1197	.0988	.0439	.0357	-.0272	-.0084	.1762	-.1062	.0381	.1336	.8861						
UNITYPE	.1153	-.2799	-.2196	-.1085	-.0344	-.0716	-.5651	.1714	.4151	-.3142	-.1440	-.1289					
SCIENCE	-.0956	.2555	.2053	.1502	.0437	.0362	.3867	-.0872	.3628	.1582	-.2470	-.2170	-.3653				
DONTHOB2	-.0885	-.0145	-.0174	-.0220	-.0152	-.1124	.0970	.0940	.0725	.0969	-.0112	.0267	-.0945	.1232			
NOHOBBY	-.0867	.0961	.0699	-.0345	-.0649	-.0303	.1111	.0077	.0333	.0645	.0615	.0547	-.1180	.1491	.2600		
GENDER2	-.1278	.1545	.1726	-.0990	-.0296	-.0827	.0088	-.0442	.0500	.0674	.1966	.2036	.0251	-.1658	-.1556	-.0683	
LANGUAGE	-.1358	.1277	.0564	.0364	-.0377	-.0263	.2879	-.1125	.0798	.2043	.9817	-.8696	-.1827	-.2170	-.0166	.0633	.2107

APPENDIX 12
SPEARMAN CORRELATION COEFFICIENTS

FULLY- ACCREDITED HONOURS GRADUATES

	Hons.awd	Jobacs	UCAS.5yr	Uni.CA
Jobacs	0.0255			
UCAS.5yr	0.4210	0.0189		
Uni.CA	0.0832	0.1833	0.0401	
Uniresit	0.0152	0.0747	0.0416	0.0734

NON-RELEVANT HONOURS GRADUATES

	Hons.awd	Jobacs.u	H.maths	UCAS.5yr
Jobacs.u	0.0686			
H.maths	0.0288	0.1069		
UCAS.5yr	0.0783	0.1823	0.4207	
Type.deg	0.1281	0.0672	0.1334	0.0405

FULLY- ACCREDITED ORDINARY GRADUATES

	A.pass.O	Jobacs	UCAS.5yr
Jobacs	0.0127		
UCAS.5yr	0.4045	0.0078	
Uniresit	0.0176	0.0652	0.0563

APPENDIX 13

PHASE II
NON-RELEVANT HONOURS GRADUATES (ONLY THOSE WHOM HAVE UNDERTAKEN THE PROFESSIONAL COURSE AT ICAS) - COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
2.5637	0.0104**	Jobs.Sch	Number of jobs undertaken whilst at school
1.9267	0.0540*	UCAS.Tot	Number of UCAS points obtained at Secondary School
1.8505	0.0642*	Placement	Whether degree incorporated a placement
1.8219	0.0685*	Illness	Any serious illness suffered
1.6684	0.0952*	No.CSYS	Number of Certificate in Sixth Year Studies undertaken
1.6171	0.1058	Mumlevel	Level of mother's occupation
1.6077	0.1079	Marital	Marital status
1.4204	0.1555	UCAS.Ana	Number of UCAS points obtained from analytical Highers
1.4052	0.1600	Agestart	Age on commencing training contract
1.3925	0.1638	Spohrs.U	Number of hours per week spent on sports/interests at university
1.2715	0.2036	Spohrs.S	Number of hours per week spent on sports/interests
1.2307	0.2184	Resit1Yr	Number of resits in first year at University
1.2100	0.2263	Fail.6yr	Number of subjects failed in 6th year at school
1.1862	0.2355	Hretaken	Number of subjects retaken at Higher to improve the grade
1.1659	0.2437	Type.Uni	Type of University attended
1.1283	0.2592	Postgrad	Whether post graduate qualification undertaken
1.1014	0.2707	Athprz.S	Number of athletic prizes awarded at school
1.0977	0.2723	Birthodr	Birth Order
1.0906	0.2755	Head.Sch	Headboy or girl at secondary school
1.0474	0.2949	H.Maths	Grade in Higher Mathematics
0.9798	0.3272	Jobacs.U	Number of jobs related to chartered accountancy whilst at university
0.9672	0.3334	No.Child	Number of children
0.9544	0.3399	No.Na	Number of non-analytical Highers taken
0.9520	0.3411	Jobacs.S	Number of jobs related to chartered accountancy whilst at school
0.9509	0.3417	Jobres.S	Number of jobs at school with responsibility for others
0.9167	0.3593	H.English	Grade in Higher English
0.8669	0.3860	Hons.Awd	Honours award
0.8616	0.3889	Gender	Gender
0.8541	0.3931	Health	State of general health
0.8132	0.4161	Dad.Job	Father's occupation
0.7892	0.4300	Abroad.U	Number of times abroad during university education
0.7313	0.4646	Spores.U	Positions of responsibility held whilst at university
0.7273	0.4670	Sch.Uni	Whether progressed directly to university from school
0.7146	0.4749	Athprz.U	Number of athletic prizes awarded at university
0.6619	0.5080	No.Ana	Number of analytical Highers taken
0.6414	0.5212	Noschool	Number of secondary schools attended
0.6126	0.5401	A.Pass.O	Number of O levels, O grades, GCSE's at A pass
0.6075	0.5435	Fail.4yr	Number of subjects failed in 4th year at school
0.6051	0.5451	Jobres.U	Number of jobs at university with responsibility for others
0.5774	0.5636	Siblings	Any siblings
0.5248	0.5997	UCAS.Lan	Number of languages Highers taken

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
0.4887	0.6251	UCAS.Na	Number of UCAS points obtained from non-analyticl Highers
0.4552	0.6489	No.Highr	Number of highers obtained at Secondary School
0.4301	0.6671	Jobs.Uni	Number of jobs undertaken whilst at university
0.4129	0.6797	No.Sci	Number of Certificate in Sixth Year Studies undertaken
0.3594	0.7193	Respon.U	Postion of responsibillity (other than sporting activity) held during university
0.3495	0.7267	Resit2yr	Number of resits in second year at University
0.3495	0.7267	Sport.S	Whether sports/interests undertaken at school
0.3405	0.7335	Type.deg	Type of degree awarded
0.3198	0.7491	No.Lan	Number of language Highers taken
0.3105	0.7562	Profexam	The number of subjects taken at the professional examination
0.2616	0.7937	H.Acs	Whether took Higher accounts or not
0.2303	0.8179	No.Spo.U	Number of sports/interests undertaken at university
0.2082	0.8351	Sixth.Yr	Remain at school for 6th year
0.1998	0.8416	Uni.CA	Whether progressed directly from university to ICAS training
0.1940	0.8462	Dadlevel	Level of father's occupation
0.1887	0.8503	Sport.U	Whether sports/interests undertaken at university
0.1706	0.8646	Posres.S	Number of positions of responsibility held during secondary school education
0.1312	0.8956	Score.O	O grade, standard grade and GCSE score
0.1211	0.9036	Acaprize	Number of academic prizes during secondary school education
0.1036	0.9175	No.Spo.S	Number of sports/interest undertaken at school
0.0803	0.9360	Abroad.S	Number of times abroad during secondary school education
0.0702	0.9440	Fail.5yr	Number of subjects failed in 5th year at school
0.0702	0.9440	Mum.Job	Mother's occupation
0.0529	0.9578	Noclub.U	Number of memberships of clubs, societies and/or teams at university
0.0465	0.9629	Type.sch	Type of School
0.0459	0.9634	UCAS.5yr	Number of ACCA points obtained at Higher in 5th year
0.0368	0.9706	UCAS.Sci	Number of UCAS points obtained from science Highers
0.0330	0.9737	Spores.S	Positions of responsibility held in relation to sports/interests at school
0.0074	0.9941	Noclub.S	Number of memberships of clubs, socieities and/or teams at school
0.0000	1.0000	Resit3yr	Number of resits in third year at University
0.0000	1.0000	Resit4yr	Number of resits in fourth year at university

Note: *** = significant at 1%
** = significant at 5%
* = significant at 10%

PHASE II

NON-RELEVANT HONOURS GRUADATES(ONLY THOSE WHOM HAVE UNDERTAKEN THE PROFESSIONAL COURSE AT ICAS) - COMPARATIVE STUDY OF MANN-WHITNEY SCORES - THE HOLD-OUT GROUP

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
2.5785	0.0099***	UCAS.Tot	Number of UCAS points obtained at Secondary School
2.5529	0.0107**	No.Child	Number of children
2.4100	0.0160**	Fail.6yr	Number of subjects failed in 6th year at school
2.0601	0.0394**	Resit1yr	Number of resits in first year at University
1.7053	0.0881*	Noschool	Number of secondary schools attended
1.6968	0.0897*	Hons.Awd	Honours award
1.5552	0.1199	No.CSYS	Number of Certificate in Sixth Year Studies undertaken
1.5092	0.1312	Abroad.S	Number of times abroad during secondary school education
1.4542	0.1459	Agestart	Age on commencing training contract
1.4392	0.1501	Siblings	Any siblings
1.2929	0.1960	Posres.S	Number of positions of responsibility held during secondary school education
1.2919	0.1964	Resit2yr	Number of resits in second year at University
1.2605	0.2075	Birthodr	Birth Order
1.2567	0.2089	Health	State of general health
1.2130	0.2251	Gender	Gender
1.1915	0.2334	Type.deg	Type of degree awarded
1.1541	0.2485	Acaprize	Number of academic prizes during secondary school education
1.1533	0.2488	Head.Sch	Headboy or girl at secondary school
1.1470	0.2514	No.Highr	Number of highers obtained at Secondary School
1.0975	0.2724	UCAS.Ana	Number of UCAS points obtained from analytical Highers
1.0815	0.2795	UCAS.Sci	Number of UCAS points obtained from science Highers
1.0770	0.2815	Marital	Marital status
1.0555	0.2912	UCAS.5y	Number of ACCA points obtained at Higher in 5th year
1.0401	0.2983	No.Sci	Number of Certificate in Sixth Year Studies undertaken
0.9945	0.3200	Jobacs.S	Number of jobs related to chartered accountancy whilst at school
0.9945	0.3200	Mum.Job	Mother's occupation
0.9939	0.3202	A.Pass.O	Number of O levels, O grades, GCSE's at A pass
0.8953	0.3706	Score.O	O grade, standard grade and GCSE score
0.8851	0.3761	Sch.Uni	Whether progressed directly to university from school
0.8458	0.3977	Dad.Job	Father's occupation
0.7834	0.4334	Mumlevel	Level of mother's occupation
0.7725	0.4398	Placement	Whether degree incorporated a placement
0.7725	0.4398	Postgrad	Whether post graduate qualification undertaken
0.7475	0.4548	No.Lan	Number of language Highers taken
0.7066	0.4798	Spores.U	Positions of responsibility held whilst at university
0.6504	0.5155	H.Acs	Whether took Higher accounts or not
0.6437	0.5198	Profexam	The number of subjects taken at the professional examination
0.6430	0.5202	Spores.S	Positions of responsibility held in relation to sports/interests at school
0.6281	0.5299	Sixth.Yr	Remain at school for 6th year
0.6241	0.5326	H.Maths	Grade in Higher Mathematics
0.5328	0.5942	Fail.4yr	Number of subjects failed in 4th year at school
0.5328	0.5942	Fail.5yr	Number of subjects failed in 5th year at school

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
0.5272	0.5980	No.Spo.U	Number of sports/interests undertaken at university
0.5169	0.6052	Athprz.U	Number of athletic prizes awarded at university
0.4906	0.6237	Respon.U	Postion of responsibility (other than sporting activity) held during university
0.4792	0.6318	Spohrs.S	Number of hours per week spent on sports/interests
0.4627	0.6436	No.Ana	Number of analytical Highers taken
0.4346	0.6639	Noclub.U	Number of memberships of clubs, societies and/or teams at university
0.4024	0.6874	Dadlevel	Level of father's occupation
0.3878	0.6982	No.Spo.S	Number of sports/interest undertaken at school
0.3816	0.7027	UCAS.Lan	Number of languages Highers taken
0.3542	0.7232	Abroad.U	Number of times abroad during university education
0.3519	0.7249	Type.sch	Type of School
0.3514	0.7253	Jobres.U	Number of jobs at university with responsibility for others
0.3348	0.7378	Jobres.S	Number of jobs at school with responsibility for others
0.3149	0.7528	Uni.CA	Whether progressed directly from university to ICAS training
0.2997	0.7644	Athprz.S	Number of athletic prizes awarded at school
0.2685	0.7883	Jobacs.U	Number of jobs related to chartered accountancy whilst at university
0.2163	0.8288	UCAS.Na	Numver of UCAS points obtained from non-analytical Highers
0.1784	0.8584	Spohrs.U	Number of hours per week spent on sports/interests at university
0.1612	0.8719	Jobs.Uni	Number of jobs undertaken whilst at university
0.0934	0.9256	Noclub.S	Number of memberships of clubs, socieities and/or teams at school
0.0566	0.9549	Jobs.Sch	Number of jobs undertaken whilst at school
0.0552	0.9560	Sport.S	Whether sports/interests undertaken at school
0.0552	0.9560	Type.Uni	Type of University attended
0.0431	0.9657	Hretaken	Number of subjects retaken at Higher to improve the grade
0.0421	0.9665	No.Na	Number of non-analytical Highers taken
0.0342	0.9656	Sport.U	Whether sports/interests undertaken at university
0.0302	0.9759	H.English	Grade in Higher English
0.0294	0.9766	Illness	Any serious illness suffered
0.0000	1.0000	Resit3yr	Number of resits in third year at University
0.0000	1.0000	Resit4yr	Number of resits in fourth year at university

Note: *** = significant at 1%
** = significant at 5%
* = significant at 10%

APPENDIX 14
HONOURS PREDICTIONS

Student number	Student's prediction	Course leader	4th year tutor	1st year tutor	Teaching member	Actual performance
15	2.1 (g)	1st	1st	1st	1st	76
37	2.1(g)	1st	1st	1st	1st	75
24	2.2 (m)	2.1 (g)	2.1 (m)	2.1 (m)	2.1 (g)	73
23		2.1/2.2	2.1 (l)	2.1 (l)	2.1 (g)	73
20	2.1 (g)	1st/2.1	1st	1st	1st	72
5	2.1 (g)	2.1 (g)	1st/2.1	2.1 (g)	1st/2.1	72
39	1st/2.1	1st	2.1 (g)	2.1 (g)	1st	71
7	2.1 (m)	2.1 (g)	2.1 (m)	2.1 (g)	1st/2.1	70
28	2.1 (l)	2.1 (m)	2.1 (m)	2.1 (l)	1st/2.1	69
10	1st/2.1	2.1 (g)	2.1 (g)	2.1 (g)	1st/2.1	67
11	2.1/2.2	1st/2.1	1st/2.1	1st	1st	66
3	2.1/2.2	2.1 (m)	1st/2.1	2.1 (g)	2.1 (g)	66
36	2.1/2.2	2.2/3rd	2.2 (g)	2.2 (l)	2.2 (m)	65
16	2.1 (m)	1st/2.1	2.1 (g)	2.1 (g)	1st/2.1	65
14	2.1/2.2	2.1 (m)	2.1 (l)	2.1/2.2	2.1 (g)	63
1	2.1 (l)	2.1 (m)	2.1 (m)	2.1 (m)	2.1 (g)	63
19	2.1 (l)	2.1 (l)	2.1/2.2	2.2 (g)	2.1 (l)	62
38	2.1 (l)	3rd	3rd	2.2 (l)	2.2 (g)	61
27	2.1 (l)	3rd	2.2 (l)	2.2 (l)	2.2 (m)	61
12	2.1 (g)	2.1 (l)	2.1 (m)	2.1 (g)	2.1 (l)	61
8	2.1 (m)	2.1 (g)	2.1 (m)	2.1 (m)	2.1 (g)	61
31	2.1 (m)	2.1 (m)	2.1 (m)	2.1 (l)	2.1 (m)	60
17	2.2 (g)	2.2 (g)	2.2 (m)	2.2 (m)	2.1 (l)	60
40	2.1 (l)	2.2 (m)	2.2 (l)	2.2 (g)	2.1 (m)	59
34	2.1/2.2	2.1 (l)	2.1 (l)	2.1 (l)	2.1 (l)	59
18	2.2 (g)	2.2 (l)	2.2 (m)	2.2 (m)	2.2 (m)	59
26	2.1/2.2	3rd	2.2/3rd	2.2/3rd	2.2 (l)	58
29	2.2 (m)	3rd	2.2/3rd	2.2 (m)	2.2 (l)	56
42	2.1 (m)	3rd	3rd	2.2 (l)	2.2 (m)	55
9		3rd	3rd	2.2 (l)	3rd	55
30	2.1/2.2	2.2 (g)	2.2 (m)	2.2 (m)	2.2 (m)	54
33	2.1 (m)	2.1/2.2	2.1/2.2	2.1/2.2	2.1/2.2	52
22	2.1 (l)	3rd	3rd	3rd	2.2/3rd	52
2	2.1 (l)	2.2 (g)	2.2 (g)	2.2 (l)	2.2 (m)	52
21	2.2 (m)	2.2 (l)	2.2 (l)	2.2 (g)	2.2 (m)	51
6	2.2 (m)	3rd	3rd	2.2/3rd	2.2/3rd	51
35	2.2/3rd	Fail - un	Fail	Fail - un	2.2/3rd	47
32		Fail	2.2 (l)	Fail - un	2.2/3rd	Unclassified
41	2.2 (m)	3rd	2.2/3rd	2.2/3rd	-	Transfered
25	2.2 (m)	3rd	2.2/3rd	2.2/3rd	-	Transfered
13	2.1/2.2	Fail - un	Fail - un	Fail - un	-	Transfered

APPENDIX 15

FULLY-ACCREDITED HONOURS GRADUATES
COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
3.8998	0.0001***	Hons.Awd	Honours award
3.1740	0.0020***	Jobacs	Number of jobs related to chartered accountancy whilst at school and University
3.0511	0.0023***	Jobacs.U	Number of jobs related to chartered accountancy whilst at university
2.5008	0.0124**	UCAS.5y	Number of UCAS points obtained at Higher in 5th year
2.1620	0.0306**	Uni.CA	Whether progressed directly from university to ICAS training
2.0066	0.0448**	Resit3yr	Number of resits in third year at University
1.8947	0.0581*	H.Maths	Grade in Higher Mathematics
1.8809	0.0588*	Dad.Job	Father's occupation
1.8408	0.0657*	Jobres.S	Number of jobs at school with responsibility for others
1.7917	0.0732*	Placemnt	Whether degree incorporated a placement
1.6024	0.1091	Siblings	Any siblings
1.5923	0.1113	Abroad.S	Number of times abroad during secondary school education
1.5717	0.1160	UCAS.Tot	Number of UCAS points obtained at Secondary School
1.4858	0.1373	Acaprize	Number of academic prizes during secondary school education
1.4284	0.1532	Illness	Any serious illness suffered
1.3635	0.1727	Noschool	Number of secondary schools attended
1.3469	0.1780	Jobs.Uni	Number of jobs undertaken whilst at university
1.2300	0.2187	Birthodr	Birth Order
1.1527	0.2490	Mum.Job	Mother's occupation
1.1309	0.2581	UCAS.Sci	Number of UCAS points obtained from science Highers
1.0800	0.2801	Jobs.Sch	Number of jobs undertaken whilst at school
1.0177	0.3088	No.CSYS	Number of Certificate in Sixth Year Studies undertaken
1.0033	0.3157	Jobacs.S	Number of jobs related to chartered accountancy whilst at school
0.9884	0.3230	Noclub.S	Number of memberships of clubs, socieities and/or teams at school
0.9742	0.3300	Mumlevel	Level of mother's occupation
0.8965	0.3700	Agestart	Age on commencing training contract
0.8806	0.3785	Type.Uni	Type of University attended
0.8616	0.3889	H.English	Grade in Higher English
0.8514	0.3945	No.Ana	Number of analytical Highers taken
0.8314	0.4058	No.Lan	Number of languages Highers taken
0.8314	0.4058	Score.O	O grade, standard grade and GCSE score
0.8199	0.4123	Dadlevel	Level of father's occupation
0.8165	0.4142	No.Spo.S	Number of sports/interest undertaken at school
0.8013	0.4230	No.Highr	Number of highers obtained at Secondary School
0.7972	0.4254	Head.Sch	Headboy or girl at secondary school
0.7670	0.4431	Fail.5yr	Number of subjects failed in 5th year at school
0.7661	0.4436	Sixth.Yr	Remain at school for 6th year
0.7005	0.4836	Sport.U	Whether sports/interests undertaken at university
0.6970	0.4858	A.Pass.o	Number of O levels, O grades, GCSE's at A pass
0.6911	0.4895	Sport.S	Whether sports/interests undertaken at school
0.6480	0.5170	Unirest	Number of resits in at University during second and third year
0.6173	0.5370	Abroad.U	Number of times abroad during university education
0.5795	0.5623	Health	State of general health
0.5776	0.5636	H.Acs	Whether took Higher accounts or not
0.5540	0.5796	Resit1Yr	Number of resits in first year at University
0.5395	0.5895	Spores.S	Positions of responsibility held in relation to sports/interests at school

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
0.5275	0.5978	Type.sch	Type of School
0.5017	0.6159	Marital	Marital status
0.4818	0.6299	Hretaken	Number of subjects retaken at Higher to improve the grade
0.4649	0.6420	Noclub.U	Number of memberships of clubs, societies and/or teams at university
0.4200	0.6745	Respon.U	Postion of responsibillity (other than sporting activity) held during university
0.4120	0.6804	Spores.U	Positions of responsibility held whilst at university
0.3539	0.7235	Fail.6yr	Number of subjects failed in 5th year at school
0.3393	0.7344	Fail.4yr	Number of subjects failed in 4th year at school
0.3378	0.7355	Jobres.U	Number of jobs at university with responsibility for others
0.3194	0.7494	UCAS.Na	Number of UCAS points obtained from analytical Highers
0.2819	0.7780	No.Na	Number of non-analytical Highers taken
0.2413	0.8093	Athprz.S	Number of athletic prizes awarded at school
0.2079	0.8353	Resit2yr	Number of resits in second year at university
0.1981	0.8429	Posres.S	Number of positions of responsibility held during secondary school education
0.1952	0.8453	Sch.Uni	Whether progressed directly to university from school
0.1867	0.8519	Athprz.U	Number of athletic prizes awarded at university
0.1691	0.8657	UCAS.Lan	Number of language Highers taken
0.1640	0.8697	Spohrs.U	Number of hours per week spent on sports/interests at university
0.1202	0.9044	No.Sci	Number of Certificate in Sixth Year Studies undertaken
0.1161	0.9706	Gender	Gender
0.1103	0.9122	Spohrs.S	Number of hours per week spent on sports/interests at school
0.0987	0.9214	UCAS.ANA	Number of UCAS points obtained from non-analyticl Highers
0.0888	0.9292	No.Spo.U	Number of sports/interests undertaken at university
0.0000	1.000	No Child	Number of children
0.0000	1.0000	Postgrad	Whether post graduate qualification undertaken
0.0000	1.0000	Resity4yr	Number of resits in fourth year at university

Note: *** = significant at 1%
** = significant at 5%
* = significant at 10%

APPENDIX 16

FULLY-ACCREDITED HONOURS GRADUATES
SPEARMAN CORRELATION CO-EFFICIENTS

	Hons.awd	Placemnt	Uni.CA	Resit3Yr	Jobacs	Dad.Job	UCAS5yr	HMaths	Jobres.s
Placemnt	0.082								
Uni.CA	0.088	0.066							
Resit3Yr	0.147	0.027	0.029						
Jobacs	0.005	0.069	0.166	0.077					
Dad.Job	0.074	0.036	0.091	0.056	0.022				
UCAS5yr	0.420	0.110	0.037	0.135	0.017	0.084			
H.Maths	0.263	0.118	0.086	0.172	0.035	0.011	0.488		
Jobres.s	0.090	0.263	0.001	0.040	0.086	0.077	0.090	0.110	
Jobacs.u	0.012	0.110	0.164	0.076	0.985	0.013	0.013	0.050	0.110

APPENDIX 17

FULLY-ACCREDITED ORDINARY GRADUATES
COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
3.1518	0.0016***	Uniresit	Number of resits in at University during second and third year
2.5816	0.0098***	Jobacs.u	Number of jobs related to chartered accountancy whilst at university
2.5447	0.0109**	Resit2yr	Number of resits in second year at university
2.5308	0.0114**	Jobacs	Number of jobs related to chartered accountancy whilst at school and University
2.2482	0.0246**	Resit3yr	Number of resits in third year at university
2.1027	0.0355**	H.Acs	Whether took Higher accounts or not
2.0273	0.0426**	Acaprize	Number of academic prizes during secondary school education
1.7927	0.0730*	Uni.CA	Whether progressed directly from university to ICAS training
1.7861	0.0741*	Score.O	O grade, standard grade and GCSE score
1.6983	0.0894*	Respon.u	Number of positions of responsibility whilst at university
1.6545	0.0980*	Sport.s	Whether sports/interests undertaken at school
1.6184	0.1056	Dad.Job	Father's occupation
1.6050	0.1085	A.Pass.o	Number of O levels, O grades, GCSE's at A pass
1.5221	0.1280	UCAS.Tot	Number of UCAS points obtained at Secondary School
1.4941	0.1351	Spores.u	Positions of responsibility held in relation to sports/interests at university
1.4937	0.1352	Jobacs.s	Number of jobs related to chartered accountancy whilst at school
1.3862	0.1657	UCAS.ana	Number of UCAS points obtained from analytical Highers
1.3772	0.1684	Sport.u	Whether sports/interests undertaken at university
1.3688	0.1711	No.Sci	Number of science Highers taken
1.3679	0.1714	Fail.4yr	Number of subjects failed in 4th year at school
1.2896	0.1972	Jobres.u	Number of jobs at university with reponsibility for others
1.2504	0.2112	Abroad.U	Number of times abroad during university education
1.1577	0.2470	Mumlevel	Level of mother's occupation
1.1512	0.2496	UCAS.5y	Number of UCAS points obtained at Higher in 5th year
1.0603	0.2890	Spohrs.s	Number of hours per week spent on sports/interests at school
1.0506	0.2934	H.Maths	Grade in Higher Mathematics
1.0387	0.2989	No.Lan	Number of languages Highers taken
0.9843	0.3250	Spohrs.u	Number of hours per week spent on sports/interests at university
0.9736	0.3303	UCAS lan	Number of UCAS points obtained from language Highers
0.9721	0.3310	Sch.Uni	Whether progressed directly from school to university
0.9349	0.3498	Postgrad	Whether a postgraduate qualification was undertaken
0.8908	0.3730	Type.uni	Type of University attended
0.8636	0.3878	No.CSYS	Number of Certificate in Sixth Year Studies undertaken
0.8437	0.3988	Resit1yr	Number of resits in first year at university
0.8389	0.4015	H.English	Grade in Higher English
0.8144	0.4154	No.Spo.U	Number of sports/intersts undertaken at university
0.7968	0.4256	Illness	Any serious illness suffered
0.7750	0.4383	Noclub.U	Number of memberships of clubs, socieities and/or teams at university
0.7571	0.4490	Mum.Job	Mother's occupation
0.7195	0.4719	Head.Sch	Headboy or girl at secondary school
0.7154	0.4744	Fail.6yr	Number of subjects failed in 6th year at school
0.7114	0.4768	Agestart	Age on commencing training contract
0.6842	0.4938	Health	State of general health
0.6662	0.5053	Dadlevel	Level of father's occupation
0.6652	0.5059	Jobs.Uni	Number of jobs undertaken whilst at university
0.6587	0.5101	Birthodr	Birth Order
0.6443	0.5194	Abroad.S	Number of times abroad during secondary school education

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
0.6144	0.5389	Marital	Marital status
0.5847	0.5587	Hretaken	Number of Highers retaken to improve the grade
0.5650	0.5721	Fail.5yr	Number of subjects failed in 5th year at school
0.4672	0.6403	Posres.s	Number of positions of responsibility whilst at school
0.4302	0.6671	UCAS.sci	Number of UCAS points obtained from science Highers
0.4073	0.6838	No.Ana	Number of analytical Highers taken
0.3957	0.6923	Noschool	Number of secondary schools attended
0.3928	0.6945	Spores.s	Positions of responsibility held in relation to sports/interests at school
0.3522	0.7247	Athprz.U	Number of athletic prizes awarded at university
0.3377	0.7356	Placemnt	Whether degree incorporated a placement
0.3360	0.7369	No.Spo.S	Number of sports/interest undertaken at school
0.3192	0.7496	Sixth.Yr	Remain at school for 6th year
0.3036	0.7614	Jobs.Sch	Number of jobs undertaken whilst at school
0.2815	0.7783	No.Na	Number of non-analytical Highers taken
0.1852	0.8531	Siblings	Any siblings
0.1381	0.8902	UCAS.na	Number of UCAS points obtained from non-analytical Highers
0.1259	0.8998	Noclub.S	Number of memberships of clubs, socieities and/or teams at school
0.1079	0.9141	No.child	Number of children
0.1073	0.9146	Type.sch	Type of School
0.0524	0.9582	Jobres.s	Number of jobs at school with responsibility for others
0.0318	0.9747	No.Highr	Number of highers obtained at Secondary School
0.0276	0.9780	Gender	Gender
0.0156	0.9875	Athprz.S	Number of athletic prizes awarded at school

Note: *** = significant at 1%
** = significant at 5%
* = significant at 10%

APPENDIX 18

FULLY-ACCREDITED ORDINARY GRADUATES
SPEARMAN CORRELATION CO-EFFICIENTS

Sport.s	0.031									
Acaprize	0.081	0.075								
H.Acs	0.077	0.002	0.017							
Resit2yr	0.024	0.012	0.035	0.104						
Resit3yr	0.039	0.062	0.103	0.028	0.234					
Jobacs.U	0.044	0.010	0.090	0.056	0.063	0.031				
Uniresit	0.028	0.045	0.072	0.085	0.876	0.674	0.058			
Jobacs	0.051	0.004	0.093	0.093	0.065	0.042	0.955	0.065		
Uni.CA	0.058	0.048	0.008	0.032	0.243	0.050	0.052	0.218	0.058	
Respon.U	0.074	0.167	0.014	0.020	0.011	0.004	0.079	0.015	0.093	0.024
	Score0	Sport.s	Acaprize	H.Acs	Resit2yr	Resit3yr	Jobacs.U	Uniresit	Jobacs	Uni.CA

APPENDIX 19

SPEARMAN CORRELATION CO-EFFICIENTS
MULTINATIONAL TRAINEES WHO REMAIN WITH THEIR TRAINING PROVIDER FOR AT LEAST 18 MONTHS POST-QUALIFICATION

	Athpsu	Deg.accr	UCAS.5yr	Hons.deg	Nosposu	Type.uni	Respons
Deg.accr	0.0889						
UCAS.5yr	0.0400	0.0125					
Hons.deg	0.1017	0.3510	0.1050				
Nosposu	0.3092	0.1692	0.0200	0.1679			
Type.uni	0.0982	0.0672	0.1927	0.1143	0.0283		
Respons	0.2672	0.0777	0.0911	0.0113	0.3813	0.0503	
Responu	0.2460	0.1897	0.0639	0.1543	0.3178	0.0657	0.2650

APPENDIX 20

PHASE II
MULTINATIONAL TRAINEES WHO CHOOSE TO REMAIN WITH THEIR TRAINING PROVIDER FOR 18 MONTHS POST-QUALIFICATION - COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
2.1473	0.0318**	No.Spo.U	Number of sports/interests undertaken at university
2.0978	0.0359**	Noschool	Number of secondary schools attended
2.0599	0.0394**	H.Acs	Whether took Higher accounts or not
1.9102	0.0561*	No.Highr	Number of highers obtained at Secondary School
1.8408	0.0656*	No.Child	Number of children
1.7445	0.0811*	Sport.U	Whether sports/interests undertaken at university
1.6507	0.0988*	No.Na	Number of non-analytical Highers taken
1.6024	0.1091	Athprz.S	Number of athletic prizes awarded at school
1.4735	0.1406	Areahome	Area of family residence
1.4330	0.1518	Jobs.Uni	Number of jobs undertaken whilst at university
1.3110	0.1899	UCAS.Sci	Number of UCAS points obtained from science Highers
1.2780	0.2013	A.Pass.O	Number of O levels, O grades, GCSE's at A pass
1.2399	0.2150	Spores.S	Positions of responsibility held in relation to sports/interests at school
1.1973	0.2312	Hretaken	Number of subjects retaken at Higher to improve the grade
1.1568	0.2474	Profexam	Number of subjects required to be taken at the professional stage
1.1482	0.2509	UCAS.Ana	Number of UCAS points obtained from analytical Highers
1.1374	0.2554	Score.O	O grade, standard grade and GCSE score
1.1371	0.2555	Hons.Awd	Honours award
1.0603	0.2890	Noclub.U	Number of memberships of clubs, societies and/or teams at university
1.0588	0.2897	Mumlevel	Level of mother's occupation
1.0516	0.2930	Spores.U	Positions of responsibility held whilst at university
1.0185	0.3085	H.English	Grade in Higher English
1.0000	0.3173	Resit4y	Number of resits in fourth year at university
0.9789	0.3276	UCAS.5y	Number of UCAS points obtained at Higher in 5th year
0.9784	0.3279	Abroad.U	Number of times abroad during university education
0.9683	0.3329	No.Sci	Number of Certificate in Sixth Year Studies undertaken
0.9659	0.3341	Spohrs.U	Number of hours per week spent on sports/interests at university
0.9569	0.3386	Nationty	Nationality
0.9483	0.3430	Degree	Hold a degree qualification
0.9471	0.3436	Acaprize	Number of academic prizes during secondary school education
0.9118	0.3619	No.Ana	Number of analytical Highers taken
0.8881	0.3745	Agestart	Age on commencing training contract
0.8683	0.3852	No.CSYS	Number of Certificate in Sixth Year Studies undertaken
0.8285	0.4074	Illness	Any serious illness suffered
0.8024	0.4223	Type.deg	Whether degree of an analytical nature
0.7875	0.4310	Jobs.Sch	Number of jobs undertaken whilst at school
0.7874	0.4310	Siblings	Any siblings
0.7848	0.4326	Hons.deg	Whether an honours degree undertaken
0.7725	0.4398	Athprz.U	Number of athletic prizes awarded at university
0.7440	0.4569	Placement	Whether degree incorporated a placement

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
0.7440	0.4569	Postgrad	Whether post graduate qualification undertaken
0.7194	0.4719	No.Spo.S	Number of sports/interest undertaken at school
0.7127	0.4761	Noclub.S	Number of memberships of clubs, socieities and/or teams at school
0.7067	0.4798	Resit3yr	Number of resits in third year at University
0.6775	0.4981	Resit2y	Number of resits in second year at University
0.6045	0.5455	Sport.S	Whether sports/interests undertaken at school
0.5933	0.5530	Deg.Accr	Whether degree fully accredited or not
0.5918	0.5540	Respon.U	Postion of responsibillity (other than sporting activity) held during university
0.5733	0.5664	Posres.S	Number of positions of responsibility held during secondary school education
0.5391	0.5898	Gender	Gender
0.5260	0.5989	Health	State of general health
0.5127	0.6082	UCAS.Lan	Number of languages Highers taken
0.4905	0.6238	Uni.CA	Whether progressed directly from university to ICAS training
0.4879	0.6256	Jobsacs.S	Number of jobs related to chartered accountancy whilst at school
0.4687	0.6393	Resit1yr	Number of resits in first year at University
0.4396	0.6602	Type.sch	Type of School
0.4303	0.6670	Sixth.Yr	Remain at school for 6th year
0.4258	0.6702	Fail.6yr	Number of subjects failed in 5th year at school
0.4031	0.6868	Jobacs.U	Number of jobs related to chartered accountancy whilst at university
0.3781	0.7054	Jobres.S	Number of jobs at school with responsibility for others
0.3672	0.7135	Head.Sch	Number of jobs undertaken whilst at school
0.3623	0.7172	Birthodr	Birth Order
0.3390	0.7346	H.Maths	Grade in Higher Mathematics
0.3316	0.7402	Fail.5yr	Number of subjects failed in 5th year at school
0.2863	0.7747	UCAS.Tot	Number of UCAS points obtained at Secondary School
0.2709	0.7864	No.Lan	Number of language Highers taken
0.2282	0.8195	Days.trn	Days per year during training contract on additional courses
0.2259	0.8213	Dad.Job	Father's occupation
0.1879	0.8509	Type.Uni	Type of University attended
0.1838	0.8541	Marital	Marital status
0.1441	0.8854	Spohrs.S	Number of hours per wiik spent on sports/interests
0.1219	0.9029	Fail.4yr	Number of subjects failed in 4th year at school
0.1119	0.9109	UCAS.Na	Numver of UCAS points obtained from non-analytical Highers
0.1111	0.9116	Jobres.U	Number of jobs at university with responsibility for others
0.0842	0.9329	Sch.Uni	Whether progressed directly to university from school
0.0813	0.9352	Dadlevel	Level of father's occupation
0.0544	0.9567	Mum.Job	Mother's occupation
0.0463	0.9631	Pass 1st	Pass all the ICAS examinations at the first attempt
0.0326	0.9740	Abroad.S	Number of times abroad during secondary school education

Note: *** = significant at 1%
** = significant at 5%
* = significant at 10%

APPENDIX 21

SPEARMAN CORRELATION CO-EFFICIENTS

MULTINATIONAL TRAINEES - STAY OR LEAVE WITHIN 18 MONTHS POST QUALIFICATION

	No.spo.U	Noschool	H.Acs	No.Higher	No.child	Sport.U
No.school	0.0466					
H.Acs	0.1421	0.0875				
No.Higher	0.1263	0.0693	0.3179			
No.child	0.0387	0.0316	0.0082	0.0939		
Sport.U	0.7338	0.0523	0.0706	0.0913	0.0327	
No.NA	0.0974	0.0546	0.0574	0.3600	0.0289	0.1061

MULTINATIONAL TRAINEES - STAY OR LEAVE TO PURSUE CAREER IN INDUSTRY

	Spohrs.u	No.Spo.U	Sport.U	UCAS.Sc	Acaprize	No.Na	Noschool	Noclub.U
No.Spo.U	0.4419							
Sport.U	0.5858	0.7284						
UCAS.Sc	0.0890	0.1979	0.1258					
Acaprize	0.0111	0.0753	0.0341	0.0242				
No.Na	0.0561	0.1271	0.0911	0.2946	0.0565			
Noschool	0.0164	0.0408	0.0317	0.0937	0.0079	0.0452		
Noclub.U	0.5187	0.6617	0.5854	0.0833	0.0558	0.0293	0.0620	
No.child	0.1210	0.0273	0.0368	0.0277	0.0718	0.1154	0.0194	0.0873

APPENDIX 22

MULTINATIONAL TRAINEES WHO CHOOSE TO REMAIN WITH THEIR TRAINING PROVIDER FOR 18 MONTHS POST-QUALIFICATION COMPARED TO THOSE WHO LEFT TO PURSUE A CAREER IN INDUSTRY - COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
2.4343	0.0149**	Spohrs.U	Number of hours per week spent on sports/interests at university
2.4146	0.0158**	No.Spo.U	Number of sports/interests undertaken at university
2.1762	0.0295**	Sport.U	Whether sports/interests undertaken at university
2.1444	0.0320**	UCAS.Sci	Number of UCAS points obtained from science Highers
2.1066	0.0351**	Acaprize	Number of academic prizes during secondary school education
1.9770	0.0480**	No.Na	Number of non-analytical Highers taken
1.8410	0.0656*	Noschool	Number of secondary schools attended
1.8227	0.0683*	Noclub.U	Number of memberships of clubs, societies and/or teams at university
1.7383	0.0822*	No.Child	Number of children
1.5345	0.1249	Resit2y	Number of resits in second year at University
1.5206	0.1284	Jobs.Sch	Number of jobs undertaken whilst at school
1.5036	0.1327	No.Highr	Number of highers obtained at Secondary School
1.4987	0.1339	UCAS.5y	Number of UCAS points obtained at Higher in 5th year
1.3006	0.1934	Marital	Marital status
1.2414	0.2145	Spores.U	Positions of responsibility held whilst at university
1.2245	0.2208	No.Sci	Number of Certificate in Sixth Year Studies undertaken
1.1899	0.2341	H.Acs	Whether took Higher accounts or not
1.1724	0.2410	Resit3yr	Number of resits in third year at University
1.1467	0.2515	Type.deg	Whether degree of an analytical nature
1.1438	0.0478	No.CSYS	Number of Certificate in Sixth Year Studies undertaken
1.1289	0.2590	H.Maths	Grade in Higher Mathematics
1.1197	0.2628	Illness	Any serious illness suffered
1.1020	0.2705	H.English	Grade in Higher English
1.0991	0.2717	Type.Uni	Type of University attended
1.0799	0.2802	Respon.U	Postion of responsibility (other than sporting activity) held during university
1.0743	0.2827	Jobsacs.S	Number of jobs related to chartered accountancy whilst at school
1.0521	0.2928	Posres.S	Number of positions of responsibillity held during secondary school education
1.0126	0.3112	Fail.4yr	Number of subjects failed in 4th year at school
0.9492	0.3425	Profexam	Number of subjects required to be taken at the professional stage
0.8534	0.3934	Jobres.S	Number of jobs at school with responsibility for others
0.8518	0.3943	Gender	Gender
0.8486	0.3961	Health	State of general health
0.8199	0.4123	Score.O	O grade, standard grade and GCSE score
0.8070	0.4196	Areahome	Area of family residence
0.7854	0.4322	UCAS.Tot	Number of UCAS points obtained at Secondary School
0.7802	0.4353	Sch.Uni	Whether progressed directly to university from school
0.7663	0.4435	Fail.5yr	Number of subjects failed in 5th year at school
0.7451	0.4562	Abroad.U	Number of times abroad during university education
0.7288	0.4661	Spores.S	Positions of responsibility held in relation to sports/interests at school
0.7208	0.4711	Athprz.S	Number of athletic prizes awarded at school

Absolute Z Score	Level of Significance	Variable Name	Explanatory Variable
0.6925	0.4886	Fail.6yr	Number of subjects failed in 5th year at school
0.6629	0.5074	Mum.Job	Mother's occupation
0.6369	0.5242	UCAS.Na	Number of UCAS points obtained from non-analytical Highers
0.5953	0.5516	Resit4y	Number of resits in fourth year at university
0.5815	0.5609	Degree	Hold a degree qualification
0.5711	0.5679	Jobs.Uni	Number of jobs undertaken whilst at university
0.5604	0.5752	Uni.CA	Whether progressed directly from university to ICAS training
0.5387	0.5901	Dad.Job	Father's occupation
0.4658	0.6414	Dadlevel	Level of father's occupation
0.3817	0.7027	Athprz.U	Number of athletic prizes awarded at university
0.3769	0.7062	A.Pass.O	Number of O levels, O grades, GCSE's at A pass
0.3707	0.7108	Days.trn	Days per year during training contract on additional courses
0.3642	0.7157	Hretaken	Number of subjects retaken at Higher to improve the grade
0.3571	0.7210	Birthodr	Birth Order
0.3530	0.7241	Placement	Whether degree incorporated a placement
0.3266	0.7440	UCAS.Ana	Number of UCAS points obtained from analytical Highers
0.3232	0.7466	Nationty	Nationality
0.3116	0.7553	Type.sch	Type of School
0.3032	0.7618	Hons.Awd	Honours award
0.2827	0.7774	Head.Sch	Number of jobs undertaken whilst at school
0.2742	0.7839	Deg.Accr	Whether degree fully accredited or not
0.2686	0.7882	Spohrs.S	Number of hours per week spent on sports/interests
0.2522	0.8009	No.Lan	Number of language Highers taken
0.2507	0.8020	Resit1yr	Number of resits in first year at University
0.2246	0.8223	Agestart	Age on commencing training contract
0.2225	0.8239	No.Spo.S	Number of sports/interest undertaken at school
0.2168	0.8284	Noclub.S	Number of memberships of clubs, socieities and/or teams at school
0.2150	0.8297	Postgrad	Whether post graduate qualification undertaken
0.2087	0.8347	Sport.S	Whether sports/interests undertaken at school
0.1806	0.8566	Hons.deg	Whether an honours degree undertaken
0.1697	0.8652	Jobacs.U	Number of jobs related to chartered accountancy whilst at university
0.1599	0.8730	Abroad.S	Number of times abroad during secondary school education
0.1463	0.8837	Sixth.Yr	Remain at school for 6th year
0.1250	0.9005	Pass 1st	Pass all the ICAS examinations at the first attempt
0.0875	0.9303	Jobres.U	Number of jobs at university with responsibility for others
0.0831	0.9337	No.Ana	Number of analytical Highers taken
0.0494	0.9606	Mumlevel	Level of mother's occupation
0.0402	0.9679	UCAS.Lan	Number of languages Highers taken
0.0309	0.9754	Siblings	Any siblings

Note: *** = significant at 1%
** = significant at 5%
* = significant at 10%

APPENDIX 23

THE USE OF BIODATA TO DETERMINE CHARTERED ACCOUNTANCY EXAMINATION SUCCESS - PUBLISHED IN A COMPENDIUM : PAPERS PRESENTED TO THE FIRST BIENNIAL BIODATA CONFERENCE, ATHENS, GEORGIA, OCTOBER 1996

THE USE OF BIODATA TO DETERMINE CHARTERED ACCOUNTANCY EXAMINATION SUCCESS

ELIZABETH GAMMIE

Senior Lecturer - Accountancy Division

The Aberdeen Business School

The Robert Gordon University

INTRODUCTION

The importance of people can never be understated in an organisation. Selecting the right person for the job is not therefore about filling job vacancies,

> *'it is about building a workforce that is suitable and adaptable to suit the enterprise's changing needs'* (Plumbley: p.7, 1991).

The importance of selection in the accounting environment is of particular relevance as it is a service function that relies heavily on human resources. Its future depends on its ability to attract, train and retain the best and most capable people (Nelson, 1989).

The Recruitment Issue

Despite demographic changes (Institute of Manpower Studies (IMS) Graduate Review 1990), and Government funding restraints for Universities (Herriot, 1989), the accounting profession has not yet suffered a recruitment problem. Indeed an increasing proportion of graduates are entering the profession (Harvey, 1991). In addition the overall number of structured training places offered by firms training students under the Institute of Chartered Accountants of Scotland (ICAS) has declined in the recession, and it is debatable whether in the age of rationalisation and computerisation, the places lost will be replaced in better times. Thus, the ICAS training providers are facing the problem of how to select the 'best' graduates from the pool of fully accredited[1] and non-relevant[2] graduates that apply to their organisation.

Training Costs

A graduate entrant into a professional accountancy office constitutes a major investment involving substantial outlay to cover the costs of recruitment, training and replacement, (Tirbutt,

[1] Degrees which satisfy the ICAS requirements for accreditation and therefore contain a substantial element of accountancy and related subjects
[2] Degrees which have an insufficient input of accountancy and are therefore treated as non-relevant by ICAS

1989). This investment is particularly onerous for those organisations that offer accountancy training contracts to graduates, (Harvey-Cook and Taffler, 1987). They claim that although the trainee provides the firm with an important component of its workforce, the training contract represents a very substantial investment to the firm. The costs of training escalate, both in actual terms and opportunity cost terms if the graduate fails to proceed through the examination system without resits, or in fact fails to qualify as a chartered accountant altogether.

Accountancy firms are therefore very concerned about the ability of the students to pass their exams. This was demonstrated by Cameron (1991) who found that the big six accountancy firms ranked this criterion as either the first or second factor in the recruitment process.

This paper will therefore define a successful trainee as one who passes the professional accountancy examinations first time. Whilst it is appreciated that this definition of success is only one of many factors that will create a successful appointment, if a trainee fails to negotiate the examination hurdle then they can never proceed to demonstrate their full worth to the organisation.

LITERATURE REVIEW

The Recruitment and Selection Process

Graduate selection procedures evolve from the basic psychometric tradition which assumes that people can be described in terms of psychological constructs that explain their behaviour (Herriot, 1984). Psychometric procedures aim to predict an individual's job performance, by measuring individual character traits. These traits can be measured in a variety of forms with interviews, application forms and psychological tests being amongst those most easily recognised.

Inferences of characteristics are drawn from these vehicles, and suitability for employment is judged on the basis of these judgements.

The selection process requires interested graduates to complete application forms, which are used for pre-selecting those candidates for interview. Interviews take place which may be followed by further interviews, group exercises or other testing procedures. At each step in the selection process a decision must be made as to whether a candidate should be considered further, progress to the next step or be rejected. The final decision is then taken by the firm on whether to offer a training contract. Care must be taken however that the firms do not concentrate solely on this reduction of applicants to the requisite number without considering the social process of selection (Herriot, 1989). Not only does the applicant require to meet expectations, but the organisation must also fulfil the necessary requirements in the eyes of the applicant. This is of particular relevance to the chartered accountancy profession where there is little to differentiate firms of a synonymous size.

The Use of Biodata in Pre-Selection

The application form is used as the first step in the elimination process, to identify those candidates who are clearly unsuitable, those who are borderline, and those who appear to have a good chance of succeeding by matching the information on the application form against the perceived requirements of the organisation. Livy (1989) identifies three basic areas which any application form should cover.

1. Basic biographical facts (e.g. age, education, training, qualifications, domicile)
2. Work or occupational experience
3. Work interest patterns of the candidate in general

In an IMS survey (1988) on employee selection in the UK, it was found that 90% of respondents used application forms and of these, 81% used the forms to filter out unsuitable candidates with almost all of these believing that the application forms were reliable enough to predict job performance. Windgrove, Glendinning and Herriot (1984) express their concern on this reliance, stating that unless organisations can demonstrate that the information contained in the application form is predictive of job performance, preselection done in this way will appear haphazard and unsystematic, resulting in unreliable pre-screening. England (1971) however suggested that the application forms could be used actuarially, whereby data is collected from a large number of recruits and related statistically, in the manner of a conventional credit-scoring system to their subsequent job performances, appropriately measured. If the weights established are relatively constant over time, then the resulting model can be used to sift later application forms on a routine basis. The technique of using the information in this manner is known as biodata.

Owens (1976) frequently cited definition of biodata emphasises a predictive classical model of selection, namely that biodata are items which can be demonstrated to be related to success in occupational pursuits and therefore can be regarded as 'predictors' for the 'criterion' of success. This is supported by Taffler and Harvey-Cook (1987) who undertook a study into the selection methods of predominantly the larger professional accountancy firms based in London. They suggest that instead of accountancy firms making selective judgements on an intuitive basis from the application form, the biographical details on the very same form when processed by an appropriately developed statistical model could be very useful in forecasting subsequent performance. They state that for the accountancy profession

'Pre-selection is a vital stage in the recruitment process with firms possibly only able to interview 10-15% of those completing an application form....the

information on the application form generally has considerable influence upon decisions made at all stages in the selection process, and can represent a very powerful predictor of job performance. '(p104).

This situation of oversubscription is also evident for accountancy firms employing trainees who undertake the ICAS system (Gammie,1996). However despite the obvious importance of pre-selection, Taffler and Harvey-Cook (1987) found that only two firms used a structured check list scoring system as a decision aid for assessing applications and no firms were using formal statistical methods at the pre-selection stage.

The interest in the use of biodata in pre-selection for accountancy firms arises therefore from the need for a systematic and valid method to pre-screen applicants on the basis of biographical information which might be predictive of success on a chosen criterion, for example professional examination success (Strebler,1991). This is of particular relevance as accountancy firms, in line with other British companies (Robertson and Makin, 1986, Shackelton and Newell, 1991) then rely on the traditional interview (Gammie, 1996). This is despite the findings of Hunter and Hunter (1984) who found that in relation to the validity of some factors used for predicting performance for entry level jobs, the composite score for ability tests gave the highest mean validity, followed by biodata with interviews showing a very low correlation, and hence low validity.

Therefore, despite the importance of recruiting the right personnel, accountancy firms are screening application forms in a largely unscientific manner, followed by a traditional and often unstructured interview.

Candidate Attributes For Selection of Graduates

In the field of graduate recruitment, there have been a few studies of the relationship between candidate attributes and decisions taken by graduate recruiters, with the majority of the work carried out in USA, (Habbe, 1948, 1956; Dickinson, 1955; Sullivan, 1961; Carroll, 1966; Keenan and Scott, 1985). Other studies namely, Campion (1978) and Wingrove, Glendinning and Herriot (1984), have concentrated on the pre-selection decisions based on application form data. Notwithstanding differences between the studies there appears to be an underlying trend of previous academic achievement (however defined), extracurricular activities and work/vacation experience being related to the selection of graduates at either the interview or application form stage.

Criteria For Accountancy Trainee Selection

Previous research (Harvey-Cook and Taffler, 1987; Krzystofik and Fein, 1988; Gammie: 1996) indicates that academic performance is also a key criterion for selecting accountancy trainees. This would appear to follow the basic behavioural axiom on which biodata is developed, namely, that past behaviour is a good predictor of future behaviour (Owens, 1965).

However whilst there is evidence that previous academic achievement (however defined) may be indicative of future academic success, the question that needs addressing is which specific aspects are important. There is currently no published statistical evidence specifically related to ICAS trainees on which the firms can base their selection decisions. The firms therefore tend to rely on anecdotal evidence from their previous trainees which may result in unsystematic and invalid selection.

If firms were to combine respondent's answers from either an application form or interview based on statistical evidence, to produce a score analogous to that produced from a test, this use of background data should provide 'less biased information in a more economical fashion.' (Stokes and Reddy, 1992, p288). To this end a review of research studies predicting job performance is carried out below.

Predictive Studies in Accountancy Performance

As one of the main criticisms of biodata is the lack of generalizability, (Gunter et al: 1993, p.45) only studies specifically examining accountancy performance have been cited. This lack of generality reflects the largely a theoretical approach that is traditionally associated with biodata, and necessitates the development of keys specifically for the type of job and criterion chosen. Therefore although studies in other professions may be of interest, biographical keys with high validities in one profession may not be relevant in another.

Undergraduate Accounting Success

Predictive studies have been carried out in the accountancy field which may be of relevance, although apparently none as yet published in the United Kingdom. Several studies, mainly based in the USA have focused on the evaluation of prospective accounting students to undergraduate programmes, (McCormick and Montgomerie, 1974; Delaney et al, 1979; Buehlmann, 1975; Dockweiler and Willis, 1983; Clark and Sweeney, 1985; Eskew and Faley, 1988; Gul and Fong, 1993; Tho, 1994).

These studies relating to performance in undergraduate accounting programmes, suggest that previous academic performance is a statistically significant indicator of University performance, albeit that the criterion of success was defined differently in each case. Unfortunately due to the limited information supplied in the articles in respect of the independent variables, it is difficult to compare the predictor variables, and this is particularly the case in relation to those variables relating to Grade Point Scores (GPSA).

Professional Accountancy Success

Other studies of more relevance to this paper have concentrated on successful professional examination performance. The American Institute of Certified Public Accountants' Uniform Statistical Information Questionnaire studies have resulted in several publications regarding the relationship between certain attributes and professional examination performance, (Leathers, 1972; Reilly and Settler, 1972; Sanders, 1972; Leathers and Sullivan, 1978) although unfortunately many of these studies have been largely descriptive in nature. More recently however, Marcus Dunn and Hall (1984) undertook an empirical analysis of the relationships between CPA examination candidate attributes and candidate performance. The individual model R^2 values, which represent the measure of the goodness of fit of a particular model, (1.00 would represent a perfect fit), were .40 for audit, .40 for law, .50 for theory and .49 for practice. The evidence suggests that candidates with greater scholastic aptitude and higher accounting GPA tend to earn higher examination scores.

There appears to be only one study that has been completed in the UK on determinants of early career success of accountants, (Harvey-Cook, 1996)[3]. Concentrating on medium sized firms within the Institute of Chartered Accountants of England and Wales (ICAEW) and 'hard' items of biodata which are technically verifiable, the paper develops two stepwise logistic regression models from data found in non relevant trainees' applicant resumes in an attempt to differentiate successful and unsuccessful trainees. The first logit model examining professional examination

[3] The work of Harvey-Cook's Ph.D. has also been incorporated in the Taffler et al (1995) paper

success, identified six variables (mainly composed of academic items), which achieve good predictive results (x^2 = 71.93), this confirms the findings of the earlier studies examining undergraduate success in accountancy examinations. The second model was developed using a different classification of success, which incorporated a good practice work rating by the firm based on the evidence of the first six months of work. Once again six variables were identified with an impressive predictive model chi-square of 44.08. The main difference between this model and the one purely examining examination success is the inclusion of the social involvement variables, which suggest that they may measure practice work potential.

The practical implication of the Harvey-Cook (1996) study is that within the confines of the ICAEW education system, background information contained in an appropriately designed applicants' resume can be used to differentiate between successful and unsuccessful trainees. Using the logit models to calculate a success probability rating firms should be able to concentrate on candidates with high logit scores and avoid those with low probabilities of success.

> '*Such a strategy will, at the very least, substantially reduce the likelihood of recruiting failures and should also increase, quite materially, the chances of recruiting those who may subsequently prove successful.*' (p26).

It would appear therefore that it is not simply previous academic ability that determines success in future accountancy studies, but other factors such as choice of subjects, and school attended may also contribute.

Summary and Discussion

Accountancy firms receive far more applications from candidates than the number they wish to interview which necessitates some form of reliable and cost effective filtering process. Firms pre-select prospective trainees on the basis of their application forms. It is argued however that this elimination process is conducted on an intuitive and unsystematic manner without any recourse to statistical evidence on which to base their decisions. The technique of using the information from the application form, actuarially and explicitly, has not yet been utilised by the recruiters, and this may result in unreliable pre-selection. The training firms then rely on the traditional interview, despite the research evidence questioning the validity of the interview as a selection technique. Only a small minority utilise more advanced selection techniques such as testing.

Studies in the field of graduate recruitment have shown that previous academic achievement, extracurricular activities and work/vacation experience are criteria sought by recruiters, and previous academic performance is a key criteria for the selection of accountancy trainees. This is based on the importance that recruiters place on the ability of accountancy trainees to pass their professional examinations. Studies examining the relationship between candidate attributes in the field of accountancy reveal that previous academic performance is indeed a significant indicator of future academic accountancy performance. However, the area of interest is what particular aspects of previous performance is related to future performance? .

Academic achievement is considered a key factor in the screening process, to satisfy the criterion of ability in the examination process, however there is no statistical evidence on which to base their pre-selection decisions. Bringing their existing selection techniques more into line with established good practice will have ramifications for the firms, the trainees and also the profession as a whole.

An area where an improvement could be made is through the adoption of statistical procedures to process biodata at the pre-selection stage. Gratton (1989) indicates that this is the best method to pre-select graduates for entry level jobs, where training will be done after recruitment, since these candidates have a limited amount of work experience on which to be assessed. If the screening of potential trainees is conducted in a systematic and reliable manner, the validity of the interview for the prediction of subsequent performance will not be so critical. This could remove the assessment of likely competence from the interview, and provide the interviewer simply with the task of conducting a socialisation process, identifying the candidates who match their organisational ethos.

METHODOLOGY

The stages in the development of a biodata model are outlined by England (1971,p.4-5). It is necessary therefore to find a way of determining which aspects of a person's total background are important for a given occupation, and to identify those items which differentiate between those trainees that pass their professional examinations first time and those who experience resits.

Empirical versus Rational Approaches to Biodata Development

Until the mid-1970s, the most popular method for developing a biographical inventory was through a strictly empirical approach, as suggested by England (1971). The empirical keying approach is thus founded on item-criterion relationships, and it is intended to maximise the prediction of an external criterion, (Gunter et al: 1993, p.26). Use of this technique permits rapid screening of applications by means of a simple scoring of the application blank, and is therefore a useful pre-screening technique for use with other selection techniques. The empirical keying approach has however been criticised for its basic empiricism, (Baehr and Williams: 1967), (Dunnette: 1962), with this method facing challenges simply for failing to advance any theoretical understanding of why biodata would predict the criteria of interest, (Mitchell and Klimoski: 1982).

Since the late 1960's attempts have been made to advance a more theoretical understanding of biographical information and various theories have been proffered by psychologists which recently suggest that individual development proceeds as a result of the ongoing interchange between individuals and their environments (Owens, 1968, 1971, Owens & Schoenfeldt, 1979, Holland, 1976, Eberhardt and Munchinski 1982, 1984, Neiner & Owens, 1985, Stokes, Mumford & Owens, 1989, Mumford, Stokes and Owens, 1990). Biographical research in the last two decades has therefore increasingly been focused on a more sophisticated conceptual framework (Stokes and Reddy, 1992).

Mitchell and Klimosky (1982) however discussed whether it was rational to be empirical, and they concluded that empirical keying methods are appropriate for scoring biographical data when the recruiter simply wants to maximise the prediction of a job criterion. This view was supported by Drakelely (1989) who found that when the purpose is to maximise prediction of a criterion, the empirical methods would appear to result in a slightly higher predictive validity than the rational method. As this paper is concerned with the profiles of successful examination candidates, the empirical method will be adopted, however interpretations of the findings will be suggested.

The Questionnaire

A questionnaire was designed following a review of the relevant theory and consideration of measures which previous studies have found to be good predictors of future performance in related applications. The objective of the questionnaire was to elicit information from recently qualified chartered accountants on their background history with a view to developing a model which identifies characteristics related to examination success.

Although the scope of a person's background history is far reaching, (Mael,1991) the type of information gathered was mainly factual, verifiable information, commonly found on a standard application form. The information will therefore in the main be non intrusive, verifiable, historical items such as number of Higher A grades which would be classified as a 'hard' item of biodata, as opposed to 'soft' items which may describe the individual in terms of personality, motivation, values and aspirations. Restricting the biodata items in this manner addresses the main criticisms levelled at biodata, namely stability over time, the 'fakeability' and accuracy of the responses, and the fairness and legality of the technique.

Concern is frequently expressed that biodata keys developed at one point in time may not predict aspects of job related behaviour at some future time (Gunter et al, 1994). However studies have shown that the extent to which a biographical item is stable over time would appear to be dependent on whether the item is objective and verifiable or subjective and hence more difficult to verify.(Shaffer et al, 1986, Harvey-Cook,1995). Likewise, the susceptibility of biodata to faking can also be minimised with the restriction on the variables to 'hard' items. Lautenschlager (1994) in his comprehensive review of fakeability studies found that objective biodata items are less susceptible to distortion than items which are more subjective.

With the Commission for Racial Equality and the Equal Opportunities Commission monitoring the employment practices of recruiters in the United Kingdom to ensure that there is no discrimination on the ground of race or sex, care must be taken that biodata does not unfairly discriminate against particular groups of people. Any biodata item must therefore demonstrate both logical and empirical evidence to warrant inclusion in any particular model. There is also the risk that candidates may be offended by some biodata questions (Robertson and Smith,1989). This is of particular relevance to the accounting profession where there is little to differentiate between firms of the same size. For example many applicants will apply to all the 'big six' firms who have an office in their preferred location. If one of these firms were to include potentially intrusive questions in a biographical Inventory, this may have an adverse impact on the attitude of the candidate towards the firm, which may lead to the rejection of an offer.

The questionnaire sectionalised a person's background history into five basic areas as follows:

1. Background
2. School History
3. Higher Education History
4. ICAS History
5. Employer History

These sections follow the life history of the trainees and are therefore in a logical order for response.

The Sample

Questionnaires were sent to 1000 recently qualified ICAS accountants with a covering letter explaining the purpose of the research exercise. The sample comprised 200 from each of the qualification years 1988 to 1992, which represented 45.6% of the population (n=2193). The number of returned, valid responses was 624[4]. This equates to a response rate of 62%, which is considered above average for self-completion mail questionnaires.

[4] As 75 of these students had undertaken the English system of secondary education which is considerably different from the Scottish system, they were excluded from the model. No further modeling work was carried out on these 75 students as it was felt that the sample size was too small to draw any meaningful conclusion

Limitations of Study

There are however two limitations of this sample which must be stressed at the outset. The first of these is in respect of restriction of range. The population of applicants to chartered accountancy offices will include both those who manage to secure a training contract and those who do not manage to progress beyond the selection process. The sample for this paper however will be drawn from those applicants that were actually successful in obtaining employment, therefore drawn from a restricted population of applicants. This problem however is not restricted to this study but is a common issue for many biodata research work which develops the initial model on a previously selected population. The second limitation is the fact that the sample was drawn from the population of accountants that were ultimately successful in completing the professional accountancy examinations and subsequently their training contracts. Unfortunately there is no data available from ICAS on either the total numbers who fail to complete their training each year, or indeed on the individuals who drop out of their training contracts for whatever reason. As individuals can only be traced through the ICAS data retrieval system if their name and the year in which they commenced their training contract is supplied, a population of unsuccessful trainees defined as those who failed to complete their training contract is not available.

THE RESULTS

The Model Building

Thirty-nine independent variables[5] were identified from the questionnaire responses, and the Mann-Whitney test was utilised to calculate the Z score, which is a quantification of the

[5] Details of the variables, their rationale for inclusion and the method of coding is available from the author

comparison of the variables from the group that passed all their examinations first time[6] to the means of the variables from the group that experienced at least one resit[7]. These results demonstrated those variables which appear to differentiate between the group which passed their examinations first time and the group which experienced failure. Using these non-parametric results as a basis for variable reduction, the model was then developed using logistic regression, which will actually quantify the relationship of these differentiating independent variables to the dependent one. Forward stepwise selection was utilised for automated model building.

In order to accommodate the Scottish Education system[8], two models were developed, one which considered trainees who had progressed from an honours degree, and those who had progressed from an unclassified degree.

The Unclassified Trainee Model

Thirty-eight variables were entered into the comparative study of Mann-Whitney scores[9], and of these variables, 10 were considered significant at the 1% level, 4 were significant at the 5% level, and 3 significant at the 10% level. The Spearman correlation coefficients were then calculated for these 17 significant variables to determine multicollinearity[10], which resulted in the exclusion of 3 variables. Finally the gender variable was also excluded from the model, as recruiting firms would not be allowed to discriminate on the grounds of sex, irrespective of the differential in performance.

The remaining thirteen variables were then entered into the logistic regression model, using the forward stepwise procedure. The resulting logistic regression model can be found in Table 1.

[6] Coded as 1
[7] Coded as 2
[8] In Scotland students can either study for a three year unclassified degree, or opt for a four year honours degree
[9] Details can be obtained from the author
[10] Details can be obtained from the author

Table 1: Logistic Regression - Trainees Progressing from an Unclassified Degree

Variable	β	Wald Statistic#	Level of Significance	Exp (β_p)
Number of resits in second year at University	0.7221	10.3424	0.0013**	2.0588
Number of A grades at O level	-0.1453	5.5318	0.0187*	0.8648
Total UCCA points	-0.0418	5.6144	0.0178*	.9591
Number of subjects taken to improve the grade at Higher	0.5325	4.6326	0.0314*	1.7032
Constant	1.8291	13.0316	0.0003***	

Model Chi-Square 41.165*** with 4 degrees of freedom
Overall Prediction Classification 64.48%

Notes
= χ^2 Distributed with 1 degree of freedom in each case
*** = Significant at 0.1%
** = Significant at 1%
* = Significant at 5%

The model consists of four academic variables, and ranking these in order of significance, Table 1 reveals that the number of resits in second year at University is the most important variable, followed by, in descending order, the number of O levels at A grade, the total UCCA points achieved and the number of subjects retaken at Higher to improve the grade.

As the objective of the model is for selection purposes, further information is required on the overall prediction classification of 64.48%, which is the probability of correctly classifying a trainee. This prediction classification is a derivative of the classification matrix which uses the criterion: predict trainee 'a' as an unsuccessful trainee if $P_a > 0.5$, otherwise predict trainee as successful. The results are contained in Table 2.

Table 2: Classification Table for Unclassified Graduates

Observed	Predicted Pass First Time	Predicted Failed One or More	Percent Correct
	PASS	FAIL	
Pass First Time	94 (60%)	68 (32%)	162 (58%)
Failed One or More	62 (40%)	142 (68%)	204 (70%)
Overall	156 (100%)	210 (100%)	366 (65%)

The overall hit rate of 65% represents 60% of correct pass predictions and 68% of correct fail predictions. Type I errors (predicting a fail when in fact there was a pass outcome) are 32%, and Type II errors (predicting a pass when in fact there was a fail outcome) of 40%. The probability of correct classification differs significantly from the chance classification of 51%[11].

5.3 Honours Trainees

The Mann-Whitney scores[12] were calculated for the same variables as utilised for the unclassified sample, with the addition of a variable which considered the honours classification. Of the 39 variables, 7 were significant at the 1% level, 4 variables at the 5% level and 4 variables at the 10% level.

[11] The number of students correctly predicted as pass students based on the random selection is calculated as (156x162)/366 = 69, likewise the number of students correctly predicted as failure students based on random selection is calculated as (210x204)/366 = 117. The overall chance classification of correctly classifying a student can therefore be computed as follows: (69 + 117)/366 = 50.8%. The difference between the probability of correct classification and correct classification based on random selection is statistically significant at 0.1% with 1 degree of freedom as reported by the Pearson $\chi^2 = 28.2$

[12] Details can be obtained from the author

The Spearman correlation coefficients were then calculated for these 15 significant variables to ascertain multicollinearity[13], again resulting in the exclusion of 2 variables. The resulting model can be found in Table 3.

Table 3: Logistic Regression - Trainees Progressing from an Honours Degree

Variable	β	Wald Statistic#	Level of Significance	Exp (β_p)
Honours classification	1.2080	17.1816	0.0000***	3.3469
Number of hours spent each week on interests at school	-.2442	4.7180	0.0298*	0.7833
Number of subjects retaken at Higher to improve the grade	0.7243	3.8999	0.0483*	2.0633
Number of resits in second year at University	1.4740	3.6603	0.0557~	4.3665
Relevance of Degree	0.6830	3.2473	0.0715~	1.9797
Constant	-3.7002	16.7815	0.0000***	

Model Chi-Square 55.376*** with 5 degrees of freedom
Overall Prediction Classification 72.68%

Notes
= χ^2 Distributed with 1 degree of freedom in each case
*** = Significant at 0.1%
** = Significant at 1%
* = Significant at 5%
~ = Significant at 10%

The model consists of four academic variables, and a commitment variable. Ranking these in order of significance, Table 3 indicates that the honours classification at University is by far the most important variable, followed by, in descending order, the number of hours spent per week on interests etc at school (commitment variable), the number of subjects retaken at Higher to improve the grade, the number of resits in second year and finally whether a relevant degree was taken or not.

[13] Details can be obtained from the author

Once again as the ultimate objective of the model is for selection purposes further information is required on the overall prediction classification of 72.68%. These results are contained in Table 4.

Table 4: Classification Table for Honours Graduates

Observed	Predicted Pass First Time PASS	Predicted Failed One or More FAIL	Percent Correct
Pass First Time	87 (73%)	18 (28%)	105 (83%)
Failed One or More	32 (27%)	46 (72%)	78 (59%)
Overall	119 (100%)	64 (100%)	183 (73%)

The overall hit rate of 73%, represents 73% of correct pass predictions and 72% of correct fail predictions. Type I and II errors are therefore 27% and 28% respectively. Once again this is significantly better than the proportionate chance criterion of 52%[14].

5.4 Discussion

Before a discussion of the models take place it is necessary to stress that a multivariate approach combines a number of independent variables simultaneously, which provides a model with greater power than the sum of all the component parts of the model. Component variables should not really therefore be interpreted on an individual basis, albeit that some insight into a particular trainees profile may be ascertained by such analysis.

Both the models contained four variables which were academically related. The only variable of a non-academic nature was that found in the honours model relating to the number of hours

[14] The number of students correctly predicted as pass students based on random selection is calculated as (119x105)/183 = 68, likewise the number of students correctly predicted as failure students based on random selection is (64x78)/183 = 27. The overall chance of classification of correctly classifying a student can therefore be computed as follows: (68+27)/183 = 52% The difference between the correct classification and the chance classification is statistically significant at the 0.1% level with 1 degree of freedom as demonstrated by the Pearson $\chi^2 = 34.4$.

spent at school on non-academic pursuits. The importance of previous academic achievement therefore supports the previous research.

The most significant variable in the honours model is the honours classification, suggesting that the better honours degree class, the greater the likelihood of incurring no resits in the professional examinations. This variable supports the findings of Taffler et al (1995). It can be argued that this is a quantifiable determination of recent academic ability. This is not however available in the unclassified model, and the training providers are faced with the problem of differentiating between a commendable or merely adequate unclassified performance. The inclusion of this variable in the honours model may explain why the honours graduate model appears to outperform the unclassified graduate model, both in terms of the model chi-square statistic and the overall prediction classification.

A university related variable common to both models is that which considers the number of resits encountered at second year university level. This would demonstrate that second year resits at University have an impact on professional examination performance, with the greater number of resits in second year at University the less likelihood of passing the ICAS examinations first time. Although this variable was the most significant in the unclassified model, it was fourth in the honours model. Although the variables which considered resits in both first and third year were also significant in the Mann-Whitney analysis, neither of these variables were found in the models. Resits in first and second year were encountered by around 15% of the trainees used to develop the models, however only 5% experienced resits in third year. It is suggested that resits in the first year are often caused, not by an academic inability of the student, but by the inability of the student to adapt to University life.

It is interesting to note that school performance (however defined) is not the most significant variable in either model. This suggests that the most recent academic achievement has more relevance than earlier performance as evidenced by the number of UCCA[15] points. The number of A grades at O level, and the total UCCA point score, both school related variables, are however found in the unclassified model, which is similar to the Dunn and Hall (1984) study. Both these variables are notable omissions from the honours model where honours classification appears to supersede earlier performance. The Taffler et al Study (1995) also found the number of A grades at O level a significant predictor in their model.

Both models, unclassified and honours, include a variable which considers the number of subjects retaken at Higher to improve the grade, with the greater the number of subjects taken, the less likelihood of passing the ICAS examinations first time. As the UCCA points score is based on the total number of points achieved over the duration of the school career, this variable identifies those trainees who resat their higher subjects in 6th year with a view to achieving a better grade. Pupils who utilise this methodology would appear to have been dissatisfied with their original grade, and the resitting of the subject suggests that with more effort, performance could be enhanced. It can be argued that this variable is a motivational measure, in that students who have applied themselves for the initial sitting would not gain any additional benefit by undertaking the subject once more.

The other academic variable in the honours model is concerned with the relevance of the undergraduate degree. Although the ICAEW results suggest that non-relevant students perform better in the ICAEW system than the relevant graduates (Kakar, 1992) this may be due to the

[15] UCCA points are calculated based on school grades achieved in the later years of Secondary School education in the United Kingdom

shortage in England and Wales of relevant graduates available for training places. As this is not the case in Scotland, there is the expectation that relevant honours graduates will perform better than non-relevant honours graduates in the ICAS system. This indeed is the case, demonstrated by a positive co-efficient sign.

The remaining variable in the honours model is that concerned with the number of hours spent per week on interests during school. The expected sign of this variable is positive whereby the greater the number of hours spent on interests at school, which could suggest a lack of commitment on behalf of the individual to their academic work, the greater the chance of failure in the professional examination system. The model reveals however a negative sign which is significant at the 5% level. This suggests that the greater the number of hours spent on interests at school, the greater likelihood of passing the ICAS examinations first time. This result is contrary to expectations. However consider two candidates with similar UCCA point scores; one who spends many hours on non-academic activities, thus necessitating a balance of time spent between academic and other interests; and the other with no non-academic interests therefore concentrating solely on academic work. It could be argued that the UCCA point score of the former is not necessarily a true indication of academic ability, and that these students are not comparable in academic terms.

Despite the importance of the high school grade in Mathematics and English as suggested by Clark and Sweeney (1985), Eskew and Faley (1988), Gul and Fong (1993), the variables relating to the grade in English and Mathematics obtained at Higher are not included in the model. Likewise, the type of school attended, as found significant by Taffler et al (1995) and Gul and Fong (1993) is also not included.

5.6 Limitations of Model

There is no doubt as to the significance of the honours classification as a determinant of ICAS examination success. However, at the time of recruitment which tends to be October/November in the year preceding the commencement of the training contract, the vast majority of potential trainees will only be in the first term/semester of their final honours year. The honours classification will not therefore be known. Taffler et al (1995) suggest that one possible strategy would be to use expected degree class, which the prospective trainees are often required to indicate on their application form. They found that this proxy was correlated at r = 0.41 (significant at better than $\alpha = 0.01$) with actual degree class. Unfortunately there is no additional information as to whether the differences are due to optimistic or pessimistic indications or indeed a combination of both. They also suggest a superior approach, whereby training providers could work backwards using the appropriate logit model.

> *'it may well be that even were the potential recruitee not to obtain an upper second degree, his or her scores on other component variables would still predict a high probability of success.' (p29)*

Another approach suggested by Taffler et al (1995) is to offer a place conditional on the prospective trainee achieving a particular degree classification, although this may not necessarily be practical, as it may result in firms recruiting less than the desired number of trainees.

A more radical approach may be to include a section on the application form which will be completed by the University, predicting the student's honours classification. Many Universities already furnish firms with this information at the reference stage, but this would involve the Universities at an earlier stage in the selection procedure. This procedure would not be dissimilar to the Universities and Colleges Admissions Service (UCAS) whereby schools provide

Universities with predicted Higher and A Level grades. Unfortunately there is no data testing the validity of the universities' prediction and further work would be required in this area. However it is difficult to envisage that based on detailed knowledge of academic ability of three years within the University, that a valid prediction of the student's honours classification could not be made by the relevant year tutor/course leader.

For firms that do not feel comfortable relying on either the student's indicative degree classification, or indeed that provided by the University, another model was developed which excluded the variable relating to the final honours classification. Forward stepwise selection was therefore utilised on the remaining 12 variables[16]. The resulting model contained all four of the remaining variables from the original model in Table 5.3, however an additional variable was now included. This variable relates to the number of non-analytical Highers that the prospective trainees had undertaken suggesting the greater number of this type of Higher, the greater the chance of passing the ICAS examinations first time. Although this may appear to be a peculiar variable to be included it is broadly comparable with the Taffler et al (1995) study which identified the significance of the number of art/language A levels.

This model however does not demonstrate the same ability to perform as the honours model originally reported in Table 3. Although the probability of correct classification was nearly 70%, which again is significantly better than the proportionate chance of correct classification of 51%, the model chi-square has been reduced from 55% to 36%.

[16] The original thirteen variables entered into the honours model with the exception of the honours classification variable

CONLUSIONS AND RECOMMENDATIONS

Accountancy firms face the annual problem of selecting the 'best' trainees from a large pool of graduates, as despite demographic changes and cutbacks in university funding, the current supply of graduates exceed ICAS chartered accountancy training places. This is a problem experienced by recruiters of graduates in general, however when the accountancy profession is considered, the choice of the right people becomes of paramount importance. Accountancy is a service function which relies heavily on human resources, and therefore selecting, training and retaining trainees is critical to the successful operation of an accountancy practice. The cost of training a young graduate is quite considerable when the opportunity cost is considered, and these costs escalate when the trainee experiences failure in the professional examination system. The importance of examination success is demonstrated by the firms identifying the ability to pass their examinations as the key factor in the screening of application forms, implying that previous academic achievement will be an indicator of future ICAS examination performance .

Accountancy firms commence their selection process with interested graduates completing application forms, which are subsequently used to pre-select candidates for the next stage in the elimination, which is usually an interview. All the training providers receive application forms in excess of the number of candidates they wish to interview, with the majority of the training providers interviewing only 10% of the applications. One of the problems facing the training providers therefore is how to narrow down the field of applications in a cost effective and reliable manner.

Studies examining accountancy performance demonstrate that previous academic ability does determine future success although particular facets of performance have more relevance than others. As there is no statistical evidence specifically based on the ICAS training system on which the firm's can base their elimination decisions, many firms are using anecdotal evidence which may result in unsystematic and unreliable selection. It is suggested that if firms were to use the information, extracted from an application form, in an actuarial and explicit manner, this could be of potential value at the pre-selection stage.

Using the multivariate statistical technique of logistic regression, various models were developed which describe the relationship between passing the ICAS examinations first time and the personal, school and university profile of the prospective trainee accountants. Separate models were developed for unclassified and honours graduates in order to account for the Scottish higher education system.

The first model concentrated on unclassified graduates, and resulted in a model $\chi 2$ significant at the 1% level. The model contained four variables, all of which were related to academic performance. Three of the variables related to school performance, however the most significant variable was concerned with the University performance as demonstrated by the number of resits encountered in second year of a degree programme.

The second model examined honours graduates, and was also significant at the 1% level. This model likewise contained four variables, two relating to academic performance at university, one relating to school performance and included the only non-academic variable, relating to the number of hours spent on outside interests whilst at school. The honours classification appears to supersede school performance as measured by the UCCA point score achieved at school, which was a notable omission from the honours model.

It would therefore appear that the most recent quantifiable academic information about a candidate has more relevance than the earlier school performance, although certain aspects of this school performance supplements the details from the university.

These results support earlier studies which identified previous academic performance as a good indicator of success in the ICAS examinations. However, the significance of these models, is that they consider which particular aspects of previous achievement determine the success. These results raise questions as to the current criterion set by many of the accountancy firms, for example, setting an UCCA point score cut-off, or requiring a particular grade in English and Mathematics to be achieved. If a logistic regression model is developed using the variables, number of UCCA points, grade in Higher English and grade in Higher mathematics, the resulting model achieves a poor model chi-square of only 23.5.

It is finally suggested that by using logistic regression as a technique, it is possible to identify the probability of a particular student progressing through the professional examination without failure. Firms can therefore identify at the pre-selection stage those students who have both a low risk and high risk of failure and who should therefore either progress to the next stage in the selection process, or be rejected. For the profiles of applicants which are less clear cut, it would be necessary for the recruiting firms to identify whether they were prepared to take the risk of progressing further with these students in the selection process. This would be dependent both on the numbers of applicants that the training provider was prepared to interview, and the number of trainees ultimately required.

The Implications for Change

Some of this evidence calls into question the current practices used by many training providers for pre-selection. Although there is a correlation between the number of UCCA points and the ability to pass professional examinations, the differential in the performance of students who possess between 18-21 UCCA points to those with 22-25 UCCA points is minimal. The performance however of students with 26+ UCCA points is significantly better. If firms use UCCA points as a pre-selection criterion, careful consideration should be given to the most appropriate cut-off. Indeed the UCCA point score variable was in fact omitted from the honours model.

On a similar theme, grades in particular subjects such as English and Mathematics were also absent from both the models, therefore firms which set minimum grades in these subjects for pre-screening purposes should be aware that this information would not appear to be critical in the determination of performance.

In light of the importance of the number of subjects retaken in order to improve the grade at Higher, firms should ensure that this information is sought at the application form stage. Although some firms request Higher grades in both fifth and sixth year, many firms do not request such detail.

The honours graduates in general performed better than the unclassified students, although the unclassified performance appeared to be dependent on which University awarded the degree. Firms which recruit students progressing from unclassified degrees, should therefore pay particular attention to the University where the unclassified degree is being undertaken, and perhaps consider encouraging prospective trainees to further their studies at university to honours level. This point has already been addressed to a certain extent with a move in recent years to the recruitment of a higher percentage of honours graduates. The recent 1995 intake of ICAS trainees reveal that 70% of trainees hold honours degrees as opposed to the 36% identified in the sample.

Although resits at university irrespective of type of degree appear to have a significant impact on ICAS performance, with the second year resits having particular relevance, very few firms specifically request this information at the application form stage.

As the class of degree is the most significant variable in the honours model, and the model loses some predictive ability if this variable is excluded, firms should consider obtaining the best estimate of this result. As the class of degree may not be available at the time of recruitment, it is suggested that firms develop a closer involvement with the universities for indicative degree classifications.

It is recommended therefore that a section is introduced in the application form which identifies university performance, requesting marks awarded for each subject at each level of the university course, specifically requesting information on any resits. A section should also be incorporated for the course leader/tutor to complete with an indicative honours classification. This information is often sought at the refereeing stage, however it is suggested that this is too late in the selection process.

FUTURE RESEARCH

If firms were to able to use models in their pre-selection process they could calculate a score for each candidate which would assess the probability of the applicant passing the professional examination system with no resits. The firms could then narrow their field of applications to a level suitable for interview by selecting the relevant numbers of candidates with the highest probabilities of success. This method of sifting through the large quantities of application forms should be cost effective as it would simply be a clerical task extracting the information from the form and entering the data into the model. It should also be reliable as it is based on statistically significant evidence. However before these models could be used in this manner it would be necessary to validate the model by applying the model to a different data set.

In addition, in light of the recent ICAS syllabus review which ultimately result in a change to the examination system, further work should be conducted to ascertain whether the models will demonstrate stability over time, and hence will provide a valid form of pre-selection irrespective of the ICAS examination system.

Finally, examination success is only one aspect of the performance of a successful accountancy trainee, and whilst it would be difficult to obtain comparable office performance data on trainees from firms, it would be a relatively straight forward exercise to ascertain those trainees who have remained with their original training provider. If a trainee successfully negotiates the ICAS examination hurdles, and but then leaves the firm on the completion of the training contract, it may be argued that the investment throughout the training period will to a certain extent be wasted. A related study therefore will be to develop a biodata model with tenure of employment post completion of the training contract as the criterion of success. Although considerable research on tenure is available in the biodata literature, apparently there have been no studies undertaken in the accountancy profession.

BIBLIOGRAPHY

Baehr, M.E., and Williams, G.B., (1967), Underlying dimensions of personal background data and their relationships to occupational classification, *Journal of Applied Psychology*, 51, 481-90.

Buehlmann, D. M., (1975) "ISU's Use of the AICPA's College Testing Program" *Journal of Accountancy*, May, 93-96

Bevan, S., and Fryatt, J., (1988) "*Employee Selection in the UK*" IMS Report No 160.

Cameron, E. (1991) *The Recruitment of Chartered Accountancy trainees in Scotland.* Unpublished Honours Thesis 91.

Campion, M.A., (1978) Identification of Variables Most Influential in Determining Interviewers Evaluations of Applicants in a College Placement Centre, *Psychological Reports*, 42, 947-952.

Carroll, S.J., (1966), Relationship of Various College Graduate Characteristics to Recruiting Decisions, *Journal of Applied Psychology*, Vol 50, 5, 421-423.

Clark, R.L., and Sweeney, R.B., (1985), Admission to Accounting Programs: Using a Discriminant Model as a Classification Procedure, *The Accounting Review*, Vol LX, 3,508-518.

Delaney, P.R., Keys, D. E., Norton, C. L. and Simon, J. R. (1979) An Admission Test for Intermediate Accounting, *The Accounting Review*, January, 155-162.

Dickinson, C., (1955), What employers look for in the college graduate, *Personnel and Guidance Journal*, 33, 460-464.

Dockweiler, R.C. and Willis C.G., (1984) On the Use of Entry Requirements for Undergraduate Accounting Programmes, *The Accounting Review*, Vol LIX, No 3.

Drakeley, R.J. (1989) Biographical Data Chapter 3.10, in Herriot, P. (ed) *Assessment and Selection in Organisations.* J Wiley & Sons, Chichester.

Dunnette, M.D., (1962), Personnel Management. *Annual Review of Psychology*, 13, 285-313.

Eberhardt, B.J. and Muchinsky, P.M. (1982a). An empirical investigation of the factor stability of Owens' biographical questionnaire. *Journal of Applied Psychology*, 67, 138-145

Eberhardt, B.J. and Muchinsky, P.M. (1984). Structural validation of Holland's hexagonal model: vocational classification through the use of biodata. *Journal of Applied Psychology,* 69, 174-81

England, G.W. (1971) *Development and Use of Weighted Application Blanks.* Industrial Relations Centre, University of Minnesota.

Eskew, R.K. and Faley, R.H. (1988). Some determinants of performance in the first college level Financial Accounting course. *Accounting Review* 63 (1) 137-147.

Gammie, E. (1996), Accountancy Graduate Selection Procedures: A Critical Analysis, *Career Development International*, Vol 1 (2) 31-38

Gul and Fong, (1993) Predicting success for introductory accounting students : some further Hong Kong evidence. *Accounting Education* Vol. 2 (1), 33-42.

Gunter, B., Furnham, A. Drakeley, R. (1993) *Biodata : Biographical indicators of business performance,* Routledge, London.

Habbe, S., (1948), Employment of the college graduate, *Studies in Personnel Policy* (No89), New York: National Industrial Conference Board.

Habbe, S., (1956), Employment of the college graduate, *Studies in Personnel Policy* (No152), New York: National Industrial Conference Board.

Harvey, M. (1991) Looking Ahead, *Certified Accountant,* Nov.

Harvey-Cook, J.E. and Taffler, R.J., (1987) Graduate Recruitment Procedures in the UK Accountancy Profession: A Preliminary Study, *Accounting and Business Research,* Spring, 99-108

Harvey-Cook, J., (1996) Graduate Recruitment at Professional Entry Level: Clinical Judgements and Empirically Derived Methods of Selection, Unpublished Doctoral Thesis

Herriot, P. (1984) *Down from the Ivory Tower : Graduates and their Jobs*, J Wiley & Sons, Chichester.

Herriot, P. (1989) Recruitment in the 90's, *Institute of Personnel Management.*

Holland, J.L. (1976) in Dunnette, M.D., (ed*), Handbook of Industrial and Organisational Psychology*, Rand McNally, Chicago.

Hunter, J.E. and Hunter, R.F., (1984) Validity and Utility of Alternative Predictors of Job Performance. *Psychological Bulletin,* Vol 96, 72-98.

Kakar, S. (1992) Financial Times, 6 October, 8.

Keenan, A. and Scott, R.S. (1985) Employment success of graduates : Relationship to biographical factors and job-seeking behaviours. *Journal of Occupational Behaviour,* Vol. 6, 305-311.

Krzystofik, A.T. and Fein, R.(1988) Does Your Firm Use the Right Approach in Hiring Camous Recruits? *Journal of Accountancy,* November, Vol. 166, 83-88.

Lautenschlager (1994) in *Biodata Handbook,* (Ed) Stokes, G.S., Mumford, M.D., and Owens, W.A., CPP Books, California

Leathers, P.E., (1972), Relationship of Test Scores to CPA Examination Performance, *Journal of Accountancy,* Sep, 101-102.

Leathers, P.E. and Sullivan, J.A., (1978) *Uniform Statistical Information Questionnaire: 1975* AICPA.

Mael, F.A. (1991). A conceptual rationale for the domain of attributes of biodata items. *Personnel Psychology* 44, 763-792.

Marcus Dunn, W. and Hall, T.W., (1984) An Empirical Analysis of the Relationships Between CPA Examinations Candidate Attributes and Candidate Performance. *The Accounting Review*, Vol. LIX, No. 4, 674-689.

McCormick, R.R., and Montgomery, J.B. (1974), The Use of AICPA Tests in Evaluating Transfer Students at a University, *Journal of Accountancy*, August, 82-88

Mitchell, T.W. and Klimoski, R.J., (1982) Is it rational to be empirical? A test of Methods for Scoring Biographical Data. *Journal of Applied Psychology,* Vol. 67, No. 4, 411-418.

Mumford, M.S. and Stokes, G.S. and Owens, W.A. (1990) *Patterns of Life Adaption: The Ecology of Human Individuality,* Hillsdale, New Jersey: Lawrence Erlbaum.

Nelson, A.T. (1989) The Human Resource Dilemma in Accounting, *Journal of Accountancy,* Aug, 46-51.

Neiner, A.G. and Owens, W.A., (1985) *Using Biodata* to Predict Job Choice Among College Graduates, *Journal of Applied Psychology*, Vol 70, No 1, 127-136.

Owens, W.A.(1968). Towards one discipline of scientific psychology. *American Psychology.* 23, 782-5.

Owens, W.A.(1971). A quasi-actuarial prospect for individual assessment. *American Psychologist,* 26, 992-9.

Owens, W.A., (1976) Background Data, in Dunnette MD (ed). *Handbook of Industrial and Organisational Psychology*, J. Wiley & Sons.

Owens, W.A. and Schoenfeldt, L.F. (1979) Towards a classification of persons (Monograph). *Journal of Applied Psychology,* 63, 569-604.

Pearson, R. and Pike, G., (1990) *The IMS Graduate Review*, IMS Report No.192.

Plumbley, P., (1991) *Recruitment and Selection*, Institute of Personnel Management, 5th Edition. ISBN 0852924593.

Reilly, F.K. and Stettler, H.F. (1972) Factors Influencing Success on the CPA Examination, *Journal of Accounting Research* Autumn, 308-321.

Robertson, I.T. and Smith, M. (1989) Personnel Selection Methods. In: *International Review of Industrial and Organisational Psychology*, ed Cooper C.L. and Robertson I.T. (Wiley and Son)

Robertson, I.T. and Makin, P.J., (1986) Management Selection in Britain : A survey and critique. *Journal of Occupational Psychology*, 59, 45-57.

Sanders, H.P., (1972) Factors in Achieving Success on the CPA Examination, *Journal of Accountancy,* Dec, 85-88.

Schaffer, G.S., Saunders, V. nd Owens, W.A. (1986): Additional evidence for the accuracy of biographical data : Long-term retest and observer ratings. *Personnel Psychology* 39: 791-809.

Shackleton, V. and Newell, S., (1991) Management Selection : A comparative survey of methods used in top British and French companies. *Journal of Occupational Psychology*, 64, 23-36.

Stokes, G.S., Mumford, M.D. and Owens, W. (1989). Life history prototypes in the study of human individuality. *Journal of Personality* 57: 509-549.

Stokes, G.S. and Reddy, (1992) Use of background data in organisation decisions. In C Cooper and I T Robertson (eds) *International Review of Industrial and Organisational Psychology* (7). Chichester: John Wiley and Sons.

Strebler, M., (1990) *Biodata in Selection : Issues in Practice.* IMS Paper, No. 160.

Sullivan, D.J., (1961) Selection Procedures for Specific Management Trainee Programs in 21 Companies, *Dissertation Abstracts*, 21, 2200-01.

Taffer, R. J. and Harvey-Cook, J.E. (1987), Graduate Recruitment, *Accountancy*, Nov, 177-180

Taffler, R.J., Harvey-Cook, J.E. and Williams, A.P.O. (1995) *Improving the Graduate Trainee Recruitment Procedures of Accountancy Firms Using Biodata,* Working Paper

Tho, L. M., (1994) Some Evidence on the determinants of student performance in the University of Malaya introductory accounting course, *Accounting Education*, 3 (4), 331-340.

Tirbutt, E., (1989) Where have all the graduate gone? *Accountancy*, Dec. 165-166.

Wingrove, J., Glendinning, R. and Herriot, P., (1984) Graduate Pre-Selection : A research note. *Journal of Occupational Psychology*, 57, 169-171.

APPENDIX 24

PRE-SELECTING GRADUATES WHO SUCCEED IN PASSING CHARTERED ACCOUNTANCY EXAMINATIONS: EVALUATION OF THE PROCESS - ICAS MONOGRAPH PUBLISHED JANUARY 1999

Pre-selecting Graduates who Succeed in Passing Chartered Accountancy Examinations: Evaluation of the Process

Elizabeth Gammie
The Aberdeen Business School
The Robert Gordon University

Published by
The Institute of Chartered Accountants of Scotland
Edinburgh

First Published 1999
The Institute of Chartered Accountants of Scotland

ISBN 1 871250 67 6

Printed by Bell and Bain Ltd, Glasgow

Research Reports Refereeing Process

This research report is published by the Education Committee in accordance with the rigorous refereeing process applied to all research reports. The refereeing process operates by sending the initial research proposal to two independent referees (one academic and one practitioner). The academic referee will either be a member of the Panel listed below or an *ad hoc* referee. All proposals are also reviewed by the Director of Research who remains in close contact with the project. The two referees are consulted on the academic and technical standard of the draft research report. In particular, they are asked to comment on:

- the academic rigour of the document;
- the validity of the approach taken in the report;
- whether the presentation of the report identifies the key issues and brings these to the attention of the intended reader; and
- whether the document will add to the knowledge and understanding of the interested reader.

Panel of Academic Referees

Professor N Garrod	University of Glasgow
Professor R H Gray	University of Dundee
Professor J Haslam	Heriot-Watt University
Professor J Holland	University of Glasgow
Professor I Lapsley	University of Edinburgh
Professor T Lee	University of Alabama
Professor W M McInnes	University of Stirling
Professor S McLeay	University of Wales
Professor M J Page	University of Portsmouth
Professor C Roberts	University of Aberdeen
Professor M J Sherer	University of Essex
Professor R Taffler	City University
Professor P Walton	Université de Genève
Professor P Weetman	Heriot-Watt University
Professor R M S Wilson	University of Loughborough

Contents

FOREWORD

As the world evolves and becomes ever more complicated for any business, we all need as much help as possible in understanding how to go about the process of recruiting the right calibre of individual to be part of our workforce and who will be skilled to deliver tomorrow's solutions in what will undoubtedly be a much different world to the one of today. My own organisation has a policy of recruiting what we refer to as "the best and the brightest" and much of our own recruitment policy has been driven from our own historical perspective; the findings of which are broadly on point with this report.

Adding to the evolving complication, the significant cost of training a CA combined with the business needs of the professional services organisations spreading the graduate recruitment net ever wider to include non-CA entrants, means that there are fewer places available for CA trainees and employers must therefore inject more certainty of success into the recruitment process. Studies such as this, help us to analyse and understand the graduate market place and to assure ourselves that the graduates we are hiring have the best possible chance of passing the professional exams and becoming qualified accountants.

A trend which has emerged over the last few years is that of the larger firms employing non-relevant graduates as CA trainees and it will be heartening to most of those employers to see that this research supports the risk those employers took in hiring non-relevant graduates in that they have apparently performed better under the ICAS training than the post-graduate diploma route which existed before non-relevant graduates were accepted as trainees. As we sit here today some 30% of the graduates entering a CA training contract are non-relevant and so this report conclusion could well give rise to an increase in that weighting.

I am pleased that ICAS, through the Scottish Chartered Accountants Trust for Education (SCATE), has been able to aid the funding and publication of this research and believe that it gives employers, whether they be large or small, a good practical insight into what the recruitment drivers should be for their own organisations.

Brian P Davidson MA CA
Convener
Education Committee

January 1999

Preface

Preface to be inserted by Mark Allison, ICAS Director of Education

ACKNOWLEDGMENTS

Thanks are due to various people who have helped in the compilation of this research study.

Firstly, I would like to thank all the qualified accountants who completed my questionnaire, and to Dierdre Sim who had the thankless task of inputting all the data into a statistical package for analysis. Thanks are also due to Dr Charlie Weir (Aberdeen Business School) and a special thanks to Pete Jones (Aberdeen Business School) and Alex Wilson (School of Computing and Applied Mathematics), who both gave me invaluable support, particularly with the statistical analysis. I would also like to acknowledge the invaluable input of the ICAS Director of Education, Mark Allison.

I am particularly grateful to the referees for their detailed advice and comments throughout the research process. As one referee commented I have embarked on a very steep learning curve and I am indebted to them for the time and effort they dedicated to help me along the process. I am also indebted to Professor Pauline Weetman and Ann Lamb, not only for their assistance and comments throughout the project but also for the encouragement that they provided.

Isobel Webber also deserves a special mention for her considerable care in typesetting this report, an onerous task when so many tables are included.

I would finally like to thank my husband Bob, for his never ending support and belief throughout this research project to its ultimate publication.

The Education Committee and the author are particularly grateful to the Trustees of the Scottish Chartered Accountants' Trust for Education who gave financial support for this publication.

Elizabeth Gammie
The Robert Gordon University

Executive Summary

Accountancy is a service function which relies on human resources. Recruiting and selecting the 'best' graduates for training contracts is, therefore, of paramount importance.

Accountancy firms in the UK receive far more applications from graduates than they wish to interview. This necessitates some form of reliable and cost effective filtering process and firms pre-select prospective trainees on the basis of the information contained in their application forms. Recruiters use various measures which they hope will be relevant in the determination of future academic success to select the 'best' graduates for interview. These measures include the grade achieved in certain examinations or the total score for the grades achieved based on the standard scale used by the Universities and Colleges Admissions Service (UCAS).

For the purposes of this report 'best' graduates are defined as those who pass the professional accountancy examinations of The Institute of Chartered Accountants of Scotland at the first attempt.

The investigation covered ICAS members who qualified in the years 1988 to 1992 and involved three stages. Stage 1 was a postal survey of 624 ICAS members to elicit personal history information. Stage 2 involved undertaking analysis to determine which aspects of an ICAS member's background appeared to differentiate between those who had passed their ICAS examinations at the first attempt and those who had experienced resits. Stage 3 involved developing exploratory statistical models for Honours and Ordinary graduates. These models identified which combination of factors appeared to indicate success in passing the ICAS examinations at the first attempt. These models also identified the relative importance of the various factors.

Findings

The investigation aimed to identify the aspects of an ICAS trainee's background which were statistically significant in relation to the ability to pass the ICAS examinations at the first attempt. From the model building exercise the following significant factors were identified.

Significant factors which predict ICAS examination performance: Honours graduates

FACTOR	RANKING
Honours classification	1
Number of hours spent each week on outside interests whilst at school	2
Number of subjects retaken at Higher to improve the grade	3
Number of resits in second year at university	4
Relevance of degree	5

The model indicates that the higher the classification of degree and the more hours spent each week on interests at school, the better the chance of passing first time. The greater the number of subjects retaken at Higher to improve the grade and the greater the number of resits in second year at university, the lower the chance of passing first time. Finally, if the trainee undertakes a relevant degree, the better the chance of passing first time.

Significant factors which predict ICAS examination performance: Ordinary graduates

FACTOR	RANKING
Number of resits in second year at university	1
Number of A passes at O grade	2
Total UCAS points	3
Number of subjects retaken at Higher to improve the grade	4

The model indicates that the greater the number of resits in second year at university and the number of subjects retaken at Higher to improve the grade, the lower the chance of passing the ICAS examinations first time. In contrast the greater the number of A passes at O grade and total UCAS points, the better the chance of passing first time.

From the factors identified above it would appear that the importance that recruiters place on previous academic performance is vindicated. The most significant variable for both Honours and Ordinary graduates relates to university performance. This suggests that most recent academic performance has the most relevance. Of particular importance is the Honours classification where available. In the case of Honours graduates, the only academic factor which relates to school performance is the number of subjects retaken at Higher to improve the grade. University performance would therefore appear to supersede school performance. It is only where there is insufficient information to differentiate between different levels of university performance, such as the award of an Ordinary degree where the classification is usually either pass or fail, that school performance becomes more significant.

For the Honours graduate whose degree classification is known it is interesting to note that the number of UCAS points is not a significant factor, despite often being used by recruiters as a pre-selection criterion. For the Ordinary graduate it was one of the significant factors. In neither case was the grade achieved in Higher Mathematics or English identified as being significant. These background factors did not contribute in any significant manner to the profile of background factors which predicted ICAS examination performance.

Issues for consideration

Although this research was specifically based on ICAS trainees who qualified in the late 1980s and early 1990s it does raise issues which call into question some of the practices used by many training providers for pre-selection. Based on the findings of this research several recommendations are proposed for those responsible for recruiting accountancy trainees.

Obtain indicative Honours classifications - In view of the fact that class of degree is the most significant factor for Honours graduates, recruiters should ensure that a best estimate of the Honours classification is obtained from the university tutor. Consideration should be given to adding a section to the application form requesting this information.

Obtain detailed information relating to university performance - In view of the fact that most recent academic performance would appear to be the most relevant indicator of examination success, recruiters should ensure that information relating to university performance is obtained. For both Honours and Ordinary graduates the number of resits in second year at university is of interest and particular attention should be paid to this information. Recruiters of graduates holding Ordinary degrees should also consider the university which awarded the degree. In general, Honours graduates performed better than Ordinary graduates although the performance of Ordinary graduates appeared to be dependent on which university awarded the degree. Consideration should be given to adding a section to the application form requesting detailed information on university performance *eg* marks awarded for each subject at each level of the university course, information relating to any resits.

Obtain information regarding the number of Highers retaken to improve the grade - Recruiters should ensure that they obtain information regarding the number of subjects retaken in order to improve the grade at Higher. Although this information has been identified as being important, very few recruiters would appear to request such information.

Review current selection criteria - Recruiters using number of UCAS points as a pre-selection criterion should be aware that the modelling exercise indicated that this was not the most appropriate factor to pre-select graduates on the basis of application forms. If training providers do, however, wish to continue to use UCAS points careful consideration should be given to the appropriate cut off point.

In addition, firms which set minimum grades in English and Mathematics for pre-screening purposes should be aware that this information does not appear to be critical in determining examination performance.

Chapter One

Approach to the Project

Accountancy is a service function which relies heavily on human resources. Selecting, training and retaining trainees is critical to the successful operation of an accountancy practice (Nelson,1989). Accountancy firms offering training contracts in Scotland face the problem of how to select the 'best' graduates from the pool of fully accredited[1] and non relevant[2] graduates applying to their organisation. Despite demographic changes (Pearson and Pike,1990) and cutbacks in university funding (Herriot, 1989), the current supply of graduates exceeds the number of chartered accountancy training places available under the auspices of The Institute of Chartered Accountants of Scotland (ICAS). This work is based specifically on ICAS trainees but has wider implications.

Accountancy firms commence their selection process by asking interested graduates to complete application forms. These forms are the basis for pre-selecting candidates for the next stage, which is usually an interview and/or a psychometric test. All the training providers receive application forms in excess of the number of candidates they wish to interview, with the majority of the training providers interviewing only 10% of applicants (Gammie, 1996). One of the problems facing the training providers therefore is how to narrow down the field of applications to identify the 'best' graduates in a cost effective and reliable manner.

For the purposes of this research report 'best' graduates are defined as those who pass the ICAS professional accountancy examinations first time. Whilst it is appreciated that this definition of success is only one of the factors that will create a successful appointment, a trainee who fails to negotiate the examination hurdle can never proceed to demonstrate full worth to the organisation in subsequent successful job performance.

The importance of examination success

A graduate entrant into a professional accountancy office constitutes a major investment involving a substantial outlay to cover the costs of recruitment, training and replacement (Harvey-Cook and Taffler,1987; Tirbutt,1989). Taking ICAS trainees as an example, in addition to the basic salary cost there are training costs which incorporate the actual expenditure incurred in terms of fees but more significantly the opportunity costs of the trainee being absent for block release and exam leave. Taking this into consideration, the total training cost[3], specifically related to the training contract, of a fully accredited graduate amounts to £14,058 and this increases quite significantly to £27,710 for a non relevant graduate. These figures, however, fail to take into consideration the cost of 'on the job training' whereby more senior members of staff are responsible for supervision and training, reducing their chargeable time. In many respects this aspect of the educational process may be the most expensive to the firms.

Training costs, however, escalate when the trainee encounters resits in the professional examination system. The importance of examination success is demonstrated by the firms in identifying the ability of trainees to pass examinations as the key factor in the screening of application forms (Cameron,1991).

Gammie (1996), in a survey of the selection techniques of professional accountancy firms who employ ICAS trainees found that nearly half of training providers had lost trainees due to their failure to pass their examinations. This economic loss in human capital terms will adversely affect the firm, yet appears to be accepted philosophically, albeit reluctantly, by the staff partners (Harvey-Cook and Taffler,1987). The proportion of such failures will reflect adversely on the firm in the eyes of prospective employees. Indeed, firms whose students have performed well in the ICAS exams often use this as a marketing tool to attract the following year's graduates.

Aims of research project

This research aims to assist training providers to select the graduates who are likely to succeed at the first attempt to pass the ICAS examinations. The project identifies the aspects of an ICAS trainee's background which are statistically significant in relation to the ability to pass the ICAS examinations at the first attempt. This work is based on the profiles of trainees who passed the ICAS examinations in the late 1980s and early 1990s.

Using the information obtained from these trainees, exploratory statistical models have been developed to identify which combination of factors would appear to indicate most effectively this potential to pass examinations at the first attempt. It must be stressed however, that, these models are purely exploratory and could not be used to assess the probability of future applicants successfully passing their ICAS examinations. Before these models could be used in this manner, it would be necessary to test them on a different group of newly qualified members to ensure that the models retained their validity by correctly classifying this new group of members into those who passed first time and those who experienced resits.

Key issues from the literature

This section identifies key issues for exploration and summarises the relevant literature in relation to the selection of graduates for accountancy trainee positions. A more detailed literature review can be found in Appendix 1.

Accountancy firms in the UK receive far more applications from candidates than the number they wish to interview. This necessitates some form of reliable and cost effective filtering process. Firms pre-select prospective trainees on the basis of their application forms. Taffler and Harvey-Cook (1987) have argued, however, that this elimination process was conducted by firms in an intuitive and unsystematic manner without any recourse to statistical evidence on which to base the decisions. They suggested that the technique of scoring information extracted from the application form, which can be demonstrated to be related to a particular aspect of performance, namely biodata, had not yet been utilised by the recruiters of ICAEW trainees, and this may have resulted in unreliable pre-selection. Gratton (1989) suggested that the use of biodata was the best method to pre-select graduates for entry level jobs, where training would be undertaken after recruitment, since these candidates only had a limited amount of work experience on which to be assessed.

The training firms in the UK rely on the traditional interview, despite the research evidence questioning the validity of the interview as a selection technique. Gammie (1996) found that in the early 1990s only a small minority of firms recruiting ICAS trainees were using more advanced selection techniques such as psychometric testing.

Studies in the field of graduate recruitment worldwide have shown that previous academic achievement, extracurricular activities and work or vacation experience are criteria sought by recruiters. Previous academic performance is a key criteria for the selection of accountancy trainees. This is based on the importance that recruiters place on the ability of accountancy trainees to pass their professional examinations. Studies examining the relationship between candidate attributes and success in the field of accountancy examinations reveal that previous academic performance is indeed a significant indicator of future accountancy examination performance both at undergraduate and professional level. However, the area of interest is to identify which particular aspects of previous performance are related to future performance. At undergraduate level, it has been found (Dockweiler and Willis, 1983; Clark and Sweeney, 1985; Eskew and Faley, 1988; Gul and Fong, 1993; and Tho, 1994) that school performance is a statistically significant indicator of university performance. Similar results were found for professional accountancy examinations, whereby a combination of school and university performance were significant indicators of professional examination performance. Of particular note was the study by Taffler *et al* (1995) which suggested that the overall UCAS[4] point score, so often used by recruiting firms in the pre-selection process, was not the most appropriate criteria in the prediction of professional examination success.

Academic achievement is considered a key factor in the screening process, to satisfy the criterion of ability in the examination process. According to Gammie (1996), however, there is no statistical evidence on which to base pre-selection decisions. She also found in relation to ICAS training that, although some firms selected trainees who performed consistently well in the TPC1[5] and TPC2[6] examinations, there was no evidence to suggest that their selection policies were more sophisticated than those firms who employed students experiencing resits in the ICAS examination process. It was concluded that, although the firms would appear to be satisfied with their selection results, they should strive for maximisation from their investment.

Research method

Stage 1 of the project was concerned with eliciting personal history information from recently qualified ICAS members. For this part of the project a postal survey was used. Stage 2 of the project involved undertaking analysis to determine which aspects of an ICAS member's total background appeared to differentiate between those who passed their ICAS examinations at the first attempt and those who experienced resits. This analysis identified those factors which were important for examination passing potential.

Stage 3 involved developing exploratory statistical models to identify which combination of factors appeared to indicate success in passing the ICAS examinations at the first attempt and, therefore, to focus on the relative importance of the various factors.

The postal survey

The questionnaire was designed following a review of the relevant theory and consideration of measures which previous studies have found to be good predictors of future performance in related applications. The objective of the questionnaire was to elicit information from recently qualified chartered accountants on their background history. The questionnaire was then scrutinised by an academic expert in the field of questionnaire design. This scrutiny considered question content and phrasing, suitability of question format, question sequence and overall layout. Following minor adjustments, the questionnaire was then evaluated by a senior member of the education team at ICAS, who provided the expertise in the field of trainee selection and the ICAS examination systems in force during the training periods in question. The questionnaire was then pilot tested to ensure that the questions were readable, answerable and unambiguous to the respondent. The responses to the variety of open questions were also examined to ensure that the responses could be analysed in a meaningful fashion. Once again minor adjustments were made in relation to some question wording, before the questionnaire was finalised. A copy of the questionnaire is presented in Appendix 3.

The population chosen for sampling was recently qualified ICAS members from each of the qualification years 1988 to 1992 (2,193 in total). Questionnaires were sent to 1,000 recently qualified members comprising 200 from each of the qualification years. This represented 45.6% of the total population. A total of 624 valid responses were returned which equates to a response rate of 62% which is considered above average for self completion mail questionnaires.

The population of ICAS members qualifying between 1989 and 1992 was chosen for two reasons. First the timescale between completion of their training contract and completion of the questionnaire was sufficiently short to enable them to recall the various details of school and university background. Second, this period covered the introduction of the route whereby the non relevant graduate trainees received all their accountancy education within ICAS. This information was used to compare performances of the fully accredited graduates to the non relevant graduates.

The questionnaire requested information on the attributes of a trainee's background history, based on the five categories of:

- personal background;
- secondary education;
- higher education;
- ICAS education; and
- employer information.

Factors related to examination success

The responses were segregated into those who passed their ICAS examinations at the first attempt and those who experienced resits. Analysis was then undertaken to explore relationships by comparing for example, the UCAS point score of those who successfully passed their examinations at the first attempt to the UCAS point score of those who experienced resits. Any differentiating individual background factors were noted as being related to successful examination performance. Although this analysis provided information on association between the background factors and examination success, it did not allow for quantification of the relationship. Further statistics were, therefore, required to identify the strength and importance of any relationship.

At this point it was decided to exclude those trainees who had undertaken A Levels. As the Harvey-Cook (1995) research indicated, the choice of subject, both at the later stages in school and at university were significant in the determination of successful professional examination performance. By restricting the analysis to those students who had undertaken Scottish Highers a more detailed analysis could be carried out in this study, both on the choice of Highers taken, and on the Higher results in particular cognate areas. The original sample size of 624 was therefore reduced to 549. No further analysis work has been carried out on the remaining 75 students (12% of the original sample) who had studied A levels at school as it was considered that the sample size was too small to draw any meaningful conclusion.

The decision was also taken to treat Honours and Ordinary graduates as separate groups. Harvey-Cook (1995) suggested that the Honours classification was a significant predictor of ICAEW examination performance. There are, however, fundamental differences in the English system of higher education whereby students can obtain an Honours degree in three years and the Ordinary degree as a chosen route is extremely rare. In Scotland, whilst the Ordinary degree route will contain some weaker students, who have not satisfied the Honours entry requirements, it can be argued that some of the best students do not proceed to an Honours degree as they wish to take a 'fast track' into the profession. In England, the award of an Unclassified degree is most often awarded when a student on an Honours course has not achieved the required standard.

Following this initial work, 39 background factors were identified. These factors, their rationale for inclusion and their method of coding can be found in Appendix 4. A score[7] was calculated for each of the factors. This score, in each case, pointed to the factors which appear to differentiate between the group who passed their examinations first time and the group who experienced failure. Statisticians warn of the need to identify any of the factors which are closely related. The strength of association between the background factors was examined[8]. For any pair of factors which were deemed to be too closely related, the decision was taken to exclude one of the factors.

Development of the statistical models

The factors which appeared to be related most strongly to professional examination success, as demonstrated by their score as discussed above, were then entered into a statistical model. This model was designed to identify the most effective factor or combination of factors which significantly differentiate between those trainees who passed their examinations at the first attempt and those who passed later.

Limitations

The sample was drawn from trainees who were successful in securing a training contract and who were all ultimately successful in the ICAS examination process. The results will, therefore, only show among those trainees already selected by existing pre-selection criteria, and who qualify, which factors may help predict whether prospective trainees will pass the examinations at the first attempt or experience resits.

Trainees who failed to qualify were not included as the information to identify them was not readily available from ICAS. The profiles of these trainees were not included in the analysis, and the interpretation of the results should be considered in this light.

It should also be noted that the analysis and model building was carried out on students who qualified in the late 1980s and early 1990s. Any background factors which would appear to be related to successful ICAS examination success may only be significant during that particular period of study. Other factors which were insignificant at that time and would have, therefore, been omitted, may now be more relevant. Likewise important factors identified in the models may now be outdated and no longer valid.

In addition, the 1990s has seen some fundamental changes to the system of university education. In a rapidly changing environment where student patterns have changed and the introduction of modularisation and semesterisation in many programmes, these models developed on graduates from the 1980s may not be valid when applied to graduates from the 1990s. The significant exploratory factors may only be significant during the period of study, and other insignificant factors could be significant in a future time period.

Structure of the report

In Chapter 2 the background factors which appear to be related to first time examination success are outlined, drawing on the profiles of recently qualified accountants in the period 1988-1992. Statistical models are developed in Chapter 3 which are designed to identify the most effective factors which differentiate between those trainees who passed their ICAS examinations without resits with those who passed later. Chapter 4 draws conclusions from the analysis, makes recommendations for the training providers and identifies further research that could be undertaken in the area.

Endnotes:

[1] Degrees which satisfy the ICAS requirements for accreditation and therefore contain a substantial element of accountancy and related subjects

[2] Degrees which have an insufficient input of accountancy and are therefore treated as non relevant by ICAS

[3] These costs are based on the 1997/98 fee and examination structure and are also based on 1997 salaries, details of the calculations can be obtained directly from the author

[4] The Universities and Colleges Admissions Service (UCAS) have a standard scale for calculating an overall performance score based on Higher and A level grades. The score is calculated as follows: Scottish Highers; A Pass - 6 points, B Pass - 4 points, C Pass - 2 points, A Levels; A Pass - 10 points, B Pass - 8 points, C Pass - 6 points, D Pass - 4 points, E Pass - 2 points

[5] Test of Professional Competence Part 1 - the first examination for fully-accredited graduates, and the level following the professional examinations as undertaken by non relevant graduates

[6] Test of Professional Competence Part 2 - the final examination

[7] The quantification of the relationship is demonstrated by the Z score, which is calculated from the Mann-Whitney test

[8] The strength of association between the background factors was calculated by the Spearman correlation coefficients

Chapter Two

Factors Related to Examination Success

Previous research studies have suggested that previous academic achievement is a key criterion used by recruiters of accountancy graduates. Some firms, therefore, may set a minimum number of UCAS points to narrow down the field of application forms, while others may look for specific grades in subjects such as Mathematics and English. Firms recruiting trainees into the ICAS system of education have, however, no statistical evidence to evaluate their selection criteria in relation to successful ICAS examination performance.

This chapter identifies the factors which appear to be related to successful examination performance by using the data derived from the questionnaire responses of recently qualified CAs. These trainees have been categorised into those who were successful, determined by their ability to pass all the ICAS examinations at the first attempt, and those who incurred resits during their ICAS education. The analysis of these two groups follows the life history of the respondents as identified in the questionnaire format outlined in the previous chapter.

ICAS examination performance

A fundamental change in the ICAS examination system took place in 1988, with transitional arrangements having operated in 1987. Immediately prior to the change, students from fully accredited degrees were required to sit four examinations. Students progressing from a non relevant programme undertook a one year postgraduate conversion course at university before commencing their training contract and examination process. Thus there was nothing to differentiate the cost of either a relevant or non relevant trainee in relation to the examination system. In

PAGE NUMBERING AS ORIGINAL

examinations was calculated and these results were linked with the examination system in an effort to identify significant trends. The results are presented in table 2.2.

Table 2.2 Examination performance analysed by education system

Type of system	Pass 1st time	One resit	Two resits	Three resits	Four or more resits
	% (n)	*% (n)*	*% (n)*	*% (n)*	*% (n)*
1983-86	40 (122)	27 (80)	18 (54)	12 (37)	3 (10)
1987	51 (61)	24 (29)	12 (15)	12 (14)	1 (1)
1988: Accredited graduates	59 (98)	30 (50)	11 (19)	-	-
1988: Non relevant graduates	82 (28)	18 (6)	-	-	-

The results indicate that proportionately more students passed the new system in the early stages, with 59% (98 out of 167) of accredited graduates passing their examinations first time in comparison to only 40% (122 out of 303) in the earlier system. It may be argued that this is simply a result of the reduction in the number of hurdles the students must negotiate. The results, however, from the non relevant students, who are required to sit up to an additional nine examinations at the professional stage, are outstanding with 82% (28 out of 34) passing their examinations first time. The results from this group of students in isolation must, however, be treated with caution due to the small number of respondents falling into this category.

As one of the objectives of the selection system is to identify those candidates who will succeed in their professional accountancy examinations, the main analysis has concentrated on the respondents who progressed through the system with no resits. The profile of this group will be compared to those with one or more resits. All first time successes will therefore be considered as a cohesive group. The split of the respondents between those who passed first time, and those with resits is almost equal, with 49.5% (n=309) passing all their professional examinations first time, and 50.5% (315) requiring at least one resit.

Personal background

An analysis of gender and age was undertaken to explore whether this information was important in the determination of ICAS examination success.

Gender

Respondents were distributed 60:40 between men and women, which is in line with the student numbers from the years under investigation (Gammie and Gammie, 1995). In the sample 55% (135 out of 245) of women passed their examinations first time in comparison to 46% (174 out of 379) of men. This is consistent with previous work in this area which suggests that women outperform men in the accounting classroom (Fraser *et al*, 1978; Hanks and Shivaswamy, 1985; Bayes and Nash, 1989; Tyson, 1989; Mutchler *et al*, 1987), although only the studies by Mutchler *et al* (1987) and Bayes and Nash (1989) showed statistically significant differences. Whilst this may be an interesting finding, sex discrimination legislation would prevent the use of gender as a differentiating tool in the selection process.

Age at commencement of training contract

The majority of trainees, 92% (567 out of 624) started their training contract before the age of 25. Half of this group passed their examinations first time. Six out of the thirteen students in the age range 26-30 years passed, of those students in the age range 31-40 years, five out of nine passed, and the one student who was over 40 also passed first time. Due to the small numbers of these older students it is difficult to draw any valid conclusion.

Secondary education

Detailed information on secondary education was analysed. This was an attempt to evaluate which particular aspects of secondary education differentiate between those students who passed their ICAS examinations first time and those who experienced resits.

Secondary school attended

The majority of respondents, 74% (460 out of 624) had attended a comprehensive school. That group showed a first time pass rate of 48% (222 out of 460). In comparison 164 students attended either a grammar, independent or single sex school of whom 53% (87 out of 164) passed the ICAS examinations with no resits. Graduates who were educated outwith the comprehensive system performed better in the ICAS examination system.

School examinations

Respondents were asked to identify whether they had sat Highers, A levels, both Highers and A levels, or neither and the grades achieved. The grades were converted into UCAS points for analysis purposes[1].

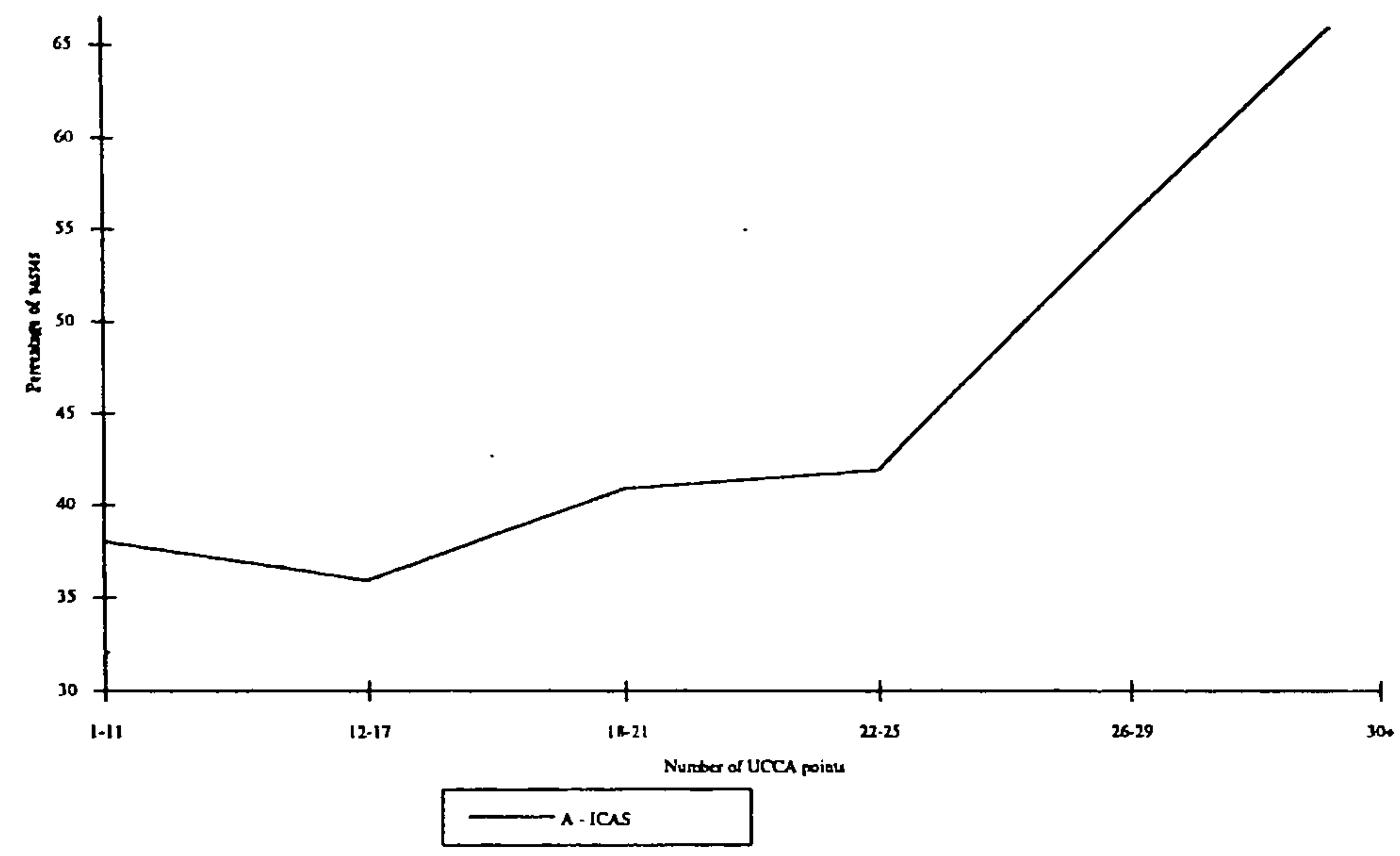
Table 2.3 Analysis of respondents by school examinations

School examinations	*No of respondents*
Highers	549 (88%)
A levels	41 (6%)
Both Highers and A levels	29 (5%)
Neither	5 (1%)
Total	**624**

As expected from trainees undertaking their training in Scotland, only 6% of the sample (n=41) sat A levels and a further 5% (n=29) sat both Highers and A levels. However, 57% of this sub group were successful first time at their examinations in comparison to 49% of those who only studied Highers.

The analysis of those who passed first time categorised into UCAS scores can be found in Figure 1.

Figure 1 - Examination passes classified by UCAS points



Source: ICAS Results, Recently Qualified Questionnaire (1993)

As might be expected, a positive link exists between the number of UCAS points and success in the ICAS examinations, with 56% (76 out of 136) of those who attained between 26-29 UCAS points passing first time, increasing to 69% (94 out of 136) of those who achieved 30 or more points. The evidence would suggest, therefore, that the greater the number of UCAS points the greater the chance of passing the accountancy examinations.

Of particular interest, however, is the gradient of the ICAS line. The relationship between the number of UCAS points and examination passes is less clear when the lower categories of UCAS points are considered. Although the graduates who train under the ICAS system and possess more than 26 UCAS points have a greater chance of success in the examinations, the differential effect of the number of points below this level is less obvious. For example 41% (38 out of 93) of ICAS students with between 18-21 UCAS points passed their examinations first time, but this percentage increased to only 42% (61 out of 145) for those with between 22-25 points. If firms wish to use number of UCAS points as a pre-selection criterion for trainees undertaking ICAS examinations they should consider the most appropriate level at which to set the cut-off. From Figure 1 the most obvious cut-off point should be 26+ UCAS points, which is the equivalent of 4 As and 1 C at Higher. If, however, firms are accustomed to recruiting students with lower UCAS points than this, the use of UCAS points as a criterion for selection may not be the most valid indicator of examination success.

It is interesting to investigate whether any particular Higher has a significant impact on the results. In Scotland students tend to sit four or five subjects at Higher, with almost all school pupils sitting core areas such as Mathematics and English. Many firms set minimum targets in these particular areas as a method of pre-selection, in the belief that Mathematics demonstrates numerical ability and English, the ability to communicate. Table 2.4 classifies respondents who passed first time by Higher subject and grade.

Table 2.4 Analysis by Higher subject and result

Higher	*Number taking subject*	*A*	*B*	*C*	*Total*
		% (n)	*% (n)*	*% (n)*	*%(n)*
English	565	59(111)	47 (99)	38 (59)	48 (269)
Mathematics	557	57(143)	44(103)	34 (21)	48 (267)
French	241	61 (46)	54 (55)	47 (26)	53 (127)
German	65	81 (17)	57 (12)	55 (11)	62 (40)
Biology	97	63 (15)	35 (17)	18 (4)	37 (36)
Chemistry	335	64 (81)	46 (66)	33 (19)	50 (166)
Physics	370	69 (78)	43 (71)	37 (31)	49 (180)
Geography	189	51 (41)	38 (29)	18 (5)	40 (75)
History	173	51 (34)	48 (40)	40 (8)	47 (82)
Accounts	178	59 (52)	37 (29)	27 (3)	47 (84)

Table 2.4 supports the earlier evidence that the greater the number of UCAS points the better the performance in the professional examinations. However, it seems that students who have studied a language subject have performed well in the ICAS system irrespective of the grade achieved. This supports the results of Taffler *et al* (1995) who suggested that the choice of subject at 'A' level, irrespective of grade achieved, may be a relevant indicator of ICAEW examination success. It may not be sufficient in the selection process therefore simply to look for A passes at Higher without examining in greater depth which subjects these grades have been achieved.

Only 75 trainees in the sample undertook CSYSs and 52% of these students passed their ICAS examinations without resits, which would suggest that undertaking the CSYS level of study at school is not indicative of future examination success.

Further analysis was then undertaken to identify whether there are any significant inter-relationships between UCAS points, gender, and type of school. Although the evidence demonstrated that trainees progressing from outwith the comprehensive system and women performed better in the examination system, a proportionately higher percentage of men, namely 68%, progressed from this non comprehensive route. This would suggest that type of education does have a significant impact on the ICAS examination results and is not simply a derivative of another factor. It is also interesting to note that there is no difference in the average UCAS points from the students dependent on their type of schooling, with an average of 23 points both for comprehensive and non comprehensive education. Similarly, there is no difference between the average UCAS points of men and women with each achieving an average once again of 23. This tends to suggest that women cope better in the professional examination system, and that their better performance is not related to a superior school performance.

Other activities undertaken at school

The respondents identified hobbies or interests they pursued during their school career together with the average amount time spent on these activities. There is very little to differentiate the trainees dependent on the sports/hobbies undertaken. An area that does require further attention in the pre-selection system however, is the very poor performance of those who did not have any sports or hobbies during school (n=51) achieving only a 35% pass rate. There is no evidence to suggest that number of hours spent on the principal activity has any affect on the results.

Although the vast majority of respondents, 91% (n=568), progressed directly from school to university, this is not a determinant of examination success. Those who took a break achieved the same success rates as those who progressed directly.

Higher education

The analysis in this section considers the impact that type of higher education, higher education performance and activities undertaken during this time has on ICAS examination performance.

Type of higher education establishment

Statistical analysis produced by ICAEW reveals some interesting data on the performance of graduates categorised by type of higher education establishment, and further analysed into relevant and non relevant degrees. A summary of their examination statistics for 1992 and 1993 is contained in table 2.5.

Table 2.5 Examination performance of graduates classified by educational establishment (expressed in percentage terms)

	U	P	U	P	U	P	U	P
	1992 Interm	*1992 Interm*	*1993 Interm*	*1993 Interm*	*1992 PE2*	*1992 PE2*	*1993 PE2*	*1993 PE2*
	%	%	%	%	%	%	%	%
Non relevant	**49.6**	**32.7**	**62.6**	**35.7**	**55.3**	**42.0**	**57.0**	**53.8**
Oxford and Cambridge	68.0		80.9		78.2		73.2	
Others	47.6		59.0		52.9		55.2	
Relevant	**44.6**	**19.6**	**61.6**	**63.6**	**49.6**	**32.6**	**53.3**	**64.3**
TOTAL	**49.1**	**29.3**	**62.3**	**41.5**	**54.7**	**37.5**	**56.5**	**56.6**

Source: Education, Training and Student Salary Statistics, 1991/92, 1992/93, ICAEW

U = University

P = Polytechnic which with few exceptions will now be known as the new universities.

The graduates from universities exceeded the performance of those from polytechnics at each sitting and level. If, however, the results of Oxford and Cambridge graduates are extracted, as they are considerably higher, the differences between the other universities and the polytechnics are not so apparent. Unfortunately there is no data published by ICAEW linking the number of UCAS points to university. However the average UCAS scores of Oxford and Cambridge graduates is normally considerably higher than that of graduates of the other universities.

There is also a significant difference between the results of 1992 and 1993. The polytechnic graduate performance has improved in 1993, with their relevant graduates exceeding the results of the relevant graduates from universities at both levels of examinations. Unfortunately there is no further data available from ICAEW regarding the split between universities and polytechnics post 1992/93 because the polytechnics converted to universities and were treated synonymously thereafter.

Any differential in performance within the Scottish context should therefore also be investigated. Whether the university or polytechnic attended has an impact on performance in the ICAS system was examined. In this instance, it is important to differentiate between the examination systems. The earlier 1983-86 system placed far less reliance on the university. Much of the university syllabus studied by graduates with accredited degrees, was re-covered by ICAS in the Professional stage and Part 1. The 1988 system assumes a core knowledge from graduates with an accredited degree, and therefore more reliance is placed on the accredited degree route, developing the trainee from the base of assumed knowledge obtained from the university degree. Those trainees whom progressed from non relevant degrees and, therefore, took the professional stage should also be identified separately. The percentage of trainees who passed all their examinations first time categorised into the university or polytechnic of degree study can be found in table 2.6.

Table 2.6 University or polytechnic of degree study

University/ Polytechnic	*Total number of students*	*Total % pass first time (n)*	*1983-86 (n)*	*1987 (n)*	*1988-89 (n)*	*Professional stage (n)*
Aberdeen*	78	45 (35)	41 (13)	29 (4)	50 (13)	83 (5)
Dundee Institute of Technology#	19	26 (5)	21 (3)	N/A	40 (2)	N/A
Dundee*	37	43 (16)	41 (7)	67 (4)	33 (4)	50 (1)
Edinburgh*	89	55 (49)	39 (18)	50 (5)	80 (20)	75 (6)
English College#	5	40 (2)	0 (0)	N/A	N/A	100 (2)
English*	20	50 (10)	40 (4)	0 (0)	33 (1)	100 (5)
Foreign*	2	50 (1)	N/A	100 (1)	N/A	0
Glasgow*	145	57 (82)	51 (38)	54 (14)	64 (27)	100 (3)
Glasgow Polytechnic	18	39 (7)	36 (4)	40 (2)	50 (1)	N/A
Heriot-Watt*	50	66 (33)	52 (14)	75 (9)	90 (9)	100 (1)
Napier Polytechnic#	16	31 (5)	33 (2)	0 (0)	40 (2)	100 (1)
Robert Gordon Institute of Technology#	12	42 (5)	25 (1)	67 (2)	40 (2)	N/A
Scottish College#	18	39 (7)	38 (3)	50 (3)	0 (0)	100 (1)
St Andrews*	6	50 (3)	50 (1)	N/A	33 (1)	100 (1)
Stirling*	31	45 (14)	27 (4)	43 (3)	78 (7)	0 (0)
Strathclyde*	75	45 (34)	27 (9)	61 (14)	56 (9)	100 (2)
Didn't attend university or polytechnic	3	33 (1)	100 (1)	0 (0)	N/A	0 (0)

Note * = University, # = Polytechnic/College

▒ = Universities whose graduates have exceeded the performance of the total sample (49% as identified in Table 4.2) have been highlighted

Although care must be exercised in the interpretation of these results due to the small numbers progressing from various routes, interesting trends do emerge. The performance of university students exceeded the performance of those trainees who were products of the polytechnic and college sector. Within the university sector differences were apparent. Both Heriot-Watt University and Glasgow University exceeded the overall sample percentage in all cases. Under the system from 1988 to date students from Edinburgh University and Stirling University have also exceeded the performance of the sample as a whole, despite poorer performance in the earlier system. Overall, however, the three universities of Heriot-Watt, Glasgow and Edinburgh appear to have stood out in performance terms with little to differentiate between the other universities and polytechnics or colleges.

Type of degree

The balance of accredited graduates to non relevant graduates remained relatively constant at around 80% to 20% during the period 1990-92. Within both these groupings there was a range of first degrees undertaken. The percentage of trainees that passed all their professional examinations, classified by first degree, can be found in table 2.7.

Table 2.7 Analysis of first degree

Type of Degree/ Diploma	*Total number*	*% Pass 1st Time*	*1983-86 system % (n)*	*1987 % (n)*	*1988-89 % (n)*	*Prof stage %(n)*
SCIENCE & ENGINEERING						
Engineering related	10	70				
Mathematics related	25	52				
Science related	19	47				
TOTAL	**54**	**54**	**38 (21)**	**44 (9)**	**54 (13)**	**91 (11)**
ARTS, HUMANITIES & SOCIAL SCIENCES						
Social science	17	65				
Language	4	50				
Law	15	47				
Miscellaneous	13	46				
Arts	12	42				
TOTAL	**61**	**51**	**44 (29)**	**33 (6)**	**23 (10)**	**88 (16)**
FULLY ACCREDITED DEGREE						
TOTAL	**483**	**50**	**40(241)**	**53 (95)**	**62 (141)**	**66 (6)**
RELEVANT HND						
Accountancy/ Business Diploma	23	35	36 (11)	44 (9)	0 (3)	N/A

The majority of trainees, 77%, (483 out of 621) were fully accredited graduates. This is broadly similar to the ICAS population as a whole. Table 2.7 reveals that there was little to differentiate in total terms between either the performance of relevant graduates compared to non relevant graduates, or graduates with science and engineering degrees compared to graduates with arts, humanities and social sciences degrees. Trainees, however, who progressed from a Higher National Diploma (HND) route did not achieve comparable pass rates to the graduate entrants.

Due to the very small numbers progressing from non relevant backgrounds, it is difficult to draw any conclusions from the analysis split between the different examination systems. It is, however, apparent that the non relevant graduates appeared to perform far better in the examination system when they received all their accountancy education from ICAS, as opposed to undertaking a one year post graduate diploma from university which they were required to do under the 1983-86 and 1987 systems. The necessity of this post graduate course in Scotland was unattractive to many non relevant students who then pursued chartered accountancy careers through the ICAEW system which did not have this requirement. It is suggested, therefore, that better non relevant students were now applying for ICAS training places. However it must also be recognised that increased training costs are now borne by the firms for non relevant students which were previously borne by either the student or the Government. These increased costs may have encouraged the training providers to consider carefully these students and only recruit the outstanding non relevant graduates, resulting in an increase in the examination performance of these trainees.

The ICAEW also publishes statistics on the performance of their trainees analysed by class of degree. Their results show that graduates with a first or an upper class second degree perform better in the professional examination system than those with lower second, third class or unclassified degrees. As discussed previously, however, the university system in Scotland is different from that in England and Wales, with many students in Scottish universities choosing to progress down the Ordinary degree route, and therefore graduating after three years.

Only 36% (224 out of 621) of the respondents graduated with an Honours degree. These Honours graduates were asked to identify which Honours classification they achieved. The results are shown in table 2.8.

Table 2.8 Performance classified by type of degree and classification

Type of degree	*No of students*	*% first time pass*
Ordinary	397	44.4
Honours:	224	59.4
First	23	91.3
Upper Second	121	69.4
Lower Second	76	36.8
Third	4	.0

The average performance of Ordinary graduates in the professional examination system is lower than that of Honours graduates. The classification of degree is also significant in performance terms, with a positive link between class of degree and examination success. Recruiting firms should therefore consider the classification of degree in the selection process.

Within the group graduating with an Ordinary degree the best performers were those who had been offered the opportunity of Honours but who had chosen the Ordinary route as they wished to commence their training contract as early as possible. There was little to differentiate however between that group and the students who felt that it was unnecessary or of no benefit to undertake an Honours course. The groups who either found that Honours was not an available route in their chosen degree, or found that the Honours option was not available to them based on their academic performance, performed less well in the examination system. They recorded first time pass rates of 37.5% (9 out of 24) and 29.7% (19 out of 64) respectively. Recruiting firms therefore may need to raise the question of why an Honours course was not undertaken.

It must be noted, however, that there would appear to be some disparity in the offering and taking up of Honours at some of these universities at this particular time. Of the Ordinary graduates of the period Heriot-Watt University achieved the best results with 61% (20 out of 33) of their Ordinary students passing the ICAS examinations first time. For Glasgow University, 53% (61 out of 116) of Ordinary graduates passed first time. The next best performance was that of the Ordinary graduates from Strathclyde and Edinburgh University. However only 43% (39 out of 91) of these students progressed through their training with no resits.

Although there is no evidence to dispute the link between the classification of an Honours degree and the examination performance, this information will not necessarily be available at the selection stage, due to the timing of the recruitment process. Indicative degree classifications however are usually available from universities, and this could be an area that is worth consideration in the selection process. Indeed many firms will make an offer to a prospective trainee on the condition that a particular degree classification is achieved.

Resits encountered during higher education

Information that is available however at the application form stage is the number of resits which a student has been required to take during their university career. Respondents were therefore asked to identify how many resits, if any, they were required to take during their first degree in order to ascertain whether this is indicative of ICAS examination performance. The results are contained in table 2.9.

Table 2.9 Respondents classified by number of resits at university

Year	*Number of resits*	*% First time pass (n)*
First year	No resits	53.3 (283)
	One or more resits	27.7 (25)
Second year	No resits	54.0 (288)
	One or more resits	22.7 (20)
Third year	No resits	51.5 (303)
	One or more resits	15.2 (5)

It should be noted that students are not usually allowed to resit subjects contributing to their Honours classification and therefore no resits are undertaken in the fourth and final year of a degree programme. It must also be stressed that there was no consideration taken of the overall assessment structure of each degree programme and hence no quantification made as to the gravity of a particular resit from institution to institution. This information however would not necessarily be available to the recruiter from the accountancy office, and hence would be difficult to evaluate. The results of table 2.9 are clear and it would appear that any resit encountered at university is a significant indicator of the ability to pass the ICAS examinations.

The later into the undergraduate degree programme the resit was required, the greater the impact on performance in the accountancy examinations. Firms should therefore raise the question in the application form whether any resits have been required, and if so, at what point in the degree programme.

Other activities undertaken during higher education

The hobbies or interests that were pursued during university were identified in the same manner to the school activities. An area requiring further attention, however, in this instance, is the relatively poor performance of those who partook in team sports, 44% (60 out of 136). The ability to work in a team is often seen as a pre-requisite of a chartered accountancy trainee, and this may often be evaluated at the pre-selection stage by the evidence of partaking in team sports. As was the case with the sports/activities undertaken at school, the average hours devoted to the activity appears to have no bearing on the success of the graduates.

Only ten respondents studied a degree with a placement period. There was no difference in their examination performance in comparison to those who completed their degree entirely at the university. However, there is evidence to suggest that those who undertook a part-time job, particularly whilst at university, performed well in the system. A larger number (n=111), representing 35% of the sample spent some of their vacations working in a financial environment. A slightly higher percentage of this group, namely 51.4% passed their ICAS examinations first time in comparison to only 48.5% of those who had not undertaken such a vacational job. There is, however, no evidence to suggest that the number of weeks in total that the student was employed has any effect on the results.

ICAS education

The effect of a break between completing a higher education course and commencing a CA contract on the determination of ICAS examination success was explored. The respondents were asked to indicate whether they progressed directly from university into their ICAS training contract. As expected, the vast majority, 91% (n=568), did progress directly. The performance, however, of those who took a break (n=56) exceeded that of those who did not, achieving a first time pass rate of 55.4%(31 out of 56) in comparison to only 48.9% (278 out of 568). The length of break varied from less than a year to more than fifteen years but there was no identifiable trend in the performance dependent on length of break.

Employer information

Although data in respect of the training organisation will not be relevant to the training providers at the selection stage, a question that must be addressed particularly in light of the generalizability criticism of biodata, is whether the training environment has an effect on examination performance. If there is a differential examination performance of trainees dependent on size of office for example, is this due to their different background attributes or a result of the training environment to which they have been subjected? Thus some analysis on the training firms was carried out.

Size of training firm

Although size of training firm is not a characteristic of the trainee, it is necessary to consider whether the size of training firm has a determining effect on ICAS examination performance. The sample were employed across the spectrum of training firms. This split together with the relevant examination success can be found in table 2.10.

Table 2.10 Categorisation by size of training firm

Size of organisation	*% employed (n)*	*% first time pass (n)*
Multinational	64 (399)	59 (234)
Large	9 (53)	38 (20)
Medium	12 (78)	27 (21)
Small	15 (94)	36 (34)

Unfortunately there are no statistics available from ICAS pre 1990 regarding split of trainees between size of office. However during the intake period of 1990-94, the average intake classified by category was large (including multinational) 63%, medium 14% and small 23%. These figures are, therefore, slightly biased towards the large firm at the expense of the small firm assuming that the intake was broadly similar in earlier years of 1985-89. As the evidence suggests that the trainees employed by the multinational firms perform better in the examination process this will result in the average pass statistics being overstated for the population as a whole. Is the better performance of the multinational trainees simply a result of these firms attracting the better graduates or is performance linked to the training the graduates receive? Further analysis was therefore carried out to address this issue. If we consider that trainees who possess at least 26 UCAS points perform better than those with less UCAS points (as demonstrated in Figure 1), larger percentages of the multinational firms achieve this criterion, with 50% (200 out of 399) of their trainees possessing at least 26 points. This is in comparison to larger firms with 26% (14 out of 53), medium firms with 19% (15 out of 78), and small firms with 27% (25 out of 94) respectively. There is evidence to suggest that the quality of trainee, using UCAS points as a determinant of quality, is better in the multinational firm.

Additional training

Many organisations in addition to sending their trainees to the compulsory ICAS classes, also send their trainees on in-house or other courses. The rationale is that additional training will result in better examination performance. Consequently the questionnaire identified if further training courses were undertaken during the training contract, and identified the average days per year spent on these courses. The vast majority of trainees, 82.7% (516 out of 624), received additional training, and their examination performance exceeded those who only attended the ICAS classes, with 53.3% (275 out of 516) passing their examinations first time in comparison to only 31.5% (34 out of 108). Investing in additional training would appear to enhance examination performance, although this may be a function of the size of the training organisation. Further analysis was carried out to ascertain the split of training between firms. A positive link between size of firm and training would seem to exist, with 3% (12 out of 399) of multinational trainees stating that they received no additional training, increasing to 11% (6 out of 53) of large firm, 35% (27 out of 78) of medium, and 68% (64 out of 94) of small firm trainees. Therefore although the firms who do undertake additional training appear to have better examination statistics, this is not necessarily a function of this training but may simply be due to other factors such as quality of graduate. What remains of interest however, is the effect the extent of this training has on performance, the results of which are analysed in table 2.11.

Table 2.11 Average number of days spent on training courses outwith ICAS

No of days	*% First time pass (n)*
< 3	34.1 (14)
3 - 6	46.5 (40)
7 - 10	59.4 (95)
11 - 14	58.7 (74)
15 - 21	45.6 (31)
>21	60.0 (21)

The evidence does not reveal a discernible trend between the volume and the likelihood of passing the examinations first time. This is not particularly surprising as internal training tends to focus on specific mechanistic procedures in the organisation, together with administrative based development. This training does not lend itself therefore to the type of work examined in the professional examination system as it is far removed from the syllabus.

There is little evidence, therefore, to suggest that differences in performance are as a direct result of the training environment in which the trainee was educated. Background factors would therefore appear to be relevant. In addition, as employer information relates to post-selection and the purpose of this report is to provide useful information for employers at the pre-selection stage, no further analysis will be carried out on the details to the employer information. It would not appear, however, that the training environment has any significant influence on success in the ICAS examination process.

Conclusion

This chapter has described those personal history items which may differentiate trainees who pass their examinations first time from those who have resits.

The intuition arising from this analysis suggests that particular attention should be paid to the following:

Higher education
- classification of Honours degree;
- if an Honours degree was not taken the reason why;
- if an Honours degree was not taken which University awarded the Ordinary degree; and
- whether resits were needed at university and if so where in the programme.

Secondary education
- the type of secondary school attended;
- whether using UCAS scores to pre-select graduates is appropriate; and
- the performance in and choice of subjects at Higher level at school.

Firms should consider these items in relation to their own practices with a view to evaluating their pre-selection criterion. Whilst some of the perceived pertinent factors support the criterion adopted by many recruiters, the relevance of other factors such as resits and type of degree would appear apparent.

Although this analysis provides some interesting information, it makes no attempt to identify whether any differences in background factors between the successful group and the group who incurred resits are statistically significant. Nor does it quantify the relative impact of the various factors in relation to ICAS examination success. The next stage is to develop an exploratory model which will quantify the weighting of the key background data items found to be correlated with examination performance. This will be examined in the next chapter.

Endnote:

[1] The UCAS point scores were calculated as follows: Scottish Highers; A Pass - 6 points, B Pass - 4 points, C Pass - 2 points, A Levels; A Pass - 10 points, B Pass - 8 points, C Pass - 6 points, D Pass - 4 points, and E Pass - 2 points. These grading scales are the standard scales as utilised by the Universities and Colleges Admissions Service (UCAS).

Chapter Three

Model Development and Evaluation

This chapter identifies the most effective combination of factors in the determination of successful ICAS examination performance. It gives separate consideration to Honours graduates and Ordinary graduates.

The analysis in the previous chapter examined various background factors arising from the questionnaire responses. From this analysis, supported by the review of other relevant studies, 39 factors were derived for statistical analysis. (See Appendix 4 for the 39 factors which were identified together with their rationale for inclusion.) One at a time, each of these factors were evaluated to determine which factors were the most important, and which were strongly associated at a statistically significant level with passing the ICAS examinations without incurring any resits.

The final stage of analysis is to combine several factors simultaneously. This should provide a profile in the determination of the success of a trainee. This approach, sometimes referred to as multivariate approach, recognises that background factors interact with each other, and that it may be the combination of factors which result in the most effective model.

Only the most important individual factors were entered into the model building exercise. There is, therefore, the possibility that the resulting model may fail to identify combinations of factors which are not deemed important enough in their own right but taken together would have warranted inclusion in the model. This will not invalidate the results reported here but could mean that some fringe components may be unselected.

The first model considers trainees who graduated with an Honours degree. The second considers Ordinary graduates.

The Honours graduate model

Scores[1] were calculated for each of the 39 factors in the Honours graduates' background in order to highlight those factors which differentiated examination performance. The results are reported in full in Appendix 5. Of these factors, seven were significant at the 1% level, four factors were significant at the 5% level and four factors were significant at the 10% level. The 15 significant factors listed in order of importance, are contained in table 3.1.

Table 3.1 Significant background factors - Honours graduates

Background factor	*Absolute Z score*	*Level of significance (%)*
Honours classification	5.92	0.01***
Number of resits in 2nd year at university	3.60	0.03***
Postgraduate qualification obtained	3.58	0.03***
Number of subjects retaken at Higher to improve the grade	2.98	0.29***
Number of UCAS points obtained	2.82	0.48***
Number of hours spent on sports *etc* at school	2.81	0.49***
Higher grade in Mathematics	2.61	0.91***
Whether degree is relevant or not	2.48	1.31**
Number of resits in 1st year at university	2.44	1.46**
Number of resits in 3rd year at university	2.02	4.33**
Number of analytical Highers	2.06	3.89**
Number of sports or hobbies undertaken at school	1.86	6.34*
Number of hours spent on sports *etc* at university	1.80	7.24*
Number of non analytical Highers	1.73	8.36*
Whether sports/interests undertaken at school	1.68	9.33*

*** = *significant at the 1% level,* ** = *significant at the 5% level,*
* = *significant at the 10% level*

These 15 significant factors were tested to ascertain any close relationship to each other, as this could adversely affect the model. The results of the correlation analysis can be obtained directly from the author. Two pairs of factors were highly related. The first pair of factors was whether the degree undertaken was relevant and whether a post graduate course had been undertaken. The reason for this strong relationship is as a result of the 1983-86 system whereby students from non relevant degrees were required to undertake a post graduate conversion course (as discussed previously). Many of the students who undertook post graduate courses would therefore be non relevant graduates, and the two factors were in effect measuring the same criterion. The post graduate factor was excluded from further analysis leaving the relevant degree as a factor to be considered.

The second pair of factors which were highly related was the number of hours spent per week on hobbies/interest at school and the number of hobbies undertaken. It was decided to exclude the number of hobbies because it was slightly less significant than the factor concerned with the number of hours spent on hobbies at school.

The remaining 13 factors were then entered into the logistic regression model using a procedure within the modelling process designed to exclude those factors which do not contribute in any significant manner anything additional to the variables already contained within the model to the prediction of successful examination performance. The resulting model can be found in table A7.1 in Appendix 7.

The result was to identify four academic factors and a commitment factor. In order of significance, the Honours classification at university is by far the most important factor, followed by, in descending order, the number of hours spent per week on interests *etc* at school (commitment factor), the number of subjects retaken at Higher to improve the grade, the number of resits in second year at university and finally whether a relevant degree was taken or not.

FACTOR	RANKING
Honours classification	1
Number of hours spent each week on interests at school	2
Number of subjects retaken at Higher to improve the grade	3
Number of resits in second year at university	4
Relevance of degree	5

The model indicates that the higher the classification of degree and the more hours spent each week on interests at school, the better the chance of passing first time. The greater the number of subjects retaken at Higher to improve the grade and the greater the number of resits in second year at University, the lower the chance of passing first time. Finally, if the trainee undertakes a relevant degree, the better the chance of passing first time.

Profiles of hypothetical Honours graduates

Using profiles of hypothetical students, the relative importance of each of the factors can be demonstrated. Taking one student profile and adjusting one factor at a time to provide a range of profiles, the probability of each student passing their ICAS examinations at the first attempt can be demonstrated.

The results of adjusting one factor at a time for hypothetical Honours graduates are shown in table 3.2.

Table 3.2 Profiles of hypothetical Honours graduates

	Graduate					
	A	*B*	*C*	*D*	*E*	*F*
Honours classification	2.1	2.2	2.1	2.1	2.1	2.1
Number of hours spent each week on interests at school	15	15	10	15	15	15
Number of subjects retaken at Higher to improve the grade	0	0	0	1	0	0
Number of resits in second year at university	0	0	0	0	1	0
Relevance of degree *R=relevant* *NR=non relevant*	R	R	R	R	R	NR
Probability of passing first time	79%	53%	75%	65%	47%	66%

Table 3.2 reveals the impact that a change in one of the factors will have on the overall probability of a student passing their examinations without any resits. It shows that although the Honours classification is the most statistically significant factor, the biggest impact on the probability of a student's success is that relating to the number of resits in second year at university, which is demonstrated by the fall in probability from 79% for student A to 47% for student E. The next most important factor in terms of the impact that a change will have on the overall probability, is that of the honours degree classification, with little to differentiate between the factors which consider the number of subjects retaken at Higher to improve the grade and the relevance of the degree. The smallest impact on the overall probability occurs with a change in the number of hours spent each week on interests at school.

Strength of the model

Statisticians refer to the model chi-square (χ^2) as an indication of how well the model performs as it measures whether all the used explanatory factors have significant explanatory power. The model χ^2 in this instance is 55.376, significant at the 1% level, suggesting that the combination of the factors contained in the model can be significantly related to examination performance. (For more details see Appendix 7).

The model also achieves an overall correct classification of trainees of 72.68% which represents 73% of those trainees who passed first time and 72% of those who experienced resits. Once again this prediction is significantly better than the chance classification of 52%. Further information on the classification of trainees can be found in Appendix 7.

The Ordinary graduate model

Scores were calculated for the same factors as utilised for the Honours sample with the obvious exception of the factor which considered the Honours classification. (The results are presented in Appendix 6). The differences between the group which passed their examinations first time and the group which passed later were considered significant at the 1% level for ten of the factors, were significant at the 5% level for four of the factors, and at the 10% level for three of the factors. The 17 significant factors listed in order of importance are contained in table 3.3.

Table 3.3 Significant background factors - Ordinary graduates

Background factor	***Absolute Z score***	***Level of significance (%)***
Number of A passes at O Grade	5.13	0.01***
O Grade score[2]	4.49	0.01***
Number of UCAS points obtained at Higher	4.17	0.01***
Number of resits in second year at university	3.49	0.05***
Number of resits in third year at university	3.20	0.14***
Number of resits in first year at university	3.13	0.17***
Higher grade in English	3.11	0.19***
Number of subjects retaken at Higher to improve the grade	2.95	0.32***
Higher grade in Mathematics	2.82	0.48***
Language Higher score[3]	2.59	0.95***
Respondent's gender	2.44	1.46**
Number of language Highers	2.42	1.53**
Took French Higher	2.29	2.22**
Type of university	2.20	2.76**
Science Higher score[4]	1.83	6.78*
Whether sports/interests undertaken at university	1.69	9.07*
Number of sports/interests undertaken at school	1.66	9.78*

*** = significant at the 1% level
** = significant at the 5% level,
* = significant at the 10% level

A further test was then carried out on these 17 significant factors to determine whether any of the variables were very highly correlated with each other[5]. This resulted in three factors being excluded from further modelling. The excluded factors were the O grade score, the number of language Highers and specifically the taking of the French Higher.

Although the gender factor was statistically significant, recruiting firms would not be allowed to discriminate on the grounds of sex, irrespective of the differential in performance, which suggests that the gender variable should be excluded, and different models developed for both sexes. No differences, however, were found in the final model irrespective of whether the gender factor was included or excluded. Gender, therefore, is not relevant in the exploratory model.

Of the remaining fourteen factors, four academic factors were found to be significant. Ranking these in order of statistical significance, table A7.3 in Appendix 7 reveals that the number of resits in second year at university is the most important factor as evidenced by its statistical significance, followed by, in descending order, the number of O grades at A pass, the total UCAS points achieved and the number of subjects retaken at Higher to improve the grade.

FACTOR	RANKING
Number of resits in second year at university	1
Number of A passes at O grade	2
Total UCAS points	3
Number of subjects retaken at Higher to improve the grade	4

Profiles of hypothetical Ordinary graduates

Once again using profiles of hypothetical students, the relative importance of each of the factors can be demonstrated. Taking one student profile and adjusting one factor at a time to provide a range of profiles, the probability of each student passing their ICAS examinations at the first attempt can be calculated.

Strength of model

The strength of the model as reported by the model $\chi 2$ of 41.165 is significant at the 1% level, which demonstrates that the factors as identified in the model can be significantly related to examination performance (for more details see Appendix 7).

It should also be noted that the model correctly classified 64.48% of the trainees into the two categories of pass all professional examinations first time and failed one or more examinations. This overall correct classification represents the correct prediction of 60% of those trainees who passed first time, and 68% of those trainees who experienced resits. The probability of correct classification from the model differs significantly from the chance classification of 51%. Further information on the classification of trainees can be found in Appendix 7.

Discussion of the Honours graduate model and the Ordinary graduate model

Both models contained four factors which were related to academic issues. The only factor of a non academic nature was that found in the Honours graduate model relating to the number of hours spent at school on non academic pursuits. The importance of previous academic achievement therefore supports the previous research as identified earlier. Of particular interest, however, are those elements of previous academic history which appear to be most important in the relationship with successful ICAS examination performance.

Common features of the Honours graduate model and the Ordinary graduate model

Some common themes are evident in both the models of Honours and Ordinary graduates and these will be discussed in terms of secondary and higher education below.

Secondary education

It is interesting to note that school performance, however defined, is not the most significant factor in either model. This suggests that other elements of background history are more important for the prediction of ICAS examination success. More recent academic achievement as in university performance has more relevance, as evidenced by the statistical significance of university achievement factors, than earlier school performance as evidenced by the number of UCAS points for example. Both models include a factor, however, which considers the number of subjects retaken at Higher to improve the grade, with the greater the number of subjects taken, the less likelihood of passing the ICAS examinations first time. As the UCAS points score is based on the total number of points achieved over the duration of the school career, this factor identifies those trainees who resat their Higher subjects in 6th year with a view to achieving a better grade. Pupils who follow this approach would appear to have been dissatisfied with their original grade, and the resitting of the subject suggests that with more effort, performance could be enhanced. It can be argued that this factor is a motivational measure, in that students who have applied themselves for the initial sitting would not gain any additional benefit by undertaking the subject once more.

Higher education

A university related factor common to both models is that which considers the number of resits encountered at second year university level. This would demonstrate that second year resits at university have an impact on professional examination performance, with the greater number of resits in second year at university the less likelihood of passing the ICAS examinations first time. Neither the first year resit or third year resit factors were found in the models. Resits in first and second year were encountered by around 15% of the trainees used to develop the models, however only 5% experienced resits in third year. It is suggested that resits in the first year are often caused, not by an academic inability of the student, but by the inability of the student to adapt to university life.

Factors unique to the Honours graduate model

The Honours graduate model included three variables which were not found in the Ordinary graduate model, and each of these is discussed in turn.

Honours classification

The most significant factor in the Honours graduate model is the Honours classification, suggesting that the better the Honours degree class, the greater the likelihood of incurring no resits in the ICAS examinations. This factor supports the findings of Taffler *et al* (1995). It can be argued that this is a quantifiable determination of recent academic ability. This is not, however, available in respect of the Ordinary graduates, and the training providers are faced with the problem of differentiating between a commendable or merely adequate ordinary performance.

Relevance of degree

The other academic factor in the Honours graduate model is concerned with the relevance of the undergraduate degree. Although the ICAEW results suggest that non relevant students perform better in the ICAEW system than the relevant graduates (Kakar, 1992) this may be due to the shortage in England and Wales of relevant graduates available for training places. This is not the case in Scotland and there is the expectation that relevant Honours graduates will perform better than non relevant Honours graduates in the ICAS system. Indeed the model demonstrated that having a relevant degree is a positive background factor for ICAS examination success. Care, however, needs to be exercised here. There was a significant change to the training and examination system for non relevants in 1988 as discussed previously, and this appeared to have an impact on the examination performance of non relevant graduates who were recruited after this change. This background factor may, therefore, not be relevant for a population of students who are being educated entirely *via* the 1988 education system, where the non relevant students appear to perform better in the ICAS education process.

Number of hours spent per week on interests at school

The remaining factor in the Honours graduate model is the number of hours spent per week on interests at school. It may be expected that the greater the number of hours spent on interests at school, which could suggest a lack of commitment on behalf of the individual to their academic work, the smaller the chance of success in the professional examination system. The model, however, revealed that the greater the number of hours spent on interests at school, the greater likelihood of passing the ICAS examinations first time. This result is contrary to expectations. Consider however, two candidates with similar UCAS point scores; one who spends many hours on non academic activities, thus necessitating a balance of time spent between academic and other interests; and the other with no non academic interests, therefore, concentrating solely on academic work. It could be argued that the UCAS point score of the former is not necessarily a true indication of academic ability, and therefore that these students are not comparable in academic terms.

Factors unique to the Ordinary graduate model

The number of A passes at O grade, and the total UCAS point score, both school related factors, are found in the Ordinary graduate model, which is similar to the Marcus Dunn and Hall (1984) study. Both these factors are notable omissions from the Honours graduate model where Honours classification appears to supersede earlier performance. The Taffler *et al* study (1995) also found the number of A passes at O grade a significant predictor in their model, despite the inclusion of a factor for Honours classification. The coding of the Honours factor in the ICAEW study was different, however, in that it simply considered whether graduates had achieved at least a 2.1 degree classification or not, as opposed to differentiating between each particular degree class.

Items which are not influential to the Honours graduate model or the Ordinary graduate model

Despite the importance of the high school grade in Mathematics and English as suggested by Clark and Sweeney (1985), Eskew and Faley (1988), Gul and Fong (1993), the factors relating to the grade in English and Mathematics obtained at Higher were not influential in either model. Likewise, the type of school attended, as found significant by Taffler *et al* (1995) and Gul and Fong (1993) was also not influential. The grade in Higher Mathematics was seen as a significant individual background factor for both the Honours and Ordinary graduates, and the grade in Higher English, a significant factor only for the Ordinary graduates. In the model building exercise, however, these factors did not contribute in any significant manner to the profile of factors which predicted ICAS examination performance. Firms who look for specific grades in these subjects may not be using the most effective factors to determine the ICAS examination performance of their applicants. The type of school attended was not a statistically significant factor for either the Honours or Ordinary graduates.

Limitations of the Honours graduate model

There is no doubt as to the significance of the Honours classification as a determinant of ICAS examination success. However, at the time of recruitment of trainees which tends to be in October or November in the year preceding the commencement of the training contract, the vast majority of potential trainees will only be in the first term or semester of their final Honours year. The Honours classification will not therefore be known.

Taffler *et al* (1995) suggested that one possible strategy would be to use expected degree class, which the prospective trainees are often required to indicate on their application form. They found that this proxy was correlated at r = 0.41 (significant at better than $\alpha = 0.01$) with actual degree class. Unfortunately there is no additional information as to whether the differences are due to optimistic or pessimistic indications or indeed a combination of both. They also suggest a superior approach, whereby training providers could work backwards using the appropriate logistic regression model.

> ... *it may well be that even were the potential recruitees not to obtain an upper second degree, his or her scores on other component factors would still predict a high probability of success.* (p29)

Another approach suggested by Taffler *et al* (1995) is to offer a place conditional on the prospective trainee achieving a particular degree classification. This, however, may not necessarily be practical, as it may result in firms recruiting less than the desired number of trainees.

A more radical approach may be to include a section on the application form which will be completed by the university, predicting the student's Honours classification. Many universities already furnish firms with this information at the reference stage, but this would involve the universities at an earlier stage in the selection procedure. This procedure would not be dissimilar to the UCAS system whereby schools provide universities with predicted Higher and A Level grades. Unfortunately there is no data testing the validity of the universities' prediction and further work would be required in this area. It is difficult, however, to envisage that (based on detailed knowledge of academic ability of three years within the university) a valid prediction of the student's Honours classification could not be made by the relevant year tutor/ course leader.

For firms that do not feel comfortable relying on either the student's indicative degree classification, or indeed that provided by the university, the process of analysis was repeated excluding the factor relating to the final honours classification. As a result all four of the factors from the original model were influential but an additional factor now became significant. This factor related to the number of non analytical Highers that the prospective trainees had undertaken suggesting the greater number of this type of Higher, the greater the chance of passing the ICAS examinations first time. Although this may appear to be a peculiar factor to be included it is broadly comparable with the Taffler *et al* (1995) study which identified the significance of the number of art/language A levels.

This model, however, does not demonstrate the same ability to perform as the Honours graduate model originally reported in table A7.3. Although the probability of correct classification was nearly 70%, which again is significantly better than the proportionate chance of correct classification of 51%, the model χ^2 has been reduced from 55% to 36%.

Summary

Although there have been studies identifying the relationship between candidate attributes and success, there is very little relating this to the field of accountancy, particularly within the United Kingdom. Using a multivariate statistical technique, various models were developed which described the relationship between passing the ICAS examinations first time and the personal, school and university profile of the prospective trainee accountants. Separate models were developed for Ordinary and Honours graduates in order to take account of the Scottish higher education system.

The Honours graduate model identified five influential factors. In order of significance, the Honours classification at university is the most important, followed by, in descending order, the number of hours spent per week on interests at school, the number of subjects retaken at Higher to improve the grade, the number of resits in second year at university and finally whether a relevant degree was taken or not.

For the Ordinary graduate model four influential factors were identified, all of which were related to academic performance. In order of significance, the number of resits in second year at university is most important followed by, in descending order, the number of A passes at O grade, total UCAS points and finally the number of subjects retaken at Higher to improve the grade.

It would, therefore, appear that the most recent quantifiable academic information about a candidate has more relevance than the earlier school performance, although certain aspects of this school performance supplement the details from the university.

These results support earlier studies which identified previous academic performance as a good indicator of success in the ICAS examinations. The significance of these models, however, is that they consider which particular aspects of previous achievement determine the success. These results raise questions as to the current criteria set by many of the accountancy firms, for example, setting an UCAS point score cut-off, or requiring a particular grade in English and Mathematics to be achieved. This particular combination of factors gives a poor explanation of ICAS examination performance compared to the factors identified for Honours and Ordinary graduates.

Endnotes

[1] The score calculated was the Z score derived from the Mann-Whitney test which identified whether there is a significant difference between the median of the group who passed their ICAS examinations at the first attempt and the group who experienced resits and subsequently passed.

[2] Based on 3 points for an A pass, 2 points for a B pass and 1 point for a C pass

[3] Based on 6 points for each A pass, 5 points for each B pass, 4 points for each C pass and 3 points for each pass with no grade, 2 points for each D pass and 1 point for an E pass in French, German, Latin or other secondary language

[4] Based on the same scores for language Highers: 6 points - A grade *etc* in Biology, Chemistry and Physics

[5] The correlation analysis can be obtained directly from the author.

Chapter Four

Conclusions, Recommendations and Plans for Further Research

The principal aims of this research were to:

- identify those background factors which appear to be related to ICAS examination performance; and
- highlight which of the factors identified were the most significant in explaining performance as measured by ICAS examination performance.

Background history analysis

The initial analysis suggested that there is evidence that a variety of factors have an effect on professional examination performance. Several factors appeared to differentiate between those trainees who pass their ICAS examinations first time and those who pass subsequently. This analysis showed that the following factors may help predict ICAS examinations success:

- type of school attended;
- choice of, and performance in, certain school subjects;
- number of UCAS points;
- type of university;
- type of degree;
- university resits; and
- Honours classification.

Although this initial analysis provided some interesting information, it is not sufficiently robust for the training provider for use in the pre-selection of prospective trainees as it does not identify the strength or quantify the relationship between the various background factors and the ability to pass professional examinations first time. Further statistical tests were, therefore, carried out to identify those factors which appeared to differentiate systematically between successful trainees and those who experienced resits within the ICAS examination process. The statistically significant background factors were then used in a model building process based on logistic regression.

The exploratory models

On account of the Scottish examination system whereby students can choose to progress down an Honours route or an Ordinary route, separate models were developed using logistic regression for each group of trainees. This model building technique identifies the most effective combination of background factors and hence profiles of trainees who pass the ICAS examinations without resits. The resulting models may, therefore, help to highlight which of the factors that measure ICAS examination performance are the most significant in explaining post selection and qualification performance.

It should be stressed that the individual background factors or factors should not be considered in isolation, as it is the combination of factors which determine the most effective way of differentiating between those trainees who passed their ICAS examinations at the first attempt with those who were required to resit. Notwithstanding this however, an examination of the individual background factors contained in the model will give an interesting insight into the profiles of those trainees who were successful.

Honours graduate model

There were 13 background factors which were statistically significant in the differentiation of those graduates who passed their ICAS examinations at the first attempt from those who had no resits. When these factors, however, were entered into the model building exercise, the Honours graduate model only contained five factors. Out of those five factors, four related to academic factors and one factor related to extra curricular activities.

FACTOR	RANKING
Honours classification	1
Number of hours spent each week on interests at school	2
Number of subjects retaken at Higher to improve the grade	3
Number of resits in second year at university	4
Relevance of degree	5

In this model the only factor which related to academic performance at school is that which considered the number of subjects retaken at Higher to improve the grade. Although it is suggested that this factor measures motivation rather than academic ability.

In addition, it is perhaps interesting to note that one of the criteria often set by accountancy firms, the number of UCAS points, does not appear to be sufficiently important to appear in the model. On a similar theme, grades in particular subjects undertaken at Higher such as English and Mathematics were also not sufficiently important to be included in the Honours graduate model.

The most important variable, as evidenced by statistical significance, represented a university related academic factor. In this model, this was the Honours degree classification. The other university related academic factor was that of number of resits in second year at university, although that was less significant.

It is suggested that it is not surprising that most recent academic performance is most relevant. For Honours graduates, the Honours classification is very important as it is an up-to-date quantification of academic ability.

Ordinary graduate model

There were 14 background factors which were statistically significant in the differentiation of those Ordinary graduates who passed their ICAS examinations at the first attempt and those who had resits. When these factors, however, were entered into the model building exercise the model only contained four factors. All four, however, were academic factors.

FACTOR	RANKING
Number of resits in second year at university	1
Number of A passes at O grade	2
Total UCAS points	3
Number of subjects retaken at Higher to improve the grade	4

Three of the academic factors related to school performance, the most important of these being the number of A passes at O grade. The factor relating to number of subjects retaken at Higher to improve the grade also appeared in the Ordinary graduate model but it was the least significant factor in the model. The factor relating to total UCAS points was evident in this model but it was one of the less significant being ranked third.

Again the most important factor in the Ordinary graduate model, as evidenced by statistical significance, represented a university related academic factor - that of number of resits in second year at university.

It would appear, therefore that most recent academic performance is most relevant. For ordinary graduates, however, where it is difficult to contrast between an adequate performance and an above average performance because there are no differentiating grades, previous school performance becomes of more relevance.

Issues for consideration

Although this research was specifically based on ICAS trainees who qualified in the late 1980s and early 1990s it does raise issues which call into question some of the practices currently used by many training providers for pre-selection. Based on the findings of this research several recommendations are proposed for those responsible for recruiting accountancy trainees.

Honours graduate model

In view of the fact that class of degree is the most significant factor in the Honours graduate model and that the model loses some of its predictive ability if this factor is excluded, training providers should ensure that a best estimate of the Honours classification is obtained.

The Honours classification may not be available at the time of recruitment, therefore, firms should obtain indicative classifications from the universities. Although this information is often sought at the refereeing stage, it is suggested that it is too late in the selection process. Firms should, therefore, consider adding a section requesting an indicative Honours classification to the application form which the course leader or tutor could complete.

Training providers should ensure that they obtain detailed information relating to university performance. For Honours graduates the number of resits in second year at university is of most interest and particular attention should be paid to this information.

Consideration should be given to extending the application form to include a section requesting detailed information on university performance *eg* marks awarded for each subject at each level of the university course, information relating to any resits.

Ordinary graduate model

Accountancy firms which recruit graduates holding Ordinary degrees should pay particular attention to the university which awarded the degree. In general, Honours graduates performed better than Ordinary graduates although the performance of Ordinary graduates was dependent on which university awarded the degree.

As with the Honours graduate model, training providers should ensure that they obtain detailed information relating to university performance and pay particular attention to the number of resits in second year.

Factors considered important by training providers

Accountancy firms using number of UCAS points as a pre-selection criterion should be aware that the modelling exercise indicated that this was not the most appropriate factor to pre-select graduates on the basis of application forms. If training providers do, however, wish to continue to use UCAS points careful consideration should be given to the appropriate cut off point.

Although the initial analysis identified a correlation between the number of UCAS points and the ability to pass professional examinations without resits, the differential in the performance of those students with between 18-21 UCAS points and those with between 22-25 UCAS points was minimal. The performance of students with 26+ UCAS points, however, was significantly better.

Firms which set minimum grades in English and Mathematics for pre-screening purposes should be aware that this information does not appear to be critical in determining examination performance. Relevant school performance, however, is the number of subjects retaken in order to improve the grade at Higher. Although very few training providers would currently appear to request such information, accountancy firms should ensure that they obtain this information.

Future research

If accountancy firms were to able to use models in their pre-selection process they could calculate a score for each candidate which would assess the probability of the applicant passing the professional examination system with no resits. The firms could then narrow their field of applications to a level suitable for interview by selecting the relevant numbers of candidates with the highest probabilities of success. This method of sifting through the large quantities of application forms should be cost effective as it would be an objective task extracting the information from the form and entering the data into the model. It should also be reliable as it is based on statistically significant evidence. Before these models, however, could be used in this manner it would be necessary to validate the model by applying the model to a different group of trainees to ensure that they were also correctly classified into those students who passed first time with those who experienced resits.

Further development work is, therefore, currently being undertaken by the author on trainees who qualified in the years 1993 and 1994, which will be validated on trainees qualifying in the year 1995. This additional work could provide a model that firms could use in the screening of application forms.

Appendix 1

Literature Review

This appendix considers the relevant literature under the following headings:

- the recruitment and selection process;
- the use of biodata in pre-selection;
- traditional selection methods;
- candidate attributes for selection of graduates;
- criteria for accountancy trainee selection; and
- predictive studies in accountancy examination performance.

The recruitment and selection process

Graduate selection procedures have evolved from the basic psychometric tradition which assumes that people can be described in terms of psychological constructs that explain their behaviour (Herriot,1984). Psychometric procedures aim to predict an individual's job performance, by measuring individual character traits. These traits can be measured in a variety of forms with interviews, application forms and psychological tests being amongst those most easily recognised. Inferences of characteristics are drawn from these vehicles, and suitability for employment is judged on the basis of these judgments.

The selection process requires interested graduates to complete application forms, which are used to pre-select candidates for interview. Interviews take place which may be followed by further interviews, group exercises or other testing procedures. At each step in the selection process a decision must be made as to whether a candidate should be considered further, progress to the next step or be rejected. The final decision is then taken by the firm on whether to offer a training contract. Care

PAGE NUMBERING AS ORIGINAL

must be taken, however, that the firms do not concentrate solely on this reduction of applicants to the requisite number without considering the social process of selection (Herriot,1989). Not only does the applicant require to meet expectations, but the organisation must also fulfil the necessary requirements in the eyes of the applicant. This is of particular relevance to the chartered accountancy profession where there is little to differentiate firms of a synonymous size.

The use of biodata in pre-selection

The application form is used as the first step in the elimination process, to identify those candidates who are clearly unsuitable, those who are borderline, and those who appear to have a good chance of succeeding by matching the information on the application form against the perceived requirements of the organisation. Livy (1989) identified three basic areas which any application form should cover:

- Basic biographical facts (*eg* age, education, training, qualifications, domicile);
- Work or occupational experience; and
- Work interest patterns of the candidate in general.

In an IMS survey (Bevan and Fryatt,1988) on employee selection in the UK, it was found that 90% of respondents used application forms and of these, 81% used the forms to filter out unsuitable candidates with almost all of these believing that the application forms were reliable enough to predict job performance. Windgrove *et al* (1984) expressed their concern on this reliance, stating that unless organisations can demonstrate that the information contained in the application form is predictive of job performance, preselection done in this way will appear haphazard and unsystematic, resulting in unreliable pre-screening. England (1971) however suggested that the application forms could be used actuarially, whereby data is collected from a large number of recruits and related statistically, in the manner of a conventional credit-scoring system to their subsequent job performances, appropriately measured. If the weights established are relatively constant over time, then the resulting model can be used to sift later application forms on a routine basis. The technique of using the information in this manner is known as biodata. Biographical data have been researched and used in different areas of applied psychology, yet a commonly agreed definition of biodata is hard to find. Taken from one of the original references on biodata, the continuing most frequently cited definition, despite its age is:

> *scored autobiographical data which are objective or scoreable items of information provided by an individual on previous experience (demographic, experiential, attitudinal) which can be presumed or demonstrated to be related to personality structure, personal adjustment, or success in social, educational or occupational pursuits* (Owens, 1976, p. 612).

This definition emphasised a predictive classical model of selection, namely that biodata are items which can be demonstrated to be related to success in occupational pursuits and therefore can be regarded as 'predictors' for the 'criterion' of success.

This was supported by Taffler and Harvey-Cook (1987) who undertook a study into the selection methods of predominantly the larger professional accountancy firms based in London. They suggested that instead of accountancy firms making selective judgments on an intuitive basis from the application form, the biographical details on the very same form when processed by an appropriately developed statistical model could be very useful in forecasting subsequent performance. They stated that for the accountancy profession

> *Pre-selection is a vital stage in the recruitment process with firms possibly only able to interview 10-15% of those completing an application form ... the information on the application form generally has considerable influence upon decisions made at all stages in the selection process, and can represent a very powerful predictor of job performance. (p104).*

This situation of over subscription is also evident for accountancy firms employing trainees who undertake the ICAS system (Gammie,1996). Despite the obvious importance of pre-selection, however, Taffler and

Harvey-Cook (1987) found that only two firms used a structured checklist scoring system as a decision aid for assessing applications and no firms were using formal statistical methods at the pre-selection stage.

The interest in the use of biodata in pre-selection for accountancy firms arises therefore from the need for a systematic and valid method to pre-screen applicants on the basis of biographical information which might be predictive of success on a chosen criterion, for example professional examination success (Strebler, 1991).

Traditional selection methods

It is evident that traditional selection methods are prevalent throughout British companies. Robertson and Makin (1986) in a survey of 108 randomly selected firms from *The Times* 1000, found that the selection techniques used when choosing managers were very much based on the historical interview and reference reports (see Table A1.1).

Table A1.1: Use of methods for managerial selection in British companies in 1984 and 1989 (percentages for each group)

Method	*1984 Never used*	*1989 Never used*	*1984 Always used*	*1989 Always used*
Interview	1.0	.0	81.4	90.5
References	3.7	4.1	67.3	73.9
Cognitive tests	70.8	30.1	5.2	12.3
Personality tests	64.4	35.6	4.0	9.6
Biodata	94.2	80.9	1.9	4.2
Assessment centres	78.6	41.1	.0	4.2

Sources: 1984 figures, Robertson and Makin (1986), 1989 figures, Shackleton and Newell (1991)

Despite encouraging progress as found by Shackleton and Newell (1991) in their comparative study, the interview remained dominant. In the Scottish accountancy profession, every respondent used interviewing[1], either in a one to one format or in a panel interview, (Gammie,1996). Although some form of testing was utilised, this was confined to the larger firms.

These results are interesting because the popularity of the various methods are in inverse relationship to their validity as predictors of job performance (measured by supervisor ratings). Hunter and Hunter (1984) conducted a meta-analytic study, which is a statistical method for bringing together the results of many different investigations. They found that in relation to the validity of some factors used for predicting performance for entry level jobs, the composite score for ability tests gave the highest mean validity, followed by biodata with interviews showing a very low correlation. The continual reliance on the interview is surprising given other research questioning the validity of the interview as a selection technique (Arvey and Campion,1982; Herriot,1984) although Herriot (1987) suggested that the reason for this may be that organisations do not see themselves as assessing graduates only on the basis of their likely competence. They believe it necessary to recruit graduates who share their style of corporate identity and culture, and feel the only method of assessing this is *via* the interview. Despite studies which have shown that the reliability and validity of the interview can be raised when an interview schedule or guide is used (Keenan and Wedderburn,1980; Herriot and Rothwell,1981), Harvey-Cook and Taffler (1987) found that only 44% of chartered accountancy offices in their study used a structured interview methodology.

Despite the importance of recruiting the right personnel, accountancy firms are screening application forms in a largely unscientific manner, followed by a traditional and often unstructured interview. The only organisations that appear to be utilising more sophisticated techniques are the large firms.

Candidate attributes for selection of graduates

In the field of graduate recruitment, there have been a few studies of the relationship between candidate attributes and decisions taken by graduate recruiters, with the majority of the work carried out in the USA. Habbe (1948, 1956) in surveys of 126 and 240 companies in the USA found that in the evaluation of college graduate applicants, interview impression and school grades were ranked highest, with lowest rankings for employment experience and test scores. The findings of Dickinson (1955) were similar in a consideration of the importance of seven factors to success in several fields of management, ranking intelligence highest and physical traits lowest. Sullivan (1961) also indicated that academic grades and extracurricular activities were important considerations in the selection of college graduates. Carroll (1966), however, did not support these earlier findings. He found that of the biographical characteristics studied, only appearance, rank (handsomeness), marital status, and office experience were found to be significantly related to any of the job seeking success criteria. His results, however, were derived from those students involved in the college recruiting process at the undergraduate level, and therefore derive from the 'poorer' end of the market in grade score terms (the majority of high grade point average students progressing to graduate school). This may explain why grades were not significantly related to any criterion of job seeking success, as very few of his respondents passed the high grades that were in evidence in the previous studies.

Other studies namely, Campion (1978) and Wingrove *et al*, (1984), have concentrated on the pre-selection decisions based on application form data. Campion found that, out of nine predictors, only grade point average and fraternity or sorority membership successfully discriminated between accepted and rejected forms. Wingrove *et al* (1984) used a much larger number of variables and while predictors varied both within the individual and type of organisation, educational achievement, work experience and leisure activities generally predicted success in pre-selection.

A study based in Scotland is that of Keenan and Scott (1985) who investigated the relationship between attributes of Heriot-Watt graduates and their success in finding employment. They found that there were no discernible relationships between age, sex, social class, type of schooling and success in obtaining employment. On the other hand, a number of university related items were correlated with successfully finding a job, these included classification of degree and relevance of vacation work. Neither membership of clubs and societies, nor being an office holder had much predictive power for final employment decisions.

Notwithstanding differences between the studies there appears to be an underlying trend of previous academic achievement (however defined), extra-curricular activities and work/vacation experience being related to the selection of graduates at either the interview or application form stage.

Criteria for accountancy trainee selection

Previous research indicates that academic performance is a key criterion for selecting accountancy trainees. This would appear to follow the basic behavioural axiom on which biodata is developed, namely, that past behaviour is a good predictor of future behaviour (Owens,1976). Kakar (1992) for example, quoted a larger accountancy firm suggesting that past examination performance is the fairest measure so far identified as a measure for pre-selection. This is hardly surprising when one considers the importance that the firms place on the ability to pass the professional accountancy examinations. A Scottish based study undertaken by Cameron (1991) into the recruitment of chartered accountancy trainees in Scotland, examined the factors the 'big six' accountancy firms considered important when recruiting accountancy trainees. The results are presented in Table A1.2.

Table A1.2: Factors considered important in the recruitment process						
Order of importance	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Sixth*
Ability to pass exams	8	5	0	0	0	0
Accountancy graduate	1	0	1	3	1	7
Leadership potential	0	1	5	3	2	2
Presentable appearance	0	2	2	3	4	6
Interpersonal skills	1	7	4	0	1	0
Interest in business	3	2	3	0	3	2

Source: The recruitment of chartered accountancy trainees in Scotland, Cameron 1991, unpublished

All the firms were concerned with the ability of the students to pass their exams, ranking this as either first or second.

Whilst the number of applications continue to greatly exceed the number of places, firms must use some means of screening hundreds of application forms. Krzystofik and Fein (1988) in a US study comparing national and local accounting firms found that academic performance as demonstrated by grade point averages were considered important factors in selecting candidates for interview. The four factors considered to be the most important in the pre-selection process can be found in Table A1.3.

Table A1.3: Important factors in selecting candidates for interview in USA		
Factor	*National firm*	*Local firm*
Grade point average (accounting)	3rd	1st
Grade point average (overall)	2nd	3rd
Work experience in accounting	4th	2nd
Evidence of leadership	1st	4th

Source: Krzystofik and Fein (1988)

Although the national firms ranked evidence of leadership as their first factor, the importance of academic achievement to the recruiters in their selection process is evident. Similar results were found by Harvey-Cook and Taffler (1987) with general academic performance the pre-eminent factor considered important in evaluating prospective trainee application forms. Non-academic information, neatness of form completion and range of extracurricular activities were, however, given particular attention by firms. References or recommendations appeared to carry little weight at this stage.

Academic achievement is also ICAS training providers' pre-eminent criteria in the consideration for interview selection (Gammie:1996). ICAS training providers were asked to identify up to four criteria for screening application forms, and the results are presented in Table A1.4.

Table A1.4: Criteria considered for selecting graduates for interview

Criteria for screening the application forms	*First criterion*	*Second criterion*	*Third criterion*	*Fourth criterion*	*Total*	*Rank*
Academic achievement	38	7	3	2	50	1st
Outside interests	-	9	3	5	17	2nd
Work experience	1	7	5	1	14	3rd=
Personal qualities	-	5	8	1	14	3rd=
Written skills/present	3	5	1	2	11	5th
Other miscellaneous	1	1	6	2	10	6th
Accredited degree	4	3	-	-	7	7th
Local connections	3	1	1	1	6	8th
Particular university	1	4	-	-	5	9th=
Interest/ commitment	1	3	1	-	5	9th=
None specified	2	9	26	40	N/A	N/A
Totals	*54*	*54*	*54*	*54*	*54*	*N/A*

***Source*:** Gammie (1996)

Of the respondents who specified any criteria, only two training providers did not use academic achievement in the screening process. Despite the emphasis that recruiters placed on academic performance, it is interesting to note that less than half of recruiters always followed up on the academic references found in the application form. Of the recruiters who utilised the academic references, less than a quarter found that the references were either a good indicator of examination or work performance. This would support the findings of Herriot (1984) who reported poor validity and reliability of references. Gammie (1996) suggested, however, that firms who follow up on academic references employ trainees who perform better in the ICAS examination system.

Whilst there is evidence that previous academic achievement (however defined) may be indicative of future academic success, the question that needs addressing is which specific aspects are important. Although there are basic examination statistics published by ICAEW each year on examination performance, relating pass rates to: UCAS points; degree class; and type of university, there is currently no published statistical evidence specifically related to ICAS trainees on which the firms can base their selection decisions. The firms, therefore, tend to rely on anecdotal evidence from their previous trainees which may result in unsystematic and invalid selection.

The fundamental difference therefore between biodata and other traditional methods of selection, lies not with the inclusion of certain items concerned with an individuals background, as indeed many items considered pertinent by recruiters may actually be valid predictors of success. The difference lies with the fact that the respondent's answers are combined based on statistical evidence to produce a score analogous to that produced from a test. It is the score from this test rather than the value of judgments from individuals reading the application form or conducting the interview that is used in the selection process. Biodata should therefore provide:

> *... less biased information in a more economical fashion.*
> (Stokes and Reddy, 1992, p288).

To this end a review of research studies predicting examination success is carried out below.

Predictive studies in accountancy examination performance

As one of the main criticisms of biodata is the lack of generalisability, (Gunter *et al*: 1993) only studies specifically examining accountancy performance have been cited. This lack of generality reflects the largely a theoretical approach that is traditionally associated with biodata, and necessitates the development of keys specifically for the type of job and criterion chosen. Therefore although studies in other professions may be of interest, biographical keys with high validities in one profession may not be relevant in another.

Undergraduate accounting success

Predictive studies have been carried out in the accountancy field which may be of relevance, although apparently none as yet published in the United Kingdom. Several studies, mainly based in the USA have focused on the evaluation of prospective accounting students to undergraduate programmes, (McCormick and Montgomery, 1974; Delaney *et al*, 1979; Buehlmann, 1975). Table A1.5 identifies other studies conducted both in the Far East and the United States of America.

Table A1.5: Studies in undergraduate accounting examination success

Study	*Samples*	*Number of variables*	*Significant predictor variables*	*Criterion measures*
Dockweiler and Willis (1983) USA	365	11	Entering GPA grades in two intro accounting programmes	Overall GPA in undergraduate accounting programme
Clark and Sweeney (1985) USA	80	14	GPA at 45 hours Grade in English Grade in Maths	Achievement of a 2.3 GPA in last 21 semester hours
Eskew and Faley (1988) USA	352	7	SAT- a measure of academic aptitude equal to the sum of the math and verbal scores from the Scholastic Aptitude Test HSG - the sum of the mean high school Maths and English grades CG - college grades which were a measure of the collegiate academic performance equal to the last cumulative grade-point index NQ - number of quizzes taken which was intended as a measure of course-related effort and motivation PRE - previous related experience PAE - pre-college study of account/bookkeeping	

Study	*Samples*	*Number of variables*	*Significant predictor variables*	*Criterion measures*
Gul and Fong (1993) Hong Kong	443	7	Self expectation of examination results High School grade in English High school grade in Mathematics English secondary school education Personality type Intention to obtain a business degree Previous knowledge of accounting	Achievement at first year undergraduate level
Tho (1994) Malaysia	615	5	Exposure to high school accounting Exposure to high school maths Grade obtained in economics	Achievement in first level tertiary accounting courses

Source: *Various - see bibliography for details*

The study by Dockweiler and Willis (1983) utilised correlation analysis, step-wise regression analysis, and finally discriminant analysis to identify the best predictors of the overall grade point average each student earned after entering the undergraduate accounting programme. The entering grade point average was the single best predictor of subsequent academic performance, although certain other factors such as the grades in the two introductory accounting courses also predicted subsequent performance in the undergraduate accounting curriculum. Classifying the students based on these three independent variables, their model achieved an overall correct classification of 81%. Scores on college aptitude tests and high school rank were not useful in predicting a student's performance. Clark and Sweeney (1985) used a step-wise procedure to reduce the number of variables and then adopted discriminant analysis for the development of their model, which correctly classified students into accept/reject groups with a statistical accuracy of 78% using only three characteristics, namely grade point average at 45 semester hours, grade English composition, and grade in college mathematics.

Both the Gul and Fong (1993) and Tho (1994) studies utilised multiple regression techniques. Gul and Fong (1993) found that their regression model explained 48% of the variation in student performance, whereas, Tho (1994) found that three academic factors were found to significantly explain 66% of the variations in performance. The two socio-demographic variables in the Tho study, namely gender and residential status did not contribute significantly to performance viability. Despite the limited number of independent variables initially chosen, a reasonable model was developed.

These five studies relating to performance in undergraduate accounting programmes in the United States and the Far East, suggest that previous academic performance is a statistically significant indicator of University performance, albeit that the criterion of success was defined differently in each case. Unfortunately due to the limited information supplied in the articles in respect of the independent variables, it is difficult to compare the predictor variables, and this is particularly the case in relation to those variables relating to Grade Point Scores (GPSA). All the studies with the exception of the Dockweiler and Willis study, separately identified in a variety of combinations, previous grades in Mathematics, English, Economics and Accounting studies. Whereas the Dockweiler and Willis study utilised the overall GPA from school as the independent variable. Whilst Tho (1994) stated that the overall GPA was not entered into the model in order that the effect of each subject could be isolated, the other studies did not provide this information. What remains unclear therefore is whether the subjects as separately identified do result in a better prediction that the overall GPA score which incorporates performance across all subjects. It should also be stressed that only the Gul and Fong study identified any non-academically related variables in their model, although this may simply be a function of the limited number of variables originally entered in each study.

Professional accountancy success

Other studies of more relevance to this monograph have concentrated on successful professional examination performance. The American Institute of Certified Public Accountants' Uniform Statistical Information Questionnaire studies have resulted in several publications regarding the relationship between certain attributes and professional examination performance, (Leathers,1972; Reilly and Stettler, 1972; Sanders, 1972; Leathers and Sullivan, 1978) although unfortunately many of these studies have been largely descriptive in nature. Marcus Dunn and Hall (1984) undertook an empirical analysis of the relationships between CPA examination candidate attributes and candidate performance. First time sitting candidates (n=280) from November 1977 and May 1978 examinations completed a questionnaire which included information regarding 38 attributes classified into the five categories of; personal data, academic background, preparation for the examination, work experience, and prior exam data. After the selection of twelve of these attributes on account of relevance to the performance on the professional examinations, multiple linear regression models were developed for each of the examination parts, audit, law, theory and practice. The individual model R^2 values, which represent the measure of the goodness of fit of a particular model, (1.00 would represent a perfect fit), were .40 for audit, .40 for law, .50 for theory and .49 for practice. The evidence suggested that candidates with greater scholastic aptitude and higher accounting GPA tend to earn higher examination scores. The results also indicated that increased undergraduate and increased graduate accounting hours also have a positive influence on the theory and practice examinations scores, although the coefficient is not significant for the undergraduate accounting hours in relation to the theory examination. Variables representing the school attended were significant in several instances which suggested that performance is associated with the school attended. The results for variables representing self study had a positive association with examination scores whereas completion of a CPA review course was not significant, although when the hours of self study were excluded from the models on the grounds of multi-collinearity, the completion of a CPA review course was found to have a positive association with examination performance. The numbers of years out of school was found to have a significant negative relationship with examination scores for law and theory but no significant relationship with audit and practice scores. Marcus Dunn and Hall suggested that the reason for this may be due to the fact that the law and theory examinations are more textbook orientated and hence more adversely affected by the absence from school. Attributes lacking significant associations with examination performance include candidates work experience, age and completion of an audit course.

There appears to be only one study that has been completed in the UK on determinants of early career success of accountants, although another is ongoing. Both are based in England and concentrate on the ICAEW system which is significantly different from that of ICAS. Professor Richard Wilson at Loughborough University is currently undertaking a longitudinal study examining the early career success of accountants within one firm of chartered accountants in England. His definition of success is based on an internal ranking of the individual derived from the staff development programme within the organisation. Unfortunately no results from this study have been published as yet, as comparisons of the findings would have been interesting. The completed work is the PhD of Harvey-Cook (1995) which has been incorporated into the Taffler *et al* paper (1995). Concentrating on medium sized firms and 'hard' items of biodata which are technically verifiable, the paper develops two stepwise logistic regression models from data found in non relevant trainees' applicant resumes in an attempt to differentiate successful and unsuccessful trainees. Defining success as the ability to pass the first two levels of the ICAEW professional examinations without resits, the logit model identified six variables which achieve good predictive results ($\chi^2 = 71.93$). The variables were as follows; number of A grade O levels, 1st or 2.1 degree classification, number of art/language A levels, BSc degree, head boy or girl at school and private education. The model was therefore composed mainly of academic items, which confirmed the findings of the earlier studies examining undergraduate success in accountancy examinations. Of particular interest, however, is the notable omission from the model of an overall UCAS point score based on all subjects sat which is often used by recruiting firms to pre-select candidates.

The second model was developed using a different classification of success. The scope of success was expanded to incorporate a good practice work rating by the firm based on the evidence of the first six months of work. Once again six variables were identified with an impressive predictive model χ^2 of 44.08. The variables were as follows; number of math and science A levels, headboy or girl, school social activities, GCC% exemption, 1st class or 2.1 degree classification, and size of social interaction groups at University. The main difference between this model and the one purely examining examination success is the inclusion of the social involvement variables, which suggest that they may measure practice work potential.

The practical implication of the Taffler *et al* study is that within the confines of the ICAEW education system, background information contained in an appropriately designed applicants' resume can be used to differentiate between successful and unsuccessful trainees. Using the logit models to calculate a success probability rating, firms should be able to concentrate on candidates with high logit scores and avoid those with low probabilities of success.

> *Such a strategy will, at the very least, substantially reduce the likelihood of recruiting failures and should also increase, quite materially, the chances of recruiting those who may subsequently prove successful.* (p26).

It would appear therefore that it is not simply previous academic ability that determines success in future accountancy studies, but other factors such as choice of subjects, and school attended may also contribute.

It was therefore decided to ask a wide range of questions in the questionnaire in order to elicit information on a variety of background factors in an attempt to identify which factors are pertinent for predicting ICAS examination success.

APPENDIX 2

METHODS UTILISED

This appendix outlines the methods utilised for the development of the exploratory statistical models.

The questionnaire

A questionnaire was designed following a review of the relevant theory and consideration of measures which previous studies have found to be good predictors of future performance in related applications, as discussed in Chapter 1 and Appendix 1. The objective of the questionnaire was to elicit information from recently qualified chartered accountants on their background history with a view to developing a model which identifies characteristics related to examination success.

Although the scope of a person's background history is far reaching, (Mael,1991) the type of information gathered was mainly factual, verifiable information, commonly found on a standard application form. The information will therefore in the main be non intrusive, verifiable, historical items such as number of Higher A grades which would be classified as a 'hard' item of biodata, as opposed to 'soft' items which may describe the individual in terms of personality, motivation, values and aspirations. Restricting the biodata items in this manner addresses the main criticisms levelled at biodata, namely stability over time, the 'fakeability' and accuracy of the responses, and the fairness and legality of the technique.

Concern is frequently expressed that biodata keys developed at one point in time may not predict aspects of job related behaviour at some future time (Gunter *et al*, 1993). However studies have shown that the extent to which a biographical item is stable over time would appear to be dependent on whether the item is objective and verifiable or subjective and hence more difficult to verify, (Schaffer *et al*, 1986, Harvey-Cook,1995). Likewise, the susceptibility of biodata to faking can also be minimised with the restriction of the variables to 'hard' items. Lautenschlager (1994) in his comprehensive review of fakeability studies found that objective biodata items are less susceptible to distortion than items which are more subjective.

With the Commission for Racial Equality and the Equal Opportunities Commission monitoring the employment practices of recruiters in the United Kingdom to ensure that there is no discrimination on the ground of race or sex, care must be taken that biodata does not unfairly discriminate against particular groups of people. Any biodata item must therefore demonstrate both logical and empirical evidence to warrant inclusion in any particular model. There is also the risk that candidates may be offended by some biodata questions (Robertson and Smith,1989). This is of particular relevance to the accounting profession where there is little to differentiate between firms of the same size. For example many applicants will apply to all the 'big six' firms who have an office in their preferred location. If one of these firms were to include potentially intrusive questions in an application form, this may have an adverse impact on the attitude of the candidate towards the firm, which may lead to the rejection of an offer.

Limitations of study

There are however two limitations of the sample used for this study which must be stressed at the outset. The first of these is in respect of restriction of range. The population of applicants to chartered accountancy offices will include both those who manage to secure a training contract and those who do not manage to progress beyond the selection process. The sample for this monograph however was drawn from those applicants that were actually successful in completing the professional accountancy examinations and subsequently their training contracts, therefore it was drawn from a restricted population of applicants. The model developed from this sample will therefore be conditional on the already existing pre-selection criteria, and any conclusions drawn from the results need to be considered in this context. This problem however is not restricted to this study but is a common issue for many biodata research work which develops the initial model on a previously selected population.

The second limitation is the fact that the sample was drawn from the population of accountants that were ultimately successful in completing the professional accountancy examinations and subsequently their training contracts. The respondents were then classified as either successful (passed all their professional examinations first time) or unsuccessful (experienced at least one resit). Unfortunately there is no data available from ICAS on either the total numbers who fail to complete their training each year, or indeed on the individuals who drop out of their training contracts for whatever reason. As individuals can only be traced through the ICAS data retrieval system if their name and the year in which they commenced their training contract is supplied, a population of unsuccessful trainees defined as those who failed to complete their training contract is not available. Those who failed to qualify were therefore excluded from the analysis. The only solution to this problem would be to undertake a longitudinal study, identifying the backgrounds of individuals as they apply for training contracts, and then following the individuals through the examination system. This technique was however rejected on the basis of the time scale involved, which would become extremely unwieldy if all parts of the examination system were to be considered.

Unlike the ICAEW, however, which experiences a very high drop out rate, either through examination failure or for other reasons, the vast majority (around 90%) of trainees commencing their ICAS training ultimately qualify, therefore large numbers of the total population have not been excluded. In addition, as the analysis focuses on the personal background history items which differentiate between those trainees who are successful and those trainees whom have experienced failure (albeit of those who ultimately qualify), the utilisation of this restricted population is permissible, as the results would only be invalid where the complete failures exhibit the same characteristics as the successful trainees. However it must be noted that background history items of those who fail to qualify are not known and any resulting conclusion arising from the analysis must be tempered in this light.

The descriptive analysis

The responses were coded and entered into the SPSS statistical software package. Some of the variables related to the criterion of interest, namely examination performance, with the remaining variables concerned with predictor data items. Different levels of measurement were utilised to categorise the variables dependent on the data available for each. This is of particular relevance for subsequent data analysis, as only certain techniques can be used on data measured at specific levels (Sirkin, 1995).

The first step in the analysis was to produce frequency analysis for each of the variables where only the basic level of measurement, namely nominal measurement is required. Then, defining pass all the professional examinations first time as the dependent variable, with the other variables which are hypothesised to affect the response, the independent variables, cross tabulations were carried out. This bivariate analysis provides information about relationships between the different variables, however it does not allow for quantification or testing of the relationship, and therefore inferential statistics are now required.

As the distribution of the dependent variable cannot be assumed to be normal, statistical procedures which do not require assumptions about the underlying distribution must be considered. The Mann-Whitney test was therefore adopted, which is the non-parametric alternative to the more commonly known t test. The Mann-Whitney tests the hypothesis that two independent samples come from populations with the same distribution, without the distribution being specified and hence normal, (Norusis, 1992). The test does however require that variables are measured by at least an ordinal scale, which necessitated the recoding of some of the nominal variables to a simplified dichotomous variable in order to meet the ordinal test.

By comparing the medians of the variables from the group that passed all their examinations first time to the medians of the variables from the group that experienced at least one resit, we can quantify the relationship by calculating the Z score which is a standardised normal deviate score which is useful for comparing variables that come from distributions with different means and different deviations.

The results from this test should demonstrate those variables which appear to differentiate between the group which passed their examinations first time and the group which experienced failure, and for which the null hypothesis (no differences between the means of the two groups) can therefore be rejected. Once these non-parametric results are available it is then possible to develop the statistical analysis further with the use of model building.

The modelling technique

The next step in the procedure is therefore to develop a statistical model which will quantify the relationship of these exploratory variables, which differentiate between successful and unsuccessful trainees, to the dependent one. There are a variety of multivariate statistical techniques that can be used to predict a binary dependent variable from a set of explanatory variables, for example multiple regression, discriminant analysis and logistic regression, and there is a continuing debate in the statistical literature about the most appropriate methodology for models with dichotomous dependent variables. However, as it is envisaged that the model could be used to predict the probability of a candidate passing first time, multiple regression as a technique was rejected. This was due to the fact that the predicted values could not be interpreted as a probability. Discriminant analysis was also rejected as serious questions have been raised about the restrictive statistical requirements posed by the technique. For the linear discriminant function to minimise the probability of misclassification, certain assumptions about the data must be met. Each exploratory variable must be a sample from a multivariate normal population, and the population covariance matrices of the dependent and exploratory variables must also be equal, (Norusis, 1992). If these underlying assumptions of discriminant analysis hold, then Efron (1975) demonstrated that discriminant analysis performs better than logistic regression. However as several of the exploratory variables in this analysis are dichotomous, this will violate the population covariance matrix assumption, and therefore result in non optimal results.

The objective of logistic regression is similar to the other rejected techniques:

> *To find the best fitting and most parsimonious, yet biologically reasonable model to describe the relationship between an outcome (dependent or response variable) and a set of independent (predictor or explanatory) variables* (Hosmer and Lemeshow, 1989,p1).

The technique will also provide the conditional probability of an observation, in this case a trainee, belonging to a certain class, in other words, pass all professional examinations first time. The model therefore directly estimates the probability of an event occurring, by weighing the independent variables and creating a score for each trainee, which will represent the probability of the trainee passing all the professional examinations first time.

The logistic regression model is calculated as follows:

$$P = \frac{1}{1 + e^{-Z}}$$

P is known as the logistic score, which provides a measure of the probability of passing the ICAS examinations first time.

Z is the combination of each independent variable(X) weighted by the coefficient (β) with β_0 representing a constant.

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_p X_p$$

In order to better understand the interpretation of the logistic coefficients, the logistic model can be written in terms of the odds[1] of an event occurring.

Writing the logistic model in terms of the log of the odds, commonly referred to the logit, we see that:

$$\log\ (\text{prob (event)/prob (no event)}) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots \beta_p x_p$$

However as it is easier to consider the odds as opposed to the logit, the logistic equation can be written in terms of odds as follows:

prob (event)/prob (no event) = $e^{\beta 0 + \beta 1 x 1 + \beta 2 x 2 + \ldots \beta p x p}$
(Norusis, 1992)

The β coefficients are weighted so as to maximise the joint probability of passing the examinations first time for the known successful candidates, and the probability of not passing first time for those candidates who were known to have experienced failure. The relative importance of variable x_p is measured by exp (β_p) which denotes the factor by which the odds ratio increases for a one unit change in that variable.

Multicollinearity

One of the assumptions of the classical multiple regression model is that no exact linear relationship exists between the independent variables in the model. Where this perfect collinearity exists, it is easily identified and rectified by the exclusion of one of the variables. However, if any of the variables or combinations of variables are highly correlated with each other, there may exist a problem of multicollinearity, (Pindyck and Rubinfeld, 1987). In practice it is not uncommon to observe correlations among the independent variables, however care must be taken that serious multicollinearity does not exist in the regression analysis, otherwise an unstable and invalid model may result. (Mendenhall and Sincich, 1988). Just how large these correlations must be before multicollinearity causes concern to the model builder is somewhat subjective. However, Gunst and Mason (1980) suggest that it is only necessary to investigate pairwise correlations larger in magnitude than 0.70.

It is therefore necessary to calculate the strength of association between the independent variables in order to identify whether a multicollinearity problem exists. The Spearman correlation coefficient was therefore calculated for the variables identified from the Mann-Whitney test which were felt to be of importance. This exercise is a commonly used non-parametric measure of correlation between two ordinal variables, whereby the values of each variable are ranked from smallest to largest, and the Pearson correlation coefficient computed on the ranks (Norusis, 1992, p208). The rank correlation ranges from between -1 and +1, where -1 and +1 indicate a perfect linear relationship between the ranks of the two variables. If any of the independent variables have a stronger association than 0.70 then multicollinearity may be a problem and a decision is required on the variable which should be retained for modelling purposes.

Variable selection

As the outcome variable in logistic regression is required to be dichotomous, the model was developed using pass all professional examinations first time as the dependent variable, and was coded as follows:

Pass all examinations first time: 1
Fail one or more examinations: 0

The minimum level of measurement for logistic regression is ordinal level data and therefore the variables were restricted to those which could satisfy this criteria. The variables which were entered into the models, together with the reasoning for their inclusion are presented in Appendix 4.

The development of the logistic regression model

Once the variables which appear to be related to professional examination success have been identified, and any variables excluded for which multicollinearity is present, the variables were entered into the model using forward stepwise selection for automated model building. This model selection technique uses the score statistic for entering the variable into the model. The model commences with only the constant, then at each step, the variable with the smallest significance level for the score statistic is entered (provided that it is less than the chosen cut-off value, which in this case was 0.05). All entered variables are then examined to see if they meet the removal criteria. If no variables meet the removal criteria, the next eligible variable is entered into the model. If a variable is selected for removal and it results in a model that has already been considered, variable selection stops. This process continues either until a previously considered model is encountered or no variables meet entry or removal criteria.

Goodness of fit of resulting models

Identifying how well the model classifies the observed data is one method of determining how well the logistic model performs. R^2 is often informally used as a goodness-of-fit statistic as it measures the proportion of the variation in the dependent variable by the multiple regression equation, however Pindyck and Rubinfeld (1987) question the appropriateness of this statistic in logistic regression, identifying several problems. They state that:

> *The difficulty with R^2 as a measure of goodness of fit is that R^2 pertains to explained and unexplained variation in the Y and therefore does not account for the number of degrees of freedom in the problem.* (p79)

They go on to suggest that R^2 should not be used to compare the validity of alternative regression models or indeed any other model derived from a different statistical technique, where the dependent variable varies from regression to regression:

> *R^2 cannot be used directly to compare models with different dependent variables.* (p82)

In logistic regression therefore the model χ^2 is reported as it indicates the goodness-of-fit for the model incorporating all the independent variables. It is calculated by taking the difference between -2LL[2] for the model with only a constant and -2LL for the current model. It is therefore an indication of the explanatory ability of the model for predicting examination success. This statistic provides the equivalent of the overall F test in multiple regression (Norusis, 1992).

Endnotes:

[1] The odds of an event occurring are defined as the ratio of the probability that it will occur to the probability that it will not.

[2] The probability of the observed results, given the parameter estimates, is known as the likelihood. Since the likelihood will be less than 1, it is customary to use -2 times the log of the likelihood (-2LL) as a measure of how well the estimated model fits the data. A good model is one that results in a high likelihood of the observed results (a perfect fit would record 1), which translates to a small value for -2LL (a perfect fit would record 0).

APPENDIX 3

THE QUESTIONNAIRE

Background

1. Are you:

   Male ☐

   Female ☐

   Please tick relevant box

2. What was your age on commencing your CA training contract?
   _____ years

School history

3. What secondary school did you attend?

   ____

4. What type of school was this:

   Comprehensive ☐

   Grammar ☐

   Independent ☐

   Other (*please specify*) ☐

   Please tick relevant box

5. Did you sit:

'O' Grades ☐

GCSE's ☐

Please tick relevant box

6. Which grades did you achieve

	'O'Grades	G.C.S.E.'s
Accounting		
Arithmetic		
Biology		
Chemistry		
Economics		
English		
French		
Geography		
German		
History		
Latin		
Mathematics		
Physics		
Others (*please specify*)		

Please enter grade in relevant box

7. Did you sit:

Highers ☐

'A' Levels ☐

☐

Please tick relevant box

Other

Please specify ______________________________

____

8. Which grades did you achieve

	Highers	'A' Levels
Accounting		
Biology		
Chemistry		
Economics		
English		
French		
Geography		
German		
History		
Latin		
Mathematics		
Physics		
Others (*please specify*)		

Please enter grade in relevant box

9. Please identify any subjects, if any which were retaken in order to improve the original grade:

____

10. Please identify any sports/outside interests pursued during your school career, indicating on average how many hours per week during term time you spent on each activity.

Activity	Hours per week
____________________	__________
____________________	__________
____________________	__________
____________________	__________

University history

11. Did you progress directly from school to university?
Please tick relevant box

Yes	☐	Go to question 15
No	☐	Go to question 12

12. What were the reasons for not progressing directly?

____

____

____

13. How many months elapsed between finishing school and commencing university?

_________ months

14. How did you spend this time?

____

15. At which university or polytechnic did you study for your first degree?

____

16. Which first degree did you study *eg* BA in Business Studies, MA in English?

____

17. How many resits, if any, were you required to take for your first degree?

1st year	
2nd year	
3rd year	
4th year	

Please identify number of resits

Which subjects, if any, were you required to resit?

____

____

18. Did you undertake an Honours Year?

Please tick relevant box

Yes	☐	Go to question 19
No	☐	Go to question 20
Started but transferred to Ordinary degree	☐	Go to question 20

19. What honours classification were you awarded

1st Class	☐	
2.1 Upper Second	☐	
2.2 Lower Second	☐	*Please tick relevant box*
3rd Class	☐	
Awarded Ordinary	☐	

Go to question 21

20. Why did you not undertake honours?

____

____

____

21. Did your degree offer a placement period?

Please tick relevant box

Yes	☐	Go to question 22
No	☐	Go to question 25

22. How long was the placement period?

3 months	☐	
6 months	☐	*Please tick relevant box*
12 months	☐	
Other (please specify)	☐	

23. By what organisation/s were you employed?

____

____

24. What was your role within the above organisation/s?

____

____

____

25. Did you spend any vacations working in a financial environment?

Please tick relevant box

Yes	☐	Go to question 26
No	☐	Go to question 28

For how many weeks in total were you employed? ____ weeks
(If you are not sure, please estimate)

26. In what organisation/s were you employed?

____

____

27. What was your role within the above organisation/s?

____

____

28. Did you also study for a postgraduate qualification?

Please tick relevant box

Yes	☐	Go to question 29
No	☐	Go to question 31

29. Which university/college did you attend for this further qualification?

____

30. What postgraduate qualification did you receive?

____

31. Please identify any sports/outside interests pursued during your university years, indicating on average how many hours per week during term time you spent on each activity.

Activity	Hours per week
______________________	__________
______________________	__________

ICAS history

32. Did you progress directly from University to your CA training?

Please tick relevant box

Yes	☐	Go to question 36
No	☐	Go to question 33

33. What were the reasons for not progressing directly?

____

____

34. How many months elapsed between finishing your university degree and commencing your CA training contract?

__________ months

35. How did you spend this time?

____

____

36. Why did you choose to train as a Chartered Accountant with ICAS?

____

____

37. Was your degree or postgraduate qualification degree fully accredited with The Institute of Chartered Accountants of Scotland?

Please tick relevant box

Yes	☐	Go to question 38
No	☐	Go to question 42

38. When did you commence your training contract?

Please enter year in relevant box

1983	☐	Go to question 39
1984	☐	
1985	☐	
1986	☐	
1987	☐	Go to question 40
1988	☐	Go to question 41
1989	☐	

39. Please indicate the number of attempts taken at each level

Preliminary	☐	*Please identify number of attempts*
Part I	☐	
Part II	☐	
Part III	☐	

Go to question 44

40. Please indicate the number of attempts taken at each level

Preliminary		*Please identify number of attempts*
Part I		
Modified TPC I		
TPC II		

Go to question 44

41. Please indicate the number of attempts at each level

TPC I		*Please identify number of attempts*
TPC II		

Go to question 44

42. Which subjects were you required to sit at the professional stage

Auditing		*Please tick relevant box(es)*
Business Finance		
Business Law		
Business Management		
Economics		
Financial Accounting I		
Information Technology		
Managerial Accounting		
Mathematical Techniques		
Taxation		

43. Please indicate the number of attempts taken at each level

TPC I	☐	*Please identify number of attempts*
TPC II	☐	

44. Please identify any sports/outside interests pursued during your Training Contract, indicating on average how many hours per week you spent on each activity.

Activity	Hours per week
______________________	__________
______________________	__________

Employer history

45. With which firm did you undertake your training contract?

____

46. Which interviewing techniques did your employer use?

One to one interview	☐	
Panel interview	☐	
Psychological testing	☐	*Please tick relevant box(es)*
Group exercise	☐	
Social event	☐	
Others (please specify)	☐	

47. Apart from the compulsory ICAS classes did your employer undertake further training courses

Please tick relevant box

Yes	☐	Go to question 48
No	☐	Go to question 49

48. On average, how many days per year did you attend additional training courses?

< 3 days	☐	
3-6 days	☐	
7-10 days	☐	*Please tick relevant box*
11-14 days	☐	
15-21 days	☐	
> 21 days	☐	

49. Are you still employed with your training employer?

Please tick relevant box

Yes	☐	Go to question 50
No	☐	Go to question 52

50. How many years is it since you completed your training contract?

< 1 year	☐	
2 years	☐	
3 years	☐	*Please tick relevant box*
3-4 years	☐	
4-5 years	☐	

51. How long do you expect to remain with this employer?

Currently job seeking	☐	
< 12 months	☐	
1-3 years	☐	*Please tick relevant box*
3-5 years	☐	
> 5 years	☐	
Indefinitely	☐	

52. How many years did you remain with your training employer after completing your training contract?

< 1 year	☐	
1-2 years	☐	
2-3 years	☐	*Please tick relevant box*
3-4 years	☐	
> 4 years	☐	

53. Why did you change companies?

____

Thank-you for your co-operation in completing this questionnaire

APPENDIX 4

EXPLANATORY VARIABLES FOR THE LOGISTIC REGRESSION MODELS

The 39 explanatory variables which have been developed from both the review of relevant literature and the analysis of the questionnaire responses are noted below. Thus variables have been classified into the following groups: background; secondary education; and higher education.

Variable	Rationale for inclusion	Method of coding
Background		
Gender	Differential performance dependent on sex	1 - male: 2 - female
Age on commencing training contract	Differential performance dependent on age	1-25 or younger: 2-26 or older
Secondary education		
Type of school	Comp education versus non-comp (Taffler *et al*, 1995)	1-comprehensive: 2-noncomp
Number of O grades at A pass	Taffler *et al*, 1995)	1-1 O grades at A grade: 2-2 O grades at A grade *etc*
O grade score	Examination of early academic performance in all subjects	Based on 3 points for an A pass; 2 points for a B pass; 1 point for a C pass

Variable	Rationale for inclusion	Method of coding
Number of UCAS points obtained at Higher	Examination of later academic performance in all subjects	Based on 6 points for an A pass 4 points for a B pass 2 points for a C pass
Number of Highers obtained	Supplementary variable to one above	1-1 Higher taken: 2-2 Highers taken *etc*
Grade in Higher English[1]	Often used as a criterion for pre-selection (see also undergraduate accounting studies	1-Grade A: 2-B: 3-C: 4-pass but no grade: 5-D: 6-E
Grade in Higher Mathematics	Often used as a criterion for pre-selection (see also undergraduate accounting studies)	1-Grade A: 2-B: 3-C: 4-pass but no grade: 5-D: 6-E
Number of UCAS points obtained from analytical Highers	Performance in analytical Highers only	Based on UCAS point score from Accounting, Economics, Mathematics and Engineering
Number of analytical Highers taken	Choice of analytical subjects at school (Taffler *et al*, 1995)	1-1 analytical Higher taken: 2-2 analytical highers taken *etc*
Number of UCAS points obtained from science Highers	Performance in science Highers only	Based on UCAS point score from Chemistry, Biology and Physics
Number of science Highers taken	Choice of science subjects at school (Taffler *et al*, 1995)	1-1 science Higher taken: 2-2 science Highers taken *etc*
Number of UCAS points obtained from language Highers	Performance in language Highers only	Based on UCAS point score from French, German, Latin and other secondary language

Variable	Rationale for inclusion	Method of coding
Number of language Highers taken	Choice of language subjects at school (Taffler *et al*, 1995)	1-1 language Higher taken: 2-2 language Highers taken *etc*
Took French Higher	Performance in French	0 - no: 1 - yes
Number of UCAS points obtained from non-analytical Highers	Performance in non-analytical Highers only	Based on UCAS point score from English, History, Modern Studies, Art, Geography and other miscellaneous subjects
Number of non-analytical Highers taken	Choice of non-analytical subjects at school (Taffler *et al*, 1995)	1-1 non-analytical Higher taken: 2-2 non-analytical Highers taken *etc*
Whether took Higher accounts or not	Choice variable as opposed to a performance related variable due to large number of respondents who did not undertake this subject	0 - did not take subject: 1 - took subject
Number of subjects retaken at Higher to improve the grade	To identify impact on UCAS point score	1-1 subject retaken: 2-2 subjects retaken *etc*
Number of certificate in sixth year studies undertaken	Examination of ultimate performance at school	1-1 CSYS taken: 2-2 CSYSs taken
Whether sports/interests undertaken at school	Popular criterion used by recruiters (Gammie, 1996)	0 - no: 1 - yes

Variable	Rationale for inclusion	Method of coding
Number of sports/ interests undertaken at school	Development of variable above	1-1 interest: 2-2 interests *etc*
Whether undertaken team sports at school	Seen as a demonstration of ability to work in a team by the selectors	0 - no, 1 - yes
Number of hours per week spent on sports/interests	Related variable to theme of outside interests	0 - no interests, 1 - 0-5 hours: 2 - 6-10 hours *etc*
Higher education		
Whether progressed directly to university from school	Question that is often raised by the training firms in the application form	0 - no did not progress directly: yes-did progress directly
Whether degree relevant or not	Determine differences in performance between relevant and non-relevant graduates	1 - relevant: 2 - non relevant
Type of university attended	ICAEW results suggest that graduates from traditional universities perform better	1 - traditional: 2 - new/polytechnic
Number of resits in first year at university	Past performance is indicative of future performance	1-1 resit: 2-2 resits *etc*
Number of resits in third year at university	Past performance is indicative of future performance	1-1 resit: 2-2 resits *etc*
Honours award[2]	Taffler *et al* (1995)	1-1st class: 2-2.1: 3-3.1: 4-3rd: 5-awarded ordinary

Variable	Rationale for inclusion	Method of coding
Whether degree incorporated a placement	Previous related experience found to be a significant predictor (Eskew and Faley, 1988)	0 - no: 1 - yes
Whether a postgraduate qualification was undertaken	Determine whether further study was undertaken	0 - no: 1 - yes
Whether a vacational job was undertaken in a financial environment	A related variable to the one above	0 - no: 1 - yes
Whether sports/interests undertaken at university	Popular criterion used by recruiters (Gammie, 1996)	0 - no: 1 - yes
Number of sports/interests undertaken at university	Development of variable above	1-1 interest: 2-2 interests *etc*
Whether undertaken team sports at university	Seen as a demonstration of ability to work in a team by the selectors of graduates	0 - no: 1 - yes
Number of hours per week spent on sports/interests	Related variable to theme of outside interests	0 - no interests: 1 - 0-5 hours: 2 - 6-10 hours *etc*

Endnotes:

[1] As English is a core subject in Scotland, the majority of trainees will have undertaken this subject, and therefore it is the performance in the subject as opposed to the choice that may be of relevance.

[2] This variable was only included for the honours sample.

APPENDIX 5

HONOURS GRADUATES - COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Mann-Whitney scores were calculated for each of the 39 explanatory variables in order to identify those background factors which appeared to differentiate between those honours graduates who passed their ICAS examinations at the first attempt and those who experienced failure before subsequently passing.

Personal background

Absolute Z score	*Level of significance*	*Variable name*	*Explanatory variable*
0.6247	0.5321	AGECOMM	Age on commencing training contract
0.2695	0.7875	GENDER2	Respondent's gender

Secondary education

Absolute Z score	*Level of significance*	*Variable name*	*Explanatory variable*
2.9790	0.0029***	NOSUBRET	Number of subjects retaken at Higher to improve grade
2.8199	0.0048***	TOTPTS2	Number of UCAS points obtained
2.8126	0.0049***	ACTHRWK	Number of hours spent on sports *etc* at school
2.6086	0.0091***	HMATHS	Higher grade in mathematics
2.0654	0.0389**	ANALYTIC	Analytical Higher score

Absolute Z score	*Level of significance*	*Variable name*	*Explanatory variable*
1.8563	0.0634*	NOHOBBY	Number of sports or hobbies undertaken at school
1.7299	0.0836*	NONONAN	Number of non analytical Highers
1.6784	0.0933*	DONTHOB	Whether sports/interests undertaken at school
1.3609	0.1735	AOGRADV	Number of A grades at O grade
1.3627	0.1730	HENGLISH	Higher grade in English
1.1193	0.2630	TOOKACC	Took Higher accounts
1.0728	0.2834	NOANALY	Number of analytical Highers
0.9894	0.3324	CSYS	Number of SYS qualifications obtained
0.8386	0.4017	TOOKFR	Took French Higher
0.8019	0.4226	OGRADESC	O grade score
0.7075	0.4793	HIGHER	Number of Highers obtained
0.6702	0.5028	LANGUAGE	Language Higher score
0.5422	0.5877	NONANAL	Non analytical Higher score
0.4957	0.6201	TEAM	Whether undertook team sports at school
0.3219	0.7475	SCIENCE	Science Higher score
0.3165	0.7517	NOLANGU	Number of language Highers taken
0.2363	0.8132	TYPESCH	Type of school
0.2031	0.8390	NOSCIENC	Number of science Highers

Higher education

Absolute Z score	*Level of significance*	*Variable name*	*Explanatory variable*
5.9247	0.0000***	HONAWAR	Honours classification
3.6006	0.0003***	RESITYR2	Number of resits in 2nd year at university
3.5798	0.0003***	POSTGRAD	Postgraduate qualification obtained
2.4802	0.0131**	RELDEGRE	Whether degree is relevant or not
2.4421	0.0146**	RESITYR1	Number of resits in 1st year at university
2.0207	0.0433**	RESITYR3	Number of resits in 3rd year at university
1.7967	0.0724*	ACTHRW2	Number of hours spent on sports *etc* at university
1.5106	0.1309	NOHOBB2	Number of sports/interest undertaken at university
1.4497	0.1471	SCHTOUNI	Whether progressed directly to university
0.8867	0.3861	UNITYPE	Type of university
0.7439	0.4569	DONTHOB2	Whether sports/interests undertaken at university
0.3997	0.6894	VACFINEM	Vacational job in a financial environment
0.1199	0.9045	PLACEMNT	Whether degree incorporated a placement
0.0624	0.9502	TEAM2	Whether undertook team sports at university

Note *** = Significant at 1%
** = Significant at 5%
* = Significant at 10%

APPENDIX 6

ORDINARY GRADUATES - COMPARATIVE STUDY OF MANN-WHITNEY SCORES

Mann-Whitney scores were calculated for each of the 38 explanatory variables in order to identify those background factors which appeared to differentiate between those ordinary graduates who passed their ICAS examinations at the first attempt and those who experienced failure before subsequently passing.

Personal background

Absolute Z score	*Level of significance*	*Variable name*	*Explanatory variable*
2.4417	0.0146**	GENDER2	Respondent's gender
0.8688	0.3850	AGECOMM	Age on commencing training contract

Secondary education

Absolute Z score	*Level of significance*	*Variable name*	*Explanatory variable*
5.1323	0.0000***	AOGRADV	Number of A grades at O grade
4.4897	0.0000***	OGRADESC	O grade score[1]
4.1749	0.0000***	TOTPTS2	Number of UCAS points obtained at Higher
3.1068	0.0019***	HENGLISH	Grade in Higher English
2.9526	0.0032***	NOSUBRET	No of subjects retaken at Higher to improve grade

Absolute Z score	*Level of significance*	*Variable name*	*Explanatory variable*
2.8229	0.0048***	HMATHS	Grade in Higher mathematics
2.5948	0.0095***	LANGUAGE	Language Higher score[2]
2.4248	0.0153**	NOLANGU	Number of Language Highers
2.2870	0.0222**	TOOKFR	Took French Higher
1.8266	0.0678*	SCIENCE	Science Higher score[3]
1.6557	0.0978*	NOHOBBY	Number of sports/interests undertaken at school
1.6392	0.1012	DONTHOB	Whether sports/interests undertaken at school
1.6039	0.1087	ACTHRWK	Number of hours spent on sports *etc* at school
1.5256	0.1271	NOANALY	Number of analytical Highers
1.4529	0.1462	ANALYTIC	Analytical Higher score
1.4529	0.1462	NONONAN	Number of non analytical Highers
1.4330	0.1519	TOOKACC	Took Higher Accounts
1.0922	0.2748	TYPESCH	Type of school attended
0.9137	0.3609	TEAM	Whether undertook team sports at school
0.6598	0.5094	HIGHER	Number of Highers obtained
0.5376	0.5908	NOSCIENC	Number of Science Highers
0.4440	0.6570	CSYS	Number of SYS qualifications obtained
0.0250	0.9800	NONANAL	Non analytical Higher score

Higher education

Absolute Z score	*Level of significance*	*Variable name*	*Explanatory variable*
3.4855	0.0005***	RESITYR2	Number of resits in 2nd year at university
3.1968	0.0014***	RESITYR3	Number of resits in 3rd year at university
3.1351	0.0017***	RESITYR1	Number of resits in 1st year at university
2.2024	0.0276**	UNITYPE	Type of university
1.6915	0.0907*	DONTHOB2	Whether sports/interests undertaken at university
1.5572	0.1194	NOHOBBY2	Number of sports/interests undertaken at university
1.5243	0.1274	TEAM2	Whether undertook team sports at university
1.2214	0.2219	ACTHRW2	Number of hours spent on sports *etc* at university
1.1609	0.2457	RELDEGRE	Whether degree relevant or not
1.0996	0.2715	SCHTOUNI	Whether progressed directly to university
1.0083	0.3133	PLACEMNT	Whether degree incorporated a placement
0.3465	0.7290	VACFINEM	Vacational job in a financial environment
0.0273	0.9782	POSTGRAD	Postgraduate qualification obtained

Note *** = Significant at 1%.
** = Significant at 5%
* = Significant at 10%

Endnotes:

[1] Based on 3 points for an A pass, 2 points for a B pass and 1 point for a C pass

[2] Based on 6 points for each A pass, 5 points for each B pass, 4 points for each C pass, 3 points for each pass with no grade, 2 points for each D pass and 1 point for an E pass in French, German, Latin or other secondary language

[3] Based on the same score as for language highers: 6 points - A grade *etc* in Biology, Chemistry & Physics

Appendix 7

The Logistic Regression Models

This appendix reports and discusses the results of the model development for both the Honours graduate and Ordinary graduate models.

The Honours graduate model

The Z scores were calculated for the 39 variables which were developed from the questionnaire data. Of these variables, seven were significant at the 1% level, four variables significant at the 5% level and four variables significant at the 10% level. The results are contained in Appendix 5. A correlation analysis was then calculated for these 15 significant variables to ascertain any variables which were too highly related to each other. The Spearman correlation coefficient results are available directly from the author. Relevant degree and postgraduate course were highly correlated with a coefficient of 0.6992. Although this score is slightly less than the cut-off point identified in Appendix 2 of 0.70, it was decided to exclude one of these variables. The reason for this strong relationship, is as a result of the 1983-1986 system whereby, students from non relevant degrees were required to undertake a post-graduate conversion course (as discussed earlier). Many of the students who undertook post graduate courses would therefore be non-relevant graduates, and the two variables are in effect measuring the same criterion. The post-graduate variable was excluded as the relevant degree variable will be of pertinence to all the educational systems. There was also a relatively high correlation between the number of hours spent per week on hobbies/interest at school and the number of hobbies taken. Once again although the coefficient was slightly less than the suggested cut-off, the number of hobbies variable was excluded on the grounds that the absolute Z score of this variable (1.8563) is less than the Z score of the number of hours spent (2.8126).

The remaining 13 variables were then entered into the logistic regression model using forward stepwise procedures. The resulting model can be found in Table A7.1

Table A7.1: Logistic regression - trainees progressing from an honours degree

Variable	β	*Level of significance*	*Exp* (β_r)
Honours classification	-1.2080	0.0000***	3.3469
Number of hours spent each week on interests at school	0.2442	0.0298*	0.7833
Number of subjects retaken at Higher to improve the grade	-0.7243	0.0483*	2.0633
Number of resits in second year at university	-1.4740	0.0557~	4.3665
Relevance of degree	-0.6830	0.0715~	1.9797
Constant	3.7002	0.0000***	
Model χ^2 55.376***with 5 degrees of freedom# Overall Prediction Classification 72.68%			

Notes # = χ^2 Distributed with 1 degree of freedom in each case
*** = Significant at 0.1%
* = Significant at 5%
~ = Significant at 10%

The Honours graduate model consists of four academic variables, and a commitment variable. Ranking these in order of statistical significance, Table A7.1 indicates that the honours classification at University is by far the most important variable, followed by, in descending order, the number of hours spent per week on interests etc. at school (commitment variable), the number of subjects retaken at Higher to improve the grade, the number of resits in second year and finally whether a relevant degree was taken or not.

The logistic coefficient (β) can be interpreted as the change in the log odds associated with a one-unit change in the independent variable. Therefore a change in the honours classification from an upper second class degree to a lower second class degree, assuming that the other variables remained the same, would reduce the log odds of the trainee passing their ICAS examinations first time by 1.2080. However it is more comprehensible to consider the odds rather than the log odds, and therefore the relative importance of coefficient p is calculated. This is measured by exp (β_p) which denotes the factor by which the odds ratio increases for a one unit change in the variable. For example, if the exp (β_p) score for honours classification is considered (3.3469), *ceteris parabis*, a lower classication at University, say for example a lower second instead of an upper second class degree, will reduce the odds[1] of the student passing by 3.3469. Whereas a subject retaken at Higher to improve the grade would only reduce the odds of the student passing by 2.0633. On this basis, the most salient measures of the model are the number of resits in second year at University (4.3665), closely followed by the honours classification (3.3469), with the number of subjects retaken at Higher to improve the grade (2.0633), the relevance of the degree (1.9797) and the number of hours spent each week on interests at school (0.7833) ranked third, fourth and fifth respectively.

Utilising fictitious trainee profiles to demonstrate the model, the probabilities of different trainees passing their ICAS examinations would be as follows:

Trainee A, achieved a 1st class degree in Accountancy. No subjects were retaken at Higher grade to improve the grade at school, no resits were encountered at University and 5 hours were spent on interest at school per week. The probability of passing the ICAS examinations first time would be 89% (the odds of this student passing first time would be 8.09). However if trainee B, revealed the same profile with the exception of the degree class whereby a 2.1 degree was achieved the probability would be reduced to 70% (the odds of this student passing first time would be reduced to 2.33^2). Trainee C only achieved a 3rd class degree in Mathematics at University, having encountered two resits in second year. No outside interests were undertaken at school, and two subjects were retaken at Higher to improve the grade. The prospects for this student are only 1% of passing the ICAS examinations without resits (the odds of this student passing first time are 0.01).

The model χ^2 is significant at the 1% level, which suggests that the combination of the variables contained in the model can be significantly related to the examination of performance.

As the objective of the model is for selection purposes, further information is required on the overall prediction classification of 73%, which is a reflection of the accuracy with which the model has correctly classified a trainee. This prediction classification is a derivative of the classification matrix which uses the criterion: predict trainee 'a' as a successful trainee if $P_a > 0.5$, otherwise predict trainee as unsuccessful. The results are contained in Table A7.2.

Table A7.2: Classification table for honours graduates

Observed	***Predicted pass first time***	***Predicted failed one or more***	***Percent correct***
	PASS	**FAIL**	
Pass first time	87	18	105 (83%)
Failed one or more	32	46	78 (59%)
Overall	119	64	183 (73%)

The overall hit rate of 73%, represents 73% of correct pass predictions and 72% of correct fail predictions. Type I errors (predicting a fail when in fact there was a pass outcome) are 27%, and Type II errors (predicting a pass when in fact there was a fail outcome) are 41%. If the model had therefore been used to predict the examination success of the trainees in the sample, 73% of the sample would have been correctly classified. This is an improvement on classifying the students by chance.

The number of students correctly predicted as pass students based on random selection is calculated as (119 times 105)/183 = 68, likewise the number of students correctly predicted as failure students based on random selection is (64 times 78)/183 = 27. The overall chance of correctly classifying a student can therefore be computed as follows: (68+27)/183 = 52%. The difference between the correct classification and the chance classification is statistically significant at the 0.1% level with 1 degree of freedom as demonstrated by the Pearson $\chi^2 = 34.4$.

The Ordinary graduate model

The Z scores were calculated for the independent variables relating to the ordinary trainees. The differences between the group which passed their examinations first time and the group which experienced failure were considered significant at the 1% level for ten of the variables, were significant at the 5% level for four of the variables, and were significant at the 10% level for three of the variables. The results are presented in Appendix 6.

A further test was carried out on these 17 significant variables to determine whether any of the variables were very highly correlated with each other which could adversely affect the results, (the results can be obtained directly from the author). As discussed in Appendix 2 correlations of greater than 0.70 were identified and a decision taken on which of the correlated variables should be excluded. Not surprisingly, the O grade score and the number of A passes at O grade were very highly correlated with a coefficient of 0.9097. Similarly, the UCAS point score attributable to language Highers, and the number of language Highers studied were also closely related, with a coefficient of 0.9817. On a similar theme, the variable which considered whether French was taken as a Higher subject or not, and both the language Higher score and the number of language Highers taken, were also correlated with scores of 0.8696 and 0.8861 respectively. From each of these pairings, one of the highly correlated variables needs to be excluded from any further modelling. As the number of A grades at O grade achieves a slightly higher absolute Z score of 5.1323, in comparison to 4.4897 for the O grade score (See Appendix 7), the O grade score was excluded. The language Higher score variable (Z score of 2.5948) was retained at the expense of both the number of language Highers (Z score of 2.4248) and the took French Higher variable (Z score of 2.2870).

It should also be noted that the gender variable achieved an absolute Z score of 2.4417 which was significant at 5%. This implies that gender does have an impact on performance, however recruiting firms would not be allowed to discriminate on the grounds of sex, irrespective of the differential in performance. If gender differences do exist however it is necessary to control for these differences in further modelling. As the gender variable is not highly correlated with any of the other statistically significant variables, gender would appear not to have an impact on the other variables. However it was decided to develop the model with both the gender variable included and excluded, in order to ascertain any differences. The resulting models were exactly the same, therefore although gender was a statistically significant variable, it was excluded from the model by the stepwise procedure. The resulting model can be found in Table A7.3.

Table A7.3: Logistic regression - trainees progressing from an ordinary degree

Variable	β	*Level of significance*	*Exp* (β_p)
Number of resits in second year at university	-0.7221	0.0013**	2.0588
Number of A passes at O level	0.1453	0.0187*	0.8648
Total UCAS points	0.0418	0.0178*	0.9591
Number of subjects taken to improve the grade at higher	-0.5325	0.0314*	1.7032
Constant	-1.8291	0.0003***	
Model χ^2 41.165*** with 4 degrees of freedom# Overall Prediction Classification 64.48%			

Notes # = χ^2 Distributed with 1 degree of freedom in each case
*** = Significant at 0.1%
** = Significant at 1%
* = Significant at 5%

The ordinary graduate model consists of four academic variables, and ranking these in order of significance, Table A7.3 reveals that the number of resits in second year at University is the most important variable, followed by, in descending order, the number of O levels at A grade, the total UCAS points achieved and the number of subjects retaken at Higher to improve the grade.

As in the previous model, the exp(β_p) reveals by what proportion the odds ratio increases for a unit change in variable p. On this basis (conditional on all the other predictor values remaining unchanged) the number of resits in second year at University is the most salient measure(2.0588), followed by the number of subjects retaken at Higher to improve the grade (1.7032), with the toal number of UCAS points (0.9591) and number of A passes at O level (0.8648), ranked third and fourth.

The model can best be demonstrated by considering the profiles of various trainees. If trainee A encountered no resits in second year at University, achieved eight A passes at O grade, achieved 25 UCAS points and did not resit any subjects at Higher to improve the grade, the probability of this trainee passing their examinations first time would be 59% (the odds of this student passing first time would be 1.43). However if trainee B revealed the same profile with the exception of the number of resits in second year at University, whereby one resit was encountered, the probability would be reduced to 41% (the odds would be reduced to 0.69[3]). At the other end of the spectrum, trainee C encountered two resits at university in second year, achieved three A passes at O grade, achieved 18 UCAS points, and resat two subjects at Higher to improve the grade. This trainee would have the very low probability of passing their ICAS examinations first time of 4% (the odds of this student passing first time would be 0.04).

The model χ^2 is a demonstration of the overall fit of the model. This statistic is significant at the 1% level, which demonstrates that the variables as identified in the model can be significantly related to examination performance.

Table A7.4: Classification table for ordinary graduates

Observed	*Predicted pass first time*	*Predicted failed one or more*	*Percent correct*
	PASS	**FAIL**	
Pass first time	94	68	162 (58%)
Failed one or more	62	142	204 (70%)
Overall	156	210	366 (65%)

Once again as the ultimate objective of the model is for selection purposes further information is required on the overall prediction classification of 65%. These results are contained in Table A7.4.

The overall hit rate of 65% represents 60% of correct pass predictions and 68% of correct fail predictions. Type I and II errors are therefore 47% and 30% respectively. Once again this is significantly better than the proportionate chance criterion. The number of students correctly predicted as pass students based on the random selection is calculated as (156x162)/366 = 69, likewise the number of students correctly predicted as failure students based on random selection is calculated as (210x204)/366 = 117. The overall chance classification of correctly classifying a student can therefore be computed as follows: (69 + 117)/366 = 50.8%. The difference therefore between the probability of correct classification based on the model and correct classification based on random selection is statistically significant at 0.1% with 1 degree of freedom as reported by the Pearson χ^2 =28.2

Endnotes:

[1] The odds of an event occurring are the defined as the ratio of the probability that it will occur to the probability that it will not

[2] The reduction in the odds between Trainee A and Trainee B arising from the reduction in the degree class from a 1st to a 2.1, can be computed by dividing the odds of student A, 8.09, by 3.3469 which is the relative importance of the degree classification variable. This will result in the odds ofTrainee B being 2.41. The difference between the 2.41 and the calculated odds of 2.33 arises due to rounding adjustments

[3] The reduction in the odds between Trainee A and Trainee B arising from the resit encountered at 2nd year at University, can be computed by dividing the odds of student A, 1.43, by 2.0588 which is the relative importance of the 2nd year resit variable. This will result in the odds ofTrainee B being 0.69.

Bibliography

Arvey, R D and J E Campion (1982) "The employment interview: a summary and review of recent research", *Personnel Psychology,* 35, 281-322.

Bayes, P E and J F Nash (1989) *Gender differences in intermediate accounting and accounting and information systems,* presented at the 1989 Mid-Atlantic Regional Meeting of the American Accounting Association.

Bevan, S and J Fryatt (1988) *Employee selection in the UK,* IMS Report No 160.

Buehlmann, D M (1975) "ISU's use of the AICPA's college testing program", *Journal of Accountancy,* May, 93-96

Cameron, E (1991) *The recruitment of chartered accountancy trainees in Scotland,* unpublished honours thesis 91.

Campion, M A (1978) "Identification of variables most influential in determining interviewers evaluations of applicants in a College Placement Centre", *Psychological Reports,* 42, 947-952.

Carroll, S J (1966) "Relationship of various college graduate charactersitics to recruiting decisions", *Journal of Applied Psychology,* 50, 5, 421-423.

Clark, R L and R B Sweeney (1985) "Admission to Accounting Programs: Using a Discriminant Model as a Classification Procedure", *The Accounting Review,* 60, 3, 508-518.

Delaney, P R, D E Keys, C L Norton and J R Simon (1979) "An admission test for intermediate accounting", *The Accounting Review,* January, 155-162.

Dickinson, C (1955) "What employers look for in the college graduate", *Personnel and Guidance Journal,* 33, 460-464.

Dockweiler, R C and C G Willis (1984) "On the use of entry requirements for undergraduate accounting programmes", *The Accounting Review,* 59, 3, 496-504.

Efron, B (1975) "The efficiency of logistic regression compared to normal discriminant analysis", *Journal of the American Statistical Association,* 70, pp892-898.

England, G W (1971) *Development and use of weighted application blanks,* Industrial Relations Centre, University of Minnesota.

Eskew, R K and R H Faley (1988) "Some determinants of performance in the first college level Financial Accounting course", *Accounting Review* 63, 1, 137-147.

Fraser, A, R Lytle and C Stolle (1978) "Profile of female accounting majors: academic performance and behavioural characteristics", *The Woman CPA,* Oct, 19-21.

Gammie, E and B Gammie (1995) "Women chartered accountants - progressing in the right direction?", *Women in Management Review,* 10, 1, 5-13.

Gammie, E (1996) "Accountancy graduate selection procedures - a critical analysis", *Career Development International, 1, 2, 31-38.*

Gratton, L (1989) "Work of the Manager", Chapter 4.2 in Herriot, P (Ed) *Assessment and Selection in Organisations,* Chichester, J Wiley & Sons

Gul and Fong (1993) "Predicting success for introductory accounting students: some further Hong Kong evidence", *Accounting Education,* 2, 1, 33-42.

Gunst, R F and R L Mason (1980) *Regression Analysis and Its Application,* New York, Marcel Dekker.

Gunter, B, A Farnham and R Drakeley (1993) *Biodata: Biographical indicators of business performance,* London, Routledge.

Habbe, S (1948) "Employment of the college graduate", *Studies in Personnel Policy* (No89), New York, National Industrial Conference Board.

Habbe, S (1956) "Employment of the college graduate", *Studies in Personnel Policy* (No152), New York, National Industrial Conference Board.

Hanks, G and M Shivaswamy (1985) "Academic performance in accounting: is there a gender gap?" *Journal of Business Education,* Jan, 154-156.

Harvey-Cook, J E and R J Taffler (1987) "Graduate recruitment procedures in the UK accountancy profession: a preliminary study", *Accounting and Business Research,* Spring, 99-108

Harvey-Cook, J (1995) *Graduate recruitment at professional entry level: clinical judgments and empirically derived methods of selection,* Unpublished Doctoral Thesis, City University.

Herriot, P (1984) *Down from the Ivory Tower: Graduates and their Jobs*, Chichester, J Wiley & Sons.

Herriot, P (1987) "Graduate Recruitment - getting it right". *Employment Gazette*, February, 78-83.

Herriot, P (1989) *Recruitment in the 90's*, London, Institute of Personnel Management.

Herriot, P and C Rothwell (1981) "Organisational choice and decision theory: Effects of employer's literature and selection interview", *Journal of Occupational Psychology* 54, 17-31.

Hosmer, D W and S Lemeshow (1989) *Applied Logistic Regression*, Chichester, J Wiley & Sons.

Hunter, J E and R F Hunter (1984) "Validity and utility of alternative predictors of job performance", *Psychological Bulletin*, 96, 72-98.

Kakar, S (1992) *Financial Times*, 6 October, 8.

Keenan, A and R S Scott (1985) "Employment success of graduates: Relationship to biographical factors and job-seeking behaviours", *Journal of Occupational Behaviour*, 6, 305-311.

Keenan, A and A A Wedderburn (1980) "Putting the boot on the other foot: Candidates' descriptions of interviewers", *Journal of Occupational Psychology* 53, 81-89.

Krzystofik, A T and R Fein (1988) "Does Your Firm Use the Right Approach in Hiring Famous Recruits?" *Journal of Accountancy*, November, 166, 83-88.

Lautenschlager, G J (1994) "Accuracy and faking of background data", in Stokes, G S, M D Mumford and W A Owens (eds) *Biodata Handbook*, California, CPP 391-420.

Leathers, P E (1972) "Relationship of test scores to CPA examination performance", *Journal of Accountancy*, September, 101-102.

Leathers, P E and J A Sullivan (1978) *Uniform Statistical Information Questionnaire: 1975*, AICPA.

Livy, B (1989) *Corporate Personnel Management*, London, Pitman.

Mael, F A (1991) "A conceptual rationale for the domain of attributes of biodata items", *Personnel Psychology*, 44, 763-792.

Marcus Dunn, W and T W Hall (1984) "An empirical analysis of the relationships between CPA examinations candidate attributes and candidate performance", *The Accounting Review*, 59, 4, 674-689.

McCormick, R R and J B Montgomery (1974) "The Use of AICPA tests in evaluating transfer students at a University", *Journal of Accountancy*, August, 82-88

Mendenhall, W and T Sincich (1988) *Statistics for the Engineering and Computer Sciences*, Dallen Publishing Company, San Fransisco, Collier MacMillan.

Mutchler, J F, J H Turner and D D Williams (1987) "The performance of female versus male accounting students", *Issues in Accounting Education*, Spring 103-111.

Nelson, A T (1989) "The human resource dilemma in accounting", *Journal of Accountancy*, August, 46-51.

Norusis, M J (1992) *SPSS for Windows Advanced Statistics Release 5*, Illinois, SPSS Inc.

Owens, W A (1976) "Background Data", in Dunnette MD (ed), *Handbook of Industrial and Organisational Psychology*, Chichester, J Wiley & Sons.

Pearson, R and G Pike (1990) *The IMS Graduate Review*, IMS Report No.192.

Pindyck, R S and D L Rubinfeld (1987) *Econometric Models and Economic Forecasts, 2nd edition*, New York, McGraw-Hill.

Plumbley, P (1991) *Recruitment and Selection*, London, Institute of Personnel Management, 5th Edition.

Reilly, F K and H F Stettler (1972) "Factors influencing success on the CPA Examination", *Journal of Accounting Research*, Autumn, 308-321.

Robertson, I T and M Smith (1989) "Personnel Selection Methods", in Cooper C L and I T Robertson (eds), *International Review of Industrial and Organisational Psychology*, Chichester, J Wiley and Sons.

Robertson, I T and P J Makin (1986) "Management selection in Britain: A survey and critique", *Journal of Occupational Psychology*, 59, 45-57.

Sanders, H P (1972) "Factors in achieving success on the CPA examination", *Journal of Accountancy*, December, 85-88.

Schaffer, G S, V Saunders and W A Owens (1986) "Additional evidence for the accuracy of biographical data: Long-term retest and observer ratings", *Personnel Psychology* 39, 791-809.

Shackleton, V and S Newell (1991) "Management Selection: A comparative survey of methods used in top British and French companies", *Journal of Occupational Psychology*, 64, 23-36.

Sirken, R M (1995) *Statistics for the Social Sciences,* California, Sage Publications.

Stokes, G S and Reddy (1992) "Use of background data in organisation decisions" in *International Review of Industrial and Organisational Psychology,* 7, Cooper C L and I T Robertson(eds), Chichester, J Wiley and Sons.

Strebler, M (1991) *Biodata in Selection: Issues in Practice,* IMS Paper, No. 160.

Sullivan, D J (1961) "Selection procedures for specific management trainee programs in 21 companies", *Dissertation Abstracts,* 21, 2200-01.

Taffler, R J, J E Harvey-Cook and A P O Williams (1995) *Improving the Graduate Trainee Recruitment Procedures of Accountancy Firms Using Biodata,* paper presented at the 1995 British Accounting Association Conference.

Taffler, R J and J E Harvey-Cook (1987) "Graduate recruitment", *Accountancy,* Nov, 177-180.

Tho, L M (1994) "Some evidence on the determinants of student performance in the University of Malaya introductory accounting course", *Accounting Education,* 3, 4, 331-340.

Tirbutt, E (1989) "Where have all the graduates gone?" *Accountancy,* Dec. 165-166.

Tyson, T (1989) "Grade performance in introductory accounting courses: why female students outperform males", *Issues in Accounting Education,* Spring, 153-160.

Wingrove, J, R Glendinning and P Herriot (1984) "Graduate pre-selection: A research note", *Journal of Occupational Psychology,* 57, 169-171.