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Towards Establishing a Scale for Assessing the Attractiveness of Petroleum Fiscal Regimes- Evidence from Malaysia

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Abstract

This paper identifies a gap in the current literature relating to the attractiveness of petroleum fiscal regimes and suggests that establishing a measurement scale based on relevant factors drawn from the extant literature and on the perceptions of experts would complement the economic models currently in use and could become an industry standard. It will undoubtedly influence the petroleum fiscal policies and practices of petroleum producing countries. The methodology used involved a review of literature to identify factors that enhance the attractiveness of petroleum fiscal regimes; deploying experts to validate the appropriateness of the identified factors; conducting exploratory factor analysis and evaluating the internal consistency reliability of the construct's dimensions; performing confirmatory analysis for convergence and discriminant validity of the dimensions; and computing model fit indices to evaluate the goodness of fit of the four-factor correlated attractiveness petroleum fiscal regime scale. The results obtained suggest that a credible and manageable scale for assessing the attractiveness of petroleum fiscal regimes can be readily constructed. This research has taken the first important pioneering step in the construction of a globally applicable scale, the mechanics of which will require extension of our research, and consequently makes a significant contribution to policymaking and literature.

Keywords: *Attractive petroleum fiscal regime, fiscal administration, fiscal certainty, fiscal efficiency, fiscal equity/neutrality, fiscal policies, fiscal practices.*

1. 0 Introduction

Countries with oil and gas resources compete for investment from the oil majors. One of the most important factors affecting investment decision outcomes is the attractiveness, or otherwise, of the petroleum fiscal regime (PFR) governing the activities of the oil companies in the host country (Shimutwikeni, 2011). The PFR encompasses taxation, fiscal arrangements, state participation and bonuses and should cover the duration of the production activity in the country (Nakhle, 2010). If the PFR is attractive in that its terms are not changed to the disadvantage of the oil companies at the whim of the national government then the stability provided is more likely to lead to those companies maintaining their investment even during periods of falling oil prices that reduce their profits (Akhigbe, 2007). In today's globalized world, oil fund investment is becoming dependent upon global tax policies and global fiscal regimes (Kondrashov, 2013). Under these conditions, oil resource rich countries should periodically overhaul their PFRs to ensure they match or better the PFRs operated by competitor nations (Roy, 2013).

Why is there a need for an oil producing nation to make its PFR attractive? A country's PFR will be associated with the type of petroleum fiscal system (PFS) it operates. PFSs can be classified under three heading: concessionary (otherwise called royalty/tax); production sharing contracts; and service contracts. The United Kingdom (Nakhle, 2007), Norway (Osmundsen & Løvås, 2009), Malaysia - before 1974 (Lee, 2013), Ghana (Amoako-Tuffour & Owusu-Ayim, 2010; Hackman, 2009), and countries in the former Soviet Union (Johnston, 2006) use concessionary PFSs. In contrast, the PFSs of Nigeria, Malaysia - after 1974 and Indonesia are based on production sharing contracts (Babajide, Ogunlade, Aremu, Oladimeji, & Akinyele, 2014).

However, the PFSs of Bolivia, Ecuador, Iraq, Iran, Kuwait, Mexico, Turkmenistan and Venezuela are aligned to service contract (Ghandi & Lin, 2014).

While the PFR of a country can fall within one of the three PFSs mentioned above, in specific terms each country has its own peculiar PFR (Babajide, et al., 2014). For instance, while Bolivia, Ecuador, Iraq, Iran, Kuwait, Mexico, Turkmenistan and Venezuela adopt service contracts, the specific terms associated with their PFRs differ in terms of service provider's remuneration, risk bearing, produced crude ownership, oil field operatorship and capital cost decision interaction (Ghandi & Lin, 2014). Thus, the differences in PFRs among oil producing countries lead to competitions because oil companies look at the specific terms within each country's PFR before deciding where its investment should take place. In fact, in a survey of 30 oil companies 83% of respondents (25 companies) considered that attractiveness of a country's PFR was the second most important after resource prospects influencing their decision to invest (Mohiuddin & Ash-Kuri, 1998). Therefore, everything else being equal, for a country to win investment from oil majors its PFR should be more attractive than the PFRs of its competing nations.

What makes a PFR attractive? Economists have modelled this issue using decline curves, neoclassical economics and scenario models, however, their analysis has been mostly focused on neutrality and progressivity of the PFR (see (Zhang, 1997, Lund, 2011, Kwabe, 2010, Smith, 2013, Smith, 2012)). Whilst the research approaches referred to above have utility value they fail to capture vital aspects of the factors that influence investors' decisions regarding the attractiveness of the PFR such as adaptability, certainty, clarity, simplicity, transparency,

imposition and administration. Consequently, there are logical reasons to explore alternative methodologies for evaluating PFRs (Smith, 2013, Smith, 2012).

In line with Smith's (2012, 2013) suggestions, this paper outlines a possible benchmarking scale for measuring the attractiveness of PFRs. The scale is derived from the results of analyzing the perceptions of experts based on their responses to a questionnaire. In essence this approach mimics reality in that judgments on PFRs invariably are made based on the views of highly paid employees of oil companies who form a view on issues such as the attractiveness of the PFR that governs the operations. The proposed scale encompasses broad indicators beyond those used in decline curves, neoclassical economics and scenario models and it incorporates perception-specific attributes of the attractiveness of PFRs such as adaptability, certainty, clarity, imposition, simplicity and transparency which have not been incorporated into economic models in the literature.

To achieve this end, psychometric properties of attractive PFRs were identified and classified based on procedures and research from the extant literature (Kaptein, 2008, MacKenzie et al., 2011, DeVellis, 2011, Hinkin, 1995, Galperin, 2012, Thien et al., 2014). The generated items were then 'validated' through experts' perceptions using a survey instrument. In reviewing the literature a view was formed that the processes contained in DeVellis (2011) relating to scale development and validation were appropriate for our purposes. These processes are: 1) Defining the construct to be measured using theory as a guide. 2) Generating an items pool. 3) Determination of measurement format. 4) Reviewing the item pool by experts. 5) Decision taken on valid items after experts' review. 6) Administration of the items to the development sample. 7)

Items evaluation and; 8) Optimization of scale length (Model-fit). These processes were followed in validating the attractiveness PFR scale.

The structure of the rest of the paper is as follows: Section 1.1 utilises the a literature and theory to help discuss and define what constitutes an attractive PFR . Section 1.2 builds on the discussion in section 1.1 to develop an items-pool based on the construct's theoretical definition. Section 2 outlines: the methodology used in the research; the measurement format; the outcomes of the experts' review of the items' pool; and decisions on the final items selected for empirical validation. Section 3 lists and reviews the results of exploratory factor analysis, internal consistency reliability, convergence validity, and discriminant validity obtained from administration of items to the development sample. It also contains the evaluation of the scale measures using relevant cut-off values, and optimization of the scale strength using model-fit indices. Section 4 discusses the results obtained in Section 3. The final section is the conclusion which outlines the potential significance of the findings, the limitations of the research, the direction of future research as well policy implication.

1.1 Definition of an Attractive Petroleum Fiscal Regime

DeVellis (2011) posited that the first stage in scale development and validation is to define the construct intended to be measured using theory as a guide. Therefore, it is worth noting that criteria for defining attractive PFRs were derived from the classic principles of judging tax system efficiency laid down by Adam Smith in 1776 (Miller and Alalade, 2003). Though Adam Smith might not have had petroleum taxation principles uppermost in his mind, his canons can be

applied to the evaluation of attractive PFRs. In its original form, Smith's four canons were: equity, certainty, convenience and economy (Miller and Alalade, 2003).

Equity: this canon is about the ability of government to collect tax from taxpayers based on their affordability. From an oil and gas perspective, to ensure equity, an oil and gas company (OGC) should pay tax based on profit margin and not on gross production revenues (Miller and Alalade, 2003). Moreover, this canon highlights that a fiscal regime should be justifiable in sharing both risk and return associated with the fiscal arrangement.

Certainty: this canon is about the ability of an OGC to make an accurate estimate of its tax liability in due course as they expect no alteration to the current terms in the foreseeable future. Certainty of what OGCs will actually pay as taxes enable them to make appropriate investment decisions based on whether or not to exploit oil under a particular fiscal regime. In other words, certainty in fiscal regime means that it is transparent in practice as it is in design and also it is stable for the foreseeable future (Miller and Alalade, 2003).

Convenience: under this principle consideration must be given to the timing of the payment of fiscal taxes and charges by OGCs from oil and gas production. With the improvement in communication and technology and the nature of oil and gas business, methods of paying fiscal charges by OGCs should be made easier, thereby increasing the *efficiency* of petroleum fiscal regime administration (Miller and Alalade, 2003).

Economy: under the principle of economy, the PFR should be designed in such a way not to distort the decision of investors. Thus, it should not be an overriding factor in the decision of an OGC as whether to exploit resources within the available oil and gas fields. If not, reserves would remain unexploited leaving the government with no revenue and OGCs with no economic benefits that can be derived from the exploitation of oil and gas reserves.

It is in line with these canons that criteria for evaluating the perceived attractiveness of petroleum fiscal regimes were derived. An attractive PFR has been defined as one which has been based on principles (equity, certainty, convenience and economy) that guide in a fair and equitable manner the allocation of oil and gas wealth between host government and investors (Nakhle, 2010). Thus, Adam Smith canons - equity, certainty, convenience and economy - can be guiding principles if a state desires to make its petroleum fiscal regime attractive. Consequently, for PFRs to be attractive they must have certain attributes such as adaptability, an effective administrative framework, certainty, clarity, efficiency, equity, flexibility, neutrality, progressivity, risk sharing, profit sharing, stability and transparency (Treasure, 2012, Ogunlade, 2010, Mohammed, 2012), which are in line with Adam Smith's canons for judging efficient tax systems. Therefore, an attractive PFR is defined in this study as a regime characterized by adaptability, administrative framework, certainty, clarity, efficiency, equity, flexibility, neutrality, progressivity, risk sharing, profit sharing, stability and transparency

1.2 Generating the Items' Pool

DeVellis (2011) posits that the second stage in scale development and validation is generating an items' pool. To facilitate this process the database of the Centre for Energy, Petroleum, Mineral Law and Policy (CEPMLP) of the University of Dundee - United Kingdom was utilized. This database contained the CELMLP Annual Review; a journal of the university. The journal ranges from volume 1 to 16. The first volume published in 1997 and the 16th volume was published in 2012; these volumes contain more than 400 articles. In each article, a search was made for keywords such as *"fiscal regime", "petroleum taxation" and "tax regime".* Many articles contained such words but few of them discussed the criteria for its evaluation. The studies that discussed the criteria are summarized in Table 1 below:

Table 1
Criteria for Assessing Attractiveness of Petroleum Fiscal Regime

Authors	**Criteria Used**	**Title Given to the Criteria**
Oldianosen (2004)	Government Take, Stability and Incremental Investment	Criteria for Evaluation of Fiscal Regime
Menezes (2005)	Neutrality, Equity and Stability	Fiscal Regime Evaluation Criteria
Akigbe (2007)	Neutrality, Stability, Risk Sharing and Profit Sharing.	Requisite Fiscal Attributes
Tordo (2007)	Neutrality, Stability and Flexibility	Designing Efficient Fiscal System
Ajayi (2008)	State Participation, State Pre-emptive Right, Neutrality, Stability	Evaluating the Changing Fiscal Terms
Oyinlola (2008)	Neutrality and Stability	Fiscal Issues Determining Investment
Onyeukwu (2008)	Economic Rent, Efficiency, Neutrality	Concepts of Resource Taxation Design
Okobi (2009)	Efficiency and Neutrality, Stability and Flexibility, Certainty and Predictability, Government Take, Imposition and Administration	Features of Desirable Tax System
Ambakederemo (2010)	Effect on Government, Effect on Investor	Analysis of Resource Rent Tax

Ogunlade (2010)	Efficiency, Neutrality, Equity, Risk Sharing, Stability, Clarity and Simplicity	Characteristic of good tax
Amoako-Tuffour and Owusu-Ayim (2010)	Progressivity, Flexibility, Neutrality, Stability, Risk Sharing.	Evaluation Criteria of Ghana Petroleum Fiscal Regime
Sarsenbayev (2010)	Neutrality and Stability	Fiscal Regime for Subsoil Users in Kazakhstan
Shimutwikeni (2011)	Economic Rent, Discount Rent, Stability and Neutrality	Competitive Fiscal Regime
Mohammed (2012)	Neutrality, Revenue Rising Potentials, Progressivity and Adaptability, Risk Sharing	Criteria for Evaluating Fiscal Regime
Treasure (2012)	Neutrality, Clarity and Transparency, Stability, Equity, Government Take	Ideal Fiscal Regime To Support Mining

In addition to the CEPMLP database, the study also undertook searches of the internet but few articles were displayed such as Otto et al.(2006), Nakhle (2010) and Amoako-Tuffour & Owusu-Ayim (2010) which discussed the criteria for assessing PFRs. Redundant items were eliminated thereby obtaining a pool of 14 items divided into four dimensions in line with Adam Smith's principles for judging efficeint tax systems as illustrated in Table 2 below:

Table 2
Items pool

Dimensions	**Items**
Fiscal Administration/economy	Administrative Framework Transparency
Fiscal Certainty	Certainty Stability
Fiscal Efficiency	Clarity Efficiency Flexibility Incremental Investment Predictability Progressivity Simplicity
Fiscal Equity	Equity Neutrality Risk and Revenue Sharing

2.0 Methods

2.1 Data Collection Procedures

Fourteen items (14) were used in measuring attractive PFRs. These fourteen items were incorporated into a questionnaire containing 69 items for a Malaysian Fundamental Research Grant Scheme (FRGS) number 12930 with the title *"Is a new fiscal regime required to improve investment climate of the marginal oil fields in Malaysia?"* The data collection lasted for six months (August, 2014 to January, 2015), in a successful effort to overcome a low response rate and the desire to optimize the validation sample. In the first three months, 71 responses were collected, while 52 responses were collected in the second three months- after follow-up. A non-response bias test was conducted in line with that recommended by Armstrong and Overton (1977). The outcome of the test in Table 3 showed that, at the 5% level of significance, there were no mean differences between the responses before and after follow-up; this indicates no non-response bias existed.

Table 3
T-Test for Responses before and after Follow-up

Items and Responses		Levene Test		t-test		
		F	**Sig.**	**t**	**Df**	**Sig. (2-tailed)**
APFR1	Before Follow-up	.068	.795	.386	118	.700
	After Follow-up			.390	113.855	.697
APFR2	Before Follow-up	.015	.902	1.059	118	.292
	After Follow-up			1.059	109.846	.292
APFR3	Before Follow-up	.131	.718	.014	118	.989
	After Follow-up			.014	109.569	.989
APFR4	Before Follow-up	.022	.882	1.519	118	.131
	After Follow-up			1.547	115.873	.125
APFR5	Before Follow-up	.013	.910	-1.261	118	.210
	After Follow-up			-1.260	109.376	.210
APFR6	Before Follow-up	.607	.438	.495	118	.621
	After Follow-up			.497	111.098	.620
APFR7	Before Follow-up	.319	.573	.498	118	.620
	After Follow-up			.501	112.666	.617
APFR8	Before Follow-up	.141	.708	.451	118	.653
	After Follow-up			.445	103.691	.657
APFR9	Before Follow-up	3.143	.079	-.496	118	.621
	After Follow-up			-.484	98.176	.629
APFR10	Before Follow-up	1.363	.245	.593	118	.554
	After Follow-up			.611	117.798	.542
APFR11	Before Follow-up	4.811	.030	1.009	118	.315
	After Follow-up			1.051	117.804	.296
APFR12	Before Follow-up	.030	.863	.261	118	.795
	After Follow-up			.265	115.114	.792
APFR13	Before Follow-up	2.526	.115	-.801	118	.425
	After Follow-up			-.822	117.290	.413
APFR14	Before Follow-up	3.212	.076	.047	118	.963
	After Follow-up			.047	113.778	.962

2.2 Population and Sample

The population of the study was comprised of 361 subjects with job specialization as Oil and Gas Accountants, Auditors, Tax Consultants, Business Development Managers and Contract Managers. The respondents were employed by 16 institutions divided into three clusters; government, industry and practitioners. For government, four institutions were selected. For industry, eight private oil companies were selected. Lastly, for practitioners, four accounting firms were selected. The population comprised all subjects relating to the area mentioned above.

Consequently, 361 questionnaires were distributed, however; only 123 were returned representing 34.07% of the population. The response rate is considered sufficient based on Sekaran (2003) who posited that a response rate of 30% is adequate for a survey research. However, only 120 cases were used for final analysis as 3 cases were deleted during data screening because they were perceived to be outliers, the presence of which would have affected the validity of the statistical tests (Tabachnick and Fidell, 2007). The outliers were eliminated if and only ift the value of their Mahalanobis distance (*D2*) was higher than the corresponding chi-square of 111.055 (p = .001). This elimination decision is in line with the approach of Tabachnick and Fidell (2007). Data screening was performed using SPSS version 19.

2.3 Instrumentation

In line with DeVellis (2011), the third step in scale development and validation is determination of the measurement format. There are many measurement formats for measuring a scale depending on the nature of questions asked by the researcher. Some of these formats include Thurstone scaling, but some researchers posit that the intricacies in using this type of scaling outweigh its benefits (DeVellis, 2011). Guttman Scaling is somewhat similar to Thurstone, only that it follows some ordering processes in asking questions. Like Thurstone scaling, studies showed that Guttmann's scaling disadvantages are higher than its advantages (DeVellis, 2011). The most widely acceptable scales are binary scales; Likert scales; semantic differential; and visual analogue. However, the evidence from the literature strongly suggested that the Likert scale was more appropriate for measuring the items of perceived attractiveness of a PFR. In fact, DeVellis (2011) posits that when items are presented in a declarative statement, a Likert scale is

the most appropriate measure to be used. A 7-point Likert measurement scale was used in this study for measuring the attractiveness of a PFR.

The fourth stage in scale development as contained in DeVellis (2011) guidelines is presenting items to experts for review. To achieve this, an instrument was designed to enable the experts to give their perceptions on the items listed in Table 4 below. It was presented to five experts in two groups. The first group consisted of three (3) senior lecturers in oil and gas accounting and taxation; two are PhD holders from UK universities and lecturers in UK universities, and the other one is also a PhD holder from a UK university but lectures in a Nigerian University. The second group consisted of two experts who are employees in OGCs and specialized in oil and gas accounting and taxation.

Table 4
Operational Definition of Items for Experts' Evaluation

Items	Operational Definition of Item	Item Code
Neutrality	Petroleum fiscal regime in country (s) targets net profit not gross revenue	APFR1
Equity	Petroleum fiscal payments made by oil companies to host government in country (s) is commensurate to their level of profitability	APFR2
Certainty	Petroleum fiscal regime in country (s) is not subject to arbitrary changes	APFR3
Revenue Sharing	Petroleum fiscal regime in country (s) enables justifiable revenue sharing between government and investors	APFR4
Stability	Petroleum fiscal regime in country (s) is likely to remain unchanged in foreseeable future	APFR5
Efficiency	Petroleum fiscal regime in country (s) has no much intricacies in operational processes	APFR6
Clarity	Petroleum fiscal regime in country (s) is unambiguous	AFFR7
Simplicity	The terminologies contained in petroleum fiscal regime in country (s) are easy to understand	APFR8
Progressivity	Taxes and changes contained in petroleum fiscal regime in country (s) increases as profit increases	APFR9
Flexibility	Petroleum fiscal regime in country (s) is designed in such away to accommodate important future regulatory changes	APFR10
Incremental Investment	Petroleum fiscal regime in country (s) enables continuous inflow of foreign investment	AFFR11
Risk Sharing	Petroleum fiscal regime in country (s) enables justifiable risk sharing between government and investors	APFR12
Administrative Framework	Petroleum Fiscal Regime in country (s) has the necessary operational structure to support compliance	APFR13
Transparency	Petroleum fiscal regime in country (s) is transparent as no allegations witnessed between the contractual parties.	APFR14

The experts were asked to rate each item in terms of its relevance in measuring the construct as well as the clarity of the statement. For identifying relevance, the guidelines for Content Validity Index (CVI) analysis recommended by Polit and Beck (2006) were used. Polit and Beck recommended four (4)-point measures for evaluating items' relevance in a scale: 1= *not relevant, 2= somewhat relevant, 3= quite relevant and 4= highly relevant.* Polit and Beck (2006) suggested

dichotomizing of the four-point measure for the computation of item level CVI denoted as I-CVI and scale level CVI denoted as S-CVI. This means denoting options 1 and 2 as *not relevant* while options 3 or 4 as *relevant*. Polit and Beck (2006) recommended that I-CVI needs to meet the threshold of 1.00 when 3 to 5 experts evaluate the items and a minimum of 0.78 for 6 to 10 experts. It is also recommended that S-CVI/Ave of 0.90 or higher is recommended at scale level. These recommendations were in line with prior studies on content validity evaluation for scale development (Waltz and Bausell, 1981, Sauls, 2004, Lynn, 1986, Davis, 1992, Champion et al., 2005). Therefore, in line with these recommendations, the following computations in Table 5 were made.

Table 5
Rating of Items Scale by Five Experts: Item rated 3 or 4 on a 4-Point Relevance Scale

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Number Relevant	I-CVI
1	X	X	X	X	X	5	1.00
2	X	X	X	X	X	5	1.00
3	X	X	X	X	X	5	1.00
4	X	X	X	X	X	5	1.00
5	X	X	X	X	X	5	1.00
6	X	X	X	X	X	5	1.00
7	X	X	X	X	X	5	1.00
8	X	X	X	X	X	5	1.00
9	X	X	X	X	X	5	1.00
10	X	X	X	X	X	5	1.00
11	X	X	X	X	X	5	1.00
12	X	X	X	X	X	5	1.00
13	X	X	X	X	X	5	1.00
14	X	X	X	X	X	5	1.00
							S-CVI/Ave =1.00
						Mean Expert	Proportion =1.00
	1.00	1.00	1.00	1.00	1.00		

From Table 5 S-CVI/Ave is calculated as (1.00 +1.00 +1.00 +1.00 +1.00 +1.00 +1.00 +1.00 +1.00+1.00+1.00+1.00+1.00+1.00)/14=1.00. Similarly, mean expert proportion is calculated as

(1.00+1.00+1.00+1.00+1.00)/5=1.00. Therefore, in line with Polit and Beck (2006) recommendation, all the items meet the minimum requirements for I-CVI of 1.00 and S-CVI of 1.00 for scale.

Moreover, the experts were solicited to give a written comment on the clarity of wordings used for each of the 14 items. Three of the experts suggested that items two, six and ten should be reworded to remove potential ambiguity. After incorporating all the necessary adjustments and corrections, the final instrument was prepared for administration to the main study sample as disclosed in 3.1 and 3.2 above.

2.4 Data Analysis Techniques

Having returned the questionnaires, all the 123 responses collected were recorded for analyses. After data screening only 120 cases were retained. Following data screening, three types of analyses were conducted: (a) exploratory factor analysis, (b) confirmatory analyses, and (c) evaluation of model fit. These analyses were conducted using SPSS version 19.0, Smart-PLS version 3, and Amos version 22.0 respectively.

2.4.1 Exploratory Factor Analysis

The aim of exploratory factor analysis is to explore the dimensionality or factorability of attractive PFRs in four dimensions in line with theory. Exploratory factor analysis is also desirable in understanding to what extent each dimension or factor is explained by the underlying items. In achieving this goal, principal component analysis method and varimax orthogonal rotation were used. Four factors were fixed for extraction in line with theory – Adam Smith's

1776 (Miller and Alalade, 2003) principles of judging efficient tax system. Naming of each dimension is based on theory – Adam Smith's 1776 principles of judging efficient tax system, and convergence of the items that reflect the name of the construct. To this end, two statistical measures were applied. These are standardized factor loadings (λ) with cutoff values of 0.50 (Hair et al., 2010).

2.4.2 Confirmatory Analyses

After the exploratory factor analysis, further analyses for internal consistency reliability, convergence and discriminant validity were conducted. Internal consistency measures the extent to which items measuring a construct correlate with one another in a structural model. Three statistical measures were used in evaluating internal consistency reliability of the dimensions of an attractive petroleum fiscal regime: (i) indicator reliability (ii) Cronbach alpha, and (iii) composite reliability (CR). The cutoff values are ≥ 0.70 for indicator reliability (Hair et al., 2010), ≥ 0.70 for Cronbach alpha (Numally, 1978), and ≥ 0.70 for CR (Hair et al., 2010).

Convergence validity measures the extent to which items of a particular construct unite in defining that construct (Hair et al., 2010). The statistical measure used in evaluating convergence validity of the dimensions of an attractive petroleum fiscal regime is referred to as the average variance extracted (AVE). AVE measures the extent of items' convergence for defining a latent construct in a SEM. The acceptable cutoff value for AVE as recommended by Hair at al. (2010) is ≥ 0.50.

Discriminant validity measures the extent to which a particular construct and its items are differentiated from other constructs and other items in SEM (Fornell and Larcker, 1981). There are two methods of estimating discriminant validity; items' cross-loading and square-root of AVE. However, square-root of AVE developed by Fornell and Larcker is considered a more rigorous measure of discriminant validity (Thien et al., 2014). Under Fornell and Larcker criteria it is required that the square-root of AVE of a particular construct should be higher than its correlation with any other construct – when this is achieved, a construct attained a discriminant validity requirement.

2.4.3 Model Fit – Goodness of Fit Indices

Model fit or goodness of fit indices measures the fitness of the confirmatory procedures to the data. Several indices were used in evaluating the model fit of this study's confirmatory analyses. These fit indices are: Mean Square Error of Approximation (RMSEA) with cutoff value ≤ 0.10 (Browne et al., 1993). Chi-square statistic $\chi 2$, and Normed Chi-square (NC) of ≤ 5 (Planing, 2014), Goodness of Fit Index (GFI) and Comparative Fit Index (CFI) of ≥ 0.80 and 0.90 respectively (Schermelleh-Engel et al., 2003).

3.0 Results

3.1 Exploratory Factor Analysis

Exploratory factor analysis is shown in Table 6. Principal component analysis was used as extraction method and varimax was applied for rotation (Kaiser, 1958, Pallant, 2010). The cut-off value is ≥ 0.6 for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, the

classification of factor loadings are: 0.5 to 0.7 as mediocre, 0.7 and 0.8 as good, 0.8 to 0.9 as great, and above 0.9 as excellent (Kaiser, 1974, Kaiser, 1970).

Table 6
Factor Analysis for Attractive Fiscal Regime Dimensions

	Factors			
Items	**Dimension 1**	**Dimension 2**	**Dimension 3**	**Dimension 4**
AFPR11	0.823			
AFPR6	0.612			
AFPR8	0.736			
AFPR12	0.728			
AFPR7	0.689			
AFPR10	0.702			
AFPR9	0.578			
AFPR2		0.828		
AFPR1		0.843		
AFPR4		0.648		
APFR3			0.821	
AFPR5			0.754	
AFPR14				0.854
AFPR13				0.829
Total eigenvalues	6.531	1.340	1.147	0.850
Variance Explianed	46.65%	9.57%	8.19%	6.07%
Total Variance Explianed	70.48%			
KMO	0.868			
Sig.	0.000			

3.2 Confirmatory Analyses

Conducting confirmatory after exploratory factor analysis is in line with the prior literature (Worthington and Whittaker, 2006, Thien et al., 2014, Johari et al., 2011). Thus, having explored the four dimensions of attractive PFRs: fiscal admininstration, fiscal certainty, fiscal efficiency and fiscal equity/neutrality, the study evaluated the internal consistency reliability of items that measure each of these dimensions. Table 7 presents the indicator reliability, Cronbach alpha and CR of the dimensions of attractive PFR.

Table 7
Internal Consistency Reliability

Dimensions	Items	Indicator Reliability	Cronbach's Alpha	Composite Reliability
Fiscal Administration	APFR13	0.864	**0.779**	**0.900**
	APFR14	0.944		
Fiscal Certainty	APFR 3	0.915	**0.752**	**0.889**
	APFR 5	0.874		
Fiscal Efficiency	APFR 6	0.781	**0.894**	**0.916**
	APFR 7	0.708		
	APFR 8	0.819		
	APFR 9	0.780		
	APFR 10	0.781		
	APFR 11	0.782		
	APFR 12	0.812		
Fiscal Equity/Neutrality	APFR1	0.865	**0.789**	**0.876**
	APFR2	0.829		
	APFR4	0.818		

As noted earlier, constructs' convergence and discriminant validity were evaluated to support the exploratory factor analysis. The results of these analyses are contained in Table 8 and 9 below:

Table 8
Convergent Validity

Constructs/Items	Loadings	AVE
Fiscal Administration		**0.818**
APFR13	0.864	
APFR14	0.944	
Fiscal Certainty		**0.800**
APFR3	0.915	
APFR5	0.874	
Fiscal Efficiency		**0.610**
APFR6	0.781	
APFR7	0.708	
APFR8	0.819	
APFR9	0.780	
APFR10	0.781	
APFR11	0.782	
APFR12	0.812	
Fiscal Equity/Neutrality		**0.701**
APFR1	0.865	
APFR2	0.829	
APFR4	0.818	

Table 9 presents the results of the discriminant validity to further confirm the dimensionality of attractive petroleum fiscal regime into four factors.

Table 9
Discriminant Validity

Latent Constructs	Fiscal Admin	Fiscal Certainty	Fiscal Efficiency	Fiscal Equity/Neutrality
Fiscal Admin./Economy	**0.905**			
Fiscal Certainty	0.408	**0.895**		
Fiscal Efficiency	0.529	0.621	**0.781**	
Fiscal Equity/Neutrality	0.351	0.518	0.526	**0.837**

4.3 Model Fit –Goodness of Fit Indices

Model fit indices highlight the fundamental indication of the extent to which a proposed measurement model or theory fits the data (Hooper et al., 2008). One interesting issue with model fit indices is that, its computation does not rely on baseline model comparison, instead it measures the degree of the model fits in comparison to no model on ground (Jöreskog and Sörbom, 1993). Figure 1 below presented model fit indices.

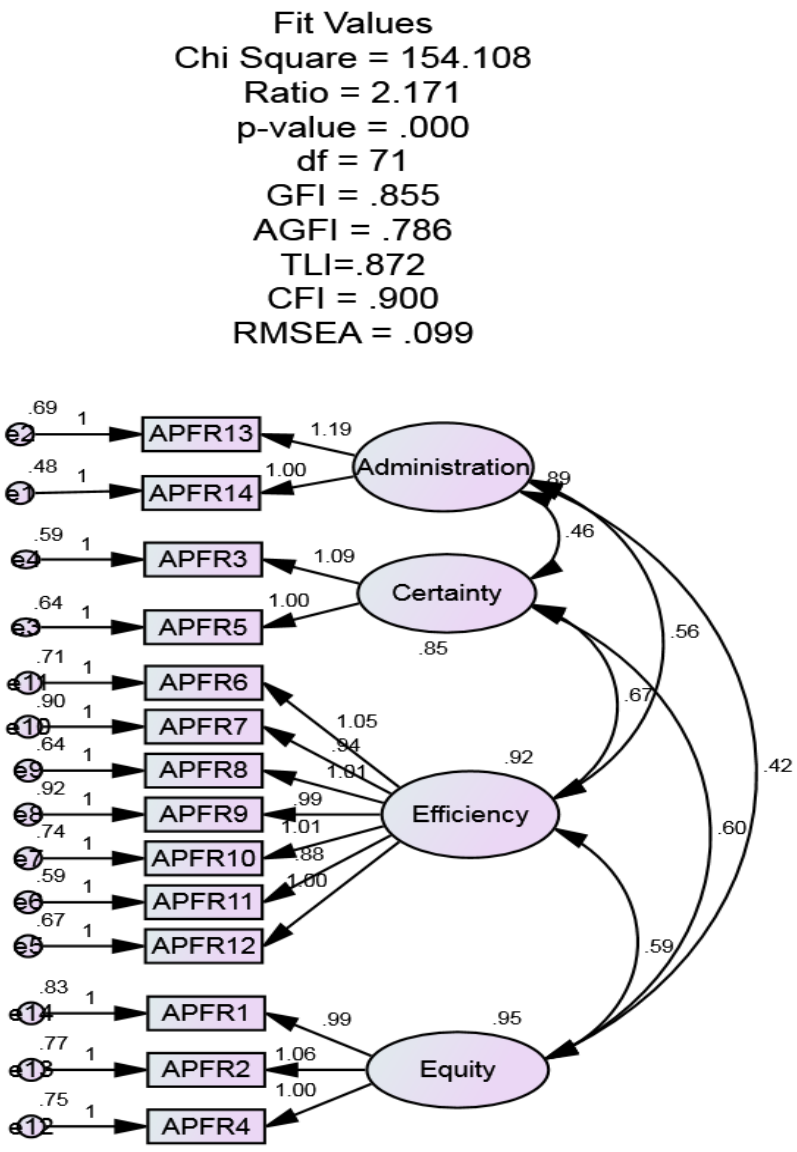

*Figure 1*Model Fit – Goodness of Fit Indices

4.0 Discussions

Exploratory factor analaysis results in Table 6 showed that four dimensions were extracted for attractive PFRs. The fisrt dimension has 7-items, an eigenvalue of 6.531 and variance explained of 46.65%, it is named fiscal efficiency. The second dimension has 3 items, an eigenvalue of 1.340 and variance explained of 9.57%, it is named fiscal equity/neutrality. The third dimension

has 2 items, eigenvalue of 1.147 and variance explained of 8.19%, it is named fiscal certainty. The fourth dimension has 2 items, an eigenvalue of 0.850 and variance explained of 6.07%, it is named fiscal administration. The names of these four dimensions were derived based on the nature of items' convergence, and the underpining theory of attractive PFRs - principles of judging efficient tax system by Adam Smith in 1776 (Miller & Alalade, 2003).

Moreover, apart from the dimesions, the overall results of factor analysis indicated that four dimensions were explored through principle component analysis using varimax orthogonal rotation. The extraction was made using four fixed factors in line with theory - principles of judging efficient tax system by Adam Smith in 1776. The total variance explained by the four dimensions is 70.48%, the KMO is 0.868, Bartlett's Test of Sphericity is significant at the 1% level of significance. The items loadings range from 0.578 to 0.854. The result confirmed that attractive PFRs have four dimensions. The KMO is above the recommended cut-off value of ≥ 0.6 (Kaiser, 1970). The factor loadings are within the ranges of mediocre and great (Kaiser, 1974). The total variance explained is higher than the commonly acceptable cut-off point of ≥ 60%.

From Table 7 it can be seen that the indicator reliability of each of the four dimensions ≥ 0.70 (Hair et al., 2010), the Cronbach's alphas exceeded the cut-off value of ≥ 0.70 (Numally, 1978), CRs of all the dimensions are ≥ 0.70 (Hair et al., 2013, Hair et al., 2012, Hair et al., 2011), indicating high internal consistency reliability among the dimensions of attractive PFRs.

As depicted in Table 8, the AVEs of attractive PFRs dimensions are all above the recommended cut-off value ≥ 0.50 (Hair et al., 2013, Hair et al., 2012, Hair et al., 2011), revealing the required convergent validity for attractive PFR dimensions.

As shown in the Table 9, the square-root of AVE of each dimension is higher that its correlation with any other construct in the model (Hair et al., 2013, Hair et al., 2012, Hair et al., 2011), thereby achieving discriminant validity.

The result in Figure 1 shows that the four-factor correlated model satisfied the goodness of fit indices using the recommended cut-off values. RMSEA is 0.99, thus within cutoff value ≤ 0.10 (Browne et al., 1993, Planing, 2014). The Chi-square statistic is $\chi 2 = 154.108$, and the Normed Chi-square ratio is 2.171, which is within the cut-off value of ≤ 5 (Planing, 2014), GFI and CFI are 0.855 and 0.900, thus, meeting the requirements of ≥ 0.80 and ≥ 0.90 respectively (Schermelleh-Engel et al., 2003, Planing, 2014). Looking at these indices, it can be concluded that, the dataset utilized in this study fits the theory - principles of judging an efficient tax system by Adam Smith in 1776 – used to measure attractive petroleum fiscal regime based on experts' perception.

5.0 Conclusion and Policy Implications

The results reported in this paper make a significant contribution to the literature on the attractiveness of petroleum fiscal regimes. A promising measurability scale has been identified based on analysis which has drawn upon the extant literature, theory and the perceptions of experts on petroleum fiscal regimes in Malaysia. In essence the scale consists of, fourteen items

that have factorability into four dimensions - fiscal administration, fiscal certainty, fiscal efficiency and fiscal equity/neutrality. Each of the four dimensions were found to have strong internal consistency reliability and well-built convergent and discriminant validity. The goodness of fit indices confirmed that the data fits the robust measurement theory - principles of judging efficient tax system devised by Adam Smith in 1776. Exploring these dimensions could have implication to policy in more specific terms than that obtainable from the overall construct.

The results are pioneering in that they are the first stage of devising a global attractiveness scale to be used in conjunction with the existing economic models that appraise petroleum fiscal schemes. The results obtained from the Malaysian viewpoint strongly suggest that the global scale can be agreed firstly across developing nations with oil and gas resources and then across all nations. We intend carrying out this research. Whilst the sample size of 120 in the current study is satisfactory for our purposes future studies will uses larger sample sizes to reflect the lager population from which the sample is drawn.

The scale established and validated in this study can serve as an index for oil producing countries when designing a new or revisiting an existing petroleum fiscal policy. While each country's petroleum industry has its peculiarities that may require a unique fiscal policy, the new scale could serve as an invaluable standard measurement tool for the policymakers in ensuring that a designed or revisited PFR is attractive enough to attract new investors as well as restrain the existing ones from pulling-out of the industry. Poorly designed petroleum fiscal policy drives away investment. Competition to attract inward investment by petroleum rich nations, and especially amongst developing countries, is fierce and the need for a robust mechanism to help

them win investment is clear. In addition, the global energy environment itself has changed. There is now unrestrained competition for investment funds between conventional and renewable providers of energy. The evidence provided in this paper is the first stage in establishing a means by which energy producing countries can create a level playing field in the investment game by ensuring that their PFR is optimally designed to attract funds. By providing a comprehensive scale that can guide petroleum fiscal policy design, this paper can revolutionize PFR development and become best practice for oil producing countries.

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