EFFECTS OF PETROLEUM FISCAL REGIMES AND TAX INSTRUMENTS ON THE INVESTMENT CLIMATE OF MARGINAL OIL FIELDS IN MALAYSIA

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Abstract

Primarily, this study examines the effect of 2010 fiscal regime changes on the investment climate of marginal oil fields in Malaysia. The study also explores the effect fiscal regime changes on investors' capital expenditure (CAPEX) performance. It also investigates the relationship between tax instruments (types of profit-based tax, types of fiscal arrangement, crypto-based tax, production-based tax and tax incentives) and the investment climate of marginal oil fields as well as the moderating effect of an attractive petroleum fiscal regime on that relationship. Scenario analysis was used in examining the effect of 2010 fiscal regime changes on the investment climate of marginal oil fields. Trend analysis was employed in investigating the effect of fiscal regime changes on investors' CAPEX performance. Lastly, Partial Least Square (PLS) path modeling was used in examining the relationship between tax instruments and the investment climate of marginal oil fields as well as the moderating effect of an attractive petroleum fiscal regime. Findings from the scenario analysis showed that the investment climate of marginal oil fields improved after 2010 fiscal regime changes for low oil prices, mixed findings for medium oil price, however, the investment climate would have been better under old regime for high oil price scenarios. Investors' CAPEX performance increased significantly after the fiscal regime changes. Moreover, the finding shows that a petroleum profit tax, production-sharing contracts, and tax incentives had a significant positive relationship with the investment climate of marginal oil fields, but that the crypto-based tax and production-based tax had significant negative relationships. However, no significant relationship was established for the brown tax and the pure service contract. Furthermore, it was found that an attractive petroleum fiscal regime significantly moderated the relationship of the brown tax, production-based tax, and tax incentives with the investment climate of marginal oil fields. However, no significant moderating effects of an attractive petroleum fiscal regime was established with respect to the crypto-based tax, petroleum income tax, production sharing contract, pure service contract. In line with these findings, practical, methodological and theoretical implications were highlighted, the study's limitations were discussed, and suggestions for future studies were offered.

Keywords: investment climate, marginal oil fields, petroleum fiscal regime, tax instruments

Abstrak

Kajian ini secara khususnya menyelidik kesan perubahan aliran fiskal 2010 ke atas iklim pelaburan medan minyak marginal di Malaysia. Kajian ini juga meninjau kesan perubahan aliran fiskal ke atas prestasi perbelanjaan modal (CAPEX) pelabur. Seterusnya, kajian ini menyelidik hubungan di antara instrumen cukai (jenis-jenis cukai berasaskan keuntungan, jenis susunan fiskal, cukai berasaskan kripto, cukai berasaskan pengeluaran dan insentif cukai) dan iklim pelaburan medan minyak marginal di Malaysia. Akhir sekali, kajian ini turut mengkaji kesan pengantara rejim fiskal petroleum dalam hubungan antara instrumen cukai dan iklim pelaburan medan minyak marginal. Analisis senario digunakan dalam meneliti kesan perubahan aliran fiskal 2010 ke atas iklim pelaburan medan minyak marginal. Analisis *trend* digunakan dalam mengkaji kesan perubahan aliran fiskal ke atas prestasi CAPEX pelabur. Akhirnya, model *Partial Least Square (PLS)* digunakan untuk mengkaji hubungan di antara instrumen cukai dan iklim pelaburan medan minyak marginal serta kesan pengantara rejim fiskal petroleum. Dapatan kajian daripada analisis senario menunjukkan bahawa iklim pelaburan bagi medan minyak marginal bertambah baik selepas perubahan aliran fiskal 2010 bagi senario harga minyak yang rendah. Dapatan kajian juga menunjukkan bahawa iklim pelaburan bagi senario harga minyak sederhana adalah bercampur selepas perubahan aliran fiskal 2010; manakala iklim pelaburan adalah lebih baik di bawah aliran fiskal sebelum 2010 bagi senario harga minyak yang tinggi. Prestasi CAPEX pelabur meningkat dengan ketara selepas perubahan aliran fiskal. Selain itu, dapatan kajian menunjukkan bahawa cukai keuntungan petroleum, kontrak perkongsian pengeluaran, dan insentif cukai mempunyai hubungan positif yang signifikan dengan iklim pelaburan medan minyak marginal tetapi bagi cukai yang berasaskan kripto dan cukai berasaskan pengeluaran, wujud hubungan negatif yang signifikan. Walau bagaimanapun, tiada hubungan yang signifikan dibangunkan bagi cukai *brown* dan kontrak perkhidmatan asas. Tambahan pula, dapatan menunjukkan bahawa aliran fiskal petroleum menjadi pengantara dalam hubungan cukai *brown*, cukai berasaskan pengeluaran dan insentif cukai dengan iklim pelaburan medan minyak marginal. Walau bagaimanapun, tiada kesan pengantara yang signifikan ditunjukkan dalam aliran fiskal petroleum yang berkaitan dengan cukai berdasarkan kripto, cukai pendapatan petroleum, kontrak perkongsian pengeluaran, kontrak perkhidmatan asas, dan iklim pelaburan medan minyak marginal. Selaras dengan penemuan ini, implikasi praktikal, metodologi dan teori telah diketengahkan. Limitasi kajian turut dibincangkan dan cadangan untuk kajian masa hadapan disarankan.

Kata kunci: iklim pelaburan, medan minyak marginal, aliran fiskal petroleum, instrumen cukai

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List of Abbreviations

AGR	Access to Gross Revenue
ANOVA	Analysis of Variance
APRT	Advanced Petroleum Revenue Tax
AVE	Average Variance Extracted
BT	Brown Tax
BOE	Barrels of Oil Equivalents
CAPEX	Capital Expenditure
CCGP	Coordinating Committee on Geosciences Program
CIT	Company Income Tax
EFA	Exploratory Factor Analysis
FRGS	Fundamental Research Grant Scheme
FIRS	Federal Inland Revenue Service
FOC	Foreign Oil Company
FTF	First Tranche Petroleum
GDP	Gross Domestic Product
GoF	Goodness of Fit
GT	Government Take
IT	Investor Take
IRR	Internal Rate of Return
JV	Joint Venture
LNG	Liquefied Natural Gas

MIDA	Malaysia Investment Development Authority
MoU	Memorandum of Understanding
MPRC	Malaysia Petroleum Resources Corporation
NCF	Net Cash Flow
NOC	National Oil Company
NNPC	Nigerian National Petroleum Corporation
NPV	Net Present Value
OGC(s)	Oil and Gas Company (ies)
OL	Operating Leverage
OPEX	Operating Expenditure
PETRONAS	Petroliam Nasional Berhad
PI	Profitability Index
PIT	Petroleum Income Tax
PLS	Partial Least Squares
POC	Private Oil Company
PPT	Petroleum Profit Tax
PRT	Petroleum Revenue Tax
PSC	Production Sharing Contract
QCE	Qualifying Capital Expenditure
R/C	Revenue over Cost
RoR	Rate of Return
RRT	Resource Rent Tax
RSC	Risk Service Contract

R/T	Royalty/Tax
RWT	Revenue Windfall Tax
SC	Service Contract
SEM	Structural Equation Modeling
SI	Saving Index
SPD	Supplementary Petroleum Duty
SRMR	Standardized Root Mean Squared
TCF	Trillion Cubic Feet
UK	United Kingdom
UKCS	United Kingdom Continental Shelve
US	United States
USD	United States Dollar
VAT	Value Added Tax
VIF	Variance Inflation Factor

CHAPTER ONE
INTRODUCTION

1.1 Introduction

Oil and gas industry in Malaysia has been experiencing series of adjustments in petroleum fiscal policies. These adjustments started in 1974 when Petroleum Development Act was promulgated, which not only led to the abolishment of the concessionary fiscal system but also paved way for the introduction of Production Sharing Contracts (PSC). The PSC itself had undergone several adjustments, which ranges from PSC of 1976, PSC of 1985, deepwater PSC of 1993, and finally to Revenue over Cost (R/C) factor PSC of 1998. The aforementioned changes may be connected with the country's desire to improve the investment climate of its oil and gas fields.

With a view to further improve the investment climate of marginal oil fields through improving rate of return to investors, the Malaysian government introduced a new fiscal regime in November 2010 (Faizli, 2012; Jaipuriyar, 2013). This regime changed the fiscal arrangement of marginal oil fields from the PSC to the Risk Service Contract (RSC) and introduced additional tax incentives. This development eventually led to the amendment of Petroleum Development Act in 2011. The tax incentives included: (1) a reduced tax rate from 38% to 25% of chargeable profit; and (2) an accelerated capital allowance from 10 to 5 years. Other provisions included: (3) a waiver of export duty on oil produced and exported by marginal oil fields operators; (5) an investment tax allowance of 60%-100% on Qualifying Capital

Expenditure (QCE) and (5) a qualified capital expenditure transferable between non-contiguous petroleum agreements within the same partnership or sole proprietorship.

The motive behind the new fiscal regime was to attract investors who would be willing to incur the required Capital Expenditure (CAPEX) for the development of marginal oil fields. Evidence has highlighted that fiscal regime and tax policy changes affect investments in the oil and gas industry. With respect to this, Ernst and Young (2013) reported that, with globalization, investment in oil and gas through exploration and production expenditures has had more emphasis on tax policy and regime changes. Moreover, Smith (2012b) documented that petroleum taxation affects investment in exploration and development of oil and gas resources. The investment for exploration and development meant the CAPEX incurred for development of oil and gas resources.

The inference can be made from these assertions that incurring more CAPEX by oil and gas investors in Malaysia is an indication of their commitment towards investment for development of marginal oil fields. Importantly, a total investment of about RM 101.3 billion of CAPEX is required in Malaysia to restore the decline in oil and gas production that has been falling from 1% to 2% annually (Economic Transformation Program, 2010). Thus, the expectation was that the new fiscal regime would improve the investment climate of marginal oil fields, which, in turn, would encourage operators to invest in such fields by incurring the required CAPEX for its development. The hope was these new funds would eventually stem the decline in country’s oil and gas production.

Otto *et al.* (2006) said that the investment climate in oil and gas industry depended on several variables, including taxation. Thus, their study highlighted taxation as one of the important determinants of the investment climate. Similarly, Nakhle (2005) posited that taxation was a significant determinant of marginal oil field investment attractiveness. Likewise, Smith and Hallward-Driemeier (2005) highlighted that taxation and regulation were among the exogenous determinants of the investment climate. In addition, the literature noted that taxes create investment distortions (Árnason, 2008; Liu, 2011), and some taxes are regressive, that is having a negative effect on investment (McPhail, Daniel, King, Moran, & Otto, 2009; Menezes, 2005). Therefore, while evidence indicated the possible influence of taxation on investment, however, taxation is very broad subjects, and some tax instruments are more pronounced in oil and gas industry. These include: types of profit-based taxes (Glave & Damonte, 2013), types of fiscal arrangement (Johnston, 2006), production-based taxes (Daniel, Keen, & McPherson, 2010a; Glave & Damonte, 2013; Menezes, 2005), crypto-based taxes (Isehunwa & Uzoalor, 2011; Johnston, 1994b) and tax incentives (Nwete, 2005). Hence, the study investigates the influence of these tax instruments on investment climate of marginal oil fields in Malaysia.

The effect of tax policy on an investor's cash flow can be moderated by the fiscal regime in place (Artist, 2009). Besides, mixed results concerning the effect on tax incentives for investment have been found. Some studies found positive and significant effects (Babatunde, 2012; Clark, 1999; Lim, 2001), while others found no effect (Lim, 1983; Ricupero, 2000). Interestingly, Baron and Kenny (1986) proposed the use of a moderating variable when there were mixed findings. Consequently, the current study examined the moderating effect of attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields.

1.2 Motivation of the Study

Several reasons motivated this study. First, the Malaysian oil and gas industry has been experiencing a series of adjustments in its petroleum fiscal regimes and arrangements ranging from PSC of 1976, PSC 1985, deepwater PSCs of 1993, Revenue over Cost PSC of 1998, as well as the recent RSC of 2010, all with the motive of improving investment climate of its oil and gas fields. Ordinarily, in other countries like United Kingdom (UK), changes in petroleum fiscal regime are usually followed by series of studies examining their effects. However, evidence about the effect of the new fiscal regime introduced in 2010 on the investment climate of Malaysian marginal oilfields is not publicly available.

The study was also motivated by the relatively weak investment climate in Malaysia offshore oil and gas fields. As noted by Otto *et al.* (2006), the investment climate in the mining sector (of which oil and gas are considered a component) is determined by expected rate of return and associated risk. In a report released by the United States (US) Department of Interior, comparing Federal Oil and Gas Fiscal Systems for some countries, shows that Malaysian offshore oil and gas fields have a relatively low Internal Rate of Return (IRR) and Profitability Index (PI) indicating a weak investment climate (Agalliu, 2011). Table 1.1 below summarizes such comparisons.

Table 1.1
Comparison of Offshore Federal Fiscal Systems

Country	**Profitability Index (PI)**	**Internal Rate Return (IRR) (%)**
Angola Offshore	1.32	16
Australia Offshore	1.57	20
Brazil Offshore	1.62	14
China Offshore	1.46	12
Indonesia Offshore	1.07	11
Kazakhstan offshore	1.17	13
Malaysia Offshore	0.93	7
Norway Offshore	1.04	12
UK Offshore	1.13	12

Note. Adapted from Agalliu, 2011, *Comparative Assessment of the Federal Oil and Gas Fiscal System: Final Report*, p. 101, U.S. Department of the Interior, Bureau of Ocean Energy Management, Herndon, VA. OCS Study.

The comparison in Table 1.1 was made for offshore oil producing countries including Malaysia. Other top oil-producing countries such as Saudi Arabia, Kuwait, Iran, and Iraq are mainly onshore basins, thus exempted from the comparison.

Moreover, in the few available studies on this subject, the methodology used in examining the impact of a petroleum fiscal regime on the investment climate in most cases was based on scenario analysis. For instance, Smith's literature survey (2012a) documented 24 studies and indicated that 15 used the scenario analysis as a methodology to understand the impact of country's petroleum fiscal framework on the investment climate. Consequently, Smith (2012a) and Smith (2013) suggested that scholars should continue to explore more methods and models to study the effects on the effect of petroleum taxation on investment. This call motivated the exploration of the survey methodology here to complement scenario analysis as Smith (2012a, 2013) suggested.

Nevertheless, in using the scenario approach for examining the effect of the petroleum fiscal regime on the investment climate, the available literature deals more with larger oil fields with only a few relating to marginal oil fields (Acheampong, 2010; Akhigbe, 2007; Kazikhanova, 2012). The fact is that most countries have different fiscal regimes for smaller fields than they do for larger fields; hence, the need exists for a study that focuses specifically on marginal oil fields. Moreover, these studies on marginal oil fields were not conducted in Malaysia, and, in fact, Akhigbe (2007) is a discussion paper which compared the marginal oil field fiscal regimes in Nigeria and the United Kingdom.

Another motivation of the study is that literature highlighted the potential moderating effect of an attractive petroleum fiscal regime on the investment climate of oil and gas fields (Artist, 2009). The fact is that taxes create investment distortions (Árnason, 2008; Liu, 2011). Interestingly, the proposal has been made that the effect of a country's tax policy on investor's cash flow may be moderated by the fiscal regime in place (Artist, 2009). In addition, studies on the relationship between tax incentives and investment have reported mixed finding. Some studies found that the relationship was positive and significant (Babatunde, 2012; Clark, 1999; Lim, 2001), while others found no effect (Lim, 1983; Ricupero, 2000). In line with theses mixed findings, Baron and Kenny (1986) proposed the use of a moderating variable. Indeed, the literature suggests that stability and simplicity of fiscal regime, which are indicators of attractive petroleum fiscal regime, will be more desirable to investors than generous tax rebates and incentives (Morisset, Pirnia, Allen, & Wells, 2000). Thus, the evidence presented above motivates the investigation into the moderating effect of an attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields.

1.3 Problem Statement

Significant volumes of Malaysia’s remaining oil-and-gas reserves lounge in marginal oil fields that hold about 580 million barrels of oil equivalents (BOE) with an average of 30 BOE per field (Bogdanich, Patten, Greenway, Maloney, & McLaren, 2013; Na, Zawawi, Liew, & Razak, 2012; Worldvest, 2013). These fields can be said to be commercially viable in terms of reserves as its hold 30 BOE per field compared to 20 BOE in Romania, Albania or Bulgaria (Akhigbe, 2007; Shirley, 2000). Likewise, in terms of production, it can also be considered viable as three marginal oil fields in Malaysia produces 30,000 BOE per day (US-Energy Information Administration, 2014), compared to 10 and 10,000 BOE per day in a marginal oil field in Texas and Indonesia respectively (Akhigbe, 2007; Shirley, 2000). However, most of the marginal oil fields in Malaysia are stranded, a situation that eventually leads to a decline in oil and gas production in Malaysia (Economic Transformation Program, 2010; Malaysia Petroleum Resources Corporation, 2014).

The reality is that despite the viability of Malaysian marginal oil fields in terms of reserve and production compared to other countries, Oil Majors[1] lack interest in them; they prefer investments in Malaysian larger oil fields that are considered more commercially viable (Faizli, 2012; TA Securities, 2014). In fact, some Oil Majors

[1] The international oil companies that have more expertise in oil and gas development such as Shell and ExxonMobil

that invested in marginal oil fields under the PSC regime have chosen to relinquish them to Petroliam Nasional Berhad (PETRONAS) due to a weak investment climate (Arulampalam, 2011). Unfortunately, the assertion has been made that, without the development of marginal oil fields, the country's oil and gas reserves will run out in the next 15 to 18 years (Abbas, 2011). Considering that oil and gas contribute 76% of Malaysia's energy needs (US-Energy Information Administration, 2013), failure to develop marginal oil fields will threaten the country's energy security.

Furthermore, a report on economic transformation program that outlined oil and gas as among the key economic areas in Malaysia disclosed that a total investment of about RM 101.3 billion of CAPEX was required in Malaysia to restore the decline in oil and gas production that has been falling by 1% to 2% annually (Economic Transformation Program, 2010). This decrease implies the need to investigate the extent to which investors' CAPEX performance improves in marginal oil fields subsector in Malaysia. In fact, it was asserted that analysis of the ways and means of increasing oil and gas production in Malaysia is the need of the hour (Islam, Jameel, Jumaat, Shirazi, & Salman, 2012).

Johnston (2006) said that countries with the desire to attract investment into their oil and gas industry should provide fiscal terms that offer a potential rate of return commensurate with the industry's associated risks. Consequently, to attract investment into marginal oil fields, Malaysia introduced tax incentives and changed the fields' fiscal arrangement from PSC to RSC in 2010. However, despite this effort, only 3 RSCs were signed for marginal oil fields from 2011 to 2013 (Lee, 2013), which increased to 6 in 2014 (Mas'ud, Manaf, & Saad, 2014). This was small compared to the 17 PSCs signed for larger fields from 2010 to 2012 (Ley, 2012). Furthermore, an international comparison of offshore petroleum fiscal systems rated Malaysia fifth lowest in terms of PI and fourth lowest in terms of investors' IRR (Agalliu, 2011). These indices also signify a relatively weak investment climate. Thus, the argument can be made that a low response by investors in utilizing smaller fields raises an important question about the investment climate for these fields.

Scenario approach based on oil and gas project's Net Cash Flow (NCF) is the most common approach use by Oil and Gas Companies (OGCs) in evaluating the viability of petroleum investment project (Nakhle, 2007). However, despite a relatively weak investment climate in Malaysian oil and gas fields that led to the introduction of new tax incentives and a change of fiscal arrangements for marginal oil fields, publicly available literature on the effect of this new fiscal regime is lacking. In addition, Smith (2012a, 2013) suggested exploring other methodologies apart from scenario analysis. Hence, this evidence suggests exploring the survey method to complement scenario analysis.

Moreover, the possible moderating effect of attractive petroleum fiscal regime in relationship between tax instruments and the investment climate was highlighted Bargaining Theory of Moran (1974). However, publicly available literature does not indicate that it has been investigated in Malaysia.

Therefore, examination of the extent to which the new fiscal regime improves the investment climate of marginal oil fields in Malaysia, the extent to which the investors' CAPEX performance improves under the new fiscal regime, the relationship between tax instruments and the investment climate of marginal oil fields, and the examination of moderating effect of attractive petroleum fiscal is to address practical, theoretical and methodological gaps identified in literature (Baron & Kenny, 1986; Blake & Roberts, 2006; Boadway & Keen, 2010; Clark, 1999; Kaiser, 2007; Lim, 1983; Nakhle, 2007; Otto *et al.*, 2006; Smith, 2012a, 2013).

1.4 Research Questions

Therefore, in alignment with the problem statement above, the following research questions were raised:

1. To what extent does the new fiscal regime improve the investment climate in Malaysian marginal oil fields?
2. To what extent do investors' CAPEX performances improve under the new fiscal regime?
3. Do tax instruments (types of profit-based taxes, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives) relate to the investment climate of marginal oil fields?
4. Does an attractive petroleum fiscal regime moderate the effect of tax instruments (types of profit-based taxes, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives) on the investment climate of marginal oil fields?

1.5 Research Objectives

In line with the above research questions, the study is designed to achieve the following research objectives. They are to:

1. Examine the extent to which the new fiscal regime improves the investment climate in Malaysian marginal oil fields;
2. Examine the extent to which investors' CAPEX performances improve under the new fiscal regime;
3. Examine the relationship between tax instruments (types of profit-based taxes, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives) and the investment climate of marginal oil fields; and
4. Examine the moderating effect of an attractive petroleum fiscal regime on the relationship between tax instruments (types of profit-based taxes, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives) and the investment climate of marginal oil fields.

1.6 Scope of the Study

Activities in global oil and gas industry are categorized into upstream, midstream and downstream (Wright & Gallun, 2008). Upstream activities cover prospecting, exploration, development, production, and decommissioning of oil and gas facilities. Midstream activities cover pipeline transportation and storage. While downstream is concerned with refining, petrochemicals operations, marketing, and distribution of oil and gas products. However, this study is concerned with upstream operations, and more specifically related to marginal oil fields, otherwise called small oil fields. A marginal oil field is described as a field not worth developing at a given time due to low income accruing from its output, but changing economic and technical conditions can render the field profitable (Svalheim, 2004). Change of economic condition refers to change in fiscal incentives and oil prices. For instance, in Malaysia the fiscal arrangement has been changed from PSC to RSC and new tax incentives were introduced, all with desire to render marginal oil fields more profitable. Hence, the study finds it important to focus on these fields to examine whether change of economic conditions render the fields more profitable as expected.

Why this study focuses on marginal oil fields? Malaysia held a total proved oil reserve of 4 billion barrels as at 2014 (US-Energy Information Administration, 2014). Significant of this reserve that is 580 million BOE is held in marginal oil fields containing an average of 30 BOE per field (Bogdanich, *et al.*, 2013; Na, *et al.*, 2012; Worldvest, 2013). As marginal oil fields constitute a significant part of Malaysian proved oil reserves, its development will enhance oil and gas production and increase oil and gas contribution to Gross Domestic Product (GDP) as well as government revenue. In addition, development of these fields will continue to serve as the basis for technology transfer because Malaysian government requires it that each marginal oil field should be developed jointly by local and foreign companies (Bogdanich, *et al.*, 2013).

Despite different fiscal regimes experienced is Malaysian oil and gas industry, the study only focused on the new fiscal regime for marginal oil fields (i.e. RSC) and immediate past fiscal regime prior to RSC (i.e. R/C factor PSC), for comparison in terms of investment climate and CAPEX performance. In terms of survey variables, it is limited to seven. These are five independent variables relating tax instruments (types of profit-based taxes, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives), one moderator (attractive petroleum fiscal regime), and one dependent variable (investment climate of marginal oil fields).

1.7 Significance of the Study

The study is significant in a number of ways. First, the oil and gas industry plays a significant role in the Malaysian economy. It contributes about 20% of its GDP (US-Energy Information Administration, 2013). The sector also contributes 40% of government revenue (Lee, 2013). It also contributes to the country's domestic energy supply; with oil providing about 39% and gas 37% of Malaysia's energy mix (US-Energy Information Administration, 2013). The importance of this sector has made it listed among the top priority area in the country's economic transformation program designed in 2010 (Economic Transformation Program, 2010). With the likely continuing decline in oil and gas production by 1% to 2% annually (Economic Transformation Program, 2010), the country will be concerned with any strategy efficient in improving the investment climate in its oil and gas industry, which eventually would increase the productivity of its remaining oil and gas reservoirs. Thus, development of marginal oil fields which constitute a significant part of Malaysian proved oil and gas reserve can further increase the country's GDP, government revenue, oil production as well as the energy security. Hence, this study would be beneficial to the Malaysian government in this regard.

Second, the study gives insights to policymakers in Malaysia on the relevant tax instruments that can improve the investment climate in its marginal oil fields. It also highlights the extent to which the new fiscal regime enhances the attractiveness of marginal oil fields in Malaysia. The study highlights the relevance and the scope for improvement in RSC as the current fiscal arrangement development of marginal oil fields in Malaysia.

Third, the study would benefit other countries that experience an increase in the number of marginal oil fields, especially those in which similarities exist between those countries and Malaysia. The study also offers insights to researchers in other countries who may consider an investigation into the effect of petroleum fiscal regime changes on the investment climate of marginal oil fields — particularly when such countries consider changes in their existing petroleum fiscal regimes.

Fourth, the study provides insights to prospective and existing marginal oil field investors both local and international on the effect of petroleum fiscal regime changes on the investment climate of marginal oil fields in Malaysia. At the same time, the study may benefit investors on what specific petroleum fiscal and tax instruments significantly affect the investment climate of marginal oil fields to enable an understanding of the likely areas for bargaining with the Malaysian government through its national oil company (NOC).

Fifth, the study will significantly benefit the academic environment both in Malaysia and globally. In terms of design, the survey methodology explored in the study adds to the existing literature on the investment climate, petroleum fiscal regimes, and tax instruments. Contextually, the study provides evidence from Malaysia regarding the impact of fiscal regime changes on the investment climate as well as the relationship between specific tax instruments and the marginal oil fields investment climate. The fact is that, despite the significance of Malaysia in global oil and gas arena, studies on its petroleum fiscal framework with respect to marginal oil fields are not publicly available.

Theoretically, even though the effect of tax instruments on the investment climate has been highlighted by the Theory of Economic Regulation and the Economic Rent Theory, empirical evidence that examines such effects is minimal. Thus, the study provides empirical evidence about those possible effects. In addition to the direct relationship, with the support of the Bargaining Theory, the study provides empirical evidence on the moderating effect of an attractive petroleum fiscal regime.

1.8 Organization of the Study

The study is organized into seven chapters. Each chapter is further subdivided into subheadings. The current chapter contains an introduction, motivations for choosing the area of study and problem statements. It also outlines the research questions and objectives. The chapter also discusses the significance and scope of the study.

Chapter Two discusses the oil and gas industry and the petroleum fiscal regime both in Malaysia and globally. The chapter also highlights the relevant government agencies responsible for improving the investment climate, designing, and administering petroleum fiscal regime and taxation in Malaysia.

Chapter Three reviews the available relevant literature on the investment climate, CAPEX performance, petroleum fiscal regimes, and tax instruments. Relevant underpinning theories including the Theory of Economic Regulation, Economic Rent Theory and Bargaining Theory are all reviewed. The linkage of these theories with the research variables is clearly discussed in the chapter.

Chapter Four discusses the conceptual framework of the research, which was formulated in line with relevant theories and literature. It is in alignment with this framework that hypotheses of the studies were developed.

Chapter Five discusses the methodology of the study. This includes the research design, population and sample selection, operational definitions and measurements of the constructs, and data analysis techniques.

Chapter Six presents the results, which were analyzed using scenario analysis, trend analysis, and Partial Least Square (PLS) path modeling.

Chapter Seven, which concludes the thesis, recapitulates and discusses the research findings in line with underpinning theories and prior literature. It also discusses the theoretical, methodological, and practical implications. The study's limitations and suggestions for future research are also discussed in this chapter.

CHAPTER TWO

OVERVIEW OF MALAYSIAN OIL AND GAS INDUSTRY AND PETROLEUM FISCAL REGIME

2.1 Introduction

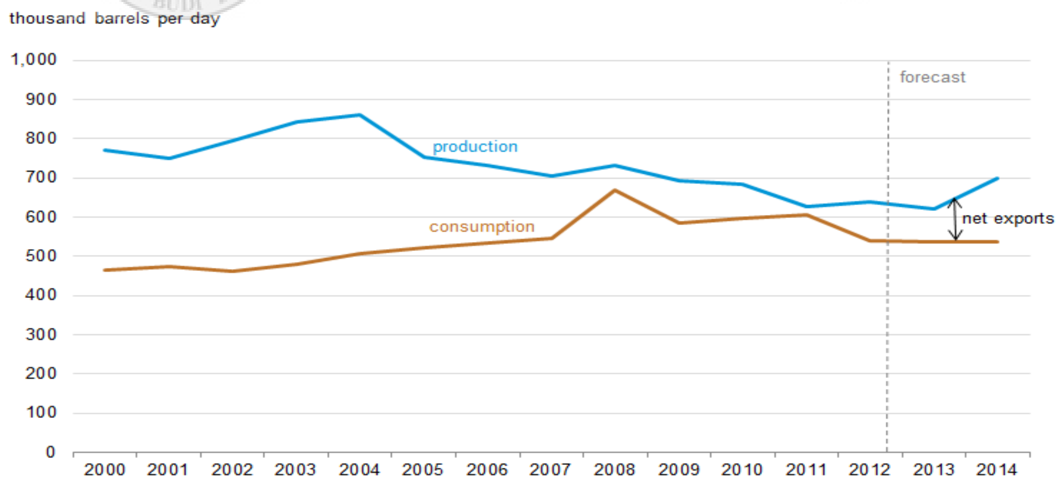
The chapter discusses the evolution of the oil and gas industry in Malaysia. The emergence of petroleum fiscal arrangements in Malaysia starting from concessionary systems of pre-1970s to the many versions of PSCs and finally to RSC introduced recently are all discussed. The discussion is also made in relation to various forms of tax instruments used in such fiscal arrangements. The chapter also discusses relevant agencies responsible for improving the investment climate and designing and administering the petroleum fiscal and taxation regimes in the Malaysian oil and gas industry.

2.2 Review of Malaysian Oil and Gas Industry

Malaysia is among the countries with oldest petroleum sector. Oil was first discovered in 1910 with the first oil well drilled in the same year at Canada Hill, Miri Sarawak (Shell, 2013). The oil production from the pioneer oil well was only 83 barrels per day, and the well has fondly become known as the Grand Old Lady (Bank Pembangunan, 2011). The Miri field produced approximately 80 million barrels of oil pre-World War II, with an average daily production of 15,000 barrels per day in 1929. Oil production drastically declined during the war due to scorched earth policies and bombings at that period (Bank Pembangunan, 2011). In fact, the war caused stoppage of oil and gas production in Malaysia in both Borneo and Peninsular Malaysia, which subsequently resumed in the 1950s (Bank Pembangunan, 2011).

In the 1960s, production activities in Borneo fields were remarkably expanded due to the discovery and development of oil in offshore fields in Sarawak. This offshore discovery was substantial, representing a new turning point for Shell's operations in Malaysia, as well as the country's oil and gas industry (Shell, 2013). Such discoveries opened the way for other oil companies such as Esso and Conoco who joined Malaysia for oil and gas activities (Bank Pembangunan, 2011). Moreover, oil and gas production was substantially increased to 100,000 barrels per day in 1974 and to more than 600,000 barrels in the 1990s (Economic Transformation Program, 2010).

Malaysia is among the top 30 oil producing countries in the world occupying 28th position in terms of oil production (Abdullah, 2012). The country has also been the second largest oil and natural gas producer in the Asia Pacific Region after Indonesia (US-Energy Information Administration, 2013). Figure 2.1 below depicts Malaysian oil and gas production, consumption and exports.

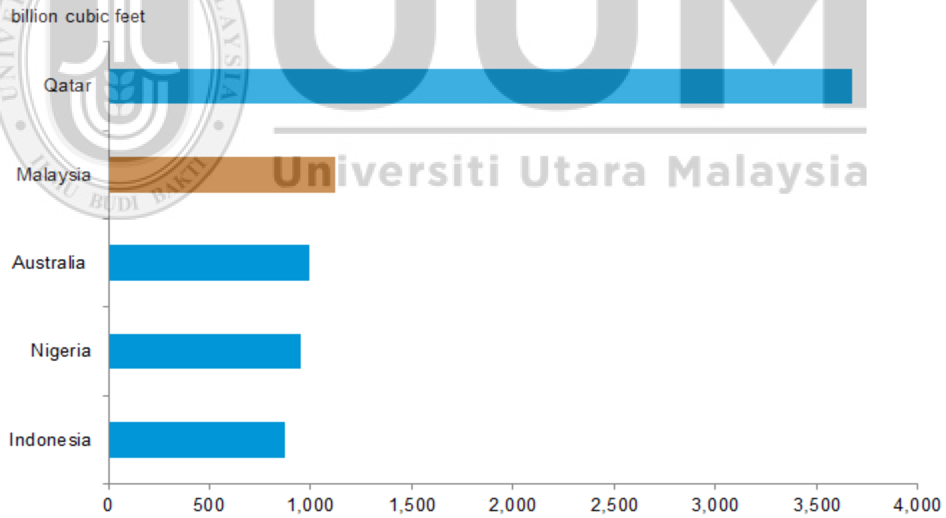


Note. Adopted from Energy Information Administration, 2013, *International Energy Statistics, Short Term Energy Outlook* US-. Retrieved from http://www.eia.gov/countries/cab.cfm?fips=MY

Figure 2.1
Malaysia Oil Production, Consumption and Export between 2000-2014.

Figure 2.1 above shows that oil production reached its all-time peak in 2004 with production exceeding 800,000 barrels per day. Nonetheless, the country has been a net exporter of oil as production exceeds the consumption level. The expectation was that exports would increase in subsequent years due to increased production resulting from changes in petroleum fiscal policies in the Malaysia oil and gas industry (US-Energy Information Administration, 2013).

In terms of natural gas exports, Malaysia is among the top five countries globally occupying the second position after Qatar. Figure 2.2 below shows the top five global Liquefied Natural Gas (LNG) exporters in the world.



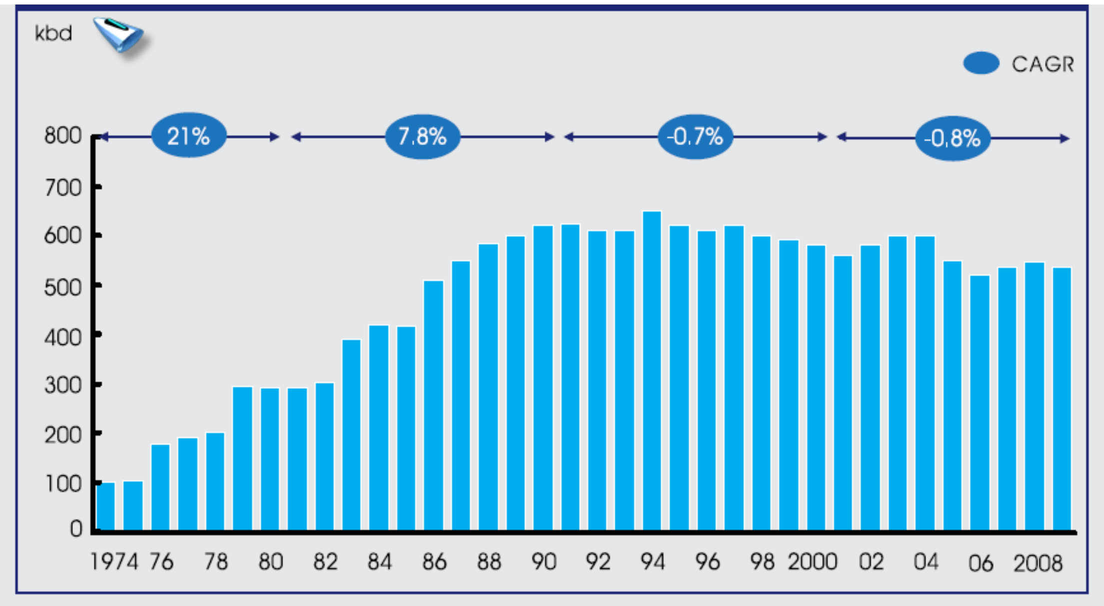
Note. Adopted US-Energy Information Administration, 2013, from *International Energy Statistics, Short Term Energy Outlook.* Retrieved from http://www.eia.gov/countries/cab.cfm?fips=MY

Figure 2.2
Top Five Countries in Global LNG Exports

In terms of reserves, Malaysia is also among the top 30 countries in the world holding about 4 billion barrels of oil in 2010. It is fifth in Asia in terms of oil, and third in terms of natural gas (US-Energy Information Administration, 2013). In terms of the energy mix, the domestic oil and gas industry provides almost 80% of Malaysian energy needs.

Oil and gas have been significant contributors to the Malaysian GDP. The contribution of the sector to GDP increased from an insignificant level in the 1970s to 16% in 2000, 20% in 2008 and 19% in 2009 (Economic Transformation Program, 2010). It rose to 20% in 2012, and the country's economic transformation program has projected that the contribution of the oil and gas sector to GDP would increase by 25% by 2020. The sector has also been a significant contributor to government revenue and annual budgets, playing a significant role in financing the country's five-year development plans and has been contributing about 40% of Malaysian annual budget (Lee, 2013). In fact, the sector has been identified among the Key Economic Areas in the country's Economic Transformation Program designed in 2010 (Economic Transformation Program, 2010).

However, available evidence from Economic Transformation Program (2010) and Malaysia Petroleum Resources Corporation (2014) showed that Malaysia has been experiencing a decline in oil production since the 1990s as shown in Figure 2.3 below.

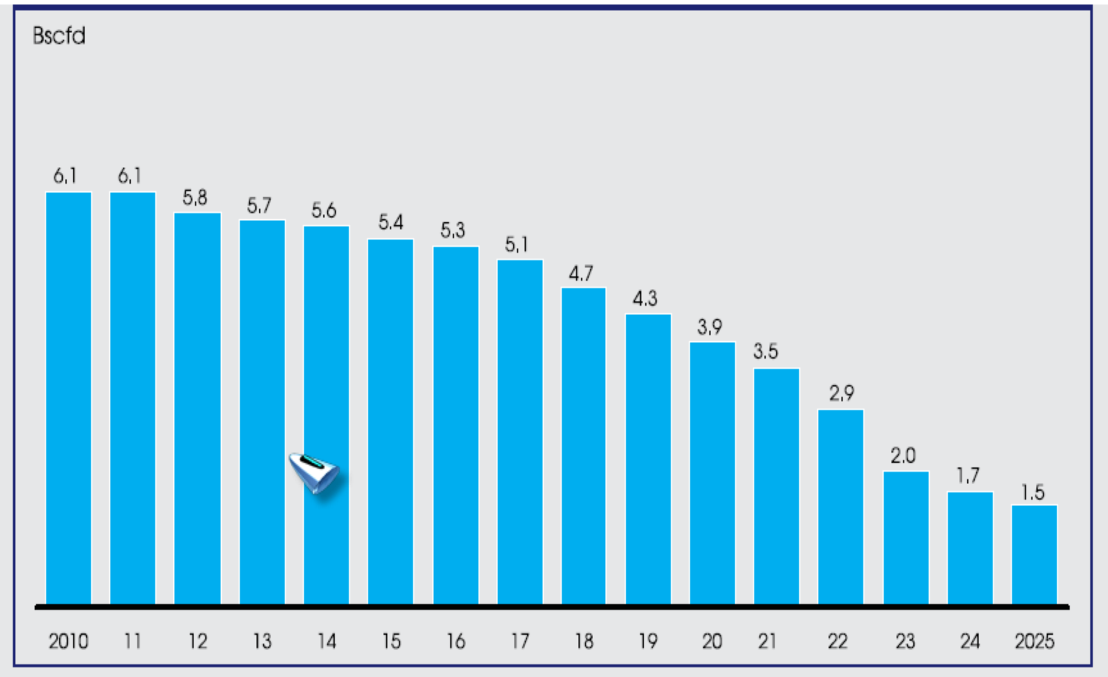


Note. Adopted from *Economic Transformation Program*, 2010, Chapter 6: Oil, Gas and Energy (p. 6).

Figure 2.3
Malaysia oil Production from 1974 to 2008.

The figure shows that oil production reached its peak some years back, and, experts have asserted that since 1990 it has been difficult for the country to sustain its production levels (Economic Transformation Program, 2010).

A similar challenge is being faced by the gas subsector, and current forecasts suggest that unless other projects came onboard, gas production in Malaysia would decline from its 2010 level based on existing projects. Figure 2.4 below shows the Malaysian gas production forecast for 2010-2025.



Note. Adopted from *Economic Transformation Program*, Chapter 6: Oil, Gas and Energy (p. 8).

Figure 2.4
Malaysia Gas Production Forecasts between 2010-2015

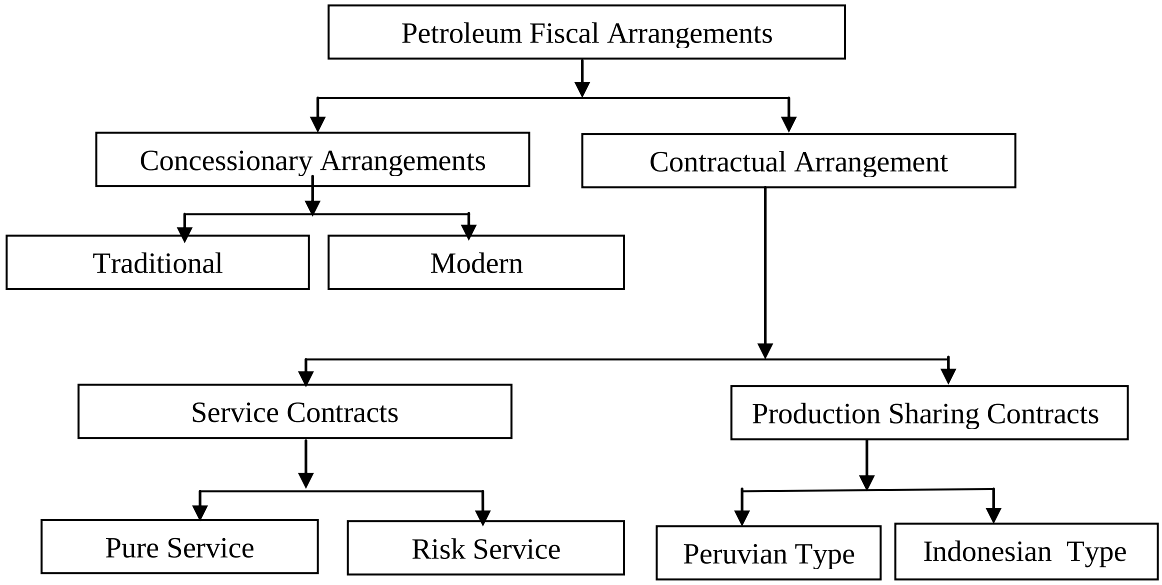
Figures 2.3 and 2.4 clearly show that Malaysia will continue to experience oil and gas production declines. This is among the challenges that influenced the country's decision to adjust its petroleum fiscal regime for marginal oil and gas fields with the aim of improving its investment climate, thereby attracting investors both locally and from abroad. Thus, objective one of this study investigates whether or not the new fiscal regime improves the investment climate of marginal oil fields.

2.3 Global Petroleum Fiscal Regime

A petroleum fiscal regime has been defined as a total sum imposed on an investor by a state based on the particular fiscal arrangement entered into between the parties as supported by the relevant legislation (Russell & Bertrand, 2012). Thus, fiscal regimes are designed by states with the aim of acquiring a fair share of wealth accruing from petroleum, and, at the same time, encouraging investors to make optimal exploration of those natural endowments (Ripley, 2011). Smith (2012a) posits that the performance of any fiscal arrangement system depends on three measures: (1) its ability to raise revenue for the host country and investor, (2) potential distortions to privates sector investment, and (3) the equitable allocation of risk between government and investors. Thus, a fiscal arrangement may impact the investment climate due to its revenue raising potentials, investment distortion and risk sharing.

The need to design an attractive petroleum fiscal regime that would improve the investment climate and attract investment into oil and gas sector has resulted in several different fiscal regimes in oil producing countries. In fact, the fiscal regimes globally are more than the number of countries having them (Kaiser & Pulsipher, 2004). The reasons for this are several. First, a country can have numerous versions of fiscal arrangements simultaneously. Second, each fiscal arrangement has its own fiscal provisions. Third, negotiation and renegotiation due to changing economic and political situations lead to the creation of different types of fiscal agreements.

However, despite numerous nuisances of fiscal regimes around the world, a regime typically falls into one of two fiscal arrangements. Figure 2.5 below shows these fiscal arrangements, which are classified into concessionary and contractual.



Note. Adapted from Johnston (2006), *How to Evaluate the Fiscal Terms of Oil Contracts* (p. 60). Initiative for Policy Dialogue Working Paper Series. Available at http://policydialogue.org/files/publications/Ch03.pdf

Figure 2.5
Classification of Petroleum Fiscal Regimes

2.3.1 Concessionary Arrangements

Concessionary arrangements, otherwise known as royalty/tax systems, are the oldest and principal form of fiscal arrangement in the world (Likosky, 2009). Prior to 1960s, a concessionary system was the only fiscal arrangement globally (Johnston, 2006). One of its features is that this system does not attach any financial obligations to the resource owner. Under a concessionary arrangement, countries that own resources grant a POC the exclusive rights to explore, develop, produce, and sell natural resources in the international market. Nakhle (2008) defined a concessionary system as a fiscal arrangement between a host country on one hand (as represented by NOC) and POCs on the other hand, whereby exclusive rights are granted to a POC to explore, develop, produce, distribute and sell hydrocarbon resources at its own risk and expenses within a determined area for an agreed period of time.

Recent developments in concessionary arrangements have led to its division into two classifications: traditional and modern concessionary systems. In traditional concessionary arrangements, the host country contracted POCs and granted them the right to extract petroleum resources. Upon commercial discovery, the POC had the right to develop and produce such petroleum resources (Johnston, 2006). Depending on the percentage of royalty and the mode of it payments, POCs take title to the production after the royalty payment. Where the royalty is paid in cash, POC takes title to 100% production. However, if the royalty is paid in oil, and assuming that the royalty is 10% of the production volume, POC takes title to 90% of the production. Ownership of exploration and development equipment normally belongs to the POC. In addition to royalty, the POC normally pays taxes on profit from the sale of the hydrocarbons. Apart from royalty and taxes, other benefits such as bonuses, domestic market obligations, and import and export duties are derived by the host country from such concessionary arrangements (Kyari, 2013).

The traditional concessionary arrangement has been criticized for several reasons. Typically, the arrangement is of long-term durations of 50 and up to 75 years, has weaker control by the host government, and benefits of production activities received by host country cover royalty and taxes only (Likosky, 2009). Other criticisms include extensive geographical coverage and a lack of financial compensation offered by investors to host countries. These criticisms are among the factors responsible for the emergence of modern concessionary systems, and, thereafter, contractual arrangements (Likosky, 2009).

With the modernization of concessionary arrangements and the intent by states to exert more control over their sovereign national resources such exclusive rights granted under traditional concessionary system have been narrowed to the wellhead level (Kyari, 2013; Likosky, 2009). Hackman (2009) stressed that modern concessions give state a room for participation through its NOC and places other obligations upon POCs. In addition to royalty and taxes, Hackman (2009) asserts that modern concessions allow flexibility for a host country to collect additional taxes in case of a resource windfall. However, modern concessionary arrangements also have problems such as licensing rounds, which require time and resources to hold and a lack of flexibility based on the location and characteristics of the exploration area compared to a contractual arrangement (Hackman, 2009). Table 2.1 below shows countries that practice concessionary arrangements.

Table 2.1
Illustration of Some Countries with Concessionary Arrangements

S/N	Country	Features of Concessionary Arrangements	Source
1	United Kingdom	Formal Structure established in 1975: – 12.5% Royalty on Gross Revenues – 70% Petroleum Income Tax (PIT) – 52% Company Income Tax (CIT) – Typical structure in Concessionary regimes – Various subsequent amendments. 3 major phases: – Abolition of Royalty in 1983 – Abolition of PIT in 1993 – Imposed 10% Supplementary charge in 2002	Nakhle and Howdon (2004)
2	Norway	Ordinary tax 28% supplemented with a special tax of 50% – Tax depreciation of CAPEX over 6 years – 30% uplift over four years to shield normal return from special tax	Osmundsen and Lovas (2009)
3	Malaysia	Prior to 1974 Malaysia practice concessionary system based: – Royalty of 10% – PIT of 38 – Later abolished in 1974 to give room for Production Sharing Contract	Lee, 2013
4	Ghana	– Royalty 4%-12.5%, – Carried interest 7.5%-15%, – Additional interest 3.75% and – Petroleum Taxes 35% – Windfall taxes to be determined based on excess of the investors predetermined rate of return	Hackman (2009). Amoako-Tuffour & Owusu-Ayim (2010)
5	Countries in the former Soviet Union	– Royalty rate varies by country – Petroleum Income Taxes- rate varies by country – Additional Tax charged on the excess of predetermined. Rate of Return (ROR) also varies by country	Johnston (2006)

2.3.2 Contractual Arrangements

As can be seen from Figure 2.5 above, contractual arrangements are divided into two groups. Each is further subdivided into two categories. The first group, which is the PSC, is subdivided into the Indonesian and Peruvian types. The second group, which is the Service Contract (SC), is divided into the Pure Service Contract and the Risk Service Contract.

2.3.2.1 Production Sharing Contract

The PSC was first introduced in 1966 by Indonesia (Fabrikant, 1975; Machmud, 2000). Pongsiri (2004) defined PSC as a contractual arrangement in which hydrocarbon resources are owned by the state, but a Foreign Oil Company (FOC) is contracted to provide technical and financial services for exploration and development operations. The FOC usually assumes the entire exploration risk and receives a specified share of production as a compensation for its technical and financial commitments in the operation. Johnston (1994) pointed out that in its original Indonesian form, the PSC had the following features:

- The State maintains the title of its hydrocarbon resources;
- A state-owned NOC maintains management control of the contract;
- The FOC, as a contractor, submits the work program and budget for State approval;
- The whole risk of the program is borne by the investor;
- A royalty is paid to the host government;
- Cost Recovery is limited to 40%;

- Profit Oil – that which remains after the royalty and the cost oil is split into 65%:35% in favor of the NOC;
- Tax is paid on profit oil (FOC paid tax on it profit oil through the NOC);
- Any property purchased for the project remains the property of the NOC; and
- The entitlement of the FOC equals the cost oil plus profit oil (net of tax).

A PSC has three main components: (1) royalty oil, (2) cost oil and (3) profit oil. Royalty is paid normally on gross production at a specified percentage or based on sliding scale percentage. For a PSC in Malaysia, royalty is charged at the rate of 10% on gross production (Agalliu, 2011), but in other countries' PSC such royalties are charged on sliding scale based on water depth or oil price (Isehunwa & Uzoalor, 2011).

The second component is cost oil. Cost oil refers to the recovery of cost incurred by the FOC during exploration and development stages. Some countries cost oil has a recovery limit for each year as a percentage of annual production while other have not (Oldianosen, 2004). The essence of such a limit is to allow the host government to earn some revenue out of the production proceeds at the early stage of the production. Malaysia has varying cost recovery limits depending on the type of arrangement.

The third component is profit oil. This is the balance of gross production after deducting royalties and cost oil. Profit oil is split between the host government and the FOC. However, the FOC pays the tax out of its share of profit oil to the government. Therefore, under this classification system, the host country has four sources of revenue in a PSC. These are a royalty paid on the gross production, the share of cost oil (when host government participates in the development stage), the share of profit oil, and taxes paid by FOC on its profit oil. Table 2.2 below shows how gross production at USD50 a barrel is shared among the parties.

Table 2.2
Illustration for Sharing of Gross Production under PSC

Gross Revenue $50/barrel	**Government**	**FOC**
Royalty at 10% of $50	$5	-
Cost recovery at 60% of ($50-$5)	-	$27
Profit at 50:50 of ($50-$5-$27)	$9	$9
Tax to government at 40% of $9 (POC profit)	$3.6	$(3.6)
Total	$17.6	%32.4
Percentage	35.2%	64.8%

Note. Adapted from Johnston (2006), *How to Evaluate the Fiscal Terms of Oil Contracts* (p. 66). Initiative for Policy Dialogue Working Paper Series. Available at http://policydialogue.org /files/publications /Ch03.pdf

As shown in Figure 2.5 above, a PSC is of two types, Indonesian and Peruvian. In the Indonesian model of PSC, the FOC pays a royalty to government and tax based on its share of profit oil. Machmud (2000) reviewed the history of the Indonesian model of PSC and revealed that the model yielded significant results in its first ten years after inception. The investment climate was astonishing in Indonesia with many FOCs seeing the country as their target investment destination. The model has been favorable to the government as it confers more control to the country over its non-renewable resources compared to the concessionary arrangement. The system was also viewed as been favorable to the FOCs as well, because it guaranteed a share of oil based on production, and a reasonable control of the oil field. In the mid-1970s, the PSC was recognized as the leading framework for cooperation between FOCs and host oil producing countries. However, due to a change in the investment climate in Indonesia, the model has not been favorable to foreign investors (Machmud, 2000).

The Indonesian PSC model has been copied by many countries including Indonesia's neighbors such as Malaysia (Machmud, 2000). Apart from neighboring countries, other countries like Egypt and Nigeria have imitated the Indonesian PSC model with little modification (Johnston, 1994b). Egypt, for instance, introduced PSC in its oil and gas industry in 1973 (Choucri, Heye, & Lynch, 1990). The only difference between the Egyptian model and the pioneering Indonesian model was that, in the Egyptian model royalty and taxes are paid by the Egyptian National Oil Company out of its share of profit oil to the government (Johnston, 1994b). This is different from the Indonesian model in which the royalty is paid from the gross production, and tax is paid by the FOC on its share of profit oil.

In the case of Peru, the PSC was introduced in its hydrocarbon sector in 1971, 1978 and 1980 (Johnston, 1994b). In the Peruvian model, the FOCs take a 40% to 50% share depending on the risks assessment, and no royalty provision exists. Taxes are paid at the rate of 40% of gross income or 68.5% of net income (Johnston, 1994b). However, due to problems experienced resulting from US tax changes announced by the IRS and the fact that most of the FOCs operating in Peru are US companies, the Peruvian government passed legislation in 1980 for the tax to be charged on net revenue (Bindemann, 1999; Johnston, 1994b).

2.3.2.2 Service Contract

Service Contracts are forms of agreement in which an FOC is contracted as a service provider to explore, develop and produce oil at its own cost; the project ownership remains with the NOC and, upon commercial discovery, the contractor will be reimbursed through payments from oil and gas production proceeds together with a fee based on an agreed upon rate (Johnston, 2006). Unlike the PSC, the SC is not commonly practiced (Johnston, 2006). Ghandi and Lin (2013) asserted that, apart from the two main classifications of SC, countries have created many different versions based on their needs and negotiations with FOCs. Table 2.3 below shows the most known countries that practice SC (Ghandi & Lin, 2013; Ghandi & Lin, 2014).

Table 2.3
Illustration of Countries with Service Contracts

Country	**Nature of the Service Contract**		
Iran	Buy-Back Service Contract First Generation (Signed 1995)	Buy-Back Service contract second generation (announced 2004)	Buy-Back Service Contract Third Generation (Signed 2009)
Kuwait	Service contract (Signed 1992)	Operating Service Contract (Announced 1999)	Enhanced Technical Service Agreement (Signed, 2010)
Venezuela	Operational Service Agreement (First Round Auction 1991)	Operational Service Agreements (Second Round Auction)	Operational Service Agreements (Third Round Auction 1997)
Mexico	Multiple Service Contract (Announced 2001)	Incentive-based Multiple Service Contract (Announced 2009)	Incentive-based the Multiple Service Contract (Second Round Auction Announced 2012)
Bolivia	Operation Contract (First Announced in 2006)		

Table 2.3 Cont.

Country	Nature of the Service Contract		
Ecuador	Service Contract (Announced 2007)	Incremental Production Contract (Signed 2012)	
Iraq	Producing Field Technical Service (2009)	Development and Production Technical Service Contract (2009)	Third (2010) and Fourth (May 2012) Rounds Auctioning Technical Service

Note. Adopted from Ghandi & Lin, 2014, Oil and gas service contracts around the world: A review. *Energy Strategy Reviews*, *3*, 63-71.

Despite the many forms of SC, some features are common to them (Bogdanich, *et al.*, 2013). These features are:

- The POC develops, operates, and maintains the fields, while the NOC retains the ownership and control of the reserves.
- Upfront capital investment and initial cost are contributed by the POC, which would be reimbursed at an agreed point in time normally after the first oil.
- The POC receives a remuneration fee; this in most instances is paid in oil, not in cash, and the fee in many instances is based on the performance.
- The POC normally pay tax based on the fee received.
- The responsibility for decommissioning of oil and gas installation normally belongs to the Government or its NOC.

As contained in Figure 2.5 above, an SC is of two types: Pure Service Contract and Risk Service Contract (RSC). Where the remuneration of the service provider is based on a flat fee not attached to profitability, such a service contract is said to be a pure service contract. However, if the payment is based on profit, the service contract is said to be a risk service contract (Johnston, 2006).

A pure service contract is clearer than its counterpart; in this type of contract, the POC is hired to perform a service for a fee and would be compensated whether a commercial discovery is made or not; the entire risk of the operation belongs to the government not the POC (Omorogbe, 1997; Smith, 1991).

Contrarily, Omorogbe (1997) and Smith (1991) describe the RSC as an agreement whereby the host government invites a POC that is willing to bear exploration risks in which two situations may emerge: either a commercial discovery is made or it is not. Where a commercial discovery is made, the POC recovers its capital and operational costs and is remunerated for the services rendered. However, in a situation in which the discovery is not of commercial quantity, the company will also recover its costs from the host government but will forfeit the service fee (Faizli, 2012). This is the form of RSC the Malaysian government introduced recently.

2.3.3 Comparison of Global Fiscal Arrangements

Despite the dichotomy in fiscal systems around the world, in many instances it shares certain similarities. Table 2.4 below compares the major fiscal arrangements.

Table 2.4
Comparison of Similarities and Dissimilarities of Petroleum Fiscal Arrangements

Fiscal Arrangement	**Concessionary**	**PSCs**	**SCs- Risks Service and Pure Service**
Global frequency (%)	44%	48%	8% [10%][2]
Type of Project	All types: Exploration, Development and EOR	All types: Exploration, Development, and EOR	All types but often non-exploration
Ownership of facilities	POC	Government – NOC	Government-NOC
Facilities Title Transfer	No transfer	When landed" or upon commissioning	When landed" or upon commissioning
POC Ownership of Hydrocarbons	Gross production less royalty oil	Cost oil + profit oil	None
Hydrocarbon Title Transfer	At the wellhead	Delivery Point, Fiscalization Point or Export Point	None
Financial Obligation Contractor 100%	Contractor 100%	Contractor 100%	Contractor 100%
Government Participation	Yes but not common	Yes, common	Yes, very common
Cost Recovery Limit	No	Usually	Sometimes
Government Control	Low Typically	High	High
POC Lifting Entitlement	Typically around 90%	Usually from 50-60%	None (by definition)
POC Control	High	Low to Moderate	Low

Note. Adapted from Johnston (2006), How to Evaluate the Fiscal Terms of Oil Contracts (p. 73). *Ini*tiative for Policy Dialogue Working Paper Series.

[2] The global frequency of concessionary system and PSC become 90%, while SC 10% as at 2015(Johnston & Johnston, 2015).

Table 2.4 above shows that among the three categories, the PSC has been the most common petroleum fiscal arrangement comprising 48% of global fiscal arrangements, followed by the concessionary system with 44% and lastly the SC with 8%. Recently, in 2015 the global frequency are 90% for concessionary systems and PSCs while 10% for SC (Johnston & Johnston, 2015). The three fiscal arrangements have some similarities in terms of project types, contractor obligations, and government participation. At the same time, dissimilarities exist in many aspects of these arrangements such as facilities transfer, ownership of hydrocarbons, title transfer, cost recovery limits, lifting entitlements, and IOC control.

2.4 Petroleum Fiscal Arrangement in Malaysia

Like many oil-producing countries, Malaysia has been adjusting its petroleum fiscal regime since the promulgation of the Petroleum Development Act 1974. The reasons for these adjustments were connected with the country's desire to improve the investment climate of its oil and gas fields. The motive is to increase the investment appetite of both domestic and foreign investors. Figure 2.6 below presents the fiscal framework developments in Malaysian oil and gas industry.

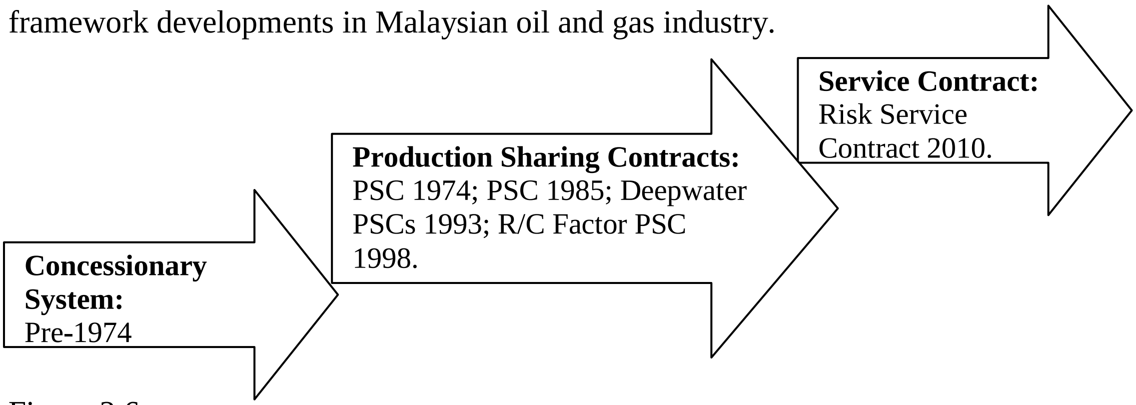


Figure 2.6
Changing Petroleum Fiscal Frameworks in Malaysian Oil and Gas Industry

2.4.1 Concessionary Arrangement in Malaysia

Similar to other oil producing countries, concessionary arrangements have been the oldest form of petroleum fiscal arrangements in the Malaysian oil and gas industry. In the 1960s, the Shell Oil Company became the first entity been awarded concessionary contracts when Malaysian oil and gas discovery was remarkably increased by the discovery of offshore fields in Sarawak and Sabah at that period. Soon other FOCs arrived in Malaysia for concessionary arrangements; these included Elf, Aquitaine, Oceanic and Telseki (Mehden & Troner, 2007). By the late 1960s, still more oil companies turned to Malaysia for concessionary arrangements to explore oil and gas resources. These oil companies were Conoco and Esso who were awarded the concessionary contracts to extract oil and gas off the east coast of Peninsular Malaysia (Bank Pembangunan, 2011; Mehden & Troner, 2007).

The tax instruments during the concessionary regime were known to be royalty/taxes. These royalty and taxes are charged by the state governments on whose land oil and gas were discovered (Lee, 2013; Razalli, 2005). The concessionary arrangements were governed by mining enactments of states that possessed oil and gas resources. In Malaysia, concessionary arrangements were like leasing agreements; they gave an oil and gas company the exclusive right to mine oil in a given area, thereby transferring the ownership of oil and gas to the lease-holder by states or landowners at the wellhead (Lee, 2013).

The promulgation of the Petroleum Development Act 1974 transferred the control of oil and gas resources from states to PETRONAS (Razalli, 2005). As noted earlier, individual states had awarded concessionary rights to FOCs; however, with the shift of control over oil and gas resources from individual States to PETRONAS, the national oil company of Malaysia, concessionary arrangements were replaced by PSCs beginning in 1974 (Lee, 2013).

2.4.2 Production Sharing Contracts in Malaysia

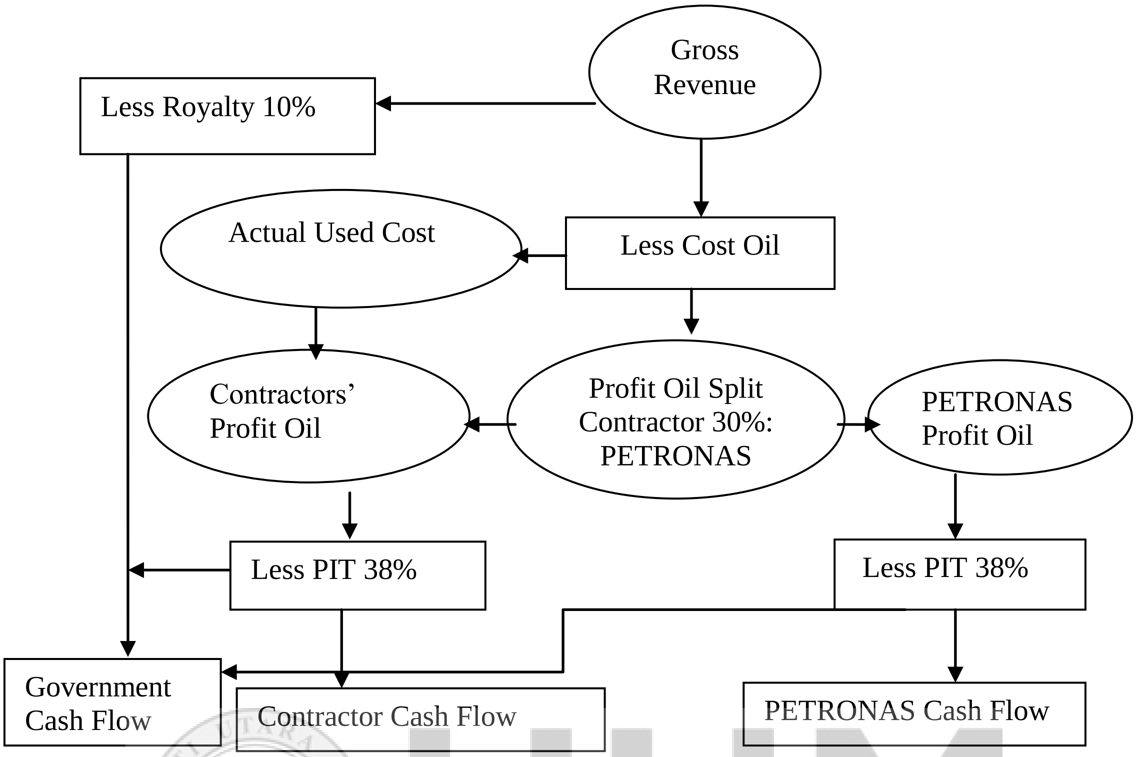
The PSC emerged in Malaysian oil and gas industry in the 1970s after the promulgation of the Petroleum Development Act (1974). Several rationales existed for the introduction of the PSC into Malaysia hydrocarbon sector. These included exercising control over the nation's sovereign natural resources, which hitherto belonged to FOCs under the concessionary system (Mehden & Troner, 2007). Another reason for PSC's introduction was the success of the arrangement in neighboring Indonesia (Pongsiri, 2004).

In Malaysia, Lee (2013) noted that a typical PSC stipulates the followings terms, among others:

- The contract duration in years, broken down into exploration, development, and production periods;
- Commencement of production;
- State participation;
- Cost recovery (cost oil) and cost recovery ceiling;
- Division of profits (profit oil);

- Financial obligations such as royalties (10%; shared equally between State and Federal Governments), taxes 38% of chargeable profit, and export duties (10%);
- Research Levy (0.5%);
- Abandonment obligations;
- Participation interests;
- Obligations of parties;
- Possibility of extension for recovery beyond the production period;
- Oil sale rights; and
- Supplementary payments by ratio.

The first PSC was introduced in 1976 after the transfer of the control of oil and gas resources from the states to PETRONAS in 1975 (Lee, 2013; Razalli, 2005). Figure below 2.7 below presents the flowchart of a Malaysian PSC of 1976.



Note. Adapted from COOP, 2004, *Overview of Malaysian PSC.* Retrieved from http://www.ccop.or.th/ppm/document/CAWS4/MalaysianPSC.pdf.

Figure 2.7
Flowchart of Malaysia Fiscal Regime 1976

Figure 2.7 above shows the major components of the Malaysian 1976 PSC. The flowchart depicts cash flow to the government, contractors and PETRONAS. Thus, the features of 1976 PSC as outlined by Coordinating Committee on Geosciences Program-CCOP (2004) contained in Figure 2.7 comprise 10% royalty, 20% cost oil, and 70% profit oil. The profit oil splits 70:30 in favor of PETRONAS. Both PETRONAS and an investor pay a Petroleum Income Tax of 38% to the government.

Lee (2013) asserted that the Malaysian petroleum fiscal regime of 1976 under the PSC arrangement was considered very stringent in terms of cost oil and profit oil splits compared to Indonesian and Philippine PSCs. The cost oil ceilings of 20% and a 70:30 profit oil split in favor of PETRONAS are features that might have made the fiscal regime under Malaysian PSC unattractive, making the investment climate unfavorable to investors, eventually leading Elf Aquitaine Oil to pull out of Malaysia (Gale, 1981; Lee, 2013). However, other oil companies such as Shell and Conoco still signed PSCs contracts with PETRONAS in 1976 (Lee, 2013).

Having faced criticisms about the stringent nature of 1976 PSC, especially on cost oil ceiling and profit oil splits, which had made the investment climate less favorable, the Malaysian government adjusted its fiscal regime under the PSC in 1985. The main differences were that profit oil splits changed to a sliding scale, and an adjustment was made for the cost oil ceiling, but the royalty and tax rates remained at 10% and 38% respectively (Coordinating Committe of Geosciences Programm, 2004). Cost oil increased to 50% of gross revenue from 20% earlier, while profit oil split was on a sliding scale based on barrels of oil produced per day. The split begins with a ratio of 50:50 when oil/gas production was 10,000 barrels per day. Then, the split moved to the next 10,000 barrels where profits were divided 40:60 in favor of PETRONAS. Lastly when oil production exceeded 20,000 barrels per day, profit oil was split into a ratio of 30:70 in favour of PETRONAS. Moreover, the adjustment was also made in relationship to the cost oil/gas ceiling from a uniform rate of 20% in 1976 to 50% for oil and 60% for gas in 1985.

With a continued desire to improve the investment climate and encourage investment into deepwater, in 1993 Malaysia designed a fiscal regime for deepwater oil fields (Layungasri, 2010). The reason for these fiscal changes, apart from improving the investment climate, was the fact that Malaysian oil and gas reserves are in deepwater offshore (Lee, 2013). This fiscal design for deep-water exploration and production attracted oil companies like Total and Murphy (Lee, 2013). There are two types of deepwater PSCs in Malaysia depending on the water depth. The first deepwater PSC covers 200-1,000 meters water depth and the second covers water depth greater than 1,000 meters. The two major features that differentiate deepwater PSC from 1985 PSC are (1) the recognition of water depth limits and (2) an increase in the duration of PSC terms (Layungasri, 2010).

Fiscal changes in deepwater PSCs include cost oil, which increased from 50% in 1985 to 70% in 1993 for oil and remained at 60% for natural gas. Profit oil splits remained on sliding scale, but changed from the first ratio of 50:50 when oil production was 10,000 barrels per day to a new ratio of 30:70 in favor of a contractor when oil production was 50,000 barrels per day. For an ultra-deepwater project, the cost oil increased from 50% in 1985 to 75% in 1993 for oil but gas terms remained 60% for both periods. Moreover, profit oil splits remained in a ratio of 60:40 in favor of a contractor when gas production was less than 21 Trillion Cubic Feet (TCF), and 40:60 in favor of PETRONAS when production exceeded 21 TCF in all the three cases. That is the 1985 PSC, the deepwater PSC, and the ultra-deepwater PSC.

In 1997, with a view to improving the investment climate in its oil and gas industry, Malaysia introduced the R/C factor PSC with an effective implementation date of 1998 (Putrohari, Kasyanto, Suryanto, & Rashid, 2007). The fiscal regime under R/C factor PSC was designed to improve the investment climate of oil fields as it enables contractors to recover capital invested during the early stage of project productivity. R/C factor PSC gives an investor a greater cost oil ceiling starting from 70% when R/C factor is 0-1.0. As the R/C factor increases, a contractor's cost oil ceiling reduces. A similar approach is also applied to profit oil splits (Putrohari *et al.*, 2007). However, the R/C factor PSC gives PETRONAS a high share of both cost oil and profit oil as production increases. Another issue brought by Malaysia R/C PSC is the participating interest by PETRONAS in development and production activities at the rate of 20% (Putrohari *et al.*, 2007). The issue of participation interest did not exist in either the 1976 PSC or the 1985 PSC.

Unlike the PSCs of 1976, 1985 and 1993, the R/C PSC of 1998 has cost recovery for PETRONAS based on its participating interest. The R/C Factor Table for both cost oil ceiling and profit oil splits are presented in Table 2.5 below.

Table 2.5
R/C factor for Malaysian 1998 PSC

Contractor's R/C Ratio	**Cost Oil**	**Profit Oil**	
	Cost Oil Ceiling	**Unused Cost Oil PETRONAS: Contractor**	**Profit Oil PETRONAS: Contractor**
0.0 < R/C ≤1.0	70%	N.A	20:80
1.0 < R/C ≤ 1.4	60%	20:80	30:70
1.4 < R/C ≤ 2.0	50%	30:70	40:60
2.0 < R/C ≤ 2.5	30%	40:60	50:50
2.5 < R/C≤ 3.0	30%	50:50	60:40
R/C > 3.0	30%	60:40	30:70

Note. Adapted from CCOP, 2004), *Overview of Malaysian PSC*. Retrieved from http://www.ccop.or.th/ppm/document/CAWS4/MalaysianPSC.pdf.

Table 2.5 above shows that the cost oil ceiling and profit oil which are based on R/C factor favored contractor at an early stage of the project with subsequent reductions as the R/C factor increases.

The above review shows that the Malaysian oil and gas industry has experienced a series of fiscal regime changes aimed at improving the investment climate. It is also evident that the PSC has remained the dominant operating arrangement in the Malaysian oil and gas industry. It is estimated that, pre-1998, only five PSCs existed. However, with the improvement of fiscal terms, especially with the introduction of new fiscal regimes aimed at improving the investment climate, the number of PSCs increased to 83 by 2012 (Lee, 2013). More recently in December 2013, PETRONAS celebrated 100 active PSCs (Zainul, 2013). In the three years alone from 2010-2012 about 17 PSCs were signed (Ley, 2012). Table 2.6 below shows the PSCs signed between 2010 and 2012.

Table 2.6
New PSC Signed From 2010 to 2012

Block	**Area**	**No. of PSCs**	**Year Signed**		
			2010	**2011**	**2012**
Shallow Water	Peninsular Malaysia	6	1	3	2
	Sarawak	7	2	3	2
	Sabah	-	-	-	-
Deep Water	Peninsular Malaysia	-	-	-	-
	Sarawak	1	-	-	1
	Sabah	3	1	-	2

Note. Adapted from Ley, 2012, Member Country Report of Malaysia. *Proceedings of the 48th CCOP Annual Session, PART I* (pp. 176-191). Coordinating Committee of Geosciences Program in East and Southeast Asia, Langkawi, Malaysia, 5-8 November.

The deduction can be made from Table 2.6 that 17 PSCs were signed during the period of 2010 to 2012, of which 13 were shallow water and four were deepwater. In the case of shallow water, Sarawak shallow water took the largest share with seven PSCs, six for Peninsular Malaysia and zero for Sabah. In the case of deepwater PSCs, Sabah had three, Sarawak had one, and Peninsular Malaysia had zero.

While many PSCs were signed within a few years as discussed above, the arrangement was described as not encouraging the development of marginal oil fields (Abbas, 2011). Big oil companies such as Shell and ExxonMobil have not been keen to develop marginal oil fields under the PSC arrangement (Abbas, 2011). In fact, some of the big oil companies have chosen to relinquish the marginal oil fields that been operated under a PSC arrangement to PETRONAS (Abbas, 2011). Thus, the RSC arrangement was introduced into Malaysian oil and gas industry.

2.4.3 Risk Service Contract in Malaysia

As noted in Figure 2.5, there are two types of SC: (1) Pure Service Contract and (2) Risk Service Contract. However, Malaysia introduced only the Risk Service Contract. This type of contract emerged in its oil and gas industry in November, 2010 leading to the amendment of Petroleum Development Act in 2011(Wei, 2011). The aim of this newest regime was to improve the investment climate for the growing number of marginal oil fields. In Malaysia, RSC has been defined as:

> A contract between the host country and contractors where the host country is the project owner and the contractors will recover the development cost and are paid a fixed fee for services rendered, based on their performance, relative to the development execution and subsequent production. (PETRONAS, 2011, p. 91)..

A review of various sources such as Bogdanich *et al.* (2013), Coastal Energy (2012), Lacouture (2013a), Lee (2013) and Worldvest (2013) revealed the following as common features of the Malaysian RSC model:

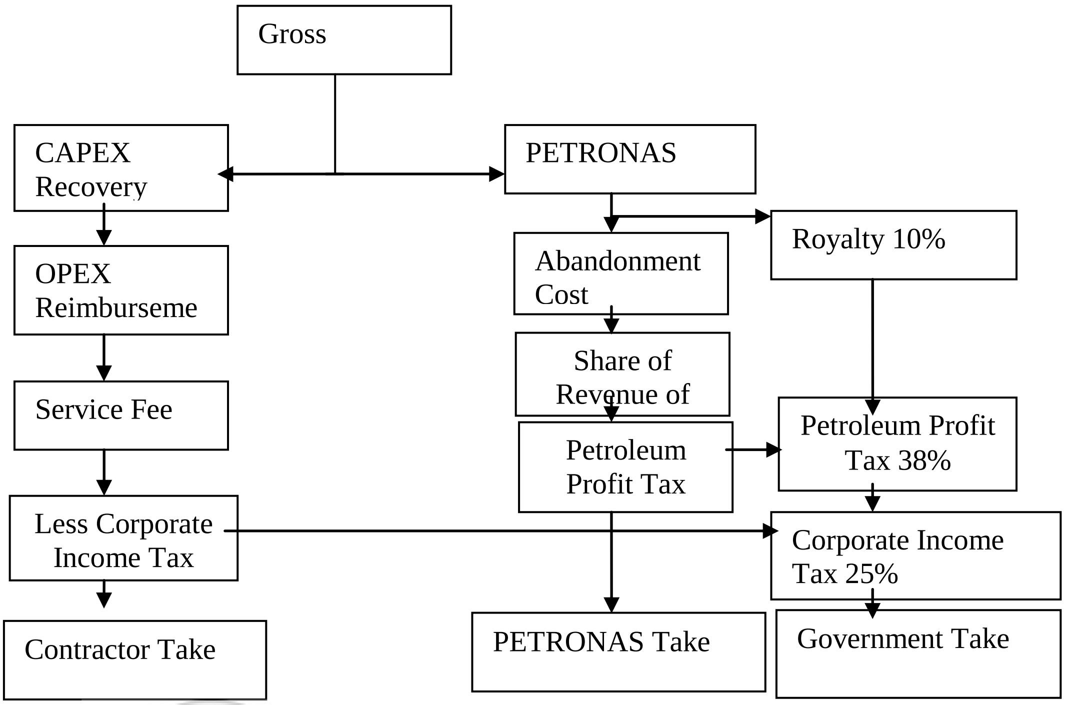
- The contractor develops and produces oil and gas from the awarded fields, while reserves discovered belong to PETRONAS. By implication, the contractor cannot book the reserve in its annual report.
- The contractor incurs all the CAPEX and OPEX, but is reimbursed when production commences at an agreed cost oil ceiling of 70% (capital cost recovery is limited to 120% of the estimated contractor's bid).
- Any unrecovered cost at the end of the field's life or contract duration would be reimbursed.
- The contractor receipt per barrel fee of 10% for the service rendered up to an agreed upon the ceiling, which is contingent on reaching certain production levels based on the target date and attaining a certain rate of production per day.
- The fee is subject to taxation based on a corporate tax rate of 25%, not the petroleum profit tax rate of 38% as applied to larger fields.
- The royalty is 10% and is paid by PETRONAS, not the Contractor.
- IRR ranges from 7%-20% subject to terms and conditions.
- The contractor is not required to pay the research recess fee of 0.5% as being paid under PSC.
- The decommissioning and dismantlement of the oil and gas facilities after the closure of the fields remains the responsibility of PETRONAS.

- Each FOC that secured the service contract must join a local partner listed in Bursa Malaysia. At least 30% equity ownership in the venture must belong to the local player for FOC to qualify for the award of an RSC.

The purpose of this fiscal swap for marginal oil fields from PSC to RSC for marginal oil fields is to improve their investment climate. In addition, new tax incentives were introduced to increase the investment appetite of OGC. These tax incentives as Wei (2011) outlined included the following.

- A reduction of the tax rate from 38% to 25% to enhance the commercial viability of marginal oil fields in Malaysia.
- The Capital Allowance has been accelerated from 10 to 5 years for marginal oil field development.
- The 10% export duty paid under PSC is waived on oil produced and exported from marginal oil fields under the RSC arrangement.
- An investment tax allowance of 60%-100% on CAPEX to be deductible against statutory income to encourage capital-intensive development.
- The Qualifying Exploration Expenditure is transferable between non-contiguous petroleum agreements with the same partnership or sole proprietor to enhance the contractors' risk appetite and encourage higher exploration activity.

The schematic presentation of the fiscal regime under RSC in the form of a flowchart is presented in Figure 2.8 below as Gerber (2012) designed.



Note: Adapted from Gerber, 2012, *Delivering strategy, performance and growth*: *Roc Oil Company Overview*, p. 27.

Figure 2.8

Flowchart of Malaysian Marginal Oil Fields Risk Service Contract

Figure 2.8 above shows that revenue flows to three parties: the contractor, PETRONAS and the government. PETRONAS pays a royalty from its share of gross revenue. The contractor a pays corporate income tax at the rate of 25% while PETRONAS pays a petroleum profit tax at the rate of 38%. The abandonment cost, which was hitherto the responsibility of the contractor, is now the responsibility of PETRONAS. These fiscal changes were made to attract investors as depicted in Table 2.7 and improve the investment climate of marginal oil fields.

Table 2.7
Summary of RSC Awards

Marginal Oil Field	Location	Operators	Award Date
Berantai Offshore Gas Field	Terengganu	UK-based Petrofac and SapuraKencana Petroleum	January 2011
Balai Cluster Offshore Fields	Sarawak	Roc Oil Co.; Dialog D&P Sdn. Bhd.; and PETRONAS Carigali Sdn.	August 2011
Kapal, Banang and Meranti (KBM) Cluster	Peninsular Malaysia	Coastal Energy Resources Company and PETRONAS Carigali Sdn. Bhd	June 2012
Tembikai-Chenang Cluster	Peninsular Malaysia	VSETIGO Petroleum Sdn Bhd	October 2013
Tanjong Baram Field	Sarawak	EQ Petroleum Development Sdn Bhd and Uzmah EnergyVenture Sdn Bhd	March 2014
Ophir Field	Peninsular Malaysia	Ophir Production Sdn Bhd a joint venture of Octanex Pet Ltd, Scomi D&P Sdn Bhd and VESTIGO Petroleum Sdn Bhd)	June 2014

Note. Adopted from Mas'ud, Manaf, and Saad' N. (2014), Comparison of Petroleum Fiscal Regime within Malaysia, *Petroleum Accounting and Financial Management Journal, 33*(2), p. 12.

The argument could be made that the attractiveness of the new fiscal framework to investors was questionable because it attracted only three RSCs within three years (2010-2012, shown in Table 2.7) compared to 17 PSCs signed within a same number of years (2010-2012, shown in Table 2.6). However, RSCs had increased to six by June 2014 as shown in Table 2.7.

Thus, slowness in working in marginal oil fields under the RSC arrangement and the decline in Malaysian oil and gas production due to stranded marginal oil fields was the reason for investigating the effect of the new fiscal regime on the investment climate of marginal oil fields in this study. This slowness of utilization mandated the examination of the relationship between specific tax instruments and investment climate of marginal oil fields in Malaysia. Moreover, based on fact that some tax instruments are regressive as they have negative impacts on investor cash flow (McPhail *et al.*, 2009; Menezes, 2005), as well as the mixed findings on the relationship between tax incentives and investment, the need exists to examine the potential moderating effect of an attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields.

Having reviewed the various forms of fiscal arrangements in Malaysia ranging from the concessionary arrangement, which hitherto was the fiscal arrangement prior to 1974, to various forms of PSCs and recently to RSC, Table 2.8 below summarizes and compares these forms of fiscal regimes.

Table 2.8
Summary and Comparison of Petroleum Fiscal Regimes in Malaysia

Fiscal Regime	Royalty /Tax	1976 PSC	1985 PSC	1993 Deepwater PSC	1993 Ultra-Deepwater PSC	1998 R/C PSC	RSC
Year	1910	1976	1985	1993	1993	1998	2010
Duration	Long term	Long term	Long term	Long term	Long term	Long term	Medium term
Royalty Rate	10% paid by FOC	10% paid by FOC	10% Paid by FOC	10% paid by FOC	10% paid by FOC	10% paid by FOC	10% paid by PETRO
Cost Oil Ceiling	No Ceiling	20%	50% ofor oil; 60% for gas	70% for oil, 60% gas	75% for oil, 60% for gas.	Sliding scale	100%
Ownership of facilities	POC	PETRO	PETRO	PETRO	PETRO	PETR	PETRO
Tax Rate	38%	38%	38%	38%	38%	38%	25%
Tax Law	PIT Act	PIT Act	PIT Act	PIT Act	PIT Act	PIT Act	CIT Act
IOC Ownership of Oil	Gross-royalty/tax oil	Cost oil + profit oil	Cost oil + profit oil	Cost oil + profit oil	Cost oil + profit oil	Cost oil + profit oil	None
Research CESS	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	None
Export Duties	10%	10%	10%	10%	10%	10%	None
Accelerated Capital Allowance	10 yrs	10 yrs	10 yrs	10 yrs	10 yrs	10 yrs	5 yrs
Qualifying Capital Expenditure	Not transferable	Not transferable	Not transferable	Not transferable	Not transferable	Not transferable	Transferable
Investment tax allowance	60%	60%	60%	60%	60%	60%	Up to 100%
Decommissioning	POC	POC	POC	POC	POC	POC	PETRO

Note: PETRO = PETRONAS

2.5 Investment Competitiveness of Malaysia Oil and Gas Fiscal Regime

In the analysis of global petroleum fiscal regimes between 1998- 2007, Malaysia was found to be among the countries with the most rigid fiscal regimes in terms of Government Take (GT), though the country has been leveraging downwards by reducing GT and increasing Investor Take (IT) in recent times (Johnston, 2008). High GT implies low IT, which also signifies an unfavorable investment climate. This rigidity has also been discussed in the work of Faizli (2012). Similarly, a rating of six countries' fiscal regimes (Portugal, Louisiana, Thailand, Nigeria, Malaysia and Indonesia) was made in terms GT for both onshore and offshore operations. Malaysia was rated as second highest after Indonesia in terms of GT (Khelil, 1995). High GT implies low IT, which can affect investors' decisions in Malaysian oil and gas industry especially in relationship to marginal oil fields.

Moreover, Malaysia was rated average in terms of attractiveness of deepwater fiscal regime to attract investment using five scales measurements as very favorable, favorable, average, tough and very tough (Khelil, 1995). In addition, a comparison of Malaysia with other countries around the world rated the Malaysian fiscal regime as regressive due to the existence of a royalty component in its PSCs (Agalliu, 2011). It was also rated second highest after Venezuela in terms of GT, fifth lowest in terms of PI and fourth lowest in terms of investors' IRR. The ratings on these indices signify a relatively weak investment climate in its oil and gas industry.

In Asia, a comparison of fiscal regimes of Brunei, Indonesia, Malaysia, Thailand and Vietnam PSCs revealed that Thailand R/T concession of 1972 had the highest value in terms of investment (Putrohari *et al.*, 2007). The Indonesian PSC known as First Tranche Petroleum (FTP) of 1988 followed this. However, continuous adjustment in the fiscal terms among these countries with the regard to the intent to maximize wealth has made the Indonesian PSC of 2006 better than other regimes in terms of project investment competitiveness.

From the above, Malaysia can be seen to be a country with relatively rigid fiscal terms in its petroleum industry. Thus, to encourage investment appetite with an attractive rate of returns for investors, the fiscal regime has had a series of adjustments from 1976 onwards with the most recent being for marginal oil fields. Consequently, the current study is intended to examine the impact of the new fiscal regime on the investment climate of marginal oil fields, as well as the effect of specific tax instruments (i.e., type of profit-based tax, type of fiscal arrangement, production-based taxes, crypto-based taxes, and tax incentives) on the investment climate of marginal oil fields. In addition, a need exists to examine the moderating effect an attractive petroleum fiscal regime might have on the relationship between tax instruments and the investment climate of marginal oil fields.

2.6 Tax Instruments Applicable to Malaysia Oil and Gas Industry

As contained in the research objectives, tax instruments considered in this study refer to the types of profit-based tax, types of fiscal arrangement, production-based tax, crypto-based tax and tax incentives. With respect to Malaysian oil and gas industry out of the three most commonly used types of profit-based tax: Company Income Tax (CIT), Petroleum Income Tax (PIT), and Brown Tax[3] (BT), two are currently being practiced in Malaysia i.e. CIT and PIT (Lee, 2013). In the case of types of fiscal arrangement, Malaysia has an experience on all the types (concessionary or royalty/tax system, production sharing contract and risk service contracts), except pure service contract. However, the application of concessionary or royalty/tax system was abandoned as far back as 1974 (Lee, 2013). For production-based tax which covers royalty, production bonuses, research CESS[4], export duty, training fee, and decommissioning liability are mostly found as components in Malaysian fiscal systems (Lee, 2013). Even though documented literature on crypto-based taxes is lacking Malaysian context, however, crypto-based taxes can be said to exist in Malaysia particularly Goods and Services Tax (GST), import duty, capital gains tax, environmental obligations, property taxes, stamp duty, taxes applicable to roads usage, withholding tax on investment, employment quota, performance bond, strict visa requirement among others. Lastly, many forms of tax incentives also exist in Malaysian oil and gas industry such as accelerated capital allowance, tax credit, investment allowance, transferable CAPEX, tax holidays, loss carry forward, tax rate reduction, tax exemption of equipment and capital goods, and reinvestment allowance.

[3]Brown tax is a type of profit-based tax introduced in United Kingdom in 2005.

[4] Research CESS is a form of progressive income tax charged by oil and gas company when it start oil production.

2.7 Administration of Petroleum Fiscal Regime in Malaysia

Some government agencies are given the responsibility of designing, imposing, and collecting the PIT as well as encouraging investment in the Malaysian oil and gas sector. These government agencies are the Inland Revenue Board Malaysia that collects PIT, the National Oil Company of Malaysia-PETRONAS that collects royalties and signs fiscal arrangements on behalf of the government, the Malaysia Investment Development Authority encourages investment in the oil and gas sector and the Malaysia Petroleum Resources Corporation that encourages investment in the oil and gas sector through recommendations of appropriate tax incentives.

2.8 Inland Revenue Board Malaysia

Overall administration of the Petroleum (Income Tax) Act 1967 as amended is vested in the Inland Revenue Board Malaysia through the Director-General or any other officer that acts on his/her behalf. Thus, the Director General of Inland Revenue Malaysia is empowered by the relevant sections with respect to the administration of Petroleum Income Tax. For instance, Section 33 (3) of Petroleum Income Tax Act (1967) as amended in 2006 provides that:

> Where in the opinion of the Director-General it is necessary for the purpose of ascertaining income from petroleum operations for any period to examine any books, accounts or records kept…(H)e may by notice under his hand require any chargeable person carrying on the petroleum operations during that period to furnish within a time specified in the notice (not being less than thirty days from the date of service of the notice) …(Petroleum Income Tax Malaysia, 1967, p. 41).

This passage implies that the power of assessing the chargeable oil and gas company to taxation is vested in the Director General of Inland Revenue Board Malaysia. Other powers conferred by the Petroleum Income Tax Act (1967) to the Director General of the Inland Revenue Board Malaysia are the power to call specific returns and production of books by a chargeable oil and gas company, to call for the statement of bank accounts, to call for information and to call for further returns. This legal framework clarifies the relevance of IRB in the administration of petroleum taxation in Malaysia.

2.8.1 Malaysia National Oil Company- The PETRONAS

Since its establishment in 1974, PETRONAS has served as the representative of Malaysian government in signing petroleum fiscal arrangements with domestic and international oil companies. The first contract in which PETRONAS represented the Malaysian government was a PSC signed with Shell in 1976 (Mehden & Troner, 2007). Since then many petroleum contractual agreements have been entered into between PETRONAS and POCs. In a recent RSC awarded to Dialog, PETRONAS has 20% stake through its wholly owned subsidiary PETRONAS-Carigali (Hann, 2011). Under the current RSC, all production after recovery of costs by an operator belongs to the government as represented by PETRONAS (Hann, 2011).

In any fiscal arrangement entered into between PETRONAS and operators, PETRONAS collects taxes and royalties from the operators for onward remittance to the Inland Revenue Board Malaysia. In fact, PETRONAS was recognized as a key chargeable person in Malaysian Petroleum Income Tax Act 1967 as amended. Thus, PETRONAS has been the single major taxpayer in Malaysia (Lee, 2013). The company also pays a dividend to governments and collects royalties on behalf of the government (Lee, 2013). Thus, PETRONAS is included in this study as the company is very important when discussing the issue of the petroleum tax regime in Malaysia.

2.8.2 Malaysia Investment Development Authority

The Malaysia Investment Development Authority (MIDA) was established under the MIDA Act of 1967 as a government agency given the responsibility of promoting investment in manufacturing and service sectors, including oil and gas. It aim is to assist prospective companies that intend to invest in Malaysia by providing the necessary information on existing and prospective opportunities. MIDA also advises investors on government policies and procedures relating to investment in Malaysia. In addition, it evaluates applications for tax incentives, licenses, duties and expatriate posts in oil and gas, among other sectors (Malaysia Investment Development Authority, 2014). MIDA specifically has an oil and gas division in its portfolio. Thus, the agency is relevant to this study as it deals with the relevant tax-related issues that promote investment in oil and gas, among other sectors.

2.8.3 Malaysia Petroleum Resources Corporation

The Malaysia Petroleum Resources Corporation (MPRC) was founded in 2011 with the objective of making Malaysia the number one oil and gas hub in Asia Pacific Region by 2017 (Malaysia Petroleum Resources Corporation, 2014). The MPRC reports directly to the prime minister. The major responsibility of the agency is ding appropriate policies relating to oil and gas by reviewing existing business regulations and tax incentives. It also has the responsibility of establishing collaborations and partnerships with multinational oil and gas companies, local companies, research institutions and academia for encouraging research and development, talent training and technology transfer relating to oil and gas. Specifically, MPRC has the following responsibilities among others: (1) recommending policies relating to oil and gas sector; and (2) recommending any prospective changes and updates of Malaysia business regulations and tax incentives for the development of oil and gas players (Malaysia Petroleum Resources Corporation, 2014).

2.9 Summary

The chapter provides an overview of the Malaysian oil and gas industry with an analysis of trends in oil and gas production. The analysis highlighted the need for future investigations in order to understand the extent to which a petroleum fiscal regime may provide an explanation of the investment climate of marginal oil fields. This study will eventually assist in designing appropriate petroleum fiscal regimes, which may help overcome the continued decline in oil and gas production. Different forms of global fiscal arrangements were reviewed through analysis of their similarities and differences. The chapter also reviewed different fiscal arrangements and their corresponding fiscal regimes prior to 1976 up to 2010. This was followed by a comparison of similarities and differences of these fiscal regimes and arrangements. The chapter ends with a review of governmental institutions responsible for the design, implementation, imposition, and collection of petroleum income tax as well as those associated with improving the investment climate in Malaysia.

CHAPTER THREE
LITERATURE REVIEW

3.1 Introduction

Prior studies on the impact of a fiscal regime on the investment climate are reviewed in this chapter, as are tax instruments that affect the investment climate of marginal oil fields. Some of the tax instruments considered in this review include types of profit-based taxes, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives. Additionally, relevant theories are also reviewed which include: Economic Rent Theory, Theory of Economic Regulation and Bargaining Theory. These theories are relevant in explaining the extent to which a new fiscal regime would improve the investment climate and investors' CAPEX performance, the relationship between tax instruments and the investment climate of marginal oil fields, and the moderating effect of attractive petroleum fiscal regime.

3.2 Petroleum Fiscal Regime and Investment Climate

Russell and Bertrand (2012) defined a petroleum fiscal regime as a total imposition on investors by the oil producing country based on a petroleum fiscal arrangement. Thus, a fiscal regime is a policy designed by oil producing states with the aim of acquiring a fair share of wealth accruing from their petroleum resources (Ripley, 2011). On the other hand, the investment climate is defined as the rate of return and risk associated with an investment, which is influenced by current and expected policies, and institutional and behavioral environments (Hallward-Driemeier, Wallsten, & Xu, 2006; Stern & Stern, 2002). By definition, a fiscal regime as a policy can affect the investment climate. In fact, Smith (2012) posited that a fiscal regime could cause investment distortion and influences allocation of risk between governments and investors. Studies on the influence of a petroleum fiscal regime on investment climate have been conducted in developed, emerging and developing countries.

3.2.1 Developed Countries

In developed countries, some studies have investigated the influence of petroleum fiscal regime changes on investment as well as their sensitivities to changes in oil price. Kemp and Stephen (2011b) presented a case with two price scenarios under the 2011 fiscal regime in the United Kingdom Continental Shelf (UKCS). Under the 2011 fiscal regime, if investment decisions were made at prices of around $70.40 per barrel, a field investment could peak in the early years and then sharply decline. However, under the same 2011 tax system, their analysis shows that at $90.60 price scenario only 15 out of the 69 fields failed to pass the hurdle of NPV/I >0.3 while 32 fields failed to pass the hurdle of NPV/I>0.5 which is higher than those obtainable under $70.40 price scenario. The investment hurdle of NPV/I >0.3 implied PI of 30% while NPV/I>0.5 reflect PI of 50%. Thus, it implied that when 69 fields where a place at profitability level of 30% only 15 out of the 69 fields failed to be profitable to develop while at profitability level of 50% 32 failed to be viable out of 69 fields. Furthermore, Kemp and Stephen (2012b) analyzed the tax changes in UKCS and their impacts on investment under two price scenarios of $70.40 and $90.55 per barrel. Two investment hurdles with NPV/I>0.30 and NPV/I>0.50 were employed. The results from the two scenarios indicated an increase in investment in the UKCS with the development of large fields. The situation is expected to continue in the short term, followed by a small fall and then regain its holistic high level especially when an investment is assessed at an oil price standing at $90.55 and above per barrel.

Other studies have investigated the effect of relaxing and reducing the tax rate and the offering of additional allowances on the investment climate of oil and gas fields. Abdo (2010) in his UK study examined the effect of petroleum fiscal regimes of 1983, 1987, 1988 and 1993 on company revenues. The result shows that petroleum tax relaxation has varying effects on investments in the UKCS. Specifically, each of the relaxations leads to an increase in cash flow for the oil company. While analyzing the 2011 tax changes in UKCS, Kemp and Stephen (2011b) found that with the removal of supplementary charge under the 2011 tax system, the majority of the fields would pass the threshold of NPV /I >0.3 and NPV/I >0.5. By implication, supplementary charge removal might have improved the investment climate of the fields.

Furthermore, it was found by Kemp and Stephen (2012a) that the introduction of additional investment incentives as a complement to 2011 tax increase has positively impacted on investment decisions in the UKCS. Specifically, such additional allowances led to a substantial acceleration in investments beyond which would have been expected without them. Moreover, the study reported that extra benefits were recorded in UKCS due to increased investment activities resulting from the additional allowances offered in that year. Kazikhanova (2012) documented similar view in this matter. She asserted that the additional allowances offered in 2012 might be the best way to enhance the attractiveness of investment in small and marginal oil fields in the UKCS, which also supplement the 2011 tax increment through budgetary provisions. Furthermore, Obiago (2012) examined the effect of fiscal regime, field maturity, and oil price on investment in UK oil and gas fields. Based on the results, Obiago (2012) recommended that the introduction of an Investment Rate of Return Allowance on marginal fields would serve as a mechanism to encourage investment and ensuring a fair share of the profits.

Conversely, negative influences of a tax increase on the investment climate were found in other studies. A review of different fiscal regime changes in the UKCS by Nakhle and Hawdon (2004) evaluated the impacts of such changes on investors' perspectives. Nakhle and Hawdo discovered that the fiscal packages of 1978-1983 ensured a significant reduction in the profitability of small fields. It implied that negative effects were recorded for the fiscal package of 1975-1983 on the investment climate of smaller fields. Similarly, it was concluded by Nakhle (2007) that apply a higher tax rate to small fields regardless of the oil prices increase may likely render the fields' investment climate unfavorable. Thus, it will eventually have negative effect on government revenue.

Moreover, Kemp and Stephen (2011a) disclosed that the 2011 tax increases on UKCS would have several impacts; the most obvious of which was to render some new investments unviable. They further pointed out that projects that were modest or marginally viable during the pre-budget period could, in principle, become unviable under the 2011 tax changes. Thus, some of 350 undeveloped discoveries in the UKCS would become uneconomic. This resulted from a substantial increase in the proportional or flat rate taxes. Furthermore, it was reported that the introduction of supplementary charges of 32% in UKCS in 2011 would have had awful long-run negative effects if field allowances were not introduced (Kazikhanova, 2012; Kemp & Stephen, 2012a). On this matter, Kazikhanova (2012) categorically asserted that the introduction of such supplementary charges under the 2011 budget had a negative effect on small and marginal fields' profitability as measured by NPV and PI.

3.2.2 Developing and Emerging Countries

Similar to developed countries, studies conducted in developing and emerging countries revealed that the petroleum fiscal regime adjustments are sensitive to oil price. Njeru (2010) utilized several key investment appraisal indicators to determine the impact of the Kenya petroleum fiscal regime on the investment attractiveness of the country's oil and gas fields. Evidence from scenario analyses indicated that while GT comparatively remained unchanged during periods of low oil price, NPV and IRR decrease, and vice versa. Thus, Njeru (2010) concluded that the flexibility Kenya fiscal regime was enough to accommodate a fluctuation in oil prices. Hence, this may affect the perception of investors in a relationship with Kenya's oil and gas fields' investment climate. Evidence from Njeru (2010) further disclosed that fields with large reserve give large SI to investors, thereby having better investment climate. Hence, when there is a low reserve in a country government may need to keep cost down through incentives to boost investors' SI (Johnston & Johnston, 2015). Another finding from Njeru's (2010) study revealed that investors' are likely to have a high percentage of AGR during low oil price, thus, can affect their evaluation of investment climate under different oil price scenarios. Similar findings were also made in Nigeria wherein Onaiwu (2009) discovered profitability of investor in oil and gas projects increased under the 1993 PSC, however, the reverse was obtained under the 2005 PSC.

Other studies have compared fiscal regimes on either the domestic perspective by comparing many regimes in a particular country or internationally among countries. Putrohari, Kasyanto, Suryanto, and Rashid (2007) compared the effect of Malaysia, Thailand, Indonesia, Vietnam and Brunei fiscal regimes on the investment climate. The findings showed that the Thailand R/T Concession 1972 gave the highest value in terms of investment, which was followed by Indonesia FTP 1988 based on NPV, IRR, and PI. Shimutwikeni (2011) also made a comparison of fiscal regime investment attractiveness for Namibia and Botswana, and the results showed that both had attractive petroleum fiscal regimes and were open to foreign investment. Similarly, Coker (2012) compared the Ghana and Sierra Leones fiscal regimes and their effects on GT. The results showed that the Sierra Leone tax instruments operate more effectively. This especially happened due to the combination of PIT and CIT in the regime, which complement each other in opposing directions.

Moreover, Quagraine (2012) examined the effect of the Ghana fiscal regime on GT compared with industry good practice. The finding showed that the Ghana GT was 63%, falling short of the industry average of 64% by 1.6%. The analysis used NPV as a proxy for GT computation. Blake and Roberts (2006) compared the effect of Alberta, Papua

New Guinea, Sao Tome and Principe, Nigerian, Tanzanian, and Trinidad and Tobago fiscal regimes on investment attractiveness. The study, which was based on an NPV comparison, concluded that a greater relationship existed between fiscal terms and geological attractiveness on a regional basis than on a global basis or, to put it another way, the competition among governments for petroleum investment is taking place regionally, not globally.

Other studies have investigated the influence of tax regime changes on investment viability. Kaiser and Pulsipher (2004) examined the influence effect of tax regime allowances on profitability. The results from regression models showed that a percentage increase in the royalty rate has more of an impact on GT, present value and the rate of return than a percentage increase in the tax rate. This indicated that regressive tax such as royalty had a stronger effect on the investment than the ordinary tax rate. Similarly, Kwabe (2010), in her Angola study, analyzed the influence of fiscal regime on profitability. Her findings indicated that the neutrality of the fiscal regime is among the various factors influencing the investment decisions but is not the main factor. Other factors also play important influence on investment attractiveness. Luo and Yan (2010) had a similar finding, documenting that, based on composite score, fiscal regime is an indicator of investment attractiveness.

Conversely, other studies showed little or no effect of fiscal regime changes on the investment climate. Mead, Muraoka and Sorensen (1982) examined the effect of Mexican fiscal regime on the profitability of its oil and gas fields. The finding showed that, despite the tax allowances and drastic increase in oil price, the after-tax earnings of oil leases from 1954-1969 was not greater than that of other industries in terms of NPV, IRR and PI. Similarly, Emeka, David, Yun, Li-Fei (2012) found that the mean and standard deviation obtained from the scenario analysis for the proxies used in assessing the effect of the fiscal regime on investment exhibited little difference to the base case values in terms of NPV, IRR and PV indicators. Moreover, Agalliu (2011) examined how fiscal regime design affected investment climate indicators such IRR and PI in many countries including Malaysia. The study showed that a country's fiscal regime design can affect its investment climate indicators such IRR and PI with some countries scoring higher than others.

The foregoing demonstrates that fiscal regime affects the investment climate of oil and gas fields. Such evidence is obtainable from both developed and developing countries. Some studies have recorded positive impacts, especially when there is a reduction in taxes and an increase in allowances. Other studies have shown a negative impact, especially when there is a tax increase. Conversely, some studies have shown no or little impact even if there is an increase in allowances.

Despite global evidence about the effect of a fiscal regime on the investment climate, only a few studies (Agalliu, 2011; Putrohari *et al.*, 2007) have considered Malaysia. However, these studies focus on an international comparison between Malaysia and other oil producing countries. The publicly available literature has not compared the investment climate of Malaysian marginal oil fields under PSC and RSC fiscal regimes.

This indicates the need for a study to fill this gap. Moreover, most studies are based on scenario analysis. Interestingly, Smith (2012, 2013) suggested that new methods be developed to study the influence of petroleum fiscal regime on investment viability. Thus, the survey method is proposed in this study to complement the scenario analysis, which eventually will contribute to filling this methodological gap.

3.3 Fiscal regime and CAPEX Performance

As subsection 3.2 above indicates, when a fiscal regime is attractive an investor will find the climate favorable for investment. Thus, an investor's appetite to CAPEX will accelerate. However, when high taxes are high and the investment climate is unfavorable, an investor may be discouraged to incur CAPEX for oil and gas development. For example, tax changes proposed by UK 1983 which included the abolishing of royalty, an increase in allowances, and the reduction of the period of Advanced Petroleum Revenue Tax (APRT) from 5 to 4 years, resulted in an increase in exploration and development activities (Favero, 1992; Hann, 1984). Likewise, an increase in the allowance through the budget year 2012 would have converted incremental projects previously considered uneconomical to economical, thus increasing investors' appetite for CAPEX (Kemp & Stephen, 2012a).

However, Kemp and Stephen (2011a) posited that an increase in taxes and other fiscal charges proposed for UKCS in UK budget 2011 reduced the ability of investors to carry out exploration and development projects. The authors further noted that providers of finance were discouraged from lending more money to investors because the returns to investment were reduced by the tax increase. Similarly, Hann (1984) and Favero (1992) noted that, apart from the decline in oil price in 1981, the introduction of the Supplementary Petroleum Duty (SPD) in same year led to the slowdown of development activities in UKCS, thus, leading to new tax changes in 1982 to control the situation.

From the above discussion evidence indicates that fiscal regime changes may affect the investors' appetite to CAPEX. An increase in taxes and a decrease of allowances reduces the investors' appetite, whereas a decrease in taxes and an increase in the allowance encourage investors' CAPEX performance. However, available literature is aligned with larger fields implying the paucity of evidence regarding marginal oil fields. This in essence motivated the current study. Hence, the current study explores trend analysis to examine whether changes in the fiscal regime improved the investors' appetite to CAPEX among Malaysia marginal oil field operating companies.

3.4 Tax Instruments and the Investment Climate of Marginal Oil Fields

As evident from the above analysis shows, studies on the impact of the fiscal regime on the investment climate mostly used the scenario analysis, which employs investment appraisal tools such NPV, IRR, PI, SI, and AGR. Thus, the use of other methodologies has been suggested (Smith, 2013). Based on this suggestion, the survey method was explored in this current study to complement scenario analysis. Hence, relationship between tax instruments (types of profit-based taxes, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives) and the investment climate was examined in this study.

Although many have written on the concept of investment climate in areas relating to foreign direct investment, yet few comprehensive measures of the variable were offered by the literature (Hallward-Driemeier, *et al.*, 2006). Within the few available measures, vast range of divergent approaches for measuring and analyzing the investment climate exist (Hallward-Driemeier, *et al.*, 2006; Silva-Leander, 2005; W. Smith & Hallward-Driemeier, 2005). However, that of Zanoyan (2005) in Table 3.1 is more comprehensive.

Table 3.1
Survey Measures of Oil and Gas Investment Climate

Dimension	**Source of Dimension**	**Item**	**Source of Item**
Investment Climate	Zanoyan (2005) Smith and Hallward-Driemeier (2005), Otto *et al.* (2006)	Strategy	Otto *et al.* (2006), Zanoyan (2005)
		Risk	Otto *et al.* (2006), Smith and Hallward-Driemeier (2005), and Zanoyan (2005)
		Identifying companies with capabilities	Zanoyan (2005)
		Clarity within government agencies	Zanoyan (2005)
		Transparency within government agencies	Zanoyan (2005)

Table 3.1 Cont.

Dimension	Source of Dimension	Item	Source of Item
		Clarity of operating arrangement	Zanoyan (2005)
		Transparency of operating arrangement	Zanoyan (2005)
		Cost of doing business	Zanoyan (2005)
		Rate of return	Otto et al (2006) and Zanoyan (2005)
		Geological potential	Zanoyan (2005)

Some of the ten measures of oil and gas investment climate outlined by Zanoyan (2005) were also highlighted by other scholars. For example strategy and rate of return and risk (Otto et al., 2006). Others are risk and cost of doing business (Smith and Hallward-Driemeier, 2005).

Moreover, the relationships of relevant tax instruments (types of profit-based taxes, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives) with investment climate were examined in the current section. These relevant tax instruments and their possible effects on investment climate are discussed in the following subsections.

3.4.1 Types Profit-based Tax and the Investment Climate of Marginal Oil Fields

Government levies profit-based taxes on the net profits of OGC. There are a number of profit-based taxes; each having its own advantages and disadvantages as tabulated Nakhle (2008) and contained in Table 3.2 below.

Table 3.2
Comparative Analysis of Production-based Tax

Tax Type	Merits	Demerits
Brown Tax	Neutral Risk Sharing Targets Economic Rent Progressive It targets project NCF	High Risk on Government Causes Over Investment Late Source of Revenue Complicated
Resource Rent Tax	Neutral Progressive Risk Sharing Target Economic Rent	Complicated Requires Knowledge of Threshold Rate Late Revenue for Host Government Over investment
Corporation Tax	Simple and Neutral Progressive Risk Sharing at the Corporate level Early revenue generation	Not Project Related No 100 relief for capital expenditure Gold plating

Note. Adapted from Nakhle, 2008, *Petroleum taxation: Sharing the oil wealth: A study of petroleum taxation yesterday, today and tomorrow*, p. 27.

Though each profit-based tax has its own merits and demerits, only BT targets project NCF (Phina, 2005). Both BT and RRT target project NCF and are petroleum profit-based taxes, however, they differ in the timing of tax bases. BT assumes quick loss offsetting than RRT (Boadway & Keen, 2009). Thus, the argument can be made that a tax that guarantees a quick offset of losses will be more likely to improve the investment climate. Boadway and Keen (2010) argued that the CIT is not good for economic profit in oil and gas operations because CT allows debt interest to be deducted. They also asserted that CT is somewhat regressive, because its burden remains almost the same at different levels of profitability (Tordo, 2007). Because different types of taxes produce different distortions to investment, the argument here is that type of profit-based tax applied can affect the investors' perception of the investment climate of marginal oil fields. In line with comparative analysis in Table 3.2, Table 3.3 below shows the type of profit-based taxes used in the oil and gas industry as sourced from literature such as (Kazikhanova, 2012; Løvås & Osmundsen, 2008; Menezes, 2005; Nakhle, 2007). Table 3.3 below presents the types of profit-based used in this study.

Table 3.3
Types of Profit-based Taxes

Tax Type	**Frequency of Application**
Resources Rent Tax (RRT)/ Petroleum Income Tax (PIT)	Common
Company Income Tax (CIT)	Common
Brown Taxes (BT)	UK

Literature showed that RRT/PIT secures target returns for an investor and ensures the capture of economic rent by the government; RRT/PIT is also progressive as it imposes taxes based on the profit not on production or gross revenue (Phina, 2005). It is very good in attracting investment as the government shares the risk with investors and does not collect rent until an investor recovers all costs (Menezes, 2005). Conversely, CIT is classified as regressive because this tax is not a petroleum project based tax (Tordo, 2007). However, CIT is still applied to OGCs (Menezes, 2005). Lastly, BT is a UK tax introduced by Gordon Brown as an alternate to the standard revenue tax and is a charge on the NCF of investors (Phina, 2005). The importance of BT is that a high rate does not serve as a disincentive to investors as it focuses normally on NCF. Hence, all the three types of profit-based tax discussed above will be investigated in this study.

3.4.2 Types of Fiscal Arrangement and the Investment Climate of Marginal Oil Fields

Fiscal arrangements can be Concessionary, PSC or SC. The type of fiscal arrangements put in place by a country is another factor that may affect the investors' perceptions of that country's investment climate for oil fields. Parrish (2011) posited that one factor to be considered in the evaluation of new oil exploration and production opportunities in a country is the type of contract employed. The choice of a particular form of contact is informed by resources nationalism, anti-foreign sentiments, resources available and the risks involved (Likosky, 2009). Because risk is an important measure of the project investment climate, the level at which risk is afforded to an investor by the particular form of fiscal arrangement can affect the investor's evaluation of particular oil and gas fields investment climate.

SCs afford the most independence to the host country; while PSCs are the best when large exploration risks exist (Likosky, 2009). Resource expertise is among the factors responsible for the prevalence of the SC in the Middle East (Iran, Iraq, Kuwait and Saudi Arabia) and South America (Bolivia, Ecuador, and Venezuela), and OGCs normally accept such arrangements (Ghandi & Lin, 2013; Likosky, 2009). Arguably, the level of risk and independence afforded by a particular form of fiscal arrangement can effect investors' evaluation of the oil field investment climate.

Unlike other fiscal arrangements, PSCs have cost recovery terms that typically reduce investors' share of production under periods of high oil and gas prices (Young & McMichael, 1998). In fact, the argument has been made that in PSC arrangements cost recovery alone could be a disincentive to investment because some PSCs do not consider the time value of money caused by the delay resulting from the cost recovery duration (Ashong, 2010). Moreover, the cost recovery limit as applied to PSCs affects the investors' timing of payback (Oldianosen, 2004). Hence, it will affect the investment climate. Thus, different cost recovery limits afforded to investors' by different forms of fiscal arrangements can affect their share of production as well as the timing of investment recovery. Thus, the argument can be made that the type of fiscal arrangement can effect an investor's evaluation of the investment climate of marginal oil fields.

3.4.3 Production-based Taxes and Investment Climate of Marginal Oil Fields

Production-based taxes are those forms of taxes levied on gross production revenue regardless of whether profit is made or not; thus, they are classified as less-neutral (Menezes, 2005). Neutrality and progressivity of taxes can effect investors' decisions. A survey of the relevant available literature reveals the following as production-based taxes as shown in Table 3.4 below.

Table 3.4
Production-based Taxes

Dimension	**Source of Dimension**	**Item**	**Source of Item**
Production-based Taxes	Menezes (2005), McPhail, Daniel, King, Moran, & Otto (2009) Russell & Bertrand (2012)	Royalty	Menezes (2005), McPhail, Daniel, King, Moran, &Otto (2009)
		Ad valorem Royalty	*Shimutwikeni (2011)*
		Production Bonus	Oldianosen (2004) Ajayi (2008)

Table 3.4 Cont.

Dimension	**Source of Dimension**	**Item**	**Source of Item**
		Research CESS	Agalliu (2011)
		Export duty on oil and gas produced	Menezes (2005) McPhail, Daniel, King, Moran, & Otto (2009) Menezes (2005)
		Training/Education Fee	*Menezes (2005)*
		Sales and Exercise Tax	McPhail, Daniel, King, Moran, & Otto (2009)
		Decommissioning and reclamation liability	McPhail, Daniel, King, Moran, & Otto (2009)

Production-based taxes are relatively regressive as they target overall revenue instead of profit (Menezes, 2005). Hence, they can effect an investors' evaluation of the investment climate of marginal oil fields. Moreover, non-neutral taxes that target production revenues instead of profit act as disincentives to investment due to their distortion effects on project revenue (Akhigbe, 2007). One major negative influence of these taxes is increasing the duration of project payback (Akhigbe, 2007).

Production-based royalties can affected oil and gas extraction decisions due to investors' anticipation of their effect on oil fields' profitability as well as their impacts on exploration and development decisions (Amoako-Tuffour & Owusu-Ayim, 2010). Royalties are classified as regressive elements that, when levied on revenue, will affect a project's NPV and consequently the project's profitability (Menezes, 2005; Okobi, 2009). Production-based tax such as royalties can affect exploration decisions as well as oil and gas development decisions significantly due to their impact on project profitability (Boadway & Keen, 2010). Another effect of royalty is that it can lead to premature closure of oil and gas fields due to its effect on project profitability (Broadway & Keen, 2010; Otto *et al.*, 2006). Other production-based taxes such as production bonuses, training fees, and research CESS can be regressive because they target overall production instead of net profit. Likewise decommissioning provisions, which are made by setting aside funds from production proceeds aside for the dismantlement of oil and gas installations, are also regressive as they are a deduction from production revenue instead of from pure operational profit. Amoako-Tuffour and Owusu-Ayim (2010) posited that production bonus scores poorly in terms of progressivity as it charged independently of projects profitability. Similar regressive effects have also been seen on export duties charged on oil produced and exported by OGCs, and these effects have boosted the skepticism of investors regarding the reality of a country's other tax incentives (Boadway & Keen, 2009). Therefore, the argument can be made that production-based taxes can effect investors' evaluations of the investment climate of marginal oil fields due to their regressivity and distortive effect on investments.

3.4.4 Crypto-based Taxes and Investment Climate of Marginal Oil Fields

Crypto-based taxes are forms of impositions and obligations made against an OGCs not directly on its oil and gas operation but based on its presence in the country (Menezes, 2005). Johnston (1994) also posited that the effect of crypto-taxes was yet another factor to be considered in designing a petroleum fiscal regime because crypto-taxes effect an OGC's decision to invest. The opinion has been that to encourage investment into a country's petroleum sector, crypto-based taxes such as signature bonus paid by OGCs based on their presence or agreement to explore oil and gas should be reduced (Mian, 2010; Nwete, 2005). Thus, a review of crypto-taxes charged on companies based on their presence in a country not on the basis of their oil and gas revenue or production has many forms as shown in Table 3.5 below.

Table 3.5
Types of Crypto-based Taxes

Dimension	Source	Item	Source of Item
Crypto Taxes	Johnston (2003) Abdul Karim (2009)	VAT	Johnston (2003)
		Import Duty	
		Capital Gain Tax	
		Property Taxes	
		Surface Rent Tax	
		Stamp Duty	
		License/Lease/Data fees for prospecting/exploration/extraction	
		Local taxes applied to water and road use	
		Withholding tax on investments	Menezes(2005)
		Signature Bonus	
		Environmental Taxes	
		Domestic Market Obligation	

Table 3.5 Cont.

Dimension	**Source**	**Item**	**Source of Item**
		Employment Quota/Hiring Obligation	Johnston (2003)
		Oppressive Government Control	
		Inefficient Allocation Mechanism	
		Reinvestment Obligation	
		Excessive Government Pipeline Tariffs	
		Price Cap Formulas	
		Performance Bond	
		Short Loss Carried Forward	
		Social Sphere Development Cost	
		Local Office Requirement	
		Cumbersome Visa Requirement	

A Value Added Tax (VAT), which normally comprises input and output VAT, can impact resource operations. With little domestic sales made by multinational oil companies, the chances for full recovery of input VAT from output VAT is very minimal, and, in many instances, developing countries have found it difficult to refund input VAT to multinationals (Boadway & Keen, 2009). Moreover, charges imposed on investors upon signing a contract or license enable the government to receive revenue early but shift risk to investors (Boadway & Keen, 2009). In turn, shifting risk to investors may affect their perceptions of the investment climate of an oil and gas project investment because risk is an important indicator of the investment climate of marginal oil fields.

Governments protect domestic industry from multinational companies that produce similar input goods for import by imposing duties. These import duties tend to be problematic to investors because they have an effect similar to signature bonuses as they target not the net profit of the companies but gross revenue (McPhail, *et al.*, 2009). Similarly, OGCs in recent days have found it difficult to deduct expenditures made to local communities in relationship to the environment, education, infrastructures and land usage for the purpose of computing tax liability (McPhail, *et al.*, 2009). Thus, where such crypto-taxes are not allowed as a deduction in arriving at the companies' tax liability, they can be seen as an additional tax burden. Though the impact of individual crypto-taxes may be less severe; however, a combination of many of them will likely affect investors' evaluation of oil and gas project's investment climate.

3.4.5 Tax Incentives and the Investment Climate of Marginal Oil Fields

Oil and gas producing countries offer many incentives to encourage investment, more importantly for marginal oil fields development. The issue of giving incentives for small fields development has been evident in countries like the US, the UK, Nigeria and Malaysia that have a large number of marginal oil fields (Butcher, 2012; Kazikhanova, 2012; Kemp & Stephen, 2012b; Onyeukwu, 2008). Table 3.6 below shows the different forms of tax incentives drawn from a review of several studies on petroleum fiscal regimes.

Table 3.6
Tax Incentives

Dimension	Source of Dimension	Item	Source of Item
Tax Incentives	Nwete (2005)	Accelerated Capital Allowance	
	Menezes (2005) Buss (2001)	Tax credit for investment in scientific research	Buss (2001)
		Investment Allowance	
	American Wind Energy Association (2013)	Transferable CAPEX (ring-fence)	Okobi (2009)
		Flow through Shares	Menezes (2005)
		Tax Holiday and Abatement	
	Butcher (2012)	Loss carry forward	Buss (2001)
		Loss carry back	Menezes (2005)
		Tax rate reduction	Okobi,(2009)
		Tax exemption on equipment and capital goods imported	Buss (2001)
		Reinvestment Allowance	IRB Malaysia (2012)
		Tax Stabilization Agreement	Buss (2001)
		Tax reduction for deeper drilling	
		Tax reduction when oil price fall below trigger price to improve production	Butcher (2012)
		Depletion/low production allowance	
		Bonus for reserves addition	Onyeukwu,(2008)
		Sliding scale royalty based on water depth to encourage deepwater drilling	Nwete (2005)

Capital allowance is given in-lieu of depreciation. In its accelerated form, a capital allowance guarantees the investor quick replacement of the worn-out capital assets (Nwete, 2005). The assumption that quick replacement of worn-out capital resulting from a capital allowance can influence investors' evaluations of an oil field's investment climate is logical. Moreover, an investment credit and a capital uplift enable investors to recover added percentages of real capital invested (Ashong, 2010). Where this added percentage is not taxable, the result will increase the project's expected rate of return, hence an improved investment climate. Cross-ring fencing means that the cost is transferable across different operations. Thus, where such an opportunity is allowed by the host country to an investor, the results will be a subsidization of less-profitable projects giving assurance to the investor that the investment climate for the development of marginal oil fields is favorable (Ashong, 2010).

Flow-through shares are an incentives applied to the mining sector, which is rarely practiced and is mostly practical in Canada (Nwete, 2005). In this form of incentive, the host government purchases shares from the OGCs under the agreement that the company will invest the value of such shares in exploration and development of its oil and gas sector. The argument can be made that as more incentives are provided to investors, they may consider investment climate as more favorable, because the availability of financing is one macro- indicator of a favorable investment climate (Dollar, Hallward-Driemeier, & Mengistae, 2006; Dollar, Hallward-Driemeier, & Mengistae, 2005). Moreover, tax holiday and abatement refer to the reduction of or relieving of a tax for a specific period of time (Nwete, 2005); this may also enable the investor to recover his investment in the early years of the project which, in turn, may render the investment climate more favorable.

Loss carry forward and backward shift risk to the government improve the investment climate for investors (Nwete, 2005). Loss carry forward stabilizes the operation while loss carry backward reduces the risk of the project a few years prior to abandonment. Shifting risk from an investor to the government may indicate a good investment climate from an investor's point of view.

Furthermore, with a view to improving the investment climate in the oil and gas industry, some countries have exempted imported capital goods from import duties (Tordo, 2007). This exemption may improve the investment climate. So, too, does tax reduction especially during the period of low oil prices. A reinvestment allowance encourages a company to incur more capital expenditure as that company is allowed to deduct some funds in computing tax liabilities. Though most of these incentives may not have a significant influence individually; however, cumulative they are likely to influence the investment climate. Other tax incentives cover a wide range of issues such as tax incentives to encourage deeper drilling, incentives to encourage production during low oil price periods, incentives to encourage develop fields with lower production outputs as well as incentives for reserve extension and additions (Butcher, 2012). Lastly is sliding scale royalty. Unlike royalty which is form of production-based tax, sliding scale royalty charged based on water depth serve as an incentive that can encourage investment (Nwete, 2005). Deepwater drilling requires sophisticated technology, so sliding scale royalty is offered to encourage deepwater drilling. This means that the deeper a POC drill the lower the royalty rate to be paid. In essence, this is better than flat rate royalty which is charged uniformly regardless of the water depth as it fails to motivate investors to drill deeper on territorial waters.

Tax incentives may help render an oil and gas industry project conducive for investment as they account for the associated losses, costs and risks in the fields' operations. Thus, such incentives improve investors' appetites to invest in mature and marginal oil fields (Nwete, 2005). Therefore, tax incentives can be important in improving the investment climate of marginal oil reservoirs.

In addition to the five independent variables discussed above (types of profit-based tax, types of fiscal arrangement, production-based taxes, crypto-based taxes and tax incentives), Febriana (2011) highlighted other factors that may influence investment climate in oil and gas industry. In her thesis at the University of Manitoba, Febriana (2011) noted, that in addition to fiscal regime, other factors such as legal certainty and the political situation might affect foreign direct investment in the oil and gas industry.
However, her study was conceptual in nature and did not give insights on how these two additional variables could be measured empirically for exploring their effects on the investment climate. While the two additional variables might be important, they were not considered in this study for two reasons. First, the scope of this work emphasized the fiscal regime, which the literature highlights as being relatively weak in the Malaysian oil and gas industry (Agalliu, 2011; Johnston, 2008, 2008; Putrohari *et al.*, 2007). Hence,

a fiscal regime can affect the investment climate. Second, the two additional variables Febriana proposed (2011) have not been empirically measured in relationship to their effects on investments in the oil and gas industry. These two reasons justified the abandonment of legal certainty and political situation in conceptual framework of the study.

3.4.6 Moderating Effect of Attractive Petroleum Fiscal Regime

An attractive petroleum regime can be defined as a regime characterized by neutrality, stability, equity, flexibility, transparency, clarity, and simplicity. The criteria for defining an attractive petroleum fiscal regime are derived from the classic principles of judging tax system efficiency Smith (1776) laid down in *The Wealth of Nations* (Miller & Alalade, 2003). Though Smith might not have had petroleum in his mind, his canons can be applied to evaluate the efficiency of an oil and gas fiscal regime (Miller & Alalade, 2003). It is in line with these canons that criteria for evaluating the attractiveness of petroleum fiscal regime were derived. Table 3.7 below summarizes these criteria based on the relevant petroleum fiscal regime studies reviewed herein

Table 3.7
Criteria for Assessing Attractiveness of Petroleum Fiscal Regime

Author(s)	**Criteria**	**Scope**
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

Table 3.7 Cont.

Author(s)	Criteria	Scope
Ajayi (2008)	State Participation, State Preemptive 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 & 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

Therefore, after removing redundant items from Table 3.7 above, fourteen items were generated as contained in Table 3.8 to measure attractive petroleum fiscal regime.

Table 3.8
Items for Measuring an Attractive Petroleum Fiscal Regime

Dimension	Source of Dimension	Item	Source of Item
Attractive Fiscal Regime - **Equity** - **Certainty** - **Convenience** - **Economy**	Akhigbe, (2007) Oldianosen (2004) Miller and Alalade (2003)	Neutrality	Mohammed (2012) Treasure (2012)
		Stability	Ogunlade (2010)
		Equity	Mohammed (2012) Treasure (2012) Ogunlade (2010)
		Flexibility	Treasure (2012)
		Certainty	Ogunlade (2010)
		Efficiency	Tordo (2007)
		Clarity	Okobi,(2009)
		Simplicity	Tordo (2007) Onyeukwu (2008)
		Transparency	Ogunlade (2010)
		Progressivity	Ogunlade (2010)
		Revenue	Treasure (2012)
		Rising	Mohammed (2012)
		Potential	Amoako-Tuffour and Owusu-Ayim (2010)
		Risk Sharing	Mohammed (2012)
		Profit Sharing	Akhigbe, (2007) Mohammed (2012) Ogunlade (2010)
		Imposition and Administration	Treasure (2012)

Studies have highlighted that the attractiveness of a country's petroleum fiscal regime features is significantly related to its chances to either attract or lose investment capital in its petroleum industry (Akhigbe, 2007; Oldianosen, 2004). Moreover, OGCs can endure investment in marginal oil fields with a low return on investment, a low per barrel economic rent and project NPV if the fiscal regime is attractive; that is, the regime is neutral, stable and commensurate investor's share of project profitability (Akhigbe, 2007).

In line with these studies, the argument can be made that the better the attractiveness of the petroleum fiscal regime, the better the investor's view about investment climate of marginal oil field even when regressive tax instruments are used. The opposite also applies in that the less the attractiveness of the petroleum fiscal regime, the worse is the investor's view about investment climate of marginal oil field even when regressive tax instruments are used.

Thus, an attractive petroleum fiscal regime can moderate the effect of taxes and incentives on the investment climate of marginal oil fields. This means that, even when regressive and less-neutral taxes are applied, the existence of an attractive petroleum fiscal regime can stimulate such an adverse effect. Conversely, even when neutral and progressive taxes are applied if the petroleum fiscal regime is not attractive, the investment climate may not be perceived as favourable by investors. In fact, fiscal regime has been highlighted as a potential moderator for the effect of petroleum tax policies on investor cash flow (Artist, 2009). Therefore, this evidence justified the examination of the potential moderating effects of an attractive petroleum fiscal regime on the relationship between tax instruments and investment climate of marginal oil fields in Malaysia.

3.5 Underpinning Theories

Underpinning theories are the foundation for any philosophical study by supporting the researcher in the rigorous pursuit of research and providing guidance from the data collection to analysis stages (Iyamu, 2013). Thus, theory is a foundation upon which the assumptions of the study rest. Underpinning theories posit basic principles and realities that guide a proper understanding of the variables and the direction of their relationships (Iyamu, 2013). Therefore, in line with this background, three theories underpinned this study. The first theory was the Economic Theory of Regulation, which underpinned the study in relationship to the first and the second objectives. The Economic Theory of Regulation explains that regulations may have positive or negative impacts on the targeted industry (Stigler, 1971). Because a marginal oil field tax regime is a new regulation, the theory may provide insights regarding the effects of the new regulations on the investment climate and CAPEX performance of marginal oil fields investors.

The second theory is the Economic Rent Theory and in particular, the Ricardian Differential Rent Theory. This theory underpinned the study in relationship to the third objective. The theory highlights how economic rent (profits) accruing to oil fields vary between larger and marginal oil fields (Nakhle, 2008). It also highlights the factors that lead to the differential profitability of oil fields.

The third theory is Bargaining Theory, which jointly with Economic Rent Theory underpinned the study in relationship to the fourth objective. Vivoda's (2011) discussion of Bargaining Theory highlights how a host country can use it's acquired bargaining experience obtained from longtime dealings with multinational oil companies to design an attractive petroleum fiscal regime, which stimulates the effect of taxes and incentives on the investment climate of marginal oil fields. These theories are discussed in detail in the following subsections.

3.6 Economic Theory of Regulation

The origin of the Economic Theory of Regulation is traced to the work of Stigler (1971), which integrated political behavior with larger economic analysis (Peltzman, Levine, & Noll, 1989). Thus, the Economic Theory of Regulation explains the power of economic and extra-economic mechanisms in relatively stabilized capitalistic societies (Danielzyk & Ossenbruegge, 2001). Accordingly, regulation is fashioned not only by notions of the public interest or cutthroat bargaining between different private interests but also by institutional provisions and rules; legal and otherwise (Baldwin & Cave, 1996, p. p.27). The central theme of the Economic Theory of Regulation is to provide an explanation for a range of issues such as who will benefit or bear the burden of the regulation, the form of regulation required, as well as the effect of the regulation on allocation of resources (Stigler, 1971).

Stigler (1971) further asserted that regulations were made for industries and were designed and implemented for their benefit. Thus, regulations whose effects are beneficial to the industry are explained by the theory as positive regulation. However, some regulations have net negative effects on industries, particularly those associated with heavy taxation (Stigler, 1971). This highlights the fact that new fiscal regulations for marginal oil fields may have impact on their investment climate.

Jaskow and Noll (1981) identified three areas under which theoretical or empirical research will fall. Thus, in relationship to the Economic Theory of Regulation, this current study falls within the last area that is “want for better terms” that is regulation linked to the price, profit and market structure. This is because that the current study relates to the need for better fiscal terms that improve investment climate of marginal oil fields.

There are four types of regulations in accounting: these are command and control regulation, self-regulation, disclosure regulation and incentive-based regulation (Gaffikin, 2005). This current study is linked to incentive-based regulations as it is concerned with tax incentives that improve the investment climate of marginal oil fields in Malaysia. The advantage of incentive-based regulation rests in the benefits provided to regulate industries as they can make claims for such incentives, which enhance the investment climate. Thus, in relationship to this study, Figure 3.1 below gives a schematic presentation of the Economic Theory of Regulation, and specifically the incentive-based regulation.

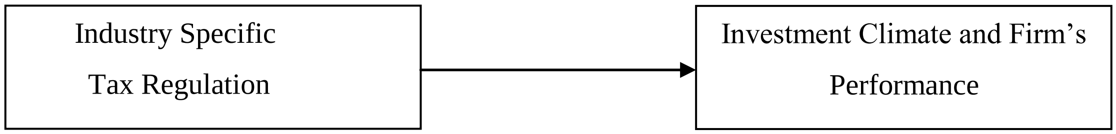


Figure 3.1
Schematic Presentation of the Theory of Economic Regulation

As the schematic presentation in Figure 3.1 implies, tax regulation targeted towards some industries may affect investment climates as well as the operational performance of firms. The fact is that regulations designed for industries may have either positive or negative effects on them. Regulations can be negative when they prevent certain behavior; they can be positive if they encourage certain activity (Gaffikin, 2005). A regulation should not always be perceived as a negative event, because it can also facilitate and encourage certain desired activities. Thus, in relationship to this current study, the introduction of less-stiff fiscal terms for marginal oil fields, which are lower than those for larger fields, may encourage investors to optimally explore and develop marginal oil fields in Malaysia. As a result, such fiscal regulation should be expected to improve the investment climate of the fields as it contains important tax incentives and allowances.

Therefore, the Economic Theory of Regulation is relevant and underpins this study for following three reasons. First, the marginal oil field fiscal regime is a new regulation introduced in 2010 to improve the investment climate. In this case, the Economic Theory of Regulation helps provide an explanation of the impact of regulation on the activities of firms, hence underpinning the study. Second, one of the four types of regulations

Gaffikin (2005) identifies is that of incentive-based regulations, which provides an explanation of how tax incentives can have impacts on targeted firms thereby improving their investment climate. Third, this study falls under one of the three areas Jaskow and Noll (1981) outlined, in which research can be underpinned by Regulation Theory, that is "want for better terms" regulations. Want for better terms means that incentives to encourage investments into marginal oil fields are needed, so that these fields could return to production and enable stakeholders to earn revenue from them. Thus, the Economic Theory of Regulation underpinned the study in relationship to the first and second objectives; that is the effect of new petroleum fiscal regulations on the investment climate and investors' CAPEX Performance.

3.6.1 Economic Rent Theory

Economic rent theory has underpinned many studies on the effects of petroleum fiscal regimes and taxation on investment (Kyari, 2013; Menezes, 2005; Nakhle, 2004, 2007; Njeru, 2010). There are two types of rents: Ricardian and Paretian rents. Ricardian rent is defined as economic rent resulting from the difference between the total amount expended for a factor to work and the amount realized from its productivity (Wessel, 1967). Paretian rent is defined as economic rent with excess earnings over that which are required to keep the factor in its present occupation (Wessel, 1967).

Difference exists between these two versions of rents. Ricardian rent deals with differential surplus whereas the Paretian rent deals the opportunity costs of holding the factor in its present occupation. Ricardian rent is the most relevant in the oil and gas taxation (Kyari, 2013; Nakhle, 2008; Njeru, 2010; Nwete, 2005), because oil reservoirs have different yielding capacities leading to differential rent. Therefore, this current study is concerned with Ricardian differential rent based on its resource rent definition. Many authors have defined Ricardian differential rent; however, the meaning of rent has remained the same. That is, rent is the different between the cost of extraction and revenue derived from the disposal of extracted resource. For instance, economic rent has been defined as "true value of natural resources, the difference between revenue generated from the resources extraction and the cost of extraction" (Nakhle, 2008, p. 16). Hughes (1975) defined economic rent as the difference between the cost of production for a fertile mineral deposit and that of production for a marginal deposit. His definition clearly highlights that economic rent accrues due to differential fertility of oil reservoirs.

To Mukherjee (2002), Ricardian rent "is that portion of the produce of the earth which is paid to the landlord for use of the original indestructible power of the soil" (p. 498). He further explained that the lower cost of production from the better land is due to its fertility or best location. Rent exists from Ricardo's viewpoint due to the fixed supply of land and higher demand for it by the society, and the difference between the yield of a better plot of land and that of a marginal plot, which regenerates only the amount equal to pay for its cultivation without a surplus (Mukherjee, 2002).

Therefore, from these definitions the deduction can be made that certain factors determine the portion of a rent accruing to the resource owner and to the operator. Because oil reservoirs are of different yields or fertility, the resource level can be a determinant of economic rent (Arnason, 2002; Taylor, Severson-Baker, Winfield, Woynillowicz, & Griffiths, 2004). This means that fields with higher reserves and production capacity yield more rent than otherwise would be the case. Another possible determinant of rent is the price; a hike in oil and gas price due to high demand can increase the amount of rent accruing from the operation (Mukherjee, 2002).

Moreover, taxation can also be a determinant of economic rent. High taxes can have a negative effect on the investors' share of economic rent but a positive effect on the resource owner's share. Thus, tax paid by the investor increases the resource owner's share of economic rent while reducing that of the project operator because economic rent is shared between the parties (Vivoda, 2011). This is evident in a fiscal arrangement in which profit oil (rent) is shared between the resource owner and investor. Investors pay taxes on its share of profit oil (rent). Lastly, subsidies and incentives given to investors to encourage oil and gas production activities can increase the investors' share of economic rent. These effects are shown in the schematic model in Figure 3.2 below.

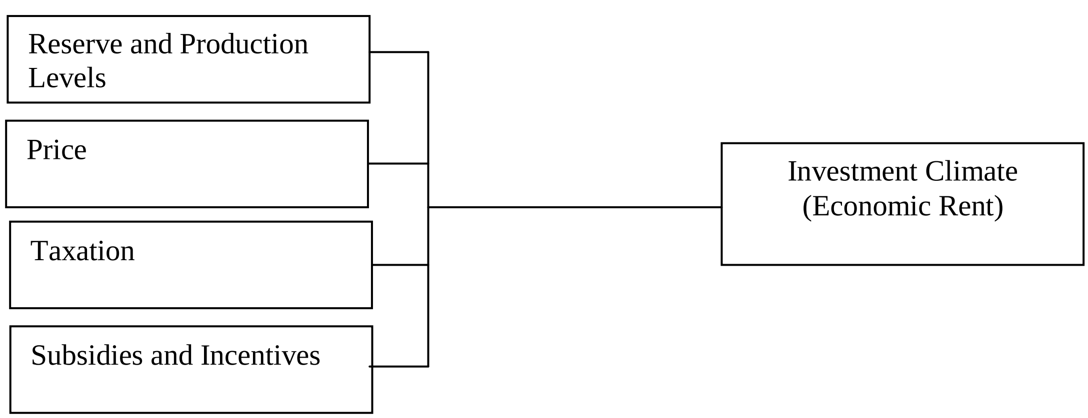


Figure 3.2
Schematic Presentation of Determinants of Economic Rent

Arnason (2002) posits that the resource rent depends on the extraction rate and the level of the resource. Thus, as depicted in Figure 3.2 above, both the production and reserve levels determine the economic rent. Higher yields of an oil reservoir indicate higher profitability; this is clear in Ricardian differential rent (Nakhle, 2007). Similarly, a price hike resulting from an increase in resource demand increases rent. The literature clearly points out that a change in exogenous variables such as price results in a change in resource rent (Arnason, 2002; Árnason, 2008).

Furthermore, taxation has been identified as a determinant of the investment attractiveness of marginal oil fields (Nakhle, 2004). Resource rent tax imposition determines when a natural resources project would be terminated, or when investors should make a field closure decision (Arnason, 2002). A resource project can be terminated when it cannot yield economic rent — that is when the investment climate is unfavorable. Thus, taxation can be a significant determinant of resource rent from the investors' viewpoint as well as from the resource owner's viewpoint.

Similarly, tax incentives and subsidies can be determinants of economic rent. In a situation in which the host country highly subsidizes and incentivize activities in its resource sector, that country may earn low economic rent, especially when subsidies and incentives outweigh the increase in production activities. The argument has been made that, when government provides a subsidy for its resource industries, such a subsidy affects its economic rent initially, but would lead to the inflow of investment beyond which it could be without the subsidies (Taylor *et al.*, 2004), thereby increasing its economic rent. The fact is that investors may perceive that such subsidies and incentives improve the investment climate for oil fields investment.

However, while the Economic Rent Theory highlights four factors that can affect economic rent in relationship to the investment climate of oil and gas fields, this study is concerned with two factors: tax and tax incentives. It is unarguable that the first two factors, resource reserves and price, relate more to geology and economics while taxation and tax incentives relate more to taxation discipline.

The foregoing analysis shows that economic rent theory, more specifically Ricardian differential rent, provides an explanation on effects of tax instruments on the investment climate of marginal oil fields. Thus, this theory underpinned the study in relationship to the third objective. There are three main reasons for underpinning the current study with Ricardo differential rent. First, the study deals with marginal oil fields that have reserves less than those of larger oil fields; this clearly indicates differential rents. Second, low economic rent accruing to marginal oil fields as highlighted by Ricardian rent implies the need for tax incentives commensurate to their differential rent that, in turn, can improve their investment climate. Lastly, by implication, marginal oil fields require an attractive petroleum fiscal regime with a combination of neutral tax instruments and incentives that would motivate operators to explore such fields.

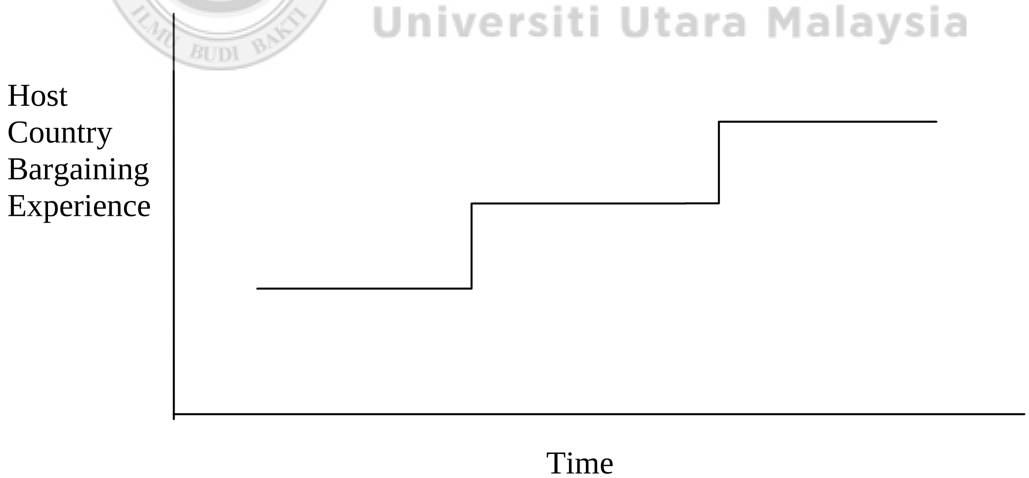
3.6.2 Bargaining Theory

The Economic Rent Theory above indicates that economic rent accruing to marginal oil field is small compared to larger fields due to the different fertility of reservoirs. Consequently, the involved parties bargain to share such "small" rent. Thus, Bargaining Theory is relevant in explaining how parties with a common interest concerning economic rent have conflicting interests on how to cooperate in sharing (Muthoo, 2000) the small economic rent accruing to small oil fields.

Bargaining is defined as the process by which parties try to reach consensus through offer and counter-offer leading to a final agreement (Muthoo, 2000). Thus, the focus of Bargaining Theory is efficiency in the distribution of properties as a result of bargaining outcomes. This focus signifies the need for efficient and fair sharing of "economic rent" to ensure commensurate returns to the parties involved, which can make oil and gas investment climate attractive.

In the oil and gas industry, host governments and FOCs have long been engaging in bargaining relationship (Vivoda, 2011). Developing countries producing oil and gas have long contracted FOCs for oil and gas exploration and development. At the outset of such negotiations, especially during concessionary periods, the host country and FOCs have varying negotiation experiences (Hosman, 2006). FOCs often have a monopoly over technological capabilities and possess greater business and negotiation experiences, but developing countries have little or no experience, for the fact that their oil industry is a frontier, and they are just starting oil and gas development activities (Hosman, 2006; Vivoda, 2011).

As time goes on, these states learn the standards of the oil and gas business and how to construct certain legal frameworks for hosting powerful multinational oil companies (Hosman, 2006; Vivoda, 2011). Hosman (2006) and Vivoda (2011) pointed out that the situation of bargaining changes over time, with the bargaining power shifting from the FOCs to the developing countries. To understand the shift in power of negotiation between host governments and FOCs, Moran (1974) developed a dynamic bargaining model or what is called the Dynamic Balance of Power Theory. Moran (1974) explained how developing countries move up the negotiation learning curve with increasing operating and supervisory skills. Thus, power of negotiation eventually shifts away from FOCs to host countries (Abdul Karim, 2009). This is shown in Figure 3.3 below.



Note. Adapted from Moran, 1974, *Multinational corporations and the politics of dependence: Copper in Chile*, Princeton, NJ: Princeton University Press.

Figure 3.3
Learning Curve: Dynamic Bargaining Theory

From Moran's (1974) assertions, the deduction can be made that, with more bargaining experience being developed by host developing countries, they can design an attractive petroleum fiscal regime that would improve the investment climate in marginal oil fields with low economic rent, thereby fostering the investment climate and development of these fields.

Bargaining Theory in relationship to petroleum fiscal policies suggests a learning process. At the onset of the relationship with a FOC, a host country imposes only royalty and taxes under concessionary systems. With learning and the desire to obtain more benefits from its sovereign national resources, other forms of arrangements emerge. Having learned the game of negotiation, host countries impose more conditions on FOCs ranging from higher taxes to expropriation (Vivoda, 2011). However, these can produce damaging results. For example, such stiff taxes and unfavorable fiscal terms led to the exit of some OGCs from Malaysia in 1970s (Lee, 2013). When OGCs view fiscal terms as not commensurate with their investments commitments, they perceive the investment climate as unfavorable. Hence, in the case of oil fields described as "marginal" that have low output and profitability, host countries need to understand that an attractive petroleum fiscal regime is required to improve the investment climate of marginal oil reservoirs.

Consequently, Bargaining Theory explains how a host country can use acquired negotiation skills obtained overtime to design an attractive petroleum fiscal regime, which may serve as a stimulator on the effect of tax instruments on the investment climate of marginal oil fields.

3.7 Summary

Chapter Three has shown that Malaysia has been a country with relatively rigid fiscal terms in its petroleum industry. Thus, to encourage the investment appetite with attractive rate of returns to investors, the fiscal regime has had a series of adjustments from 1976 until today, with the most recent ones for marginal oil fields. Chapter Three also has shown that fiscal regimes may affect the investment climate of oil and gas fields. Such evidence is obtainable in both developed and developing countries. Some studies recorded positive effects, especially in the instance in which taxes have been reduced and increments in allowance have been provided. Other studies have shown negative effects especially in the case of a tax increase. Some studies have shown little or no impact even if there were an increase in allowances. Despite global evidence on the effect of fiscal regimes on the investment climate, only a few studies such as Agalliu (2011) and Putrohari *et al.* (2007) have considered Malaysia. However, these studies are international comparisons between Malaysia and other oil-producing countries. The extant literature does not have a comparison of the investment climate of marginal oil fields in Malaysia under PSC and RSC fiscal regimes. Filling this gap motivated this study.

The extant literature has also shown that fiscal regime changes may affect investors' appetite for CAPEX. An increase in taxes and a decrease of allowances reduced the investors' appetite for CAPEX, whereas a decrease in taxes and an increase in the allowance encourage investors' CAPEX performance. However, to the best of this researcher's knowledge, studies on the influence of fiscal regimes on CAPEX performance are unavailable in the Malaysian context. Hence, this study uses trend analysis to examine whether changes in the fiscal regime improved the CAPEX performance of investors among Malaysia marginal oil fields' operating companies.

Moreover, most studies on the influence of regime on the investment climate of oil and gas fields use scenario analyses. Consequently, Smith (2012, 2013) suggested exploring new methods for examining the influence of petroleum fiscal regime on investment viability. Thus, this study uses the survey method to complement scenario analysis, which contributes to filling the methodological gap.

Relevant theories identified from the extant literature were used to guide this study. These were the Economic Theory of Regulation, Economic Rent Theory and Bargaining Theory.

CHAPTER FOUR
CONCEPTUAL FRAMEWORKS AND HYPOTHESES DEVELOPMENT

4.1 Introduction

A conceptual framework is formulated based on previous empirical evidence, theories and practical problems in the area in which the researcher wants to investigate (Eisenhart, 1991). A framework normally contributes to the research in two ways: identification of research variables and clarification of the relationship that exists among them (McGaghie, Bordage, & Shea, 2001). Thus, a conceptual model examines the constructs chosen for investigation or interpretation and the anticipated relationship that exists among them is useful in providing an explanation to the phenomenon being inquired about (Eisenhart, 1991). It is in line with these guidelines that the conceptual frameworks of the current study are formulated.

The variables for the study are derived from the literature based on the phenomenon being considered. Relevant theories were used that highlighted the relationship between the variables or effect of one variable on the other. In this study, there were four objectives for which frameworks were formulated. Objectives 1 and 2 each have an independent conceptual framework, while objectives three and four share a single framework. Thus, the conceptual frameworks depict the direction of the relationships or the effect of independent variables on the dependent variables. Therefore, each of these objectives and their respective hypotheses are discussed in the following subheadings.

4.2 Effect of Fiscal Regime Changes on the Investment Climate of Marginal Oil Fields

It can be recalled from Chapter three that when scenario analysis is used investment climate is measured using investment appraisal indicators such as NPV, IRR, PI, AGR and SI. Thus, literature documents that changes in a petroleum fiscal regime can impact the investment climate in the oil and gas industry measured by those investment appraisal indicators (Kazikhanova, 2012; Kemp & Stephen, 2011a, 2011b, 2012a, 2012b). Moreover, the Theory of Economic Regulation highlights that regulations are often made to benefit the industry; that is to protect them from powerful competition so as to improve their performance (Gaffikin, 2005; Stigler, 1971). Some regulations can have negative effects on the industry, particularly those relating to heavy taxation (Stigler, 1971). Other regulations can have positive effects on industries particularly those relating to tax incentives (Gaffikin, 2005). In line with the evidence from theory and extant literature, the following conceptual framework is proposed to explain how favorable changes in government tax regulation in oil and gas sector affect the investment climate of marginal oil fields. The framework is depicted in figure 4.1 below:

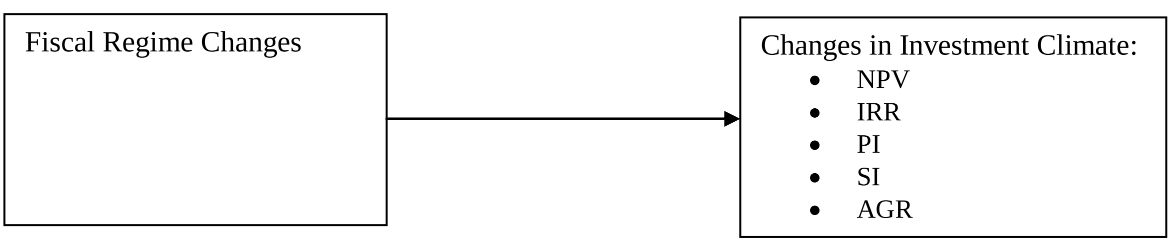


Figure 4.1
Conceptual Framework (Model 1)

A model is presented to provide an explanation to the current research challenge in Malaysia. The argument is that, since the introduction of new marginal oil fields tax regulations in 2010 aimed at improving the fields' investment climate, publicly available literature did not reveal that studies had undertaken to account for the effectiveness of these fiscal regulations in achieving their objectives. Therefore, to address this research challenge, the following hypotheses are formulated for achieving objective one of the study. This examines the extent to which the new fiscal regime improves the investment climate in marginal oil fields in Malaysia.

$H_{1\ (a\text{-}i)}$[5] *The new marginal oil fields fiscal regime under RSC will have a higher investor's NPV than R/C factor PSC under different oil prices and reserves levels.*

$H_{2\ (a\text{-}i)}$ *The new marginal oil fields fiscal regime under RSC will have a higher investor's IRR than R/C factor PSC under different oil prices and reserves levels.*

$H_{3\ (a\text{-}i)}$ *The new marginal oil fields fiscal regime under RSC will have a higher investor's PI than R/C factor PSC under different oil prices and reserves levels.*

$H_{4\ (a\text{-}i)}$ *The new marginal oil fields fiscal regime under RSC will have a higher investor's AGR than R/C factor PSC under different oil prices and reserves levels.*

$H_{5\ (a\text{-}i)}$ *The new marginal oil fields fiscal regime under RSC will have a higher investor's SI than R/C factor PSC under different oil prices and reserves levels.*

[5] The (a-i) in hypotheses 1-5 refers to as the various scenarios hypothesized of which: (a) high oil price-high reserve, (b) high oil price-medium reserve, (c) high oil price-low reserve, (d) medium oil price-high reserve, (e) medium oil price-medium reserve, (f) medium oil price-low reserve, (g) low oil price-high reserve, (h) low oil price-medium reserve, and lastly (i) low oil price-high reserve.

4.3 Effect of Fiscal Regime Changes on Investors' CAPEX Performance

Studies have documented that tax reduction and investment incentives encourage investors to incur more CAPEX required for oil and gas development (Favero, 1992; Hann, 1984). Conversely, an increase in taxes and a reduction in allowance decrease the investors' appetite for CAPEX (Kemp & Stephen, 2011a). Moreover, in relationship to the Economic Theory of Regulation, Gaffikin (2005) asserted that, although the tax is used as an instrument to regulate certain activities in the industry, it can also used as a motivation to encourage some activities in the same industry. Gaffikin further noted that, through incentive-based regulations, industries claim certain incentives that serve as motivation for them to undertake certain activities. Gaffikin (2005) further posited that regulation can be negative when it prevents certain behavior, but can also be positive when it encourages certain behavior. It is also evident that regulation can have an incentive effect on productivity growth (Seo & Shin, 2011; Uri, 2003). Thus, the argument can be made that productivity may increase profitability. Therefore, in line with the literature and theory, the following conceptual framework is proposed with the aim of providing an explanation about whether or not the change in marginal oil fields fiscal regulation has improved investors' CAPEX performance. The framework is depicted in Figure 4.2 below.

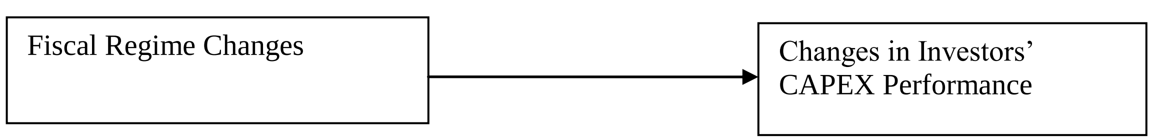


Figure 4.2
Conceptual Framework (Model 2)

This model is proposed to provide an explanation about whether fiscal regime changes introduced in 2010 encouraged investors to incur more CAPEX beyond that which would have been expected without such incentives. In mature oil provinces such as the UK, any change in a petroleum fiscal regime attracted researchers to investigate the importance of such changes to investors and the government (Kemp & Stephen, 2011a, 2011b, 2012a, 2012b; Nakhle, 2004, 2005, 2007; Nakhle & Hawdon, 2004). However, since the adjustment of Malaysian marginal oil fields fiscal regime in 2010, the current study did not come across related studies undertaken to provide explanations about the relevance of the new fiscal regime in improving investors' CAPEX performance. Therefore, to address this research challenge, the following hypotheses were formulated to achieve objective two in relationship to the effect the new marginal oil fields fiscal regime on investors' CAPEX performance.

$H_{6\ (a\text{-}d)}$[6] *Investors' CAPEX performances increased after the fiscal regime changes in 2010.*

H_7 *Investors' cumulative (marginal oil fields' subsector) CAPEX performance increased after the fiscal regime changes in 2010.*

4.4 Relationship between Tax Instruments and the Investment Climate of Marginal Oil Fields

Studies highlight the fact that tax instruments are important determinants of marginal oil field investment attractiveness (Akhigbe, 2007; Nakhle, 2005). Nakhle (2005) argued that taxation is a significant factor influencing the investment attractiveness of marginal

[6] The (a-d) in hypothesis 6 refers to individual CAPEX performance of marginal oil fields' investors, for which: (a) is the CAPEX performance of Dialog, (b) is the CAPEX performance of SapuraKencana, (c) is the CAPEX performance of PETROFAC, and lastly (d) is the CAPEX performance of PETRONAS.

oil fields. Nakhle (2005) defined taxation as the composition of tax instruments applied to the petroleum industry, such as royalties, resource rent taxes and tax incentives as contained in her opinion survey of industry experts. Moreover, Akhigbe (2007) posited that, when governments in oil and gas producing countries provide a wide range of incentives through legislation, improvements could result in the investment climate of marginal oil fields. In fact Martin (1997) argued that adjustments made to the UK petroleum fiscal regime were the most significant factor leading to the 1985 and 1995 peaks in oil production. Consequently, when other factors are held constant, tax instruments are important factors that affect the investment climate of marginal oil fields (Sarsenbayev, 2010).

The Economic Rent Theory, specifically the Ricardian school of thought, posits that because oil and gas reservoirs are of different fertility, the result is differential rents (Mukherjee, 2002; Nakhle, 2008; Njeru, 2010) with marginal lands having lower or no rent under different price and reserve levels (Mukherjee, 2002). The differential rent definition reflects the nature of a marginal oil field, describing it as “a field that may not produce enough net income to make it worth developing at a given time; should technical or economic conditions change, such a field may become commercial” (Svalheim, 2004, p. 5). These technical and economic conditions include technology, costs, price, and taxation. Linking this definition with the Nakhle’s (2005) view on the effect of taxation on oil field investment climate, the implication that less-stiff taxes combined with certain incentives can improve the investment climate of marginal oil fields.

Similarly, in relationship to Economic Rent Theory, Taylor, Severson-Baker, Winfield, Woynillowicz, and Griffiths (2004) posited that subsidies given to oil and gas exploration companies can affect the government's share of economic rent and will lead to more oil and gas activities than would have been without such subsidies. This implied that tax incentives offered to an OGC influence its evaluation of oil and gas project's investment climate, which affects its investment behavior.

Moreover, the application of Bargaining Theory in the oil and gas industry highlights how host countries obtain bargaining power overtime through the learning curve approach, which enables them to optimize benefits from their sovereign national resources (Hosman, 2006; Moran, 1974; Vivoda, 2011). This means that states can use their bargaining experience in designing an attractive petroleum fiscal regime for marginal oil fields, which may serve as a motivation for optimal development of marginal oil fields in such a manner that would benefit both the operator and government. Conversely, applying stringent fiscal terms can affect the investment climate of the marginal oil fields and may chase investors away from the industry (Glave & Damonte, 2013). Hence, government needs to use its acquired bargaining experience to propose fiscal terms that can motivate the operators to optimally produce from such reservoirs.

Therefore, in line with the literature and theoretical evidence, which shows the likelihood of a relationship between tax instruments and the investment climate of marginal oil fields, the following conceptual framework is developed that depicts the direction of the relationship between the tax instruments and the investment climate of marginal oil fields in the presence of an attractive petroleum fiscal regime. The framework is presented in model three below.

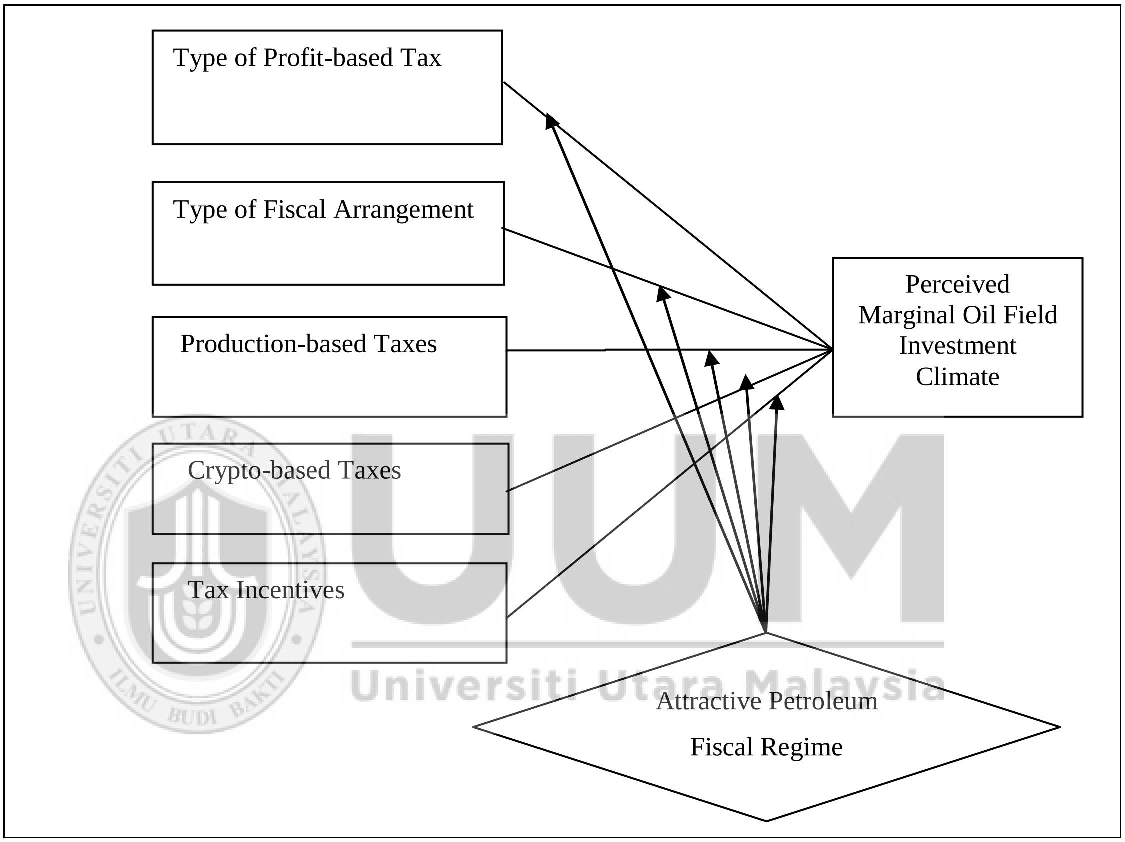


Figure 4.3
Conceptual Framework (Model 3)

Therefore, model 3 is a conceptual framework proposed to achieve objectives three and four for examining the relationship between tax instruments and the investment climate of marginal oil fields, and whether attractive petroleum fiscal regimes stimulate such relationships. In line with this framework, hypotheses are developed in the following subheadings.

4.4.1 Relationship between Types of Profit-based Tax and the Investment Climate of Marginal Oil Fields

Theoretically, the literature highlights that taxes create investment distortions (Árnason, 2008; Liu, 2011). Interestingly, the more a tax targets pure economic rent, the less distortion that tax creates to investment (Árnason, 2008). However, different tax types have different investment distortions, thus; the most proper tax type is the one that creates the least distortion (Nakhle, 2008). Nakhle (2008) enumerate three types of taxes that target pure economic rent — BT, RRT/PIT and CIT. Although each of these target economic rent, a comparison of the merit and demerits the three types of profit-based taxes indicates that only BT targets investors' NCF and it is common knowledge that NCF is an important determinant of a project's investment climate. Freebairn and Quiggin (2010) concluded that BT has the desired efficiency and greater transparency in principle.

PIT is also progressive as it imposes tax based on profit not on production or gross revenue; it also secures target returns for an investor and enables the government to capture economic rent (Phina, 2005). PIT also enables risk sharing between the government and investors; hence it is very good in attracting investment. More so, it does not collect rent till an investor recovers all his costs (Menezes, 2005). However, CIT is classified as regressive because it is not a petroleum-project based tax (Tordo, 2007), but is still applied to OGCs (Menezes, 2005).

While three types of profit-based taxes that target economic rent exist, as contained Nakhle (2008), however only two types (BT and PIT) should be investigated in this current study. The remaining one CIT, which currently applies to marginal oil fields, would be used as a reference-base. Consequently, the argument can be made that these types of profit-based taxes have differential effect on the investment climate of marginal oil fields due to differential investment distortions, transparency, and efficiency. Thus, in line with this argument the following hypothesis is developed as part of achieving objective three of the study.

$H_{8a\ (i\text{-}ii)}$[7] *Type of profit-based tax is positively related to the investment climate of marginal oil fields.*

Though different types of profit-based tax have different investment distortions (Árnason, 2008; Liu, 2011), the argument can be made that, regardless of the type of profit-based tax applied in a country's energy sector, if the petroleum fiscal regime is attractive this tax may have less of a distortion effect on an investment. This means that an interaction between the type of a profit-based tax and an attractive petroleum fiscal regime may have a significant effect on the investment in a marginal oil field. Thus, the argument can be made that an attractive fiscal regime can stimulate the effects of types of profit-based tax on the investment climate of marginal oil fields. In fact, the literature highlights that effect of tax policy in oil and gas industry on investor cash flow can be moderated by country fiscal regime (Artist, 2009). Therefore, in line with this argument the following hypothesis is developed.

[7] The (i-ii) in hypothesis 8a and 8b refers to types of profit-based tax, of which: (i) is BT, and (ii) is PIT.

$H_{8b\ (i\text{-}ii)}$ *An attractive petroleum fiscal regime moderates the relationship between types of profit-based tax and the investment climate of marginal oil fields.*

4.4.2 Relationship between Types of Fiscal Arrangement and the Investment Climate of Marginal Oil Fields

The literature notes that three major fiscal arrangements, concessionary, production sharing and service contracts are the most common agreements in the oil and gas industry. However, each has its distinct attributes that make them different from the others, although in a few instances, they share common features. Likosky (2009) posits that in countries in which resource nationalism and anti-foreign sentiment are common, a name attached to a particular form of arrangement may be rhetorically more important than the actual practice. The petroleum fiscal arrangement literature shows that different arrangements provide different degrees of independence and resource control to a host country (Johnston, 1994a, 2003). In fact, Likosky (2009) argued that a service contract gives a high level of independence to the host countries, but a low level to investors. In contrast, Likosky (2009) opines that production-sharing arrangements are more desirable to attract developmental projects in which high exploration risk exists. Thus, this indicates how different types of fiscal arrangements have varying implications for investors' evaluations of the investment climate of oil fields. More interesting, Likosky (2009) further posits that, even within a particular country, different projects require different types of fiscal arrangements. By implication, this shows that a particular form of fiscal arrangement could be more desirable for marginal oil field development projects.

Despite the existence of four types of fiscal arrangements — a concessionary system (royalty/tax system), a production-sharing contract, a risk service contract, and a pure service contract — only two are examined in this current study. First, a concessionary system was the first fiscal arrangement in Malaysia from 1910 until 1974, when a production-sharing contract was introduced. The abandonment of a concessionary system after more than 60 years of existence may mean that the system was tested and found unfavorable. Second, a risk service contract, which currently applies to marginal oil fields, would be used as a reference-base. Therefore, in line with the literature the argument can be made that types of fiscal arrangements are related to the investment climate of marginal oil fields. Hence, the following hypothesis is developed as part of achieving objective three of the study.

$H_{9a\ (i\text{-}ii)}$[8] *Type of fiscal arrangement is positively related to the investment climate of marginal oil fields.*

Furthermore, the literature highlights that different oil and gas projects require different types of fiscal arrangements (Likosky, 2009). This means that a small field oil project such as a marginal oil field requires a fiscal arrangement different from those of large oil projects. However, the argument can be made that, regardless of the type of fiscal arrangement applied to small oil and gas field's projects, the interaction between the type of fiscal arrangement and attractive petroleum fiscal regime may have a significant effect on the investment climate of marginal oil fields. This means that an attractive petroleum

[8] The (i-ii) in hypothesis 9a and 9b refers to as types of fiscal arrangements, for which: (i) is Production Sharing Contract (PSC), and (ii) is Pure Service Contract.

fiscal regime stimulates the relationship between types of fiscal arrangement and the investment climate of marginal oil fields in Malaysia. In addition, the literature highlights that the effects of mineral right policy on investor cash flow can be moderated by a country's fiscal regime (Artist, 2009). Therefore, in line with the above argument the following hypothesis is developed.

$H_{9b\ (i\text{-}ii)}$ *An attractive petroleum fiscal regime moderates the relationship between types of fiscal arrangement on the investment climate of marginal oil fields.*

4.4.3 Relationship between Production-based Taxes and the Investment Climate of Marginal Oil Fields

Production-based taxes are those forms of taxes paid by the investor based on mineral output regardless of whether economic rent (profit) is realized or not. These forms of taxes are less neutral than profit-based taxes as they do not target economic profit directly, but rather overall production revenue (Menezes, 2005). Moreover, the argument can be made that the absence of production-based taxes such as royalties positively influences the production of new/marginal oil fields (Phina, 2005). Thus, Phina (2010) concluded that eliminating royalty and reliance of profit-based taxes that are more neutral and capturing economic rent can boost production from marginal oil fields and would motivate small companies to join the game.

To reduce financial risks and increase fields' investment climate, companies generally prefer profit-based taxes instead of production-based taxes. The fact is that production-based taxes compel companies to make an upfront payment regardless of whether they recover their cost or not (McPhail *et al.*, 2009). These scholars further assert that production-based taxes are disliked for two main reasons. First, they can have a negative effect on economic cut-off rates because they are regressive, and second, they are paid even in loss-making years (McPhail *et al.*, 2009). Consequently, capitalizing on these two reasons McPhail *et al.* (2009) argued that production-based taxes are negatively related to the investment climate of marginal oil fields, due to their regressive nature and upfront payment even in the periods of losses. Hence, the following hypothesis is formulated as part of achieving the third objective:

H_{10a} *Production-based taxes are negatively related to the investment climate of marginal oil fields.*

However, the argument can be made that the presence of an attractive petroleum fiscal regime comprises neutral tax instruments can stimulate the relationship between production-based taxes and the investment climate of marginal oil fields. Fiscal regimes can be attractive when they comprise some neutral tax instruments and are stable and simple to administer (Akhigbe, 2007; Ogunlade, 2010; Oldianosen, 2004; Sarsenbayev, 2010). Moreover, Artist (2009) proposed that the effect of tax policy on private investor cash-flow can be moderated by a fiscal regime in place. Thus, this highlights the fact that an attractive fiscal regime can be a potential moderator of the relationship between production-based taxes and the investment climate of marginal oil fields. Therefore, the following hypothesis is developed as part of achieving objective four.

H_{10b} *An attractive petroleum fiscal regime moderates relationship between production-based taxes and the investment climate of marginal oil fields.*

4.4.4 Relationship between Crypto-based Taxes and the Investment Climate of Marginal Oil Fields

Crypto-based taxes, otherwise known as quasi-taxes or presence-based taxes, are additional costs and obligations imposed on OGCs based on their presence and are sometimes implemented regardless of whether production, revenue and, or profits are made. According to Johnston (2003), crypto-taxes are payment obligations by an investor company to the host country, but not appearing in the GT calculation and not recoverable either. Johnston (2003) further said that they are the price of doing business, and they vary among countries. Crypto-taxes are indirect taxes through which a government collects additional revenue through levies, imposition of duties and other financial obligations (Iledare, 2014). Examples of crypto-based taxes are domestic market obligation, security fees, custom duties, hostile audits, unclear regulations, government participation and hiring requirements (Abdulkarim, 2009).

Although some crypto-based taxes such as government participation are neutral, they are not in favor of OGCs, because the government as participant is “carried” at the exploration stage with no cost commitment and sometimes uses its production share to settle its development cost obligations (Abdulkarim, 2009). Moreover, some crypto-based taxes not related to either company output or profit are the most non-neutral taxes among all categories of taxes as it places tax liability on the companies even in the absence of production and/or revenue from oil and gas operation (Menezes, 2005).

McPhail *et al.* (2009) opined that quasi-taxes such as the level of government participation, environmental obligation, technology transfer, skill training and employment have consequences for investment decisions and production efficiency. These crypto-tax instruments are not disposed to assist profitability as they tend to lower the field's profitability in economic terms (Iledare, 2014).

However, empirical evidence about this relationship has not been established in the literature of petroleum fiscal regimes. Mineral taxation literature has not explored the relationship between crypto-taxes and investment decisions of companies in either theoretically or empirically (McPhail *et al.*, 2009). Thus, the argument can be made that crypto-based taxes relate to the investment climate of marginal oil fields because these taxes increase the investors' obligations beyond those within the fiscal arrangements and lower the profitability of oil and gas assets (Iledare, 2014). These arrangements also compel investors to pay taxes even in loss-making years (McPhail *et al.*, (2009). As a result, the following hypothesis is developed as part of achieving the third objective.

H_{11a} *Crypto-based taxes are negatively related to the investment climate of marginal oil fields.*

Nevertheless, the relationship between crypto-based taxes and the investment climate of marginal oil fields may be contingent upon the moderating effects of attractive petroleum fiscal regimes. The expectation is that an attractive petroleum fiscal regime can reduce the adverse effects of crypto-based taxes on the investment climate of marginal oil fields.

An attractive petroleum fiscal regime is the one that is stable, neutral and simple. A fiscal regime that is stable, simple and contains neutral elements can reduce the adverse effects that crypto-based taxes may have on the investment climate of marginal oil fields. In fact, Artist (2009) highlighted that the effect of country's tax policy on the investors' cash-flow can be moderated by the fiscal regime in place. This highlights the fact that an attractive petroleum fiscal regime can be a potential moderator of the relationship between crypto-based taxes and the investment climate of marginal oil fields. Thus, the following hypothesis is developed to investigate whether the existence of attractive petroleum fiscal regime can impact the relationship between crypto-taxes and the investment climate of marginal oil fields as part of achieving objective four.

H_{11b} An *attractive petroleum fiscal regime moderates the relationship between crypto-based taxes and the investment climate of marginal oil fields.*

4.4.5 Relationship between Tax Incentives and the Investment Climate of Marginal Oil Fields

Morisset, Pirnia, Allen, and Wells (2000) said that understanding the effects of incentives in attracting investments became part of the research agenda in mid-1980s. Lim (2001) pointed that fiscal incentives can enhance a country's location advantage. Thus, Babatunde (2012), Clark (1999) and Lim (2001) have documented that, all things being equal, the effect of tax incentives on investment attractiveness should be positive and significant. However, other studies such as Lim (1983) and Ricupero (2000) showed that incentives have no effect in improving investment attractiveness in less developed countries. Evaluating its aggregate effects is difficult (Ricupero, 2000). Despite conflicting findings, studies show that investors' have differential preferences for incentives. A survey of managers of US firms by Rolfe, Ricks, Pointer and McCarthy (1993) showed that new companies prefer incentives that can shrink their take-up expenses such as equipment and material, while existing firms prefer incentives that target profit improvement. In the aggregate, however, Clark (1999) suggested that small firms are more responsive to incentives than big ones are. This implied that, with respect to marginal oil fields that is the environment in which small firms operate; these small firms would be responsive to incentives.

Though survey evidence on the relationship between tax incentives and the investment attractiveness has been obvious in other industries, evidence is scanty on effect of incentives on the investment climate of marginal oil fields. However, the effect of incentives on the investment climate has been documented in the oil and gas industry through scenario analysis (Kazikhanova, 2012; Kemp & Stephen, 2011a, 2011b, 2012a, 2012b). Therefore, in line with the previous studies that highlight the relationship between tax incentives and investment attractiveness and limited empirical evidence on the effect of tax incentives on marginal oil fields investment climate, the following hypothesis is developed as part of achieving objective three.

H_{12a} *Tax incentives are positively related to the investment climate of marginal oil fields.*

Though the current study posits a significant relationship between tax incentives and the investment climate of marginal oil fields; however, global literature on the such relationship documented mixed findings (Tung & Cho, 2000). For instance, Morisset *et al.* (2000) in a literature survey documents that tax incentives neither cause serious negative effects on investment environment nor attract the desired externalities. Contrarily, Clark (1999) and Ricupero (2000) found positive effects of tax incentives on investment attractiveness. Moreover, it was argued that despite inconsistencies in the literature and cautions by scholars on the use of incentives, states are likely to continue offering them (Buss, 2001). Consequently, the recommendation is that stability and simplicity of the fiscal regime would be more desirable to investors in an environment with political and institutional risks than generous tax rebates and incentives (Morisset, *et al.*, 2000).

The suggestion has been made that, where inconsistencies are present in the literature, a moderator variable could be introduced into the model to examine whether it could stimulate the relationship (Baron & Kenny, 1986). Hence, due to inconsistencies in the literature about the relationship between tax incentives and investment attractiveness, and the relevance of an attractive petroleum fiscal regime in attracting investment, the current study proposed that an attractive petroleum fiscal regime stimulates the relationship between tax incentives and the investment climate of marginal oil fields. As a result, the following hypothesis is formulated as part of achieving objective four of the study.

H_{12b} *An attractive petroleum fiscal regime moderates the relationship between tax incentives and the investment climate of marginal oil fields.*

4.5 Summary

The chapter presented the three conceptual frameworks of the study, which were derived from three issues: the practical problem, the extant literature and the relevant theories. From these frameworks, hypotheses were developed in line with the objectives and research questions. Table 4.1 below summarizes the hypotheses in line with the research questions and objectives.

Table 4.1
Summary of Research Questions, Objectives and Hypotheses

Research Questions	**Objectives**	**Hypotheses**
1-To what extent does the new fiscal regime improves investment climate in Malaysian marginal oil fields?	1- To examine the extent to which the new fiscal regime improves investment climate in Malaysian marginal oil fields.	H1 (a-i), H2 (a-i), H3 (a-i), H4 (a-i), and H5 (a-i).
2-To what extent do investors CAPEX performances improve under the new fiscal regime?	2-To examine the extent to which the investors' CAPEX performances improve under the new fiscal regime.	H6 (a-d) and H7
3-Do tax instruments relate to the investment climate of marginal oil fields?	3-To examine the relationship between tax instruments and the investment climate of marginal oil fields.	H8a (i-ii), H9a (i-ii), H10a, H11a and H12a
4- Does an attractive petroleum fiscal regime moderate the relationship between tax instruments and the investment climate of marginal oil fields?	4-To examine the moderation effect of attractive petroleum fiscal regime on the relationship between tax instruments on the investment climate of marginal oil fields.	H8b (i-ii), H9b (i-ii), H10b, H11b, and H12b

CHAPTER FIVE
METHODOLOGY AND ASSUMPTIONS

5.1 Introduction

There are two main research paradigms, interpretivism and positivism, that are conducted, which use qualitative and quantitative methodologies respectively. The positivism approach is suitable for researchers who seek independence in understanding the social reality by detaching themselves from the subject of the study thereby drawing conclusions based on experiential proof and tested theories using hypothesis testing (McKerchar, 2008). Thus, a positivist researcher gives an explanation on the phenomenon based on deductive reasoning gained from a structured process, which will lead to the determination of a causal relationship, drawing valid conclusions and making predictions based on confidence intervals (McKerchar, 2008; Schrag, 1992). By implication, positivist researchers are independent of the conclusions drawn from their studies; thus, they are described as being realists and fundamentalists who view the world independently from their own knowledge.

In contrast, interpretivism, which is otherwise known as anti-positivism, is based on the belief that the researcher cannot be separated from the subjects being studied (McKerchar, 2008; Ponterotto, 2005). This paradigm provides explanation of social reality based on the researcher's subjective interpretation; thus, a researcher's explanations are likely to be open-ended and messy instead of neat, complete and nice (McKerchar, 2008; Ponterotto, 2005). The implication derived from this discussion is that a positivist researcher uses a quantitative methodology while an interpretivist employs qualitative methodology.

In relationship to the phenomenon being considered in this study, some scholars use a quantitative scenario analysis (Kazikhanova, 2012; Kemp, Rose, & Dandie, 1991; Kemp & Stephen, 2011a, 2011b, 2012a, 2012b; Nakhle, 2007; Nakhle & Hawdon, 2004), while other studies use a quantitative survey (Kyari, 2013). Some even use qualitative survey methodologies through interviews (Nakhle, 2004, 2005). However, a researcher's beliefs as well as how the researcher views and understands the real world influences the selection of the research paradigm (Saad, 2011).

Therefore, with a view of being independent of the conclusions that would be drawn from this current study and in line with other previous studies relating to the examination of the relationship between tax instruments and investment climate, the positivist paradigm seems more appropriate for this study. In fact the argument can be made that, despite its criticisms, a positivist paradigm is difficult to avoid due to its tests of causation (Schrag, 1992).

In petroleum fiscal regime studies or petroleum tax design, the scenario approach has been the most commonly used methodology. In addition, many OGCs have used scenario analysis based on NCF in evaluating investment viability (Nakhle, 2007). Therefore, this approach was employed. In addition, trend analysis and a survey approach were also employed as a complement to the scenario analysis to enable the incorporation of perception-based factors. Because some fiscal instruments such as domestic market obligation, employment quotas, price cap formulas, reinvestment obligation and performance bond, which are unquantifiable but whose effects can be perceived, cannot be incorporated into scenario analysis. In fact, Smith (2012, 2013) suggested exploring other methodologies as complement to scenario analysis. In this, Smith concluded that:

> We close with the suggestion that, wherever possible, lets tax policies for extractive resources be founded on the basis of models and methods that admit the broadest range of behavioral response. And let researchers continue their efforts to develop and refine models to that end (Smith, 2013, p. 330).

Thus, the expectation by this study is that combining the scenario approach, trend analysis and the survey approach will provide more explanatory power about the influence of tax instruments and attractive petroleum fiscal regimes on the investment climate of marginal oil fields. The combination of these methods in a single study is based on the suggestion that studies using scenario techniques can be improved immensely if they are combined with other methods (Mietzner & Reger, 2005). Hence, this evidence justifies the use of other methods in addition to the scenario approach, which provides explanations on the effects of tax instruments and fiscal regimes on the investment climate of marginal oil fields.

5.2 Scenario Approach

Objective one of the study was examined using the scenario analysis. This objective was formulated to examine the impact of 2010 fiscal regime changes on the investment climate of marginal oil fields in Malaysia. The aim of this analysis is to understand whether the change in the fiscal regime improves the investment climate of marginal oil fields in Malaysia. Therefore, in line with flowcharts presented in Chapter Two that highlight cash flow to the government and investors under different regimes, this subsection presents cash flow models derivation for scenario analyses. It also presents field sizes and production assumptions, tax scenario assumptions, oil price assumptions, cost assumptions, fee assumptions, duration assumptions and analysis techniques and software to be used in achieving the objective.

5.2.1 Variable Measurement

The proxies used mostly for fiscal regimes are taxes and tax allowances contained in a particular country's petroleum fiscal policies, while the proxies for measuring investment climate are investment viability indicators such as Pay Back Period, NPV, IRR, PI, SI and AGR (Hao & Kaiser, 2010; Kaiser, 2007; Mingming, Zhena, & Yanni, 2014; Njeru, 2010; Sen, 2014). Moreover, the most common method in conducting such analysis is the scenario approach, which is based on the projection of NCF for oil and gas production with the application of country's fiscal impositions (Nakhle, 2007). This measurement approach measurement was utilized with modifications based on the peculiarities of the Malaysian fiscal regime for marginal oil fields.

5.2.2 Cash flow Model Derivations

Because the study evaluates the investment climate of Malaysia marginal oil fields, the investors' NCF model would be important for the analysis. In this, two models are appropriate: R/C factor PSC and RSC cash flow models. PSC cash flow model for investor comprises costs recovered during the year, profit oil received by the investor, CAPEX incurred during the year, Operating Expenditure (OPEX) incurred during the year, research CESS paid during the year, and tax paid during the year are also included. This is expressed as follows in line with (Hao & Kaiser, 2010; Nakhle, 2010):

Model 1

$PSC_t = CR_t + PO_t – CAPEX_t – OPEX_t - RCESS_t – TAX_t$

Where;

PSC = Investor's cash flow under Production Sharing Contract

CR = Cost recovered during the year

PO = Share of investor's profit oil during the year

CAPEX = Capital Expenditure incurred during the year

OPEX = Operating Expenditure incurred during the year

RCESS= Research CESS

TAX = Tax paid by investor

Moreover, investor's cash flow under RSC comprises investor' cost recovery during the year; fee oil received, CAPEX incurred during the years, OPEX incurred during the year and tax paid during the year are used. This is expressed in line with the related studies (Hao & Kaiser, 2010; Nakhle, 2010):

Model 2

$RSC_t = CR_t + FEEOIL_t - CAPEX_t - OPEX_t – TAX_t$

Where;

RSC = Investor's cash flow under Risk Service Contract

CR = Cost recovered during the year

FEEOIL = Fee Oil received during the year

CAPEX = Capital Expenditure incurred during the year

OPEX = Operating Expenditure incurred during the year

TAX = Tax paid by investor

Apart from these, however, there is variation on cost recovery based either on the percentage limits or accelerated capital allowance, which differ under the two fiscal regimes. Therefore, data relating to the fiscal terms of R/C factor PSC and RSC, which are based on publically available information as contained in Fig. 2.7, Fig. 2.8 and Table 2.5 above were utilized. Moreover, for the field data, the data for Kapal, Banang and Meranti (KBM) marginal fields project located in Offshore Peninsular Malaysia were utilized. The data was obtained from the information released by the project contractor (Coastal Energy, 2012), and offshore technology.com (Offshore Tecnology.com, 2014). Hence, assumptions relating to productions, reserves, costs, and duration are based on the information available from these sources.

5.2.3 Company and Field Assumptions

The study assumes that each single oil field is owned and operated by a single OGC; in an ideal case, an oil field is managed by more than one JV, with each company receiving its share and paying its tax separately. The rationale for this assumption is to avoid complications in the computations. A similar assumption was also used to simplify the computation in previous studies such as those of Njeru (2010) and Nakhle (2004).

5.2.4 Tax Scenarios

The study uses two tax scenarios relating to fiscal regime under PSC and RSC. The scenario under PSC uses total imposition on investors under R/C factor PSC while the RSC scenario considers impositions under the new RSC for marginal oil fields. Table 5.1 below presents the two scenarios.

Table 5.1
Tax Scenarios

Scenario	Fiscal Terms
PSC Scenario	Royalty of 10% on gross production, PIT of 38%, Research CESS of 0.5% Capital allowance for 10 years, Export Duty 10%
RSC Scenario	Royalty paid by PETRONAS on its share, CIT of 25% no Research CESS, Accelerated Capital Allowance for 5 years, Zero Export Duty.

5.2.5 Field Size (Reserves) and Production Assumptions

The study assumes a base case field size consist a reserve of 30 million BOE, which is the average field size for marginal oil fields in Malaysia (Faizli, 2012; Na *et al.*, 2012) Therefore, KMB field data was used. It was estimated that the recoverable reserves of a KMB marginal field range from 15 to 35 million BOE (Coastal Energy, 2012). Thus, three reserve levels: small, medium and large with 15, 25 and 35 million BOE respectively were assumed.

It was also estimated that KMB fields have lower production, which are 4,530 barrels per day (bpd) of oil, 4 million metric cubic feet (mcf) of gas that is the equivalent of 5,220 BOE based on the American Petroleum Institute's (API) conversion of 6:1. That is 1 barrel of oil is equivalent to 6 mcf of gas. The annual production at lower range will be 1,905,300 BOE. During a higher period, the production stands at 16,495 bpd of oil and 14 million mcf of gas, which is equivalent to 18,909 BOE per day, with the annual production during the high production period of 6,901,785 BOE.

The KMB contract has an estimated production period of 8 years 2012 to 2019, and production was started in December 2013 (Lacouture, 2013b). Therefore, based on this data, the assumption was that for small fields (15 million BOE), production started at the lower range in the second year beginning from December, 2013, it reached its peak in the third year i.e. 2014 and then declined at 45% annually up to 2019. For medium fields (25 million BOE), the assumption was that production started at lower range in the second year beginning from December, 2013, it reached its peak in the third year i.e 2014 and then declined at 21% annually up to 2019. For larger fields (35 million BOE), the assumption was that production started at lower range in the second year beginning from December, 2013, it reached its peak in the third year i.e. 2014 and then declined at 6% annually up to 2019. Similar assumptions were made in previous studies based on reserve levels used in their studies (see Ghandi & Lin, 2014; Hao & Kaiser, 2010; Kaiser, 2007; Saidu & Mohammed, 2014). Table 5.2 below presents reserves, production and depletion rate assumptions used in the analyses.

Table 5.2

Reserve, Production, and Depletion Assumptions

Large Size Marginal Field (≈35 million BOE)		**Medium Size Marginal Field (≈25 million BOE)**		**Small Size Marginal Field (≈15 million BOE)**	
Year	**Production**	**Year**	**Production**	**Year**	**Production**
2012		2012		2012	
2013	156,600	2013	156,600	2013	156,600
2014	6,901,785	2014	6,901,785	2014	6,901,785
2015	6,487,678	2015	5,452,410	2015	3,795,982
2016	6,098,417	2016	4,307,404	2016	2,087,790
2017	5,732,512	2017	3,402,849	2017	1,148,284
2018	5,388,561	2018	2,688,251	2018	631,557
2019	5,065,248	2019	2,123,718	2019	347,356
Total	**35,830,802**		**25,033,017**		**15,069,354**
Annual Depletion Rate	**6%**		**21%**		**45%**

Note. The depletion rates assumed to be 6%, 21% and 45% for marginal oil fields with recoverable reserves of 35 million BOE, 25 million BOE, and 15 million BOE respectively. The production data for 2013 and 2014 are real, while 2015,2016,2017,2018 and 2019 were projected.

However, the two tax scenarios were tested for sensitivities to various oil prices and reserve levels. In this, three field sizes sensitivities were tested at 15, 30 and 35 million BOE based on Coastal Energy estimates that the marginal oil fields reserves in Malaysia range from 15-35 million BOE (Coastal Energy, 2012).

5.2.6 Development and Operation Costs

It has been estimated that the development cost (capital expenditure - CAPEX) of KMB marginal fields is equivalent to USD 320 million to be expended within three years (Coastal Energy, 2012). Therefore, this assumption was used in this study. No specific operating cost data are available for KMB fields; however, average operational/lifting cost (operational expenditure - OPEX) within Asia is estimated at USD 9.5 per barrel (US Energy Information Administration, 2014b). Therefore, this rate is assumed for KMB fields in this study.

5.2.7 Price Assumption

Three Brent spot crude oil prices were assumed: low, medium and high. The highest average annual Brent spot crude oil prices from 1987-2040 (projection) based on nominal dollar value of 2012 was USD 141.46, while the lowest was USD 17.2 (US Energy Information Administration, 2014a). Therefore, these two prices were used to arrive at the medium oil price (141.46 plus 17.2 divided by 2), which equaled 79.33. Thus, USD 79.33 was used as the medium oil price. In summary, three Brent oil prices were assumed: high, medium, and low with values of USSD 141.46, USD 79.33, and USD 17.2 respectively. The duration of the KMB fields' development project (2012 –

2019) is covered by the Brent oil price projection of 1987-2040, providing sufficient justification for prices assumed in the analysis.

5.2.8 Service Fee

Many press releases on Malaysian RSC revealed that contractors are entitled to a per barrel remuneration fee attached to performance. However, Lacouture (2013) reported that contractors of Malaysian marginal fields under RSC receive 10% of per barrel revenue as a remuneration fee. Therefore, 10% remuneration fee for RSC contractors was used.

5.2.9 Discount Rate

In line with other studies, this study assumed a 15% discount rate for computation of DCF (Kaiser & Pulsipher, 2004; Saidu & Mohammed, 2014). The DCF was then used in calculating NPV, IRR, PI, AGR, and SI for different oil prices and reserves scenarios.

5.2.10 Unit of Analysis

The units of analysis for the scenario analysis were derived from documents gleaned from press releases made by PETRONAS, Coastal Energy (Operator of the KMB field) and the US Energy Information Administration. The reason for using documents is to extract relevant information relating to the oil prices, reserves levels, features of fiscal arrangements and their provisions. Similar studies have used similar sources of data (see (Ghandi & Lin, 2014; Hao & Kaiser, 2010; Kaiser, 2007; Saidu & Mohammed, 2014).

5.2.11 Analysis Techniques

The investment climate under the two tax scenarios was evaluated using investor's NPV, IRR, PI, SI, and AGR. Moreover, sensitivity analysis was conducted for measuring how sensitive the two tax scenarios were to different oil prices and reserve levels. The analysis was conducted using the Excel Package. Formulas were used based on the cash flow derivation model expressed in Section 5.2.2 above for computing investor's NPV, IRR, PI, AGR, and SI under for various scenario at different oil prices and reserve levels.

5.3 Trend Analysis of Investors CAPEX

Objective two of the study was achieved using trend analysis. The essence of this analysis is to reconfirm whether or not 2010 fiscal changes impacted the investment climate. Thus, using trend analysis to support the scenario analysis is consistent with the view of Kivikunnas (1998), who posits that "Trend analysis operates as a complementing, not as standalone system and normally provides information to some reasoning mechanism" (p. 6).

Hence, in this study trend analysis was conducted to confirm whether the change in the fiscal regime of marginal oil fields changed investors' CAPEX performance in line with the second objective of the study and to complement objective one on the effect fiscal regime changes on the investment climate of marginal oil fields. The argument here is that, when the investment climate is improved, companies would be willing to incur capital CAPEX and vice versa. In other words, when investors' appetite for CAPEX increases, it signifies that the investment climate is conducive; otherwise, it is not. The remaining part of this section discusses the period to be covered for the analysis, the number of companies to be involved, and analysis technique to be used.

5.3.1 Period Coverage

The trend analysis covers a period of six years. These include the three years before the change (2007, 2008 and 2009) and three years after the change (2011, 2012 and 2013). The six years were selected for the fact that the new fiscal regime was introduced in 2010, and most of the companies entered into the new fiscal arrangement on the basis of the new regime effective from 2011 onwards. Thus, financial statements of marginal oil fields operators for three years before and three years after were used for the analysis.

5.3.2 Population and Sample

The population for this analysis covers all companies that operate marginal oil fields in Malaysia. However, a sample of four companies was selected based on availability of data for the period covered in the study. Table 5.3 below presents the population and sample for the analysis.

Table 5.3
Companies and Year of First RSC Award

Company	**Year of RSC Award**
Petrofac	2011
Kencana/Supura Group	2011
ROC Oil	2011
Dialog D&P	2011
PETRONAS Carigali	2011
Costal Energy	2012
EQ Petroleum	2014
Uzmah Energy	2014
Ophir Oil	2014

Based on this population, four companies emerged as the sample used for the trend analysis, based on the following criteria. The companies and the criteria for exclusion from the sample are shown in Table 5.4 below.

Table 5.4
Population and Sample Selection

Criteria	**No.**
Total population of marginal oil fields operators	9
Coastal Energy was removed as it was awarded RSC in 2012	(1)
ROC Oil started operation in 2011 and has no prior Malaysian data.	(1)
EQ Petroleum, Uzmah Energy and Ophir Oil were awarded RSC in 2014	(3)
Sample (Petrofac, Kencana/Supura Group, Dialog D&P, and PETRONAS Carigali)	4

5.3.3 Unit of Analysis

The unit of analysis for the trend analysis is companies' annual reports. Four proxies of CAPEX were extracted from cash flow statements under "investing activities". These were: (1) purchase of property, plant and equipment, (2) tangible drilling costs incurred, (3) intangible drilling costs incurred, and (4) purchase of oil and gas properties.

5.3.4 Data Analysis

Trend analysis was conducted using Excel. Rosenberg (2007) and Meals, Spooner, Dressing and Harcum (2011) enumerated steps required in testing the significance of a trend. The first step is data exploration, which involves evaluating the data for missing observations. The second step is determining the variables for the analysis. The third step is data reduction and flow adjustment. The fourth step is graphing of the data for visual insights. The last step is statistical evaluation of the significance of the monotonic trend. The first four steps were performed using Excel, while last step was performed using the Jonckhree-Terpstra trend test through SPSS.

5.4 Survey Approach

The third and fourth objectives were achieved using a survey. Objective 3 examines the relationship between tax instruments and investment climate of marginal oil fields in Malaysia, while objective four examines the moderating effect of an attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields.

The remaining subsection discusses population and sample selection, unit of analysis, survey instrument development and validation, survey instrument design, and method of questionnaire administration. The section also considers issues relating to data collection procedures; this is followed by procedures for measuring and analyzing data collected for the study.

5.4.1 Survey Population

The population of the study comprises all staff that deal with oil and gas accounting and taxation in oil and gas related establishments in Malaysia. These focus groups were divided into three clusters: government, industry and practitioners. For the government, oil and gas accounting and taxation staff of PETRONAS and the Inland Revenue Board Malaysia, Malaysia Investment Development Authority and Malaysia Petroleum Resources Corporation were considered. For industry, OGCs that deal with marginal oil fields were surveyed. For practitioners, the oil- and gas-related staff of four audit firms (Ernst and Young, Deloitte, KPMG and BDO) that audit the accounts of marginal oil fields' operators were surveyed. The clusters as well as the organizations within each cluster are shown in Table 5.5 below.

Table 5.5
Survey Clusters and Populations

Cluster	**Organization**	**Population**
Government	PETRONAS/Vestigo	59
	Inland Revenue Board of Malaysia	26
	Malaysia Investment Development Authority	12
	Malaysia Petroleum Resources Corporation	0
Industry	Petrofac	25
	ROC Oil	27
	Coastal Energy	6
	SapuraKencana Group	19
	Dialog D&P	13
	EQ Petroleum Development	30
	Uzmah Energy Venture	20
	Scomi Energy	20
Practitioners	Ernst and Young	20
	Deloitte	16
	KPMG	18
	BDO	50
Total		**361**

Note. The approximate number of populations of oil and gas accounting, taxation and related employees were obtained from the contact persons in the respective organizations during the researcher's pilot study.

The study covered the whole population. Thus, the study distributed questionnaires to the whole population. This enabled obtaining an adequate number of respondents to run the analysis, which ensured its robustness. Similar approach was used in oil and gas study by Kyari (2013).

5.4.2 Unit of Analysis

The unit of analysis for the survey was the individuals within the focused organizations. The focus was made upon the staff that deals with oil and gas accounting, taxation and related matters in their respective organizations as outlined in Table 5.5 above. The organizations were selected based on their relevance to the phenomenon under investigation and as used in prior studies in the area (Kyari, 2013; Nakhle, 2004).

5.4.3 Instrument Development and Validation

Measures used in the survey instruments for this study were developed in line with guidelines and understanding of the prior studies (DeVellis, 2011; Galperin, 2012; Hinkin, 1995; Kaptein, 2008; MacKenzie, Podsakoff, & Podsakoff, 2011). The processes used in developing and validating survey instruments are similar among the aforementioned studies. However, the processes contained in DeVellis (2011) are comprehensive covering all other processes suggested or used by other scholars. These processes are: (1) determination of what is intended to measure with theory as a guide, (2) generating an items pool, (3) determination of measurement format, (4) reviewing the item pool by experts, (5) considering the inclusion of valid items, (6) administration of the pilot study to the development sample, (7) item evaluation, and (8) optimization of scale length. Therefore, these processes were followed in developing and validating the research instrument.

Thus, the following steps used DeVellis's (2011) guidelines. First, the definition of each construct to be measured was identified in line with its application in oil and gas. This was done through an extensive review of the literature. In this, emphasis is paid to theory and the specificity of the construct.

Second, a pool of items was generated from such definitions and the review of relevant literature. In this, an effort was made to ensure that only items that were conceptually linked to the constructs were generated and that redundancy in terms of items was avoided but content was ensured, which is the foundation for internal consistency. It was also ensured that items generated were easy for respondents to understand.

Third, the measurement format was also identified based on literature on scale development. The literature shows that the Likert scale is the best measure for this study because the items examine the attitudes of respondents based the extent of their agreement or endorsement with the statement used to measure the construct.

Fourth, the pool of prospective items was presented to the experts from four groups. The first group comprised three senior lecturers in oil and gas accounting and taxation; two were PhD holders from UK universities and lectures in UK universities, and the third was also PhD holder from a UK university but lectures in a Nigerian University. The second group comprised five PhD students in oil and gas accounting and taxation related fields; four were in UK universities and the fifth was in a Malaysian University. The third group comprised two PhD holders who were senior lecturers in a Malaysian University and are conversant with questionnaire related research. The fourth group comprised three PhD students in a Malaysian University who used questionnaires in their studies.

The first and the second group considered three issues: (1) relevance of the items in measuring the construct, (2) clarity and conscience of the item, and, (3) lastly, suggesting any additional item that was relevant, but not included in the items pool. The third and fourth commented on the clarity of each individual item and appropriateness of the individual measurement. The questionnaire was designed in English Language. After receiving the responses from the four groups, many wordings were amended, some questions were deleted, some questions were added and the Likert scale was confirmed as the appropriate measurement tool for continuous variables and dichotomous measurement was confirmed as the measurement for categorical variables based on the suggestions of these experts.

Fifth, consideration was made for inclusion of valid items in the research instrument after incorporating the suggestions the experts had made.

The sixth and seventh steps, which were the administration of instruments to a pilot study group and evaluation of items, were performed. The result of that pilot study is contained in Section 5.4.3.1 below.

5.4.3.1 Pilot Study

The pilot study was conducted for evaluation of reliability of the research instrument. In achieving the sixth stage of scale development, the questionnaires were distributed to the study sample. In this case, thirty questionnaires were distributed to the pilot study sample following Callegaro, Manfreda, and Vehovar’s (2015) suggestion that 15-30 respondents was the minimum number required for a pilot study. Twenty usable questionnaires were obtained and were used in evaluating the reliability of the reflective latent constructs. There were five dichotomous variables, four reflective latent constructs and one formative construct in the third conceptual framework, which were validated through the pilot survey instrument. Reliability analysis is only required for reflective latent constructs, but not for formative latent construct Coltman, Devinney, Midgley, and Venaik (2008). Therefore, reliability analysis conducted in this pilot study was for the four reflective latent constructs. The results are shown in Table 5.6 below:

Table 5.6
Pilot Study for Reliability Analysis

Reflective Latent Construct	**Number of Items**	**Cronbach's alpha**
The investment climate of marginal oil fields	10	.923
Crypto-based tax	20	.950
Production-based tax	8	.940
Tax incentive	17	.938

The result of internal analysis conducted using Cronbach's alpha revealed that all the reflective latent constructs met the commonly minimum required alpha of .70 and above, thus showing strong internal consistency reliability. Therefore, the instrument was developed in line with theory and the suggestions of the experts, and pilot study results demonstrate strong internal consistency reliability. A copy of the survey questionnaire is attached as Appendix A.

5.4.4 Instrument Design

The survey questionnaire had five parts, which were from A to G. Part A contained statements relating to the moderator that is attractive petroleum fiscal regime. Part B contained statements relating to crypto-based tax. Part Care statements relating to production-based tax and. Part D relates to the dependent variable i.e. marginal oil fields' investment climate. Part E relates to tax incentives. Part F contained questions relating to two dichotomous variables: type of profit-based taxes and type of fiscal arrangement. The last part, which is Part G, contained questions relating to the demographic information of the respondents such as age, gender, educational qualification, and workplace.

The questions in parts A-E had Likert scale ranging from 1 to 7. The use of a Likert scale ranging from 1 to 7 instead of from 1 to 5 as initially developed by Likert in 1932 was due to the need to increase the granularity of the measurement (Bertram, 2006). Questions in parts F and G were categorical. For example, part F asked about three types of profit-based taxes and respondents were asked to indicate the one, which they thought, was more appropriate to improve the investment climate of a marginal oil field. Similarly, in part G, questions relating to demographics, respondents were required to choose from among various nominal variables. Therefore, parts F and G were coded as nominal variables.

5.4.5 Method of Questionnaire Administration

Several methods exist for administering a survey questionnaire, each one having its own strengths and weaknesses. Direct administration of the instrument to respondents is expensive but has the potential of good response rate while a mailed survey is less expensive but can have a low response rate (Fraenkel & Wallen, 1993). Moreover, an electronic-based survey is characterized by a low response rate but has the potential for respondents to disclose even sensitive information (Bowling, 2005).

In Malaysia, Saad (2011) recorded a 40.9% response rate for the direct personal delivery of a survey questionnaire, which may be compared with a response rate of 16.0% experienced by Loo (2006) and 24% by Manaf, Hasseldine, and Hodges (2005) in mail surveys. However, in comparing the response rate of paper-based and online-based surveys outside Malaysia, a study that averaged eight other studies found that a paper-based survey had a 56% response rate compared to a 33% response rate for an online-based survey (Nulty, 2008). Because the anticipated respondents, who are oil and gas accounting and taxation staff from relevant organizations, are few as Kyari (2013) noted, the need existed to optimize the response rate in this study. Thus, the personal delivery approach for questionnaire administration was adopted. Apart from optimizing response rate, the approach is further supported when a need exists for the anonymity of respondents (Hair, Money, Samouel, & Page, 2007).

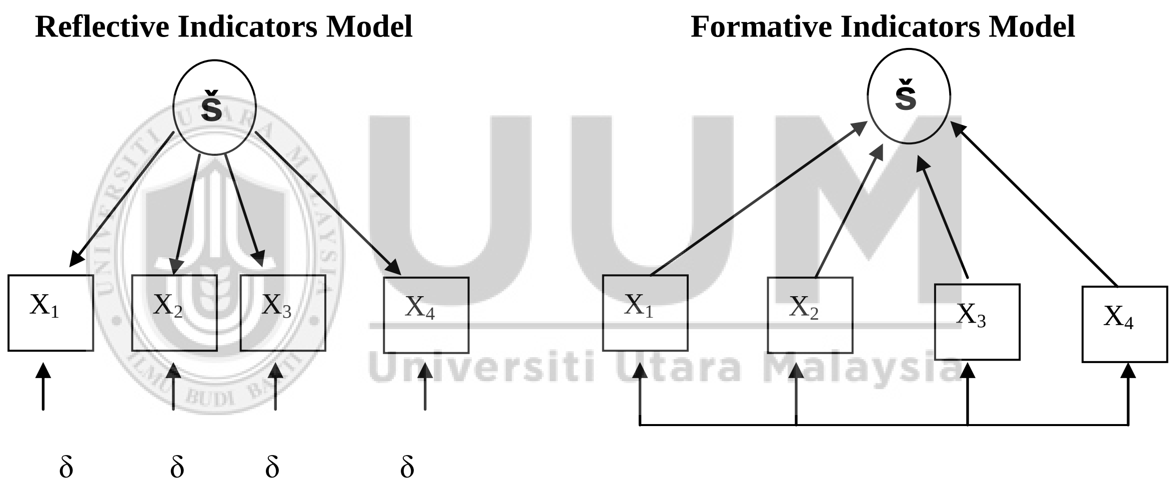
5.4.6 Measurements and Operational Definition Variables and Constructs

The conceptual framework of this study comprises a dependent variable, three latent independent variables, two dichotomous independent variables, and a moderator variable. These variables were derived from theory and literature. In line with the theory i.e. principles of efficient tax system by Adam Smith (1776) the moderator variable which is an attractive petroleum fiscal regime is formative. However, the other latent variables including crypto-based taxes, investment climate, production-based taxes and tax incentive were operationalized as reflective. The remaining variables were dichotomous. A discussion below considers the distinctions between formative and reflective constructs.

5.4.6.1 Reflective versus Formative Measures

Two types of Structural Equation Modeling (SEM) exist. They are covariance and component based, and each has different assumptions. The major underlying assumption of covariance Structural Equation Modeling (Covariance-SEM) is that the latent construct or variable must be reflective in nature (Chin, 1998). However, component-based-SEM such as Partial Least Square (PLS) eliminates this assumption; thus, the latent construct can be measured either as reflective or formative; hence, the need exists to discuss both reflective and formative measures. Constructs are classified as reflective when changes in the latent or outcome variable cause changes in its indicators, (Wilcox, Howell, & Breivik, 2008). A clear description of the characteristics of a reflective construct is depicted in Figure 5.1 below. The figure indicates that a latent construct exists independent of its measures; thus, it is the changes in the latent construct that cause changes in its indicators, not the other way round. Therefore, an item may have a high level of correlation among other indicators. Hence, adding or dropping an indicator may not necessarily change the conceptual domain of latent construct. Thus, internal consistency and reliability measurements became necessary.

Conversely, a formative construct is directly opposite to a reflective construct. In this case, the changes in the indicators determine the changes in the latent or outcome variable (Diamantopoulos & Siguaw, 2006). Figure 5.1 below depicts the characteristics of a formative construct as Coltman, Devinney, Midgley and Venaik (2008) describe it. In a formative case, indicators are recognized as causing rather than being caused by the latent variable. This indicates that it is the combination of the indicators that form the latent construct. Thus, variation in indicators or items causes a concomitant variation in the construct and adding or dropping one indicator can cause a change in the conceptual domain of the latent construct. Hence, internal consistency is not necessarily required because indicators are not expected to correlate with each other.



$X_1 = \lambda_1 š + \delta_1$
$X_2 = \lambda_1 š + \delta_2$
$X_3 = \lambda_1 š + \delta_3$
$X_4 = \lambda_1 š + \delta_4$

$š = \mu_1 x_1 + \mu_2 x_2 + \mu_3 x_3 + \mu_4 x_4 + \varsigma$

Note. Adapted from Coltman, Devinney, Midgley, and Venaik (2008), Formative versus reflective measurement models: Two applications of formative measurement, *Journal of Business Research*, *61*(12), 1254.

Figure 5.1
Reflective and Formative Measures

Figure 5.1 above depicts formative and reflective indicators. The first model is reflective in nature, showing that the causing effect comes from the latent construct to indicators separately. This means dropping one indicator or adding another one may not necessarily affect the conceptual domain of the latent constructs. The second model is formative indicating that the causal effect comes from indicators to latent construct, and the indicators jointly influence the latent construct. This means that dropping or adding another indicator can affect the conceptual domain of the latent variable. Furthermore, Coltman *et al.* (2008) provided a framework for assessing reflective and formative constructs with theoretical and empirical consideration. Table 5.7 below depicts this framework.

Table 5.7
Framework for Theoretical and Empirical Consideration for Assessing Reflective and Formative Measures

Consideration	Reflective Model	Formative Model
Theoretical Consideration		
Nature of the construct	Latent construct exist independent of measures used.	Latent construct are a combination of its indicators.
Direction of causality between items and latent variable	Variation in the construct causes variation in item measures	Variation in the indicators cause variation in the construct
Characteristic and Interchangeability of the items	Adding or dropping construct does not affect the conceptual domain of the construct	Adding or dropping item may affect the conceptual domain of the construct
Empirical Consideration		
Item inter-correlation	Testing the internal consistency and reliability by Cronbach's alpha, Average Variance Extracted and Factor Loading	No empirical test of indicators reliability possible.
Item relationship with construct antecedents and consequences	Item may have similar sign and significant relationship with antecedent and consequences of the construct	Item may not have similar significant relationship with antecedence and consequences of the construct

Table 5.7 Cont.

Consideration	Reflective Model	Formative Model
Empirical Consideration		
Measurement Error/ collinearity	Identifying and extracting measurement error by common factor analysis	Using vanishing tetrad test to determine the behaviour of formative items and using standard diagnostics to rule out collinearity

Note. Adapted from Coltman, Devinney, Midgley, and Venaik (2008), Formative versus reflective measurement models: Two applications of formative measurement, *Journal of Business Research, 61*(12), 1252.

As an elaboration on the difference between formative and reflective measures, Diamantopoulos, Riefler, and Roth (2008) assert that formative measures are exogenous and cause indicators, whereas reflective are endogenous and effect indicators.

5.4.6.2 High Order Formative Models

Where constructs are conceptualized and afterward operationalized as multidimensional indicators the need for clear specification of the model into second order becomes imperative (Jarvis, MacKenzie, & Podsakoff, 2003). Conceptually, a construct is classified as multidimensional when it comprises several interrelated elements and is conceptualized as one overall abstraction, which can be hypothetically meaningful for use as a representative of these elements (Diamantopoulous *et al.*, 2008). Jarvis *et al.* (2003) posit that, when a model comprises multidimensional constructs, the researcher needs to differentiate at least two level of analysis. These are: first, the relationship of the manifest items to the first-order dimension, and second, the relationship of individual dimensions to the second-order construct. Failure to specify the second-order relationship clearly can make the research use individual dimensions separately instead of as group as it can be theoretically possible (Diamantopoulous *et al.*, 2008).

Therefore, to avoid this problem of misspecification, and, for the fact that first-order construct can be either formative or reflective and that those first-order-constructs can be formative or reflective indicators of second order construct, Jarvis *et al.* (2003) identified four different types of multidimensional constructs.

First-order formative and second-order formative: this means that both the first and second orders have formative measures. This model is also called the aggregate model, a composite model, emergent model or indirect formative model (Diamantopoulous *et al.*, 2008).

First-order formative and second-order reflective: this means that the first-order has formative measures, which are reflective measures of the second-order construct.

First-order reflective and second-order formative: this model is the direct opposite of (2) above; the first order has reflective measures, which are formative measures of the second order.

First-order reflective and second-order reflective: this means that the first order has reflective measures, which are reflective measures of the second-order constructs. This model is also called the latent model, factor model, super-ordinate model indirect reflective model or the second-order total disaggregate model (Diamantopoulous *et al.*, 2008).

In addition, Jarvis *et al.* (2003) acknowledged the existence of mixed models which contained a combination of both reflective and formative indicators either in first order or second order (Saad, 2011).

Therefore, based on the literature reviewed on formative versus reflective measures, the model used in this study is a mixed model. For instance, the investment climate of a marginal oil field was measured using reflective indicators. Production-based taxes as a construct was also measured as reflective because items within the construct are expected to correlate. Similarly, crypto-taxes as a single construct were measured as reflective because items within the construct are expected to correlate. Likewise, tax incentives were also measured as a reflective construct. An attractive petroleum fiscal regime was measured as a formative construct in line with theory that includes Smith's (1776) principles of an efficient tax system. Thus, the dimensions within an attractive petroleum fiscal regime were expected not to highly correlate with each other. The three types of revenue-based taxes and fiscal arrangement types were dichotomous variables; each respondent was required to indicate the most appropriate response for improving the investment climate of the fields.

5.4.6.3 Operational Definition of Constructs

The model used in this survey has six main constructs, classified as five independent variables – types of profit-based tax, types of fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentive; one moderator variable i.e. an attractive petroleum fiscal regime, and one dependent variable i.e. the perception of the investment climate of marginal oil fields. Therefore, indicators used in measuring these constructs are discussed in the following subsections.

5.4.6.3.1 Perceived Marginal Oil Field Investment Climate

Different operational measures are possible for the investment climate. The concept can be operationalized using formative or reflective indicators. The formative indicators are exogenous, which measure the investment climate based on broad economic issues that can affect firms extrinsically, such as corruption, access to finance, regulation, taxation, infrastructures, and labor (Dollar *et al.*, 2006; Dollar *et al.*, 2005; Hallward-Driemier *et al.*, 2005; Smith & Hallward-Driemier, 2005). These measures are extrinsic as they are not specific to a particular industry, but rather they affect the economy as a whole. This indicates that change in these factors (corruption, access to finance, regulation, taxation, infrastructures, and labor) can lead to change in the investment climate, hence they are formative.

Conversely, reflective measures of the investment climate are endogenous, which measure investment climate based on firm-specific issues such as expected rate of return and associated risk (Otto *et al.*, 2006), or cost, risk and barriers to competition (Smith &

Hallward-Driemeier, 2005). Smith and Hallward-Driemeier (2005) posit, that although the scope of the investment climate is very large, new sources of micro-level data indicate that firms assess the investment climate using endogenous factors such as risk, cost and barriers to competition. This leads to the conclusion that a change in investment climate causes a change in these indicators (expected rate of return, associated risk, cost, barriers to competition); hence they are reflective. This means that change in the investment climate will increase investors' rate of return, reduce risk, reduce costs of doing business, enhance companies' competitiveness, so investors would feel more protected, and hence their performance would increase. Zanoyan (2005) suggests ten points that would encourage investment in the upstream petroleum sector. These ten-points seem reflective because all are aim at encouraging investment and are likely to correlate. The ten points are contained in Table 5.7 below.

Therefore, in this study the investment climate of marginal oil fields was operationalized as a first-order construct measured using ten reflective indicators. These indicators are expected to correlate with each other because the change in the investment climate cause changes in its indicators. The measurements of investment climate are contained in Table 5.8 below. The respondents were asked to state the extent of their agreement that each of the statements will improve investment climate of marginal oil fields in Malaysia.

Table 5.8
Measurement of Marginal Oil Fields' Investment Climate

Items	**Statements**
1	Engaging the key stakeholders in oil and gas industry to create the necessary strategies.
2	The willingness of PETRONAS to take major exploration risk.

Table 5.8 Cont.

Items	Statements
3	The capability of PETRONAS in dealing with private oil companies for the development of marginal oil fields in Malaysia.
4	Clarity of role within government agencies.
5	Transparency of role within government agencies.
6	Clarity in the operating arrangement between PETRONAS and private oil companies.
7	Transparency in the operating arrangement between PETRONAS and POCs.
8	Reducing operating cost for private oil companies that operate marginal oil fields.
9	Offering competitive fiscal terms to enhance the rate of returns.
10	Realistic and objective assessment of geological potentials.

5.4.6.3.2 Perceived Attractive Petroleum Fiscal Regime

A petroleum fiscal regime can be described as attractive when it possesses attributes such as neutrality, stability, simplicity, equity, flexibility, revenue-increase potential, risk sharing and transparency. These derive from Smith's (1776) principles of an efficient tax system. In line the theory, attractiveness was operationalized as a formative second-order construct with first-order reflective items. This means that the second-order formative items were expected not to correlate with each other as they measure different domains of an attractive fiscal regime. The measurements of attractive petroleum fiscal regime are contained in Table 5.9 below. The respondents were asked to state the extent of their agreement that each of the statements will improve investment climate of marginal oil fields in Malaysia.

Table 5.9

Measurement of Perceived Attractive Petroleum Fiscal Regime

Items	**Statements**
1	Computation of Malaysian marginal oil fields tax system targets net profits.
2	Marginal oil field tax system in Malaysia has not been subjected to arbitrary changes.
3	Tax expenses paid by marginal oil fields operators in Malaysia are commensurate with their level of profitability.
4	Tax regime for marginal oil fields in Malaysia is flexible to accommodate future regulatory changes.
5	Marginal oil fields operators in Malaysia are certain of their tax obligation in the foreseeable future.
6	Tax regime applied to marginal oil fields in Malaysia is efficient.
7	Tax regime applied to marginal oil fields in Malaysia is clear and unambiguous.
8	Tax regime applied to marginal oil fields in Malaysia is simple to comply with.
9	There is transparency in the tax regime applied to marginal oil fields operators in Malaysia.
10	Marginal oil field tax regime is progressive as it increases as income increases.
11	Malaysian marginal oil fields tax regime enhances investors' revenue rising potentials.
12	Marginal oil field tax regime in Malaysia enables risk sharing between government and investors.
13	Marginal oil field tax regime in Malaysia enables profit sharing between government and investors
14	Malaysian marginal oil field tax regime has an effective administrative framework to encourage compliance.

5.4.6.3.3 Types Profit-based Tax

Three types of profit-based taxes are considered in this study; these are: petroleum income tax, corporate income tax and brown tax. Dummy variables were created for these categorical variables. Using dummy variables when dealing with categorical variables such as income level and income source has been used previously in tax-related studies such as Manaf *et al.* (2005) and Alabede, Ariffin, and Idris (2012). These categorical variables were operationalized as PIT= 1; CIT = 2; and BT = 3, with CIT serving as a reference point. The essence of using CIT as a reference point is that, this type of profit-based tax applies to marginal oil fields, possibility because policymakers in Malaysia considered it as the most desirable, hence, the need to explore the desirability of other types. The essence of this analysis is testing whether other types of profit-based tax such as petroleum income tax and brown tax are also linked with the investment climate of a marginal oil field.

5.4.6.3.4 Types of Fiscal Arrangement

Similar to the type of revenue-based tax, there are four common types of fiscal arrangements: concessionary system, production-sharing contract, risk service contract pure service contract. Dummy variables were created, and operationalized as: production sharing contract = 1, risk service contract = 2 and pure service contract = 3, with the risk service contract serving as a reference point. Using a risk service contract as a reference point is because the risk service contract is currently applied to marginal oil fields in Malaysia, perhaps because policymakers considered it as the most desirable. However, previous studies have shown that fiscal arrangements such as PSC and SC are more stable than other forms of fiscal arrangement (Tissot, 2011). Hence, the need for exploring other forms of fiscal arrangements to evaluate their desirability for marginal oil fields development in Malaysia.

5.4.6.3.5 Production-based Taxes

Production-based taxes have been defined as those taxes charged against the gross revenue or output from oil and gas operations irrespective of whether a profit is made or not (Menezes, 2005). Production-based taxes are a first-order construct and were operationalized in this study using eight reflective indicators. The indicators are recognized as reflective because all are regressive; thus, they are expected to correlate with each other. They are charged to OGCs based on their oil and gas output irrespective of whether profit is made or not. Thus, the indicators are expected to co-vary with each other. The items for measuring this construct as derived from the literature are contained in Table 5.10 below. The respondents were asked to state the extent of their agreement on each of the statements.

Table 5.10
Measurement of Production-based Taxes

Items	**Statements**
1	Payment of royalty on gross oil and gas produced by investors will negatively affect their decision to invest in marginal oil fields.
2	Payment of ad valorem royalty on gross revenue from oil and gas produced and sold by investors' will have a negative effect on their decision to invest in marginal oil fields.
3	Production bonus, when imposed on operators, will negatively affect their decision to invest in marginal oil fields.
4	Export duty paid on oil and gas produced and exported will have a negative effect on investors' decision to invest in marginal oil fields.
5	Research levy paid by investors on revenue from oil and gas produced will have a negative effect on their decision to invest in marginal oil fields.
6	Training/education fees paid by investors out of revenue from oil and gas produced will have a negative effect on their decision to invest in marginal oil fields.
7	Exercise tax paid by investors on production inputs will negatively affect investors' decision to invest in marginal oil fields.
8	The obligation to set some funds aside from production revenue for decommissioning of oil and gas installations will negatively affect investors' decision to invest in marginal oil fields.

5.4.6.3.6 Crypto-based Taxes

Crypto-based taxes have been defined as those costs and obligations that an oil and gas investor must bear but are not captured in Take (revenue) calculations (Johnston, 2007). They are also defined as forms of taxes charged against a company based on its presence in the tax environment and not directly placed on oil and gas operations (Menezes, 2005). Crypto- taxes are also known as quasi-taxes, presence-based taxes or indirect taxes (Iledare, 2014). Crypto-taxes are a first-order construct that was operationalized in this study using twenty-one reflective indicators. The construct contains indicators relating costs and obligations borne by OGC based on their presence in host country regardless of whether production or revenue is realized from their activities. The items are expected to correlate as they are all charges made either in cash or in kind and may affect investors' decisions. Table 5.11 below presents the measurement of crypto- taxes used in this study as derived from the literature.

Table 5.11
Measurement of Crypto-based Taxes

Items	Statements
1	Import duty paid on machines and materials imported by investors will have a negative effect on their decision to invest in marginal oil fields.
2	Capital Gain Tax on disposal of fixed assets by investors will have a negative effect on their decision to invest in marginal oil fields.
3	Property tax charged by government on operators' assets will have a negative effect on their decision to invest in marginal oil fields.
4	Surface rent tax paid on land used by investors will have a negative effect on their decision to invest in marginal oil fields.
5	License/Lease/Data fees for prospecting /exploration/ extraction will have a negative effect on investors' decision to invest in marginal oil fields.
6	Local taxes applied to water and road used by operators will have a negative effect on their decision to invest in marginal oil fields.

Table 5.11 Cont.

Items	Statement
7	Withholding Tax imposed on return on investment earned by operators will have a negative effect on their decision to invest in marginal oil fields.
8	Signature bonus paid by oil companies to host government will negatively affect the investors' decision to invest in marginal oil fields.
9	Environmental taxes paid by operators on restoration and compensation to host communities will have a negative effect on their decision to invest in marginal oil fields.
10	Obligation imposed on operators to sell oil and gas produced in the domestic market will have a negative effect on their decision to invest in marginal oil fields.
11	Obligation on operators to employ indigenous individuals will have a negative effect on their decision to invest in marginal oil fields.
12	Oppressive government control on investors' activities within the country will have a negative effect on their decision to invest in marginal oil fields.
13	Inefficient allocation mechanism in contracts between operators and host government will have a negative effect on their decision to invest in marginal oil fields.
14	Obligation that operators must reinvest the profit within the country instead of investing it abroad will have a negative effect on their decision to invest in marginal oil fields.
15	Excessive government pipeline tariffs paid by operators when transporting oil and gas will have a negative effect on their decisions to invest in marginal oil fields.
16	Obligation on operators that they must sell oil and gas within the country at a specific price will have a negative effect on their investment decision in marginal oil fields.
17	Imposing bond on operators that they must meet certain level of performance will have a negative effect on their decision to invest in marginal oil fields.
18	Granting few years for which loss will be carried forward as a tax relief will have a negative effect on investors' decision to invest in marginal oil fields.
19	Cost incurred by operators to local communities as a social responsibility will have a negative effect on investors' decision to invest in marginal oil fields.
20	High visa requirements for operators' expatriate staff will have a negative effect on their decision to invest in marginal oil fields.

5.4.6.3.7 Tax Incentives

Tax incentives can be defined as an aspect of tax codes such as reliefs, allowances, and rebates designed to incentivize or encourage economic activity in a particular country. Tax incentives as a construct was operationalized as second-order construct measured using seventeen first-orders indicators. Moreover, the items are expected to correlate; hence, it is operationalized as reflective indicators. Table 5.12 shows items for measuring tax incentive construct. The respondents were asked to express the extent to which each of the incentives will encourage investment into marginal oil fields in Malaysia.

Table 5.12
Measurement Items of Tax Incentive

Items	Statement
1	**The accelerated capital allowance** that will enable the operators to recover their capital expenditure within a short period of time.
2	**Investment allowance and capital uplift** that will reduce the marginal oil fields' operators' tax liability.
3	**Depletion allowance** to encourage marginal oil fields' development.
4	**Reinvestment allowance** given to marginal oil fields' operators that will encourage reinvestment of their profit in the same line of business.
5	**Allowing losses to be carried forward** so as to provide tax reliefs to investors.
6	**Allowing losses to be carried backward** when losses are incurred as the closure of operation approaches.
7	**Tax rate reduction** when oil price falls below trigger price to encourage oil and gas production.
8	**Tax rate reduction** to encourage deeper drillings for hard to reach wells.
9	**Generalized tax rate reduction** to encourage investment in marginal oil fields.

Table 5.12 Cont.

Items	Statement
10	**Sliding scale royalty rate** applied based on water depth to encourage deep-water drilling.
11	**Bonuses** designed for marginal oil fields' operators that will encourage reserve additions.
12	**Tax credit** for investment in research relating to marginal oil fields' development.
13	**Tax exemption** on equipment and other capital goods imported by marginal oil fields' operators.
14	**Transferable Capital Expenditure** within the same partnership or sole proprietorship.
15	**Flow through shares** a policy in which government buy shares from marginal oil fields operators that encourage their exploration effort.
16	**Tax holidays and abatement** to encourage operations during periods of losses resulting from low oil prices.
17	**Guarantee by the government** to marginal oil fields' operators that tax regime will remain stable during the contract periods.

5.4.7 Data Analysis

The survey data was subjected to preliminary analyses including an independent sample t-test for non-response bias, descriptive statistics, one-way ANOVA for the three respondents' groups, data screening analyses, and Partial Least Square path modeling.

5.4.7.1 Independent Samples t-test for Non-Response Bias

The purpose of conducting non-response bias is to compare early and late responses. The common assumption leading to a non-response bias test is that those respondents brought into the response pool through a researcher's persuasive efforts may provide data that can lead to measurement error (Olson, 2006). Thus, to ensure no difference between the responses collected respondents' willingness and those received through a persuasive effort, non-response bias test was conducted. As Manaf *et al.* (2005) pointed out, to conduct the non-response bias test, the dates at which the questionnaires were received are recorded, and then the means of early and late responses are computed and compared. Thus, this test was conducted for the evaluation of whether significant statistical difference existed between early and late responses.

5.4.7.2 Descriptive Statistics

Descriptive statistics provide summaries and attributes of the data in relationship to a variable or a combination of variables (Tabachnick, Fidell, & Osterlind, 2001). They also provide reliable differences, relationships and estimates of subjects' values that will enable consistent findings (Tabachnick *et al.*, 2001). If reliable differences exist, these statistics are used to provide central tendencies. Thus, descriptive statistics provide an understanding and clarification of the impacts of the research report (Hair *et al.*, 2007). The most commonly used descriptive statistics are mean, median, mode, maximum, minimum, variance and standard deviation. Hence, in this study, minimum, maximum, mean, and standard deviation were computed for latent constructs to provide central tendencies. This analysis was performed using SPSS.

5.4.7.3 One-Way ANOVA

This analysis was conducted to measure whether significant statistical differences existed in the opinion of the three respondents' groups (government, industry, and practitioners) on the measurement items for attractive petroleum fiscal regime crypto-based taxes, investment climate, production-based taxes, tax incentives, types of fiscal arrangements and types profit-based tax. One-way ANOVA was considered appropriate in analyzing differences between the three groups of respondents.

5.4.7.4 Other Data Screening Analyses

In addition to above preliminary analyses, other data screenings were performed, which are considered as preconditions for multivariate analyses. Data screening improves the researcher's understanding on whether or not the assumptions of multivariate data analysis have been violated (Hair *et al* , 2007). Conducting this analysis enables the researcher to understand the extent of data fitness for the intended analysis. Hair, Black, Babin, and Anderson (2010) posited that data screening and preliminary analysis encompasses four issues. These are: (1) identification and treatment of missing values, (2) identification and treatment of outliers, (3) normally tests and, (4) multicollinearity tests.

5.4.7.5 Partial Least Square Path Modeling

Partial Least Square (PLS) falls under one of the two types of Structural Equation Modeling (SEM). The two types of SEM are Covariance-SEM and Component-based-SEM. PLS is part of Component-based-SEM. Several divergent rationales exist for using either of the two types of SEM in a research work (Hair, Ringle, & Sarstedt, 2011). Table 5.13 below presents rule of thumb for selecting CB-SEM and PLS-SEM.

Table 5.13
Rule of Thumb for Selecting Covariance-SEM and PLS-SEM

Issue	**Covariance-SEM**	**PLS-SEM**
Research Goals	Theory testing, confirmation and comparison	Predicting key target construct, exploratory research, and extension of an existing structural theory
Measurement Model Specification	Mostly reflective measures	Both formative and reflective measures.
Structural Model	Non-recursive Model	Complex Model
Assumptions	Parametric with sample size and data distribution assumptions	Nonparametric does not require assumptions to be fulfilled
Sample Size	Large	Small and Large
Model Specification	If research requires goodness-of-fit criterion	If research will use latent variable scores in subsequent analyses

Note. Adapted from Hair, Ringle, and Sarstedt, (2011), PLS-SEM: Indeed a silver bullet, *The Journal of Marketing Theory and Practice, 19*(2), 145.

Therefore, the rules of thumb Hair *et al.* (2011) outlined justified the use of PLS-SEM in this study for five reasons. First, the study does not test or compare theories , rather it is an exploratory study intended for predicting the influence of fiscal instruments on the investment climate of marginal oil fields; hence, a model is proposed for that purpose. Second, the study has both reflective and formative constructs. Third, the model structure is regarded as somewhat complex as the structure will examine both direct and indirect effects of the variables under consideration. Fourth, most measures are new thus the need for nonparametric analysis exists to meet certain assumptions by covariance-based SEM. Fifth, based on the nature of the industry and the research area, the sample size was small.

Apart from justifications derived from Hair *et al.* (2011), another justification for using PLS is that it provides the possibility for different variable measurements ranging from categorical to ratio (Chin & Newsted, 1999). This need also justifies using PLS-SEM, for the fact that this study comprises both categorical and ratio variables. Based on the aforementioned justifications, PLS-SEM is considered more appropriate for the study. The subsections below discuss procedures for evaluating measurement and structural models when using SEM-PLS.

5.4.7.5.1 Measurement Model Evaluation

The evaluation of a measurement model differs for formative and reflective constructs. A formative construct is different from a reflective construct in reliability and validity measurements. Therefore, a discussion on measurement model evaluation is carried-out in this study based on construct type as follows: (1) formative construct or (2) reflective construct.

Formative construct: when analysis involves a formative construct, the reliability analysis that is conducted through internal consistency and convergent validity is not required because the items or indicators are not expected to be highly correlated and are assumed to be error-free. Thus, the theoretical basis and expert opinions play a more significant role in evaluating formative indicators (Hair *et al.*, 2011). However, SEM-PLS offers important criteria for statistical assessment of measurement quality for formative indicators. The first is to examine indicators weights and loadings and assess their significance through bootstrapping. The minimum number of samples for bootstrapping is 5,000; moreover, the number of cases should be same as the number of observations in the initial sample. The significance level for indicators weights and loadings are assessed using t-value. The t-values for significance for a two-tailed test are 1.65, 1.96 and 2.58, which are the 10%, 5% and 1% levels respectively. Where all indicator weights are significant, indicators are retained. However, if both the weights and loadings are not significant, no empirical basis exists to retain the indicators. The second is to examine the multicollinearity. In this instance, the value of Variance Inflation Factor (VIF) should be less than 5 for each indicator to avoid high multicollinearity. Third, where high numbers of indicators are used in measuring formative construct and some are insignificant, items should be segregated into distinct constructs if theoretical support justifies doing so.

Reflective indicators: different from formative construct, reliability and validity assessment play a significant role in evaluating the measurement model with reflective constructs. In terms of validity, a reflective construct is required to meet convergent and discriminant validity conditions. First, for convergent validity, these conditions are assessed using Average Variance Extracted (AVE), which is required to be higher than 0.5. This means that the variance explained by latent construct for its indicators is 50% and above (Hair *et al.*, 2011). Second, for discriminant validity, each latent construct's AVE should be greater than the highest squared correlation of the latent construct with any other latent construct in the research model. Moreover, the loading of an indicator should be greater than all of its cross-loadings (Hair *et al.*, 2011). Reliability is measured through either of two approaches. Reliability can be measured through Cronbach's alpha or composite reliability. The threshold is that internal consistency should be greater than 0.7 using either Cronbach's alpha or composite reliability, however, when research is exploratory, 0.6 to 0.7 is acceptable and an indicator loading higher than 0.70 is required (Hair *et al.*, 2011).

5.4.7.5.2 Structural Model Evaluation

Four assessments are important in evaluating the structural model. These are: (1) assessment of R^2 values, (2) assessing the significance of path coefficients through bootstrapping procedures, (3) assessing the model's predictive relevance, and (4) the assessing the effect-size of each of the independent variable to the latent dependent variable. These are further discussed below.

R-square: R^2 is important in assessing the predictive ability of the structural model. The value of R^2 explains the total variation in the latent dependent variable explained by independent variables (Saad, 2011). R^2 can be assessed in two ways, either the effect of a particular independent variable on the dependent variable, or for the endogenous latent variables in the structural model. In the case of the effect of a particular independent variable on the dependent variable the values of 0.02, 0.15 and 0.35 are considered small, medium and large effect respectively (Cohen, 1988). However, for overall effect on the endogenous latent variable the values of 0.25, 0.50 and 0.75 are considered weak, moderate and substantial respectively (Hair *et al.*, 2011).

Path coefficients: bootstrapping is normally used in assessing the significance of path coefficients. In this case, the minimum number of bootstrapping sample is 5,000, and the number of cases should be same as the number of observations in the original sample. Moreover, for path coefficients the critical *t*-values for two-tailed tests are 1.65, 1.96 and 2.58 at 10%, 5% and 1% significance levels respectively (Hair *et al.*, 2011)

Predictive Relevance: this is another method of evaluating a structural model by assessing the model's capability to predict. In most cases it is carried-out through Geisser's Q^2, which proposes that the model must be able to predict each of the indicators of endogenous latent constructs (Hair *et al.*, 2011) Thus, a Q^2 value above zero indicates that the exogenous variable has a predictive relevance for the endogenous variable being considered.

Assessing the Effect-size: this assesses the extent to which each of the independent variables contributes independently to the explanation of the dependent variable. It is assessed using f^2 (Cohen, 1988). Thus, $f^2$of .02, .15, and .35 are classified as small, medium and large (Cohen, 1988).

5.5 Summary

The chapter presents the methodology and assumptions used in conducting the study. The methodologies for four objectives, scenario analysis (objective one), trend analysis (objective two) and survey analysis (objective three and four), were fully elaborated and discussed. The assumptions for conducting the scenario analysis are clearly shown. The chapter provides strong guidelines on how the study was conducted based on the methodologies used, which are in alignment with prior researcher.

CHAPTER SIX
RESULTS

6.1 Introduction

In this chapter, three different analyses were performed for achieving the research objectives. The scenario analysis was conducted for achieving the first objective, which examined the extent to which the new fiscal regime improved the investment climate in Malaysian marginal oil fields. Trend analysis was carried-out for achieving the second objective, which examines the extent to which investors' CAPEX performance improved under the new fiscal regime. Lastly, the Partial Least Square (PLS) path modeling was used to achieve the third and fourth objectives. These objectives examined the relationship between tax instruments and the investment climate of marginal oil fields as well as the moderating effect of an attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields respectively.

6.2 Scenario Analysis Results

Scenario analysis was conducted to achieve objective one of the study, which examines the extent to which the new fiscal regime improves the investment climate of Malaysian marginal oil fields. For that purpose, five investment appraisal techniques were used to evaluate the influence of the new fiscal regime (RSC and its fiscal provisions) in comparison with the old one (PSC and its fiscal provisions). The investment appraisal tools used were NPV, IRR, PI, AGR and SI. The results of these analyses are presented in Figures 6.1 through 6.5 and Tables 6.1 through 6.5.

6.2.1 Investor's Net Present Value

Net present value is described as a sum of all future cash flow discounted using a specified cost of capital to obtain the present value (Arshad, 2012). The cash flow comprises both in and out flows. In this study, instead of a project's NPV, the investor's NPV was used to evaluate how investors view investment climate of marginal oil fields' under old regime –using R/C factor PSC fiscal terms and the new regime – using RSC fiscal terms. The analysis and the results in Figure 6.1 and Table 6.1 respectively are for the investor's NPV under the new and old regimes using different oil prices and reserves scenarios.

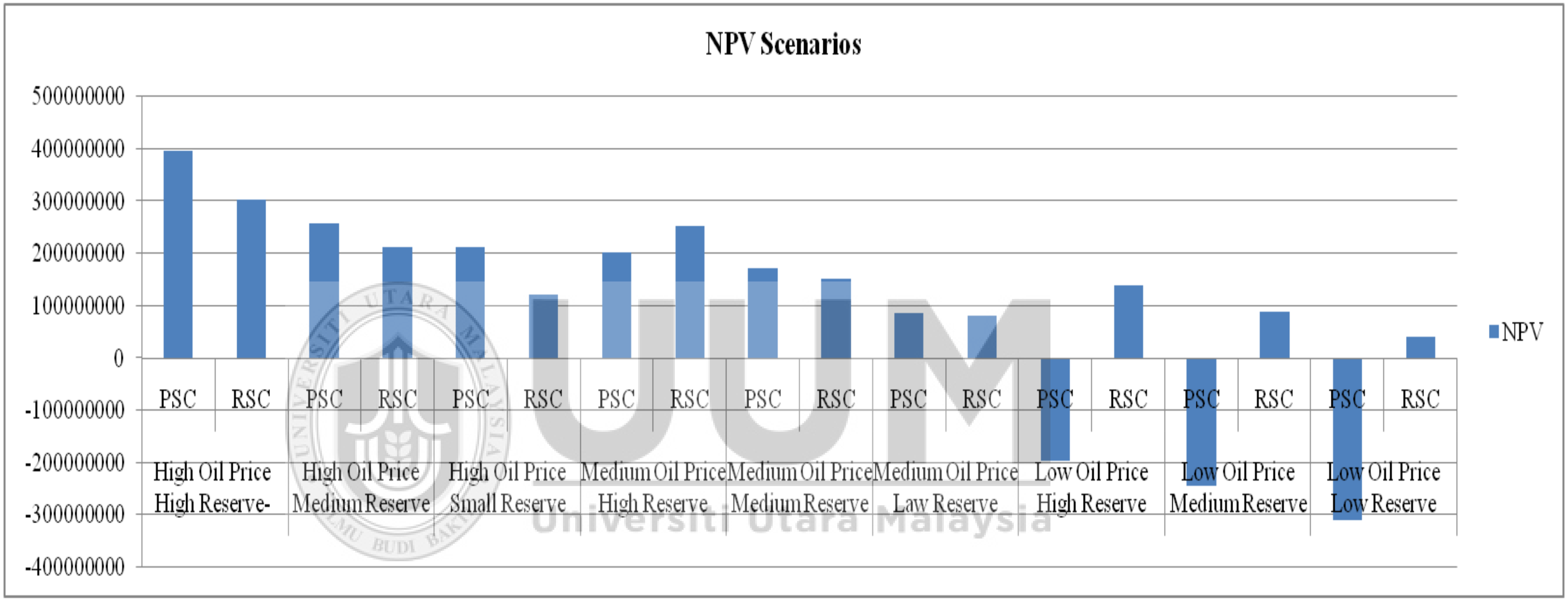


Figure 6.1
Investor's NPV under Different Oil Prices and Reserve Levels

Table 6.1
Results of Investment Climate using Net Present Value (NPV)

Hypothesis	Statement	NPV		Result
		PSC	RSC	
H_{1a}	New fiscal regime under RSC has higher NPV under High Oil Price-High Reserve	396.83	303.88	Not Supported
H_{1b}	New fiscal regime under RSC has higher NPV under High Oil Price-Medium Reserve	257.26	212.06	Not Supported
H_{1c}	New fiscal regime under RSC has higher NPV under High Oil Price-Low Reserve	212.35	122.03	Not Supported
H_{1d}	New fiscal regime under RSC has higher NPV under Medium Oil Price-High Reserve	201.66	252.06	Supported
H_{1e}	New fiscal regime under RSC has higher NPV under Medium Oil Price-Medium Reserve	172.82	151.06	Not Supported
H_{1f}	New fiscal regime under RSC has higher NPV under Medium Oil Price-Low Reserve	85.97	81.42	Not Supported
H_{1g}	New fiscal regime under RSC has higher NPV under Low Oil Price-High Reserve	-195.76	140.26	Supported
H_{1h}	New fiscal regime under RSC has higher NPV under Low Oil Price-Medium Reserve	-243.08	90.05	Supported
H_{1i}	New fiscal regime under RSC has higher NPV under Low Oil Price-Low Reserve	-307.96	40.83	Supported

Note. NPV is in million USD.

Hypotheses 1a, 1b, and 1c postulated that the fiscal regime under RSC would have a higher investor's NPV under high oil price-high reserve, high oil price-medium reserve and high oil price-low reserve respectively. The results from Table 6.1 above revealed that these hypotheses were not supported. Specifically, the result revealed that PSC had a high NPV under high oil price-high reserve (*PSC-NPV = 396.83, RSC-NPV = 303.88*), high oil price-medium reserve (*PSC-NPV = 257.26, RSC-NPV = 212.06*) and high oil price-low reserve (*PSC-NPV = 212.66, RSC-NPV = 122.03*).

Hypotheses 1d, 1e, and 1f proposed that the new fiscal regime under RSC fiscal terms would have a higher NPV under medium oil price-high reserve, medium oil price-medium reserve and medium oil price-low reserve respectively. The results from Table 6.1 revealed that hypothesis 1e was supported but 1d and 1f were not supported. Specifically, the results showed that under medium oil price-high reserve (*PSC-NPV = 201.66, RSC-NPV = 252.06*) the fiscal regime under RSC had higher NPV, while under medium oil price-medium reserve (*PSC-NPV = 172.82, RSC-NPV = 151.06*) and medium oil price-low reserve (*PSC-NPV = 85.97, RSC-NPV = 81.42*) the fiscal regime under PSC had higher NPV.

Hypotheses 1g, 1h, and 1i proposed that the new fiscal regime under RSC fiscal terms would have a higher NPV under low oil price-low reserve, low oil price-medium reserve, and low oil price-low reserve respectively. The result from Table 6.1 revealed that all these hypotheses were supported. Specifically, the results highlighted that the fiscal regime under RSC had a higher NPV under low oil price-high reserve (*PSC-NPV = -*

195.76, RSC-NPV = 140.26), low oil price-medium reserve (*PSC-NPV = -243.08, RSC-NPV = 90.05*), and low oil price-low reserve (*PSC-NPV = -307.96, RSC-NPV = 40.83*).

6.2.2 Investor's Internal Rate Return

The internal rate of return is an investment appraisal tool that equates NPV to the initial investment or cost (Arshad, 2012). The internal rate of return uses two discounting rates that equate NPV to zero. Unlike NPV, which provides answers in monetary terms, IRR provides answers in percentage. Like in NPV, the computation of IRR focused on investor's cash flow, which was then used to compute IRR under different oil prices and reserve levels for both the old regime and new regime. The results and analysis of the IRR are presented in Figure 6.2 and Table 6.2 below.

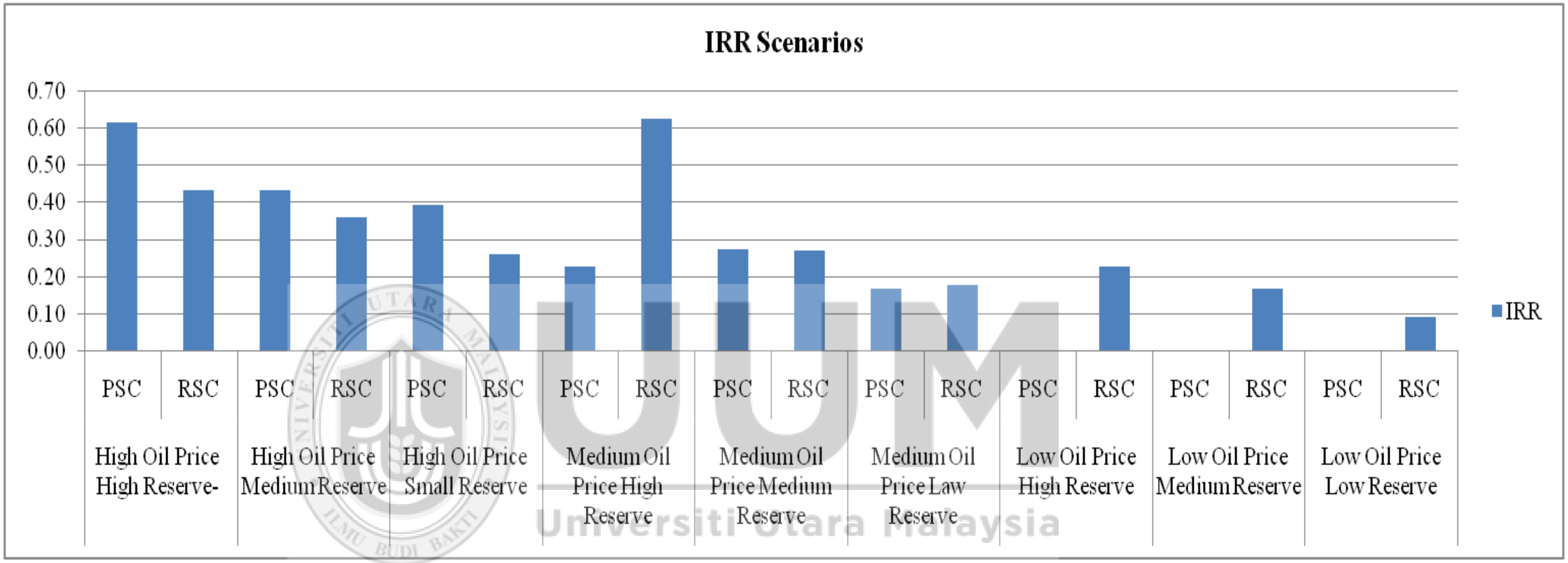


Figure 6.2
Investor's IRR under Different Oil Prices and Reserve Levels

Table 6.2

Results of Investment Climate using Internal Rate of Return (IRR)

Hypothesis	**Statement**	**IRR**		**Result**
		PSC	**RSC**	
H_{2a}	New fiscal regime under RSC has higher IRR under High Oil Price-High Reserve	61%	43%	Not supported
H_{2b}	New fiscal regime under RSC has higher IRR under High Oil Price-Medium Reserve	43%	36%	Not supported
H_{2c}	New fiscal regime under RSC has higher IRR under High Oil Price-Low Reserve	39%	26%	Not supported
H_{2d}	New fiscal regime under RSC has higher IRR under Medium Oil Price-High Reserve	22%	62%	Supported
H_{2e}	New fiscal regime under RSC has higher IRR under Medium Oil Price-Medium Res.	27%	27%	Not supported
H_{2f}	New fiscal regime under RSC has higher IRR under Medium Oil Price-Low Reserve	17%	18%	Supported
H_{2g}	New fiscal regime under RSC has higher IRR under Low Oil Price-High Reserve	0%	23%	Supported
H_{2h}	New fiscal regime under RSC has higher IRR under Low Oil Price-Medium Reserve	0%	17%	Supported
H_{2i}	New fiscal regime under RSC has higher IRR under Low Oil Price-Low Reserve	0%	9%	Supported

Hypotheses 2a, 2b and 2c postulated that the fiscal regime under RSC would have a higher investor's IRR under high oil price-high reserve, high oil price-medium reserve and high oil price-low reserve respectively. The results from Table 6.2 revealed that the three hypotheses were not supported. Specifically, the results revealed that the R/C factor PSC had a higher investor's IRR under high oil price-high reserve (*PSC-IRR = 61%, RSC-IRR = 43%*), high oil price-medium reserve (*PSC-IRR = 43%, RSC-IRR = 36%*) and high oil price-low reserve (*PSC-IRR = 39%, RSC-IRR = 26%*).

Hypotheses 2d, 2e and 2f proposed that the new fiscal regime under RSC fiscal terms would have a higher IRR under medium oil price-high reserve, medium oil price-medium reserve and medium oil price- low reserve respectively. The results from Table 6.2 revealed that hypothesis 2d and 2f were supported but 2e was not supported. Specifically, the results showed that RSC had a higher IRR under medium oil price-high reserve (*PSC-IRR = 22%, RSC-IRR = 62%*) and medium oil price-low reserve (*PSC-IRR = 17%, RSC-IRR = 18%*). However, both the R/C factor PSC and RSC fiscal regimes had equal investor's IRR under medium oil price-medium reserve (*PSC-IRR = 27%, RSC-IRR = 27%*).

Hypotheses 2g, 2h and 2i postulated that the new fiscal regime under RSC fiscal terms would have a higher NPV under low oil price-low reserve, low oil price-medium reserve, and low oil price-low reserve respectively. The results from Table 6.2 revealed that all these hypotheses were supported. Specifically, the results highlighted that RSC fiscal regime had a higher IRR under low oil price-high reserve (*PSC-IRR = 0%, RSC-IRR =*

23%), low oil price-medium reserve (*PSC-IRR = 0%, RSC-IRR = 17%*), and low oil price-low reserve (*PSC-IRR = 0%, RSC-IRR = 9%*).

6.2.3 Investor's Profitability Index

The profitability index (PI) has been defined as a proportion of discounted cash inflow over the discounted cash outflow (Gurau, 2012). PI is considered to be a benefit-cost ratio or cost-benefit ratio technique. Like in the rest of the appraisal tools, the profitability index was computed using investors' net cash inflow divided by net outflow. The results and analysis of the PI are presented in Figure 6.3 and Table 6.3 below.

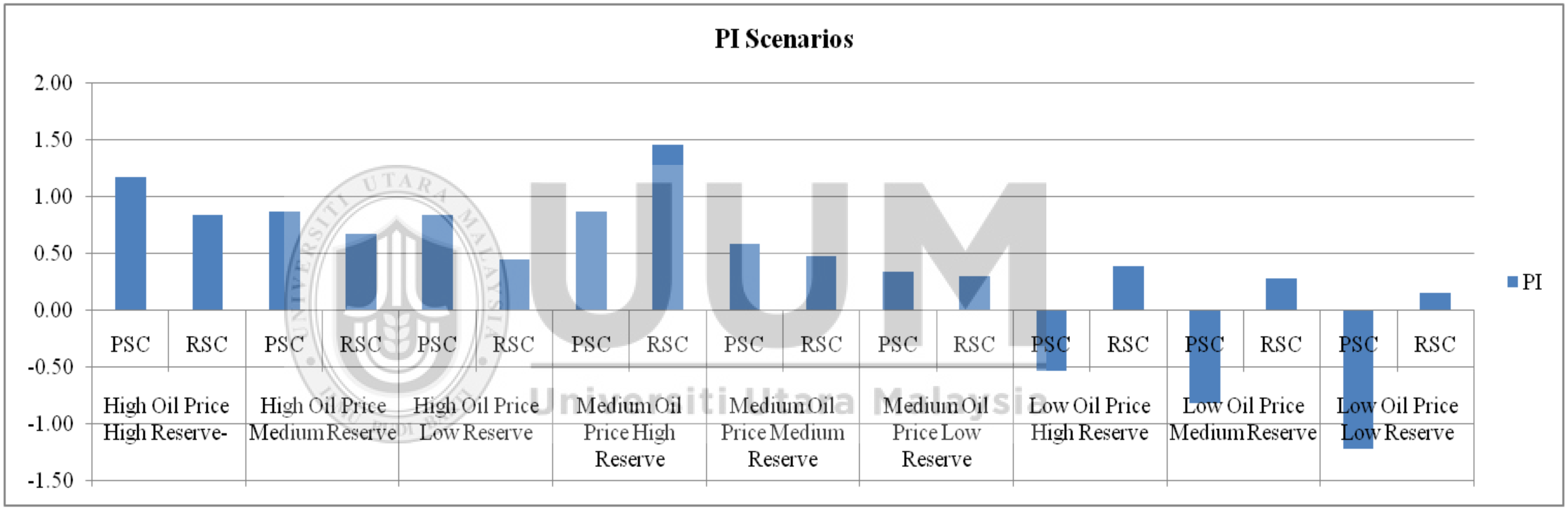


Figure 6.3

Investor's PI under Different Oil Prices and Reserve Levels

Table 6.3
Results of Investment Climate using Profitability Index (PI)

Hypothesis	Statement	PI		Result
		PSC	RSC	
H_{3a}	New fiscal regime under RSC has higher PI under High Oil Price-High Reserve	117%	84%	Not supported
H_{3b}	New fiscal regime under RSC has higher PI under High Oil Price-Medium Reserve	87%	67%	Not supported
H_{3c}	New fiscal regime under RSC has higher PI under High Oil Price-Low Reserve	84%	45%	Not supported
H_{3d}	New fiscal regime under RSC has higher PI under Medium Oil Price-High Reserve	87%	146%	Supported
H_{3e}	New fiscal regime under RSC has higher PI under Medium Oil Price-Medium Reserve	58%	48%	Not supported
H_{3f}	New fiscal regime under RSC has higher PI under Medium Oil Price-Low Reserve	34%	30%	Not supported
H_{3g}	New fiscal regime under RSC has higher PI under Low Oil Price-High Reserve	-54%	39%	Supported
H_{3h}	New fiscal regime under RSC has higher PI under Low Oil Price-Medium Reserve	-82%	28%	Supported
H_{3i}	New fiscal regime under RSC has higher PI under Low Oil Price-Low Reserve	-112%	15%	Supported

Hypotheses 3a, 3b and 3c proposed that the new fiscal regime under RSC fiscal terms would have a higher investor's PI under high oil price-high reserve, high oil price-medium reserve and high oil price-low reserve respectively. The results in Table 6.3 revealed that the three hypotheses were not supported. Specifically, the results showed that the PI under high oil price-high reserve (*PSC-PI = 117%, RSC-PI = 84%*), high oil price-medium reserve (*PSC-PI = 87%, RSC-PI = 67%*) and high oil price-low reserve (*PSC-PI = 84%, RSC-IRR = 45%*) were all higher under the R/C factor PSC fiscal regime – depicting a favourable investment climate.

Hypotheses 3d, 3e, and 3f postulated that the new fiscal regime under RSC fiscal terms would have a higher investor's PI under medium oil price-high reserve, medium oil price-medium reserve and medium oil price-low reserve respectively. The results in Table 6.3 revealed that hypothesis 3e was supported but 3d and 3f were not supported. Specifically, the results showed that the RSC regime had a higher PI under medium oil price-high reserve (*PSC-PI = 87%, RSC-PI = 146%*), while under medium oil price-low reserve (*PSC-PI = 58%, RSC-PI = 48%*) and medium oil price-medium reserve (*PSC-P I= 34%, RSC-PI = 30%*) fiscal regime under the R/C factor PSC had a higher PI.

Hypotheses 3g, 3h and 3i postulated that the new fiscal regime under RSC fiscal terms would have higher investor's PI under low oil price-high reserve, low oil price-medium reserve and low oil price-low reserve respectively. The results in Table 6.3 showed that all these hypotheses were supported. Specifically, the results highlighted PI under low oil price-high reserve (*PSC-PI = -54%, RSC-P1 = 39%*), low oil price-medium reserve

(*PSC-PI = -82%, RSC-PI = 28%*), and low oil price-low reserve (*PSC-PI = -112%, RSC-PI = 15%*) was higher under the RSC fiscal regime.

6.2.4 Investor's Access to Gross Revenue

Access to gross revenue (AGR) refers to the maximum share of revenues a company receives from a joint venture in relationship to its share of working interest in a particular accounting period (Johnston, 2007). In a fiscal regime with only royalty, investor AGR is only limited by the royalty, i.e., the revenue entirely belongs to the investor with the exception to royalty paid to government or the landlord (Johnston, 2007). This is calculated using gross revenue earned by an investor as a ratio of total gross revenue of the project. The result and analysis of the PI are presented in Figure 6.4 and Table 6.4 below.

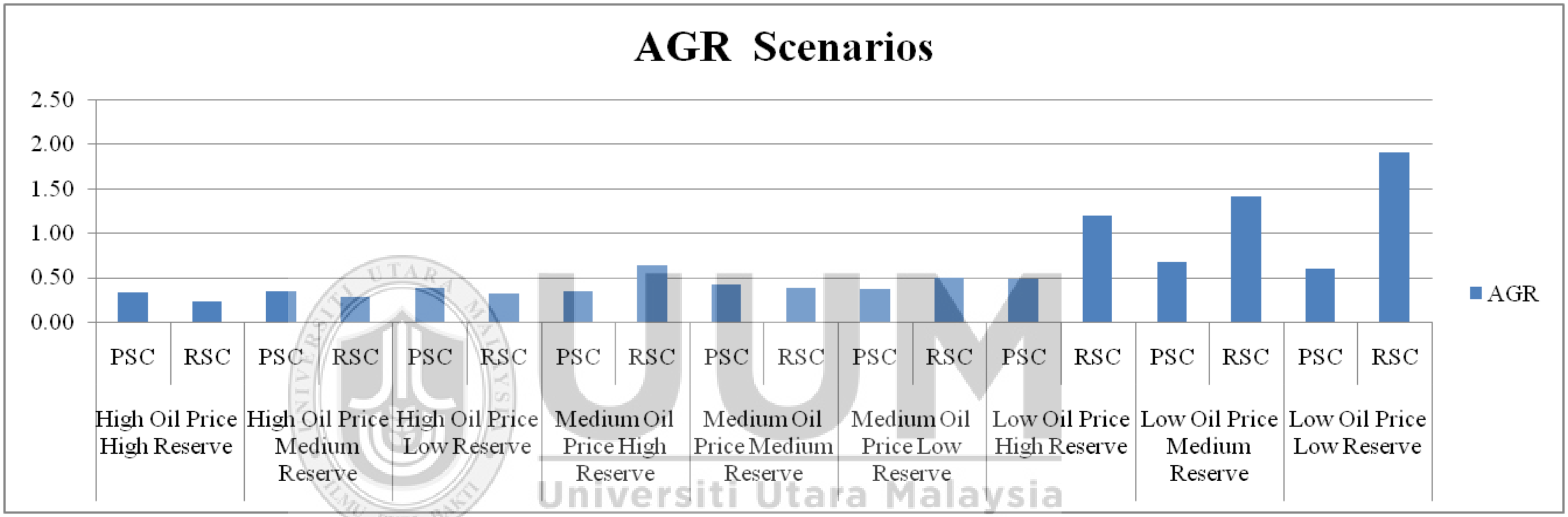


Figure 6.4
Investor's AGR under Different Oil Prices and Reserve Levels

Table 6.4

Results of Investment Climate using Investor's Access to Gross Revenue (AGR)

Hypothesis	Statement	AGR		Result
		PSC	RSC	
H_{4a}	New fiscal regime under RSC has higher AGR under High Oil Price-High Reserve	33%	23%	Not supported
H_{4b}	New fiscal regime under RSC has higher AGR under High Oil Price-Medium Reserve	35%	28%	Not supported
H_{4c}	New fiscal regime under RSC has higher AGR under High Oil Price-Low Reserve	38%	32%	Not supported
H_{4d}	New fiscal regime under RSC has higher AGR under Medium Oil Price-High Reserve	34%	64%	Supported
H_{4e}	New fiscal regime under RSC has higher AGR under Medium Oil Price-Medium Reserve	42%	39%	Not supported
H_{4f}	New fiscal regime under RSC has higher AGR under Medium Oil Price-Low Reserve	37%	49%	Supported
H_{4g}	New fiscal regime under RSC has higher AGR under Low Oil Price-High Reserve	48%	120%	Supported
H_{4h}	New fiscal regime under RSC has higher AGR under Low Oil Price-Medium Reserve	67%	142%	Supported
H_{4i}	New fiscal regime under RSC has higher AGR under Low Oil Price-Low Reserve	60%	191%	Supported

Hypotheses 4a, 4b and 4c postulated that the new fiscal regime under RSC fiscal terms would have a higher investor's AGR under high oil price-high reserve, high oil price-medium reserve and high oil price-low reserve respectively. The results in Table 6.4 revealed that the three hypotheses were not supported. Specifically, the results revealed that the investor AGR under high oil price-high reserve (*PSC-AGR = 33%, RSC-AGR = 23%*), high oil price-medium reserve (*PSC-AGR = 35%, RSC-AGR = 28%*) and high oil price-low reserve (*PSC-AGR = 38%, RSC-AGR = 32%*) was higher under the R/C factor PSC fiscal regime than under the RSC fiscal regime.

Hypotheses 4d, 4e and 4f postulated that the new fiscal regime under RSC fiscal terms would have a higher investor's AGR under medium oil price-high reserve, medium oil price-medium reserve and medium oil price-low reserve respectively. The results in Table 6.4 revealed that hypotheses 4d and 4f were supported while hypothesis 4e was not supported. Specifically, the results showed the AGR under medium oil price-high reserve (*PSC-AGR = 34%, RSC-AGR = 64%*), medium oil price-low reserve (*PSC-AGR = 37%, RSC-AGR = 49%*) were higher under the fiscal regime for RSC than for R/C factor PSC. However, the AGR under medium oil price-medium reserve (*PSC-AGR = 42%, RSC-AGR = 39%*) was higher under the fiscal regime for PSC than for RSC.

Hypotheses 4g, 4h and 4i postulated that the new fiscal regime under RSC fiscal terms would have a higher investor's AGR under low oil price-high reserve, low oil price-medium reserve and low oil price-low reserve scenarios respectively. The results in Table 6.4 revealed that all three hypotheses were supported. Specifically, the results highlighted that an investor's AGR under low oil price-high reserve (*PSC-AGR = 48%*, *RSC-AGR = 120%*), low oil price-medium reserve (*PSC-IRR = 67%*, *RSC-IRR = 142%*), and low oil price-low reserve (*PSC-IRR = 60%*, *RSC-IRR = 191%*) was higher under the RSC fiscal regime than under the R/C factor PSC fiscal regime.

6.2.5 Investor's Saving Index

The saving index (SI) from undiscounted viewpoint reflects how much an investor opportunes to gain if he saves a dollar. Statistically, from undiscounted viewpoint, the SI measures the percentage age of gross revenue goes to investor (Johnston, 2008). It measured in monetary units. Unlike other investment appraisal tools, the saving index was computed using project gross revenue divided by company profit oil — for PSC or investor remuneration fee for RSC. The result and analysis of the SI are presented in Figure 6.5 and Table 6.5 below.

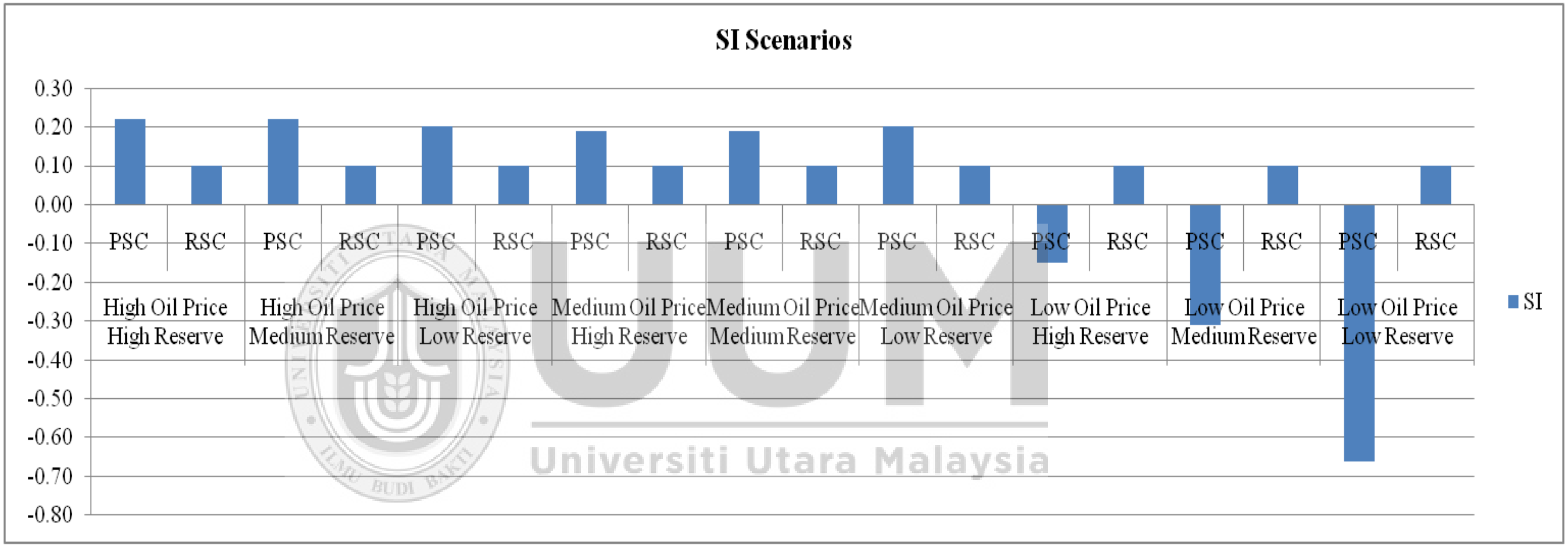


Figure 6.5
Investor's SI under Different Oil Prices and Reserve Levels

Table 6.5

Results of Investment Climate using Investor's Saving Index (SI)

Hypothesis	Statement	SI		Result
		PSC	RSC	
H_{5a}	New fiscal regime under RSC has higher SI under High Oil Price-High Reserve	0.22	0.10	Not supported
H_{5b}	New fiscal regime under RSC has higher SI under High Oil Price-Medium Reserve	0.22	0.10	Not supported
H_{5c}	New fiscal regime under RSC has higher SI under High Oil Price-Low Reserve	0.20	0.10	Not supported
H_{5d}	New fiscal regime under RSC has higher SI under Medium Oil Price-High Reserve	0.19	0.10	Not supported
H_{5e}	New fiscal regime under RSC has higher SI under Medium Oil Price-Medium Reserve	0.19	0.10	Not supported
H_{5f}	New fiscal regime under RSC has higher SI under Medium Oil Price-Low Reserve	0.20	0.10	Not supported
H_{5g}	New fiscal regime under RSC has higher SI under Low Oil Price-High Reserve	-0.15	0.10	Supported
H_{5h}	New fiscal regime under RSC has higher SI under Low Oil Price-Medium Reserve	-0.31	0.10	Supported
H_{5i}	New fiscal regime under RSC has higher SI under Low Oil Price-Low Reserve	-0.66	0.10	Supported

Hypotheses 5a, 5b to 5c postulated that the new fiscal regime under RSC fiscal terms would have a higher investor's SI under high oil price-high reserve, high oil price-medium reserve and high oil price-low reserve respectively. The results in Table 6.5 revealed that all these hypotheses were not supported. Specifically, the results showed that under high oil price-high reserve (*PSC-SI = 0.22, RSC-SI = 0.10*), high oil price-medium reserve (*PSC-S I= 0.22, RSC-SI = 0.10*) and high oil price-low reserve (*PSC-SI = 0.20, RSC-SI = 0.10*), the PSC fiscal regime had a higher SI.

Hypotheses 5d, 5e and 5f postulated that the new fiscal regime under RSC fiscal terms would have a higher investor's SI under medium oil price-high reserve, medium oil price-medium reserve and medium oil price-low reserve respectively. The results in Table 6.5 revealed that all these hypotheses were not supported. Specifically, under medium oil price-high reserve (*PSC-SI = 0.22, RSC-SI = 0.10*), medium oil price-low reserve (*PSC-SI = 0.19, RSC-SI = 0.10*), and medium oil price-medium reserve (*PSC-SI = 0.20, RSC-SI = 0.10*) R/C factor the PSC fiscal regime had a higher SI than under the RSC fiscal regime.

Hypotheses 5g, 5h and 5i postulated that the new fiscal regime under RSC fiscal terms would have a higher investor's SI under low oil price-high reserve, low oil price-medium reserve and low oil price-low reserve respectively. The results in Table 6.5 revealed that all these hypotheses were supported. Specifically, the results highlighted that under the RSC fiscal regime it was likely to be more favorable than PSC under low oil price-high reserve (*PSC-SI = -0.15, RSC-SI = 0.10*), low oil price-medium reserve (*PSC-SI = -0.31, RSC-SI = 0.10*), and low oil price-low reserve (*PSC-SI = -0.66, RSC-SI = 0.10*).

6.3 Trend Analysis Results

Trend analysis was performed to achieve the second objective of the study, i.e., it examines the extent to which the investors' CAPEX performance improved under the new fiscal regime. As mentioned in the methodology, some researchers have made an effort to follow relevant steps in conducting trend analysis. Rosenberg (2007) and Meals, Spooner, Dressing and Harcum (2011) enumerated steps required for testing the significance of a trend. The first step is data exploration, which involves evaluating the data for missing observations. The second step is determining the variables for the analysis. The third step is data reduction and flow adjustment. The fourth step is graphing the data for visual insights. The last step is a statistical evaluation of the significance of the monotonic trend. Therefore, these steps were followed in evaluating the significance of the trends in this study.

6.3.1 Data Exploration

Four items were used in measuring the CAPEX used in the study. These were: (1) purchase of property, plant and equipment, (2) tangible drilling costs, (3) intangible drilling costs, and (4) purchase of oil and gas properties. Each item was extracted from cash flow statements under investing activities for each of the seven years. Even though some items were not reported consistently, the study is concerned with the lump sum CAPEX. Therefore, the available items obtained in each year were summed to obtain the

CAPEX for that year. It is in this way that the current study explored the data and dealt with the missing values as required by this step.

6.3.2 Determination of Variables for the Analysis

Two variables were used for analysis in this study. These were CAPEX and Regime. CAPEX is measured as an amount of capital expenditure incurred in a particular year. Regime refers to the fiscal regime in place, which is measured as ordinal variable with 1 as the old regime during PSC arrangement and its provisions and 2 as the new regime during RSC arrangement and its provisions. The definition of regime as an ordinal variable is based on the expectation that the new regime will lead to more CAPEX performance due to its less-stiff provisions than the old regime. Put differently, the new regime is expected to have a higher value for investors than the old one. Six years were selected for the analysis, and they were divided into two groups. Three years before the introduction of the new regime (2007, 2008 and 2009) were classified as the old regime. Then, three years after the introduction of the new regime (2011, 2012 and 2013) were classified as the new regime.

6.3.3 Data Reduction and Flow Adjustment

In this stage, data for the analysis is converted from monetary values to percentage change in CAPEX so as to ensure the uniformity of unit of measurement. For instance, some annual reports used Malaysian Ringgits while others used United States' Dollars. Thus, using percentage change in CAPEX gives uniform units of measurement. For this purpose, year 2010 was used as a base-year. This exercise was performed using Excel.

6.3.4 Data Graphing

The fourth step in conducting trend analysis used Meals, Spooner, Dressing, and Harcum's (2011) approach for plotting graphs for data visualization to enable an understanding of the monotonic nature of the trend. Thus, figures 6.6 to 6.10 depict the trend via visualization.

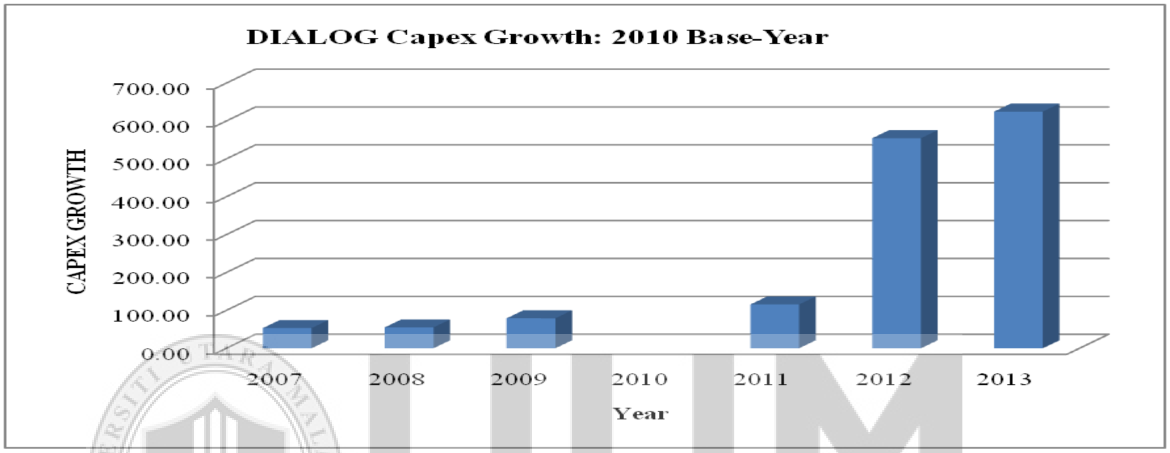


Figure 6.6
Dialog CAPEX Growth- 2010 Base-Year

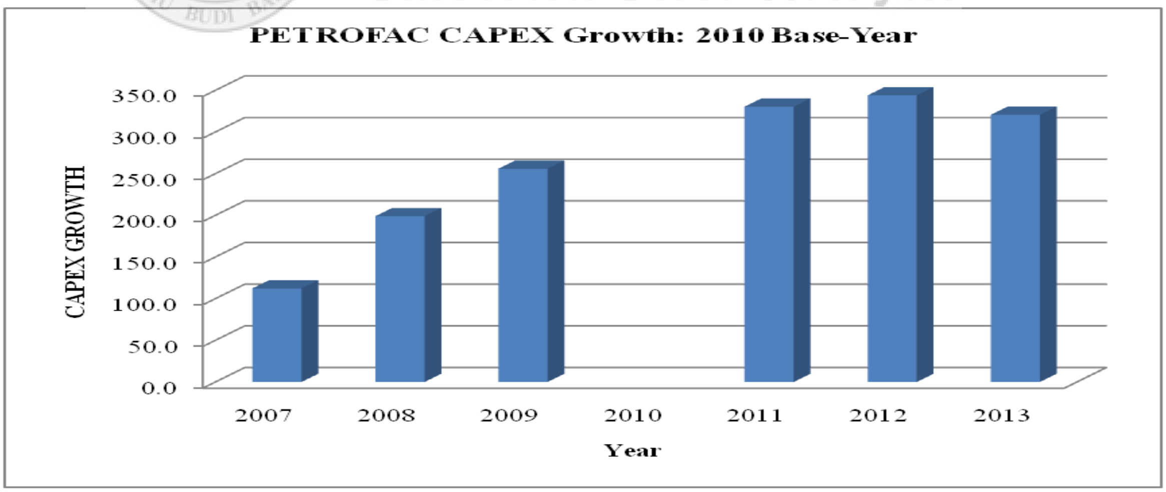


Figure 6.7
PETROFAC CAPEX Growth- 2010 Base-Year

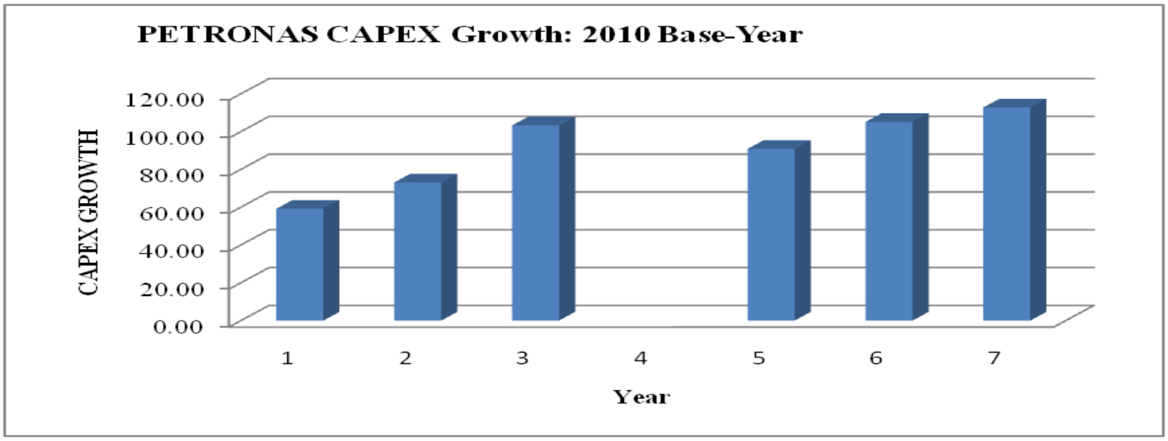


Figure 6.8
PETRONAS CAPEX Growth- 2010 Base-Year

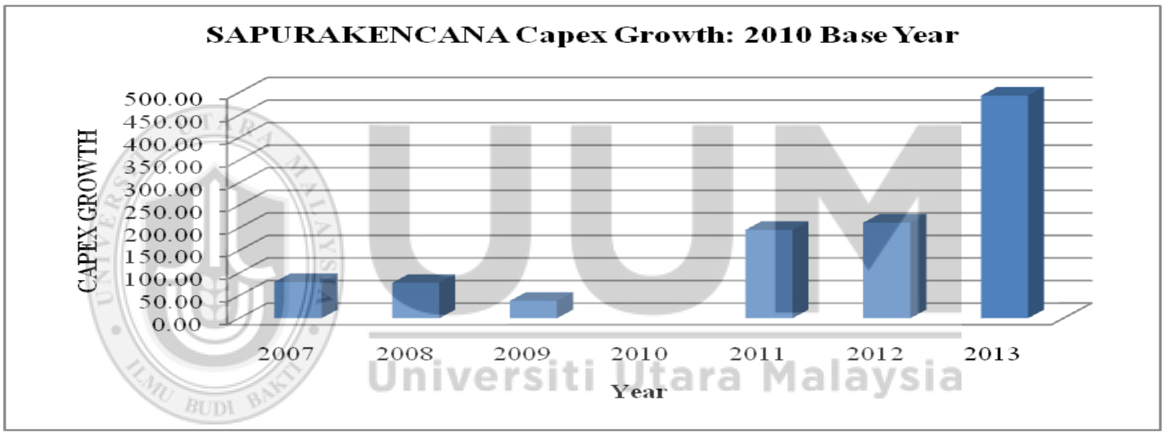


Figure 6.9
SapuraKencana CAPEX Growth: 2010 Base-Year

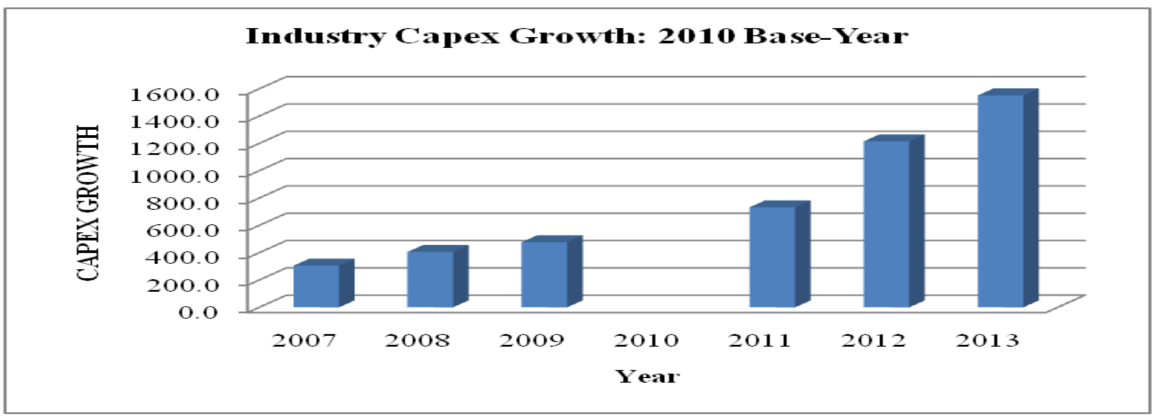


Figure 6.10
Industry CAPEX Growth: 2010 Base-Year

Figure 6.6 shows that a giant stride was made in the CAPEX performance of Dialog Energy after the fiscal regime changed. For PETROFAC, evidence in Figure 6.7 above showed an increasing trend in CAPEX performance after the 2010 fiscal regime changes. In Figure 6.8 above, a consistent trend is depicted for PETRONAS CAPEX performance with a large increment made during the new regime. In Figure 6.9 above, an increasing trend in its CAPEX performance after 2010 fiscal regime changes was recorded for SapuraKencana. For the overall industry, Figure 6.10 above depicted an increasing trend after 2010 fiscal regime changes.

Moreover, in order to gain more visual effect of the trend, the three years before the fiscal regime change were merged and classified as the old regime and three years after the fiscal regime change were merged and classified as the new regime. Figures 6.11 to 6.15 below depicted the trend for the improved visual effect.

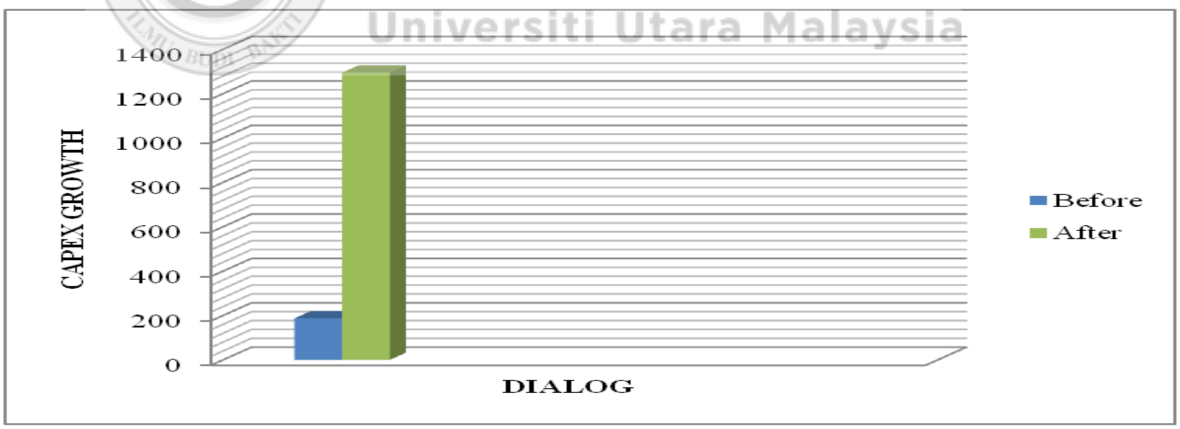


Figure 6.11
Diglog Energy CAPEX Performance

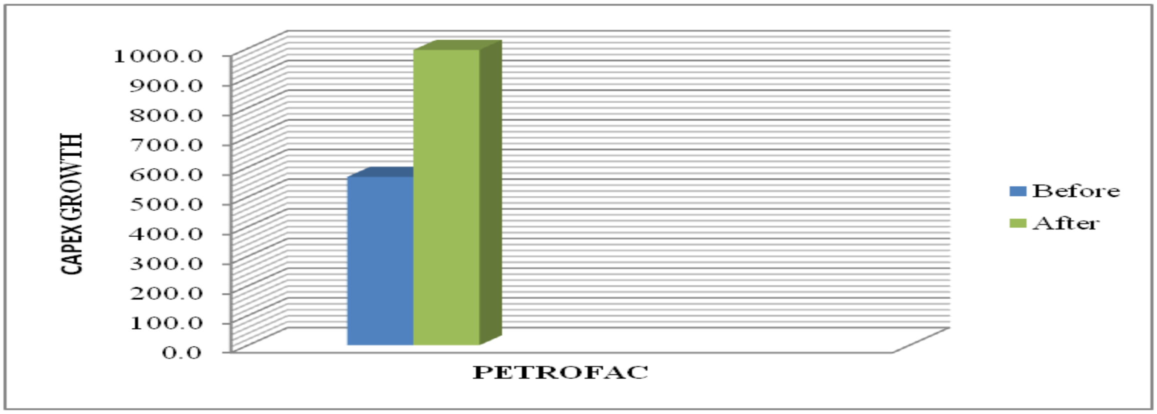


Figure 6.12
PETROFAC CAPEX Performance

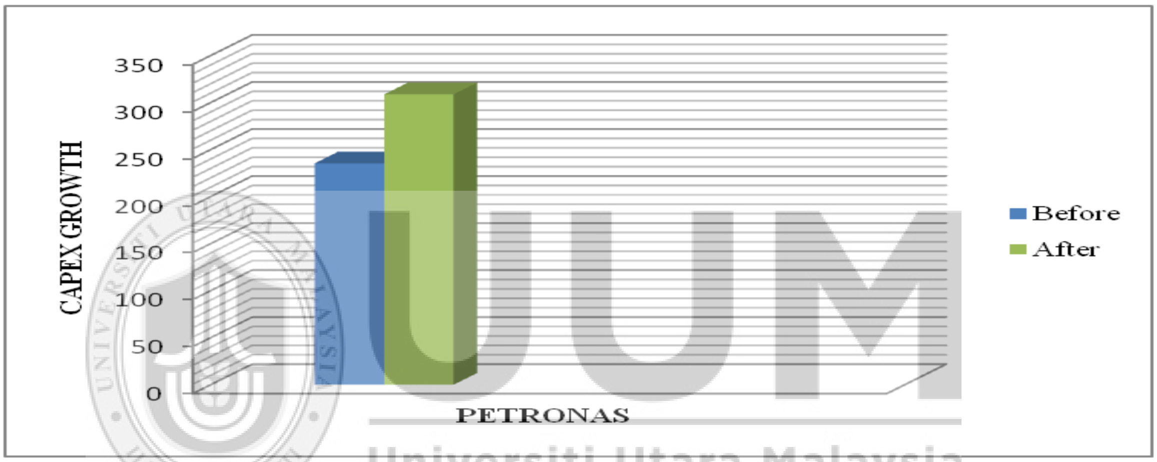


Figure 6.13
PETRONAS CAPEX Performance

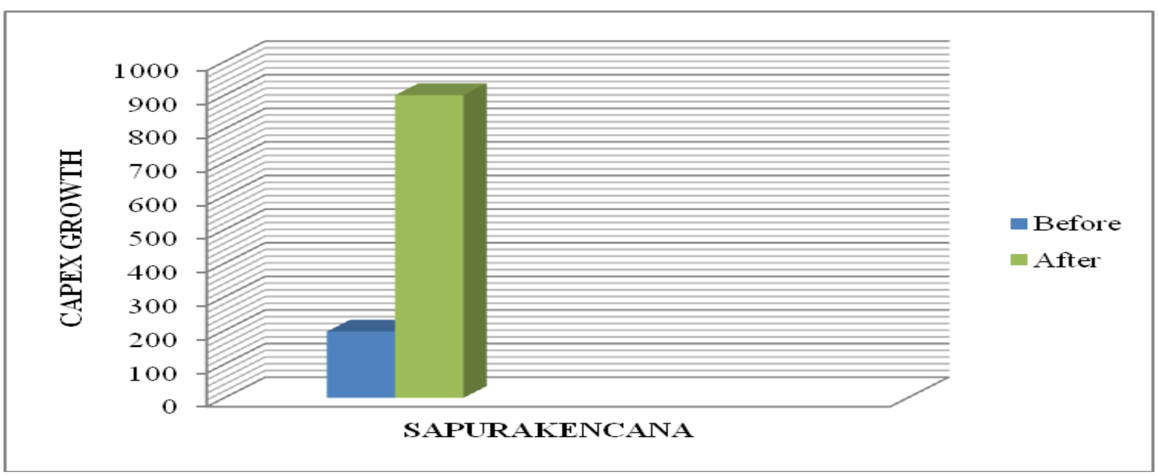


Figure 6.14
SapuraKencana CAPEX Performance

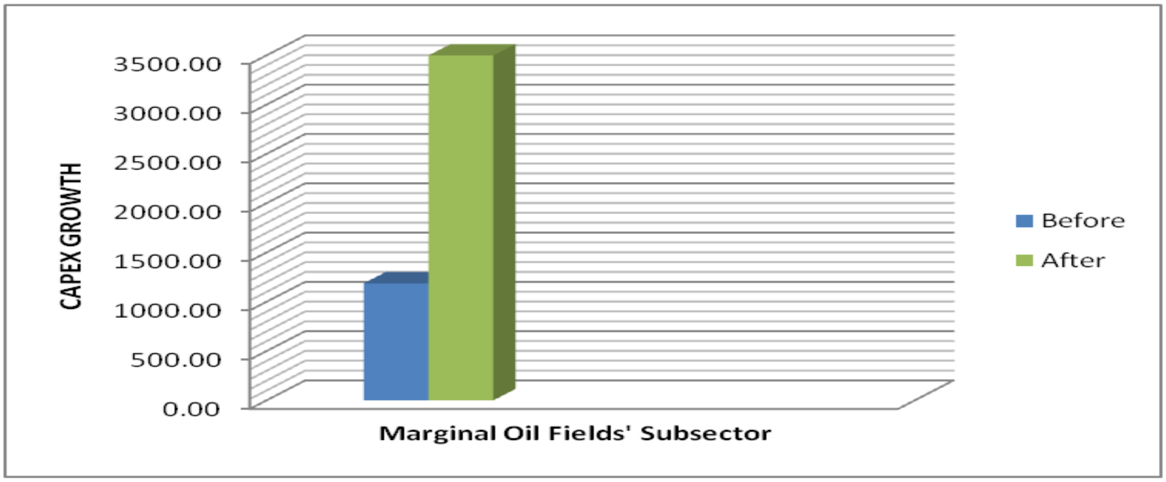


Figure 6.15
Marginal Oil Fields' Subsector CAPEX Performance

6.3.5 Statistical Evaluation of Trend Significance

Evaluation of the monotonic nature of the data as well as its statistical significance is the last step in trend analysis. In order to make this evaluation, the Jonckheere-Terpstra trend test, which is a non-parametric test, was conducted using the Statistical Package for the Social Sciences (SPSS). This test is used in studies in which the null hypothesis that no trend is present among the observations is tested (Zhang & Cabilio, 2013). The Jonckheere-Terpstra trend test was used in this study for two reasons. First, the Jonckheere-Terpstra trend test was used because the data did not meet the parametric requirements of other trend tests such as linear regression. Second, the Jonckheere-Terpstra trend test is based on ordered alternatives, thus the test considered appropriate in this study due to ordering of the two alternatives regimes. The main hypothesis for this analysis is that CAPEX increases as the regime changes. This hypothesis is based on the idea that the old regime is considered to be low in attractiveness due to a high tax rate and low incentives, while the new regime is considered to be highly attractive due to a low tax rate and high incentives. In line with this main hypothesis, the proposition is that as the regime moves from low attractive to high attractive, the CAPEX for investors and industry increases. Thus, the two samples are considered as ordered alternatives not categorical; hence, trend tests for two nominal groups such as Mann-Whitney U test, Mann-Whitney-Wilcoxon test, Kalmogorov-Smirnov Z, Moses Extreme Reaction and Wald-Wolfowitz Runs are inappropriate for this purpose. The result is shown is Table 6.6 below.

Table 6.6

Trend Analysis Results using Jonckhree-Terpstra Test

Hypothesis	**Statement**	**J-T Statistic**	**Sig.**	**Decision**
6(a)	Fiscal Regime Adjustment Changed CAPEX Performance of Dialog Energy	1.964	0.025	Supported
6(b)	Fiscal Regime Adjustment Changed CAPEX Performance of PETROFAC	1.964	0.025	Supported
6(c)	Fiscal Regime Adjustment Changed CAPEX Performance of PETRONAS	1.528	0.064	Supported
6(d)	Fiscal Regime Adjustment Changed CAPEX Performance of SapuraKencana	1.964	0.025	Supported
7	Fiscal Regime Adjustment Changed CAPEX Performance of overall Subsector	1.964	0.025	Supported

Note. All are 1-tailed tests.

Hypotheses 6 (a-d) postulated that an investor's individual CAPEX performance trend would after the 2010 fiscal regime adjustment. This hypothesis comprised four sub-hypotheses for the four marginal oil fields' investor-companies for which data was available. For hypothesis 6(a), the difference in CAPEX performance trend for Dialog Energy before and after the fiscal regime adjustment is positive and significant *(Std. J-T Statistic = 1.964, Asymp. Sig. = 0.025).* The implication is that the trend in the company's CAPEX increased significantly after 2010 fiscal regime adjustment. The result supported the hypothesis that the investor's CAPEX performance increased after the 2010 fiscal regime adjustment. For hypothesis 6 (b), the difference in the CAPEX performance trend for company PETROFAC before and after the fiscal regime adjustment was also positive and significant *(Std. J-T Statistic = 1.964, Asymp. Sig. = 0.025).* The implication is that the trend in the company's CAPEX increased significantly after 2010 fiscal regime adjustment. The result supports the hypothesis that investor's CAPEX performance would increase after the 2010 fiscal regime adjustment.

For hypothesis 6(c), the difference in CAPEX performance trend for PETRONAS before and after the fiscal regime adjustment was also positive and significant *(Std. J-T Statistic = 1.528, Asymp. Sig. = 0.064).* This is an indication that the trend in the company's CAPEX increased significantly after the 2010 fiscal regime adjustment. The result supports the hypothesis that this investor's CAPEX performance would increase after the 2010 fiscal regime adjustment.

For hypothesis 6 (d), the difference in CAPEX performance trend for SUPURAKENCANA before and after the fiscal regime adjustment was positive and significant *(Std. J-T Statistic = 1.964, Asymp. Sig. = 0.025).* This showed that trend in the company's CAPEX increased significantly after the 2010 fiscal regime adjustment. The result supports the hypothesis that the investor's CAPEX performance would increase after the 2010 fiscal regime adjustment.

Hypotheses 7 postulated that investors' cumulative (marginal oil fields subsector) CAPEX performance would increase after the 2010 fiscal regime adjustment. The result revealed that the difference in CAPEX performance trend for the marginal oil fields subsector before and after the fiscal regime adjustment was positive and significant *(Std. J-T Statistic = 1.964, Asymp. Sig. = 0.025).* This showed that the trend in the marginal oil field's subsector CAPEX increased significantly after the 2010 fiscal regime changes. The result supports the hypothesis that the investor's cumulative CAPEX performance would increase after the 2010 fiscal regime adjustment.

6.4 Survey Results

The purpose of the survey was to achieve the third and fourth objectives of the study. Objective three examines the relationship between tax instruments and the investment climate of marginal oil fields, while objective four examines the moderating effect of attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields. Data from the survey was analyzed using Partial Least Square (PLS) path modeling. Before the main PLS path modeling, the demographic profile of the respondents was analyzed, the data was also subjected to response rate analysis, followed by screening and preliminary analyses, descriptive statistics of all the latent constructs were also analyzed, a *t*-test for non-response bias was also carried-out, and lastly a one-way Analysis of Variance (*ANOVA*) was carried out for three respondents' groups.

For the main PLS path modeling, the result was presented in two models. The first was the measurement model. In this, results for the assessment of individual item reliability, internal consistency reliability, convergent validity and discriminant validity and model fit evaluation were presented. The second was the structural model, which covers the assessments of the R-squared, significance level of paths coefficients; value, effect sizes, and model predictive relevance. In addition, the structural model of PLS path modeling was complemented with the result of moderating effects of attractive petroleum fiscal regime.

6.4.1 Distribution of Survey Instrument and Response Rate

In conducting the study, 361 questionnaires were distributed to 16 organizations divided into three clusters (government, industry, and practitioners) between August, 2014 to January, 2015. In each organization, a relationship was established with one person who was to coordinate the data collection. The questionnaires were distributed using self-addressed return envelope. Due to anticipated low response in Malaysia, several steps were followed to maximize the response rate.

First, in the design of the survey instrument, the cover-page of each questionnaire contained a statement that the Malaysian government funded the research. The reason for doing this was that part of the instrument would be used for Fundamental Research Grant Scheme (FRGS) with Code Number 12930. This statement implied that, by funding, the government had a good concern for the research, which, in turn, would encourage response.

Second, to further maximize the response rate, the study planned to complete the data collection within three months (August, September and October, 2014). However, only 71 questionnaires were received during that period. To follow up, reminders were made to the respective contact persons (Dillman, 1991).

The third step taken for the maximization of the response rate was slating an additional three months (November, December, 2014 and January, 2015) for continued follow-up, making the duration of the data collection six months. During this additional period, several approaches were employed such as phone calls, (Saad, 2011), Short Message Services (SMS) (Sekaran, 2003), and emails (Porter, 2004).

Finally, the need for maximization of response rate resulted in several trips to Kuala Lumpur in each of the additional three months. The purpose was to have meetings with the contact persons for reminders and the collection of completed questionnaires, as some respondents no time to return the questionnaires by post. After these efforts, an additional 52 responses were collected.

The outcome of several efforts tailored towards maximization of response rate yielded a total of 123 responses out of 361 questionnaires distributed. Using Jobber's (1989) definition of response rate, this study achieved a response rate of about 34.1%. Of 123 responses collected, one questionnaire was significantly incomplete, thereby making it unusable for analysis. The remaining 122 were used for further analysis. The removal of one questionnaire made the valid response of rate about 33.8%. This response rate is considered to be satisfactory for the analysis. Sekaran (2003) suggested that a response rate of 30% was adequate for surveys. Table 6.7 showed the breakdown of the response rate.

Table 6.7
Questionnaire Response Rate

Response	**Rate**
Number of questionnaires distributed	361
Number of questionnaires returned	123
Number of of questionnaires excluded	1
Number of questionnaires returned and usable	122
Response rate	34.1%
Valid response rate	33.8%

6.4.2 Respondents' Demographic Profiles

This section discussed the respondents' demographic characteristics. The demographics examined include age, gender, qualification, and employer. Table 6.8 below presents the demographic profiles of the respondents.

Table 6.8
Demographic Profile of the Respondents

Demographic Profile	**Frequency**	**Percentage**
Age		
Below 30 years	43	35.8
30-39 years	45	37.5
40-49 years	23	19.2
50 and above	9	7.5
Total	**120**	**100**
Gender		
Male	77	64.2
Female	43	35.8
Total	**120**	**100**
Qualification		
Diploma/Degree/Professional Qualification	98	81.7
Masters/PhD	22	18.3
Total	**120**	**100**
Employer		
Government Institutions (Government)	32	26.7
Private Oil Companies (Industry)	69	57.5
Accounting Firms	19	15.8
Total	**120**	**100**

Table 6.8 shows that 5.8% of the respondents were below 30 years of age, 37.5% were 30 to 39 years, 19.2% were 40 to 49 years, and the remaining 7.5% were 50 years and above. Of the respondents, 64.2 % were male, while 35.8 % were female. The majority of the respondents, about 81.7%, had diploma/degree/professional qualifications, while the remaining 18.3% had master degrees/PhDs. Government institutions employed 26.7% of the respondents, private oil companies employed 57.5%, and accounting firms employed the remaining 15.8%.

6.4.3 Data Screening and Preliminary Analysis

Data screening and its preliminary examination are important to determine if the data set meets the assumptions necessary for multivariate analysis. Such an analysis improves the researcher's understanding on whether the assumptions of multivariate data analysis have been violated (Hair *et al.*, 2007) Conducting this analysis enables the researcher to understand the extent of data fitness for the intended analysis. Hair, Black, Babin, and Anderson (2010) posited that data screening and preliminary analysis encompassed four issues. These are: (1) identification and treatment of missing values, (2) identification and treatment of outliers, (3) normally tests, and (4) multicollinearity tests. Therefore, these four steps were followed in the screening and preliminary analysis of the data.

Before the commencement of the data screening, all the 122 usable responses were entered and coded into SPSS software. Then frequencies were tabulated for minimum and maximum values to determine if there were any outliers or abnormalities. The outcome of this exercise revealed that no item had a value outside its scale or categorical range as labeled in SPSS.

6.4.3.1 Identification and Treatment of Missing Values

The study has 8,418 data points. That is 69 items (excluding categorical items) multiplied by 122 cases. Of this set, 12 data points were randomly missed, which accounted for about .14%. Specifically, crypto-based taxes, investment climate, tax incentive had 4, 2, 2 and 4 missing values respectively. No missing values were found for other variables. Generally, researchers agree that missing values of 5% and below are considered insignificant (Tabachnick & Fidell, 2007). The recommendation is that where the missing values are less than 5%, mean replacement is the most common approach for substitution (Tabachnick & Fidell, 2007). Therefore, all the missing values were replaced with series mean using SPSS. The output of missing values replacement is contained in Appendix C. Table 6.9 below presents the variables and their respective missing values.

Table 6.9
Missing Values Analysis

Variable	**No. of Missing Values**
Attractive Petroleum Fiscal Regime	4
Crypto-based Tax	0
Investment Climate	2
Production-based Tax	0
Tax Incentive	4
Total Missing	12
Total Data Points	8,418
Percentage Missed	.14%

6.4.3.2 Identification and Treatment of Outliers

Aggarwal and Yu (2001) defined an outlier as a data point with a value that is highly different from the rest of the data based on some measure. The presence of outliner in a dataset has the possibility of arbitrarily distorting t values for estimators, which may render the results meaningless for practical application.

In order to avoid this problem, data was examined for univariate and multivariable outliers. For univariate outliers, the data was examined based on Tabachnick and Fidell's (2007) recommendations using a cut-off of ± 3.29 ($p < .001$) for standardized values. Following these recommendations for detecting outliers and using the standardized values, two univariate outliers were identified in the dataset. These outliers were cases number 20 and 56, which were subsequently deleted, because they might affect the accuracy of the statistical estimations. Having fulfilled the requirements for univariate outliers, multivariate outliers were also examined using Mahalanobis distance (D2), which Tabachnick and Fidell (2007) defined as "the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all the variables" (p. 74). Based on 69 observed variables, the corresponding chi-square was 111.055 ($p = .001$). Based on this threshold value, no multivariate outlier was identified in the dataset. Therefore, having removed the identified outliers, the final dataset stood as 120 cases.

6.4.3.3 Normality Test

Normality is an important assumption of multivariate analysis (Tabachnick & Fidell, 2007). The traditional assumption has been that PLS path modeling provides accurate statistical estimates despite an extremely non-normal dataset (Cassel, Hackl, & Westlund, 1999; Wetzels, Odekerken-Schroder, & Van Oppen, 2009). Recently, this traditional assumption seems to have been relaxed. The argument has been made that bootstrapped standard error estimates can be inflated by extremely skewed and kurtotic data (Chernick, 2011; Hair, Hult, Ringle, & Sarstedt, 2013). Eventually, these would affect the statistical estimation of the path-coefficients (Ringle, Sarastedt, & Straub, 2012). Thus, the suggestion has been made that researchers who use PLS-SEM (Hair, Sarstedt, Ringle, & Mena, 2012) should conduct normality tests. Hair *et al.* (2013) said that normality tests using the Kalmogorov-Smirnov test and the Shapiro-Wilk test provide limited guidance on whether or not a data is normally distributed. Thus, the recommendation is that skewness and kurtosis should both use thresholds of +1 or -1. Therefore, in line with the current trend in using of PLS path modeling, normality tests were conducted using skewness and kurtosis so as to improve the statistical accuracy of path coefficients estimations. The results of skewness and kurtosis for the normality test are contained in Appendix B. The skewness and kurtosis of all the observed variables were less than -1 or +1, except those of APFR3 and IC1, which were subsequently deleted. By so doing, the data satisfied the normality assumptions as presently required in PLS path modeling.

In addition to continuous variables, the study has categorical independent variables. These were: Brown Tax, Company Income Tax, Production Sharing Contract, Pure Service Contract, Petroleum Income Tax, and Risk Service Contract. However, the assumption of normality as required in PLS-SEM is not applied to categorical variables, because, when data is labeled as categorical, violating the normality assumption is not a problem because the proportion of each category is explicitly modeled (Feldman, Masyn, & Conger, 2009). Therefore, owing to this logic, the resulting assumption is that the normality of categorical variables is not required in this study.

Moreover, the argument exists that popular statistical methods for testing normality have low power of estimates, thus the recommendation is that it is preferable to assess normality using both visual and statistical methods (Ghasemi & Zahediasl, 2012). Following Ghasemi and Zahediasl’s (2012) recommendation, in addition to skewness and kurtosis, normality was also assessed using the visual method. Thus, a normal probability plot is used to ensure that the complete dataset does not violate the normality assumption. Figure 6.1 below is the visual presentation of the normality of the data, which, by visual inspection, shows that the data did not violate the assumption of normality.

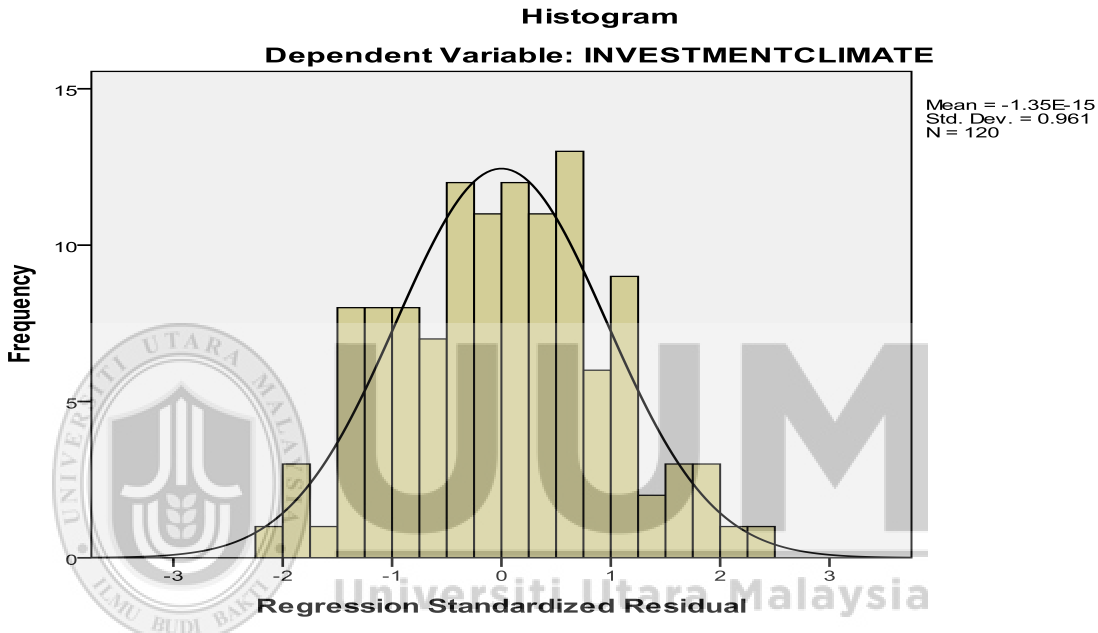


Figure 6.16
Histogram for Normal Distribution

6.4.3.4 Multicollinearity Test

Multicollinearity is a phenomenon in which two or more exogenous latent variables have a high level of correlation (Tabachnick & Fidell, 2007). The implication is that the two variables are telling the same story relating to the research model. Eventually, this can considerably distorted estimates of coefficients of a regression model as well as their statistical significance (Tabachnick & Fidell, 2007).

In PLS path modeling, tolerance and the Variance Inflation Factor (VIF) are the two common methods being used in evaluating normality (Hair *et al.*, 2013). Tolerance refers to the variance of one exogenous variable not explained by any other exogenous variable in the model, while VIF is defined as reciprocal of tolerance (Hair *et al.*, 2013). Hair *et al.* (2013) further asserted that a tolerance value of .20 or lower and a VIF of 5 or higher indicated potential problems of multicollinearity. Table 6.10 below presents the results of multicollinearity using tolerance and VIF values.

Table 6.10
Multicollinearity Test using Tolerance and VIF

	Collinearity Statistics	
Exogenous Variables	**Tolerance**	**VIF**
Attractive Petroleum Fiscal Regime	.816	1.226
Brown Tax	.690	1.449
Crypto-based Tax	.365	2.739
Petroleum Income Tax	.634	1.577
Production-based Tax	.385	2.599
Prod. Sharing Contract	.534	1.873
Pure Service Contract	.730	1.369
Tax Incentive	.730	1.370

Tolerance and VIF values as contained in Table 6.10 above indicated that multicollinearity did not exist among the independent variables. The tolerance values are all above the minimum threshold of .20 and the VIF has values of less than the cutoff point of 5 as Hair *et al.* (2013) suggested. Thus, the results of the multicollinearity tests above confirmed that no high correlation exists among the exogenous variables.

6.4.4 Descriptive Statistics of the Latent Variables

In this section, the descriptive statistics of the latent constructs are discussed. The categorical variables need not be included, because the answers are categorical. For each category, the responses were coded as 1 when a particular category was selected and 2 when it was not selected. For the latent variables, minimum and maximum scores, mean and standard deviation were computed. The measurement for all the latent variables is based on a 7-point Likert-type scale ranging from 1 = strongly disagree/very irrelevant, 2=disagree/irrelevant, 3= somewhat disagree/somewhat irrelevant, 4= neutral, 5= somewhat agree/somewhat relevant, 6= agree/relevant to 7 = strongly agree/very relevant. For easier interpretation the 7-point scale was classified into three categories: low, moderate and high. Scores of less than 3 (6/3 + lowest value 1 were considered low), scores of 5 (highest value 7- 6/3) were considered high, whereas those scores falling in between the two categories were considered moderate. Table 6.11 below presents the results of the descriptive statistics.

Table 6.11
Descriptive Statistics of the Latent Variables

	N	Min	Max	Mean	Std. Deviation
Attractive Petroleum Fiscal Regime	120	1	7	4.9	.905
Crypto-based Tax	120	1	7	4.0	1.108
Investment Climate	120	1	7	5.4	.837
Production-based Tax	120	1	7	4.0	1.045
Tax Incentive	120	1	7	5.2	.883

Table 6.11 shows that the mean responses ranged from 4.0 to 5.4 for all the latent variables. In particular, the mean of an attractive fiscal regime was 4.9 and the standard deviation was .905, indicating that the respondents moderate agreement that the

petroleum fiscal regime is attractive in Malaysia. Crypto-based tax had a mean of 4.0 with a standard deviation of 1.108, indicating that the respondents moderately agreed that a crypto-based tax can affect investment in marginal oil fields. Investment climate had a mean score of 5.4 and standard deviation of .837, indicating that respondents viewed the investment climate in marginal oil fields as high. Production-based tax had a mean of 4.0 and a standard deviation of 1.045, indicating their agreement on the moderate effect of a production-based tax on the investment climate in marginal oil fields. Lastly, tax incentive had a mean of 5.2 and a standard deviation of .883, indicating that they viewed tax incentives as a relevant tool for the development of marginal oil fields.

6.4.5 Independent Sample *t*-test for Early and Late Responses

Differences in answers between early and late respondents refers to as non-response bias (Lambert & Harrington, 1990). As mentioned in 6.4.1 above, the data collection was expected to complete within three months. However, a low response and the desire to maximize the response rate mandated an increment of three additional months. The extended period was associated with a high level of follow-up through reminders and revisits to contact persons. Armstrong and Overton (1977) recommended time-trend extrapolation as a mean of examining non-response bias, wherein early response is compared with late response. Consequently, in order to examine whether high-level follow-ups resulted in response-bias, early and late responses were compared.

In line with Armstrong and Overton's (1977) recommendation, the responses were classified into two groups: early and late responses. Those responses collected within the first three months amounted to 68 valid responses (of the 71 early responses, one was a partly completed questionnaire and two univariate outliers comprising case 20 and 56 were excluded), were classified as early responses. The remaining responses collected after follow-up, which amounted to 52 cases that were classified as late responses. In conducting the non-response bias test, an independent sample *t*-test was used to examine whether or not non-response bias occurred among the dependent and independents variables of the study as depicted in Table 6.12 below.

Table 6.12
Independent Sample t-test for Non-Response Bias

			Levene's test for Equality of Variances					
Variable	**Response**	**N**	**F**	**Sig.**	**T**	**Mean**	**SD**	**(2-tailed)**
Attr. Petr. Fiscal Regime	Early Response	68	.024	.878	-.164	4.95	.886	.870
	Late Response	52			-.163	4.92	.938	.871
Brown Tax	Early Response	68	5.628	.019	-1.195	1.84	.371	.235
	Late Response	52			-1.169	1.75	.437	.245
Crypto-based Tax	Early Response	68	1.198	.276	-.090	4.01.	1.178	.928
	Late Response	52			-.092	3.99	1.019	.927
Investment Climate	Early Response	68	.711	.401	-.061	5.42	.768	.951
	Late Response	52			-.060	5.41	.928	.952
Petroleum Income Tax	Early Response	68	.088	.767	1.102	1.46	.502	.273
	Late Response	52			1.102	1.56	.502	.273
Prod. Sharing Contract	Early Response	68	1.522	.220	1.905	1.44	.500	.059
	Late Response	52			1.910	1.62	.491	.059
Production-based Tax	Early Response	68	.081	.776	.608	3.96	1.055	.544
	Late Response	52			.609	4.08	1.038	.544
Pure Service Contract	Early Response	68	.059	.808	.122	1.90	.306	.903
	Late Response	52			.122	1.90	.295	.903
Tax Incentive	Early Response	68	1.650	.201	-.504	5.20	.939	.615
	Late Response	52			-.514	5.11	.812	.608

The results of the independent sample *t*-tests in Table 6.12 above using Levene's test for Equality of Variances and *t*-test for equality of means showed that there was an equality of variances as well as means between early and late responses. Levene’s test of .05 and above and *t*-test (sig. 2-tailed) of .05 and above indicated that an equality of variance and mean respectively (Pallant, 2011). Significant values of less than .05 in each case indicated that variances and means were not equal respectively. Thus, the results implied that non-response bias was not an issue in this study.

6.4.6 One-Way *ANOVA* for Three Respondents’ Groups

A one-way *ANOVA* is conducted when a researcher needs to examine whether a mean difference across more than two groups (Pallant, 2011). Because this study has respondents from three clusters, government institutions, industry and practitioners, a one-way *ANOVA* was deemed necessary to examine whether or not the mean responses across the three respondents’ groups were equal. A one-way *ANOVA* has two main assumptions: the normality of distribution and homogeneity of variance (Coakes & Steed, 2009). The assumption of normality assumption was satisfied in this study as contained in 6.4.3.3. For the homogeneity test, the results are contained in Table 6.13 below.

Table 6.13
Homogeneity Test

Variable	***Levene's Statistic***	***df1***	***df2***	***Sig.***
Attractive Petroleum Fiscal Regime	2.291	2	117	.106
Brown Tax	2.776	2	117	.066
Crypto-based Tax	1.115	2	117	.331
Investment Climate	.194	2	117	.824
Petroleum Income Tax	.186	2	117	.830
Production-based Tax	2.047	2	117	.134
Prod. Sharing Contract	.091	2	117	.913
Pure Service Contract	1.484	2	117	.231
Tax Incentive	1.675	2	117	.192

In Levene's test for homogeneity of variance, a significance level above of .05 and above indicates that the assumption of homogeneity has not been violated (Pallant, 2011). Therefore, looking at the significance of the *p*-values in Table 6.13 above, the homogeneity assumption was not violated; thus, the main one-way *ANOVA* test was conducted. Table 6.14 below presents the results of the one-way *ANOVA* test, which examined whether or not a difference in means existed among the three groups of respondents.

Table 6.14
One-Way ANOVA for Mean Difference among Three Groups

Variable		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Attractive Petro Fiscal Regime	Between Groups	.411	2	.205	.247	.781
	Within Groups	97.116	117	.830		
	Total	97.526	119			
Brown Tax	Between Groups	.307	2	.153	.950	.390
	Within Groups	18.893	117	.161		
	Total	19.200	119			
Crypto-based Tax	Between Groups	5.278	2	2.639	2.195	.116
	Within Groups	140.686	117	1.202		
	Total	145.965	119			
Investment Climate	Between Groups	.046	2	.023	.032	.968
	Within Groups	83.367	117	.713		
	Total	83.413	119			

Table 6.14 Cont.

Variable		Sum of Squares	Df	Mean Square	F	Sig.
Petroleum Income Tax	Between Groups	.229	2	.114	.449	.639
	Within Groups	29.771	117	.254		
	Total	30.000	119			
Production-based Tax	Between Groups	5.564	2	2.782	2.616	.077
	Within Groups	124.454	117	1.064		
	Total	130.018	119			
Prod. Sharing Contract	Between Groups	.189	2	.094	.371	.691
	Within Groups	29.778	117	.255		
	Total	29.967	119			
Pure Service Contract	Between Groups	.063	2	.032	.344	.710
	Within Groups	10.737	117	.092		
	Total	10.800	119			
Tax Incentive	Between Groups	2.315	2	1.157	1.496	.228
	Within Groups	90.514	117	.774		
	Total	92.829	119			

In a one-way *ANOVA*, a significant *p*-value of .05 and below indicates that a significant difference exists in the mean responses among the three groups, while values above .05 shows that no mean difference exists among the three groups (Pallant, 2011). Following, Pallant's (2011) guideline, the results in Table 6.14 showed that the *p*-values are all above .05, indicating that mean differences across the three groups for all the variables were not significant.

6.4.7 PLS Path Model Results

As mentioned in Section 5.4.7.4 of the methodology chapter and Section 6.4 in this chapter, the PLS path model will be evaluated using the measurement model and structural model, which is popularly known as the two-step process. The adoption of the two-step process in evaluating and reporting the PLS path modeling is in line with Henseler, Ringle, and Sinkovics (2009). Moreover, because one of the five latent variables is formative (the moderator), while the other four are reflective, two measurement models were evaluated for both the formative and reflective constructs.

6.4.7.1 Measurement Model Results for Reflective Constructs

The measurement model for reflective construct was evaluated using five criteria. These are indicator reliability, internal consistency reliability, convergent validity, discriminant validity, and model fit evaluation (Hair *et al.*, 2011; Henseler *et al.*, 2009 and model fit Henseler *et al.*, 2014) These five criteria are discussed in Sections 6.4.7.1.1 to 6.4.7.1.5 below. The measurement model including the moderator is presented in Figure 6.17 below.

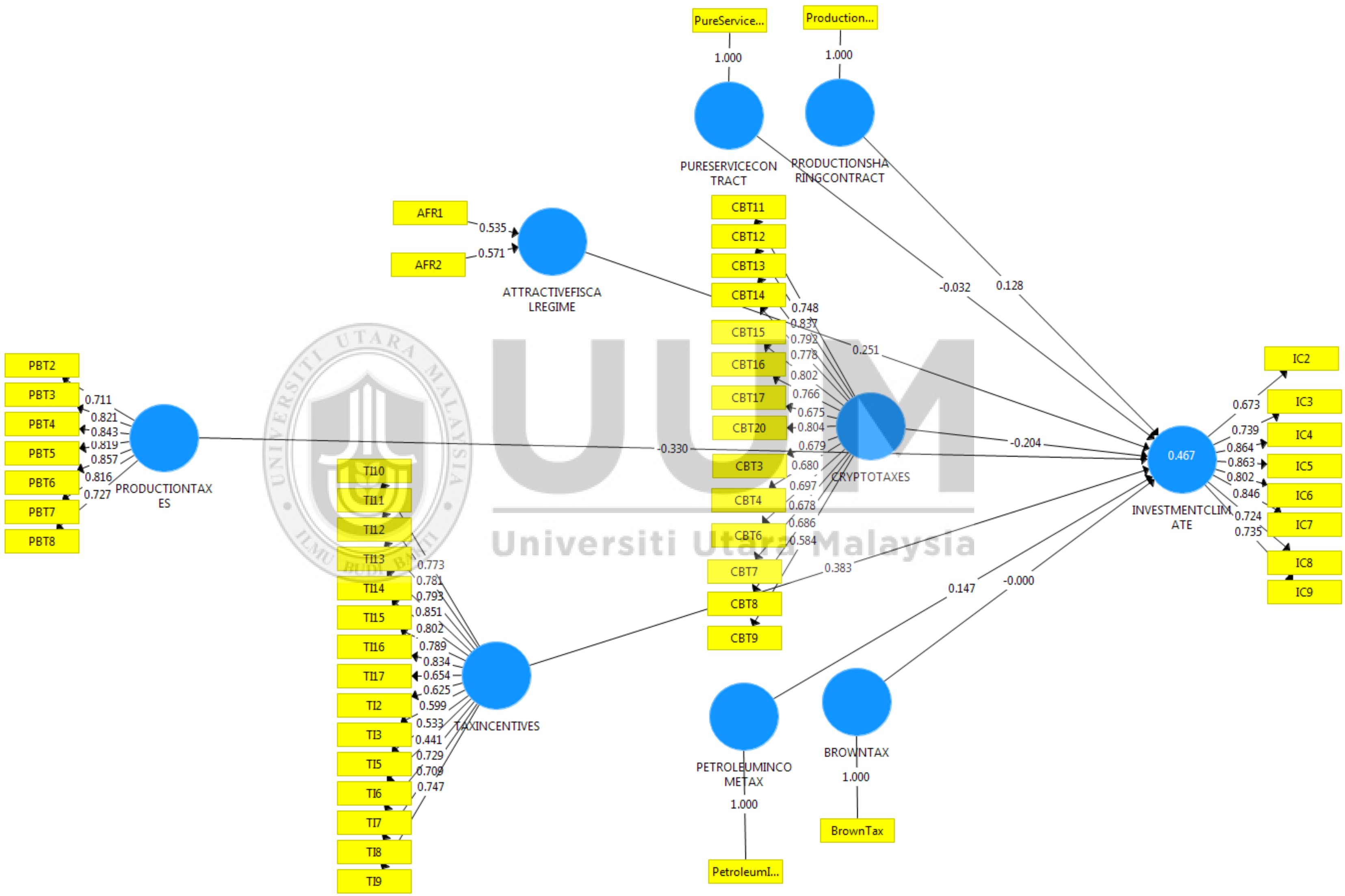


Figure 6.17

Measurement Model for Reflective Latent Constructs

6.4.7.1.1 Indicator Reliability

The reliability of indicators is assessed using the outer-loadings of each latent construct (Hair *et al.*, 2013). For indicator to be reliable it must have a loading of .7 or above (Hair *et al.*, 2011). However, an indicator with loading of .4 can be retained if its deletion will reduce the composite reliability (Hair *et al.*, 2013). Specifically, Hair *et al.* (2011) posited that an indicator of .40 to .70 should only be deleted if its removal leads to an increase in composite reliability. Therefore, following the criteria of Hair *et al.* (2011) and Hair *et al.* (2013), of a total 69 items, the study was left with 55 items, after deleting 14 items, due to either low loading or the need to improve the composite reliability to reach the cutoff point of .7. The result is presented in Table 6.15 below.

6.4.7.1.2 Internal Consistency Reliability

Internal consistency reliability measures how well the indicators work together in measuring a construct. The most commonly used measures of internal consistency reliability are Cronbach's alpha and composite reliability (Peterson & Kim, 2013). However, most PLS path modeling authors believe that composite reliability is a better measure of internal consistency reliability than Cronbach's alpha (Hair *et al.*, 2011; Hair *et al.*, 2013). Thus, composite reliability is used in this study. The cutoff point of composite reliability for internal consistency assessment is .60 for exploratory research and .70 for confirmatory research. Table 6.15 below presents the results of internal consistency reliability.

6.4.7.1.3 Convergence Validity

Convergence validity measures the extent to which the chosen items truly represent the intended latent construct, in essence, it measures how the selected items correlate with each other to truly measured the intended latent construct (Hair, Tatham, Anderson, & Black, 2006). The commonly used measure of convergence validity is AVE, with a minimum threshold of .5 (Hair *et al.*, 2011; Hair *et al.*, 2013). Table 6.15 below presents the AVE results in line with the criteria of Hair *et al.*, 2011 and Hair *et al.*, 2013.

Table 6.15
Indicators' Loadings, Composite Reliability, and Average Variance Extracted of Latent Constructs

Latent Variables/Indicators	Standardized Loadings	Composite Reliability	Average Variance Extracted (AVE)
Crypto-based Tax		.941	.536
CBT3	.679		
CBT4	.680		
CBT6	.697		
CBT7	.678		
CBT8	.686		
CBT9	.584		
CBT11	.748		
CBT12	.837		
CBT13	.792		
CBT14	.778		
CBT15	.802		
CBT16	.766		
CBT17	.675		
CBT20	.804		
Investment Climate		.927	.614
IC2	.673		
IC3	.739		
IC4	.864		
IC5	.863		
IC6	.802		
IC7	.846		
IC8	.724		
IC9	.735		

Table 6. 15 Cont.

Latent Variables/Indicators	**Standardized Loadings**	**Composite Reliability**	**Average Variance Extracted (AVE)**
Production-based Tax		.926	.641
PBT2	.711		
PBT3	.821		
PBT4	.843		
PBT5	.819		
PBT6	.857		
PBT7	.816		
PBT8	.727		
Tax Incentive		.940	.518
TI2	.625		
TI3	.599		
TI5	.533		
TI6	.411		
TI7	.729		
TI8	.709		
TI9	.747		
TI10	.773		
TI11	.781		
TI12	.793		
TI13	.851		
TI14	.802		
TI15	.789		
TI16	.834		
TI17	.654		

Table 6.15 above shows the composite reliability of all the latent constructs. The values ranged from .926 to .948, which is above the recommended minimum threshold of .70, indicating that all the latent constructs had strong internal consistency. The value of AVE ranged from .518 to .641, which is above the recommended minimum threshold of .50, confirming that the constructs had strong convergence validity. The categorical variables, namely, brown tax, petroleum income tax, production sharing contract, and pure service contract do not require composite reliability and AVE because all of them have single items.

6.4.7.1.4 Discriminant Validity

Duarte and Raposo (2010) defined discriminant validity as extent to which a particular latent construct differentiate itself from other constructs. By implication, the approach postulates that, for a latent construct to achieve discriminant validity, that latent construct must share more variance with its assigned indicators than with any other latent construct in the structural model (Hair *et al*, 2011) The Fornell-Larcker criterion is the most common approach for evaluating construct's discriminant validity. This approach requires that for a construct to achieve distriminant validity, the AVE of the latent construct should be higher than the construct's highest correlation with any other latent construct (Fornell & Larcker, 1981; Hair *et al.*, 2011). Table 6.16 below presents the computation of discriminant validity using Fornell and Larcker's (1981) approach.

Table 6.16
Discriminant Validity

Latent Variable	**2**	**3**	**4**	**5**
Crypto-based Tax	**.753**			
Investment Climate	-.158	**.784**		
Production-based Tax	-.615	-.130	**.801**	
Tax Incentive	-.310	.558	.140	**.722**

In addition to Fornell and Larcker's (1981) criteria, Hair *et al.* (2011) said that discriminant validity of a construct could be evaluated by comparing a construct's indicator loadings with its cross-loadings. Thus, the recommendation is that all indicator loadings must be higher than its cross-loadings (Chin, 1998) Table 6.17 below shows the results of discriminant validity using indicator loadings and cross-loadings.

Table 6.17

Indicator Loadings and Cross-Loadings

Indicators	Crypto-based Tax	Investment Climate	Production-based Tax	Tax Incentive
CBT11	.748	-.030	-.571	-.203
CBT12	.837	-.125	-.509	-.225
CBT13	.792	-.140	-.317	-.234
CBT14	.778	-.005	-.528	-.186
CBT15	.802	-.077	-.424	-.213
CBT16	.766	-.062	-.424	-.239
CBT17	.675	-.043	-.607	-.225
CBT20	.804	-.150	-.441	-.299
CBT3	.679	-.071	-.622	-.209
CBT4	.680	-.033	-.603	-.195
CBT6	.697	-.030	-.586	-.225
CBT7	.678	-.055	-.596	-.213
CBT8	.686	.015	-.541	-.210
CBT9	.584	.053	-.526	-.200
IC2	-.101	.673	-.067	.527
IC3	-.075	.739	-.090	.344
IC4	-.085	.864	-.201	.456
IC5	-.076	.863	-.182	.395
IC6	-.025	.802	-.196	.361
IC7	-.035	.846	-.168	.307
IC8	-.240	.724	.075	.508
IC9	-.231	.735	.007	.493
PBT2	-.485	-.078	.711	.116
PBT3	-.503	-.143	.821	.091
PBT4	-.517	-.112	.843	.154
PBT5	-.506	-.092	.819	.042
PBT6	-.459	-.131	.857	.179
PBT7	-.529	-.060	.816	.110
PBT8	-.448	-.046	.727	.138
TI10	-.314	.367	.129	.773
TI11	-.289	.489	.109	.781
TI12	-.158	.428	.060	.793
TI13	-.295	.440	.173	.851
TI14	-.249	.448	.205	.802
TI15	-.222	.412	.184	.789
TI16	-.215	.388	.145	.834
TI17	-.125	.390	.023	.654
TI2	-.188	.474	.037	.625
TI3	-.072	.399	-.025	.599
TI5	-.200	.324	-.030	.533
TI6	-.144	.024	.081	.441
TI7	-.285	.265	.204	.729
TI8	-.319	.257	.202	.709
TI9	-.247	.381	.147	.747

6.4.7.1.5 Model Fit Evaluation

Hair *et al.* (2013) posited that no global goodness-of-fit criterion exists for PLS path modeling. However, a more recent article jointly posited that two most reliable measures for evaluating model fit exist for PLS path modeling. They are: exact fit (goodness of fit-GoF) and the standardized root mean square (SRMR) residual (Henseler *et al.*, 2014). GoF is not a global fit measure, but rather is a measure of how well the hypothesized model fits the data used in a study (Henseler & Sarstedt, 2013). In this study, both GoF and SRMR were used to measure how well the hypothesized research model fits the data used.

GoF is computed as the geometric mean of average communality of the outer measurement model and average R-squared of endogenous latent variable (Tenenhaus, Amato, & Esposito Vinzi, 2004). GoF is calculated using the formula:

$$\text{GOF} = \sqrt{\bar{R}^2 \times \text{Average Communality } (\overline{AVE})}$$

The suggestion has been made that the closer of GoF to 1, the better the data fits the hypothesized model (Tenenhaus *et al.* 2004). GoF values are classified as .10 as small, .25 as medium and .36 as large (Wetzels, Odekerken-Schröder, & Van Oppen, 2009). The GoF of the present study is calculated as shown in Table 6.18 below.

Table 6.18
Goodness of Fit (GoF)

Latent Constructs	Communality	R-Squared
Crypto-based Tax	.536	
Investment Climate	.614	.467
Production-based Tax	.641	
Tax Incentives	.518	
Geometric Mean	**.575**	**.467**

$$\textbf{GoF} = \sqrt{.467 \times .575}$$

GoF = .52

Following Wetzels *et al.* 's (2009) guidelines, the GoF shown in Table 6.18 above has a value of .52 and can be classified as large, thereby revealing a strong fitness of the hypothesized model to the data used in this study.

The second measure of model fit is SRMR. SRMR is defined as the residual differences between the sample's correlated data and the predicted correlated model (Hooper, Coughlan, & Mullen, 2008). SRMR values range from zero to 1.0, with values closer to zero indicating perfect model fit. A well-fitting model should have a SRMR value less than or equal to .05; however, a value close to .08 deemed acceptable (Hooper *et al.*, 2008; Hu & Bentler, 1999). Although a model with an SRMR value of 0 signifies perfect fit, SRMR is normally low when the sample size is large (Hooper *et al.*, 2008).

In this study, the value of the SRMR residual obtained from Smart-PLS 3 was .084 which is very close to the acceptable value of .08 (Hu & Bentler, 1999). Moreover, following Hooper *et al.* (2008) asserted that the larger the sample size, the lower the SRMR residual, the SRMR value of .084 obtained in this study is sufficient owing to the low sample size that comprised only 120 cases. More so, scientifically 0.084 obtained in this current study can equally be rounded to 0.08.

Therefore, based on the values obtained in this study for the most reliable model fit indicators that were exact fit (GoF) and SRMR residual (Henseler *et al.*, 2014), the conclusion can be made that the hypothesized model fits the data used in this study.

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6.4.7.2 Evaluation of Measurement Model Results for Formative Construct

As noted in the methodology chapter, the concept of an attractive petroleum fiscal regime was operationalized as a formative construct with multi-dimensions. The justification for this is that the construct was derived from Smith's (1776) canon of taxation that has four dimensions (Miller & Alalade, 2003). Specifically, because 14 items were derived from the literature were used in measuring this construct and based on the guideline of Jarvis *et al.* (2003), the construct operates as a first-order reflective dimension and a second-order formative dimension. This means that each dimension has reflective measures, and the dimensions themselves are formative measures of the main construct, an attractive petroleum fiscal regime.

For the first-order reflective measures, exploratory factor analysis (EFA) was conducted to explore their factorability into dimensions. Thus, items for the first order and the dimensions for the second order were explored in SPSS using principle component analysis based on an eigenvalue of 1. The fact is, that even though Smith's (1776) principles of an efficient tax system highlighted that taxation is multidimensional, the available literature did not reveal that such dimensions were previously explored; hence, the need to conduct the EFA. The result of the EFA is contained in Table 6.19 below.

Table 6.19
Dimensions of Attractive Petroleum Fiscal Regime

	Factors		
Items	**AFR1**	**AFR2**	**AFR3**
AFPR11	.786		
AFPR6	.748		
AFPR8	.743		
AFPR12	.731		
AFPR7	.714		
AFPR10	.707		
AFPR9	.591		
AFPR2		.828	
AFPR1		.799	
AFPR4		.704	
AFPR5		.450	
AFPR14			.860
AFPR13			.836
Total eigenvalues	6.531	1.340	1.147
Variance Explianed	31.2%	18.9%	14.4%
Total Variance Explianed	64.4%		
Table 6.19 continued			
KMO	.863		
Signifance	.000		

Table 6.19 above shows that the 14 items can be factored into three dimensions: AFR1, AFR2, AFR3 with eigenvalues of 6.531, 1.340, and 1.147 respectively. Each of the items has the required loading of not less than .40 (Hair *et al.*, 2011) Furthermore, the construct's total variance explained was about 64.4% and the KMO was .863, which is beyond the recommended value of .60 (Kaiser, 1970) Therefore, using these three formative indicators of attractive petroleum fiscal regime AFR1, AFR2, AFR3, the study proceeded with the evaluation of the measurement model.

For the evaluation of the measurement model of second-order formative dimensions, internal consistency and convergent validity are not required (Hair *et al.*, 2011).

However, it was posited that SEM-PLS offers important criteria for the statistical assessment of measurement quality for formative indicators (Hair *et al.*, 2011). The first step is to examine indicators' weight and loading and assess their significance using *t*-statistics through bootstrapping with 5,000 samples. The second step is to examine the multicollinearity; in this, for each indicator, the value of VIF should be less than 5 to avoid high multicollinearity. Therefore, these two steps were followed in evaluating the formative construct as contained in Table 6.20 and 6.21 below respectively.

Table 6.20
Indicators Weights and t-statistics of Attractive Petroleum Fiscal Regime

Construct and Item	**Weight**	***t*-statistic**	**Sig.**
Attractive Petroleum Fiscal Regime			
AFR1	.542	3.138	.001
AFR2	.592	3.012	.001
AFR3	-.050	.230	.409

Table 6.20 above shows that of the three formative dimensions, two (AFR1 and AFR2) have significant weights as indicated by *t*-statistics and *p*-values. Moreover, to ensure no multicollinearity among formative indicators, it is required that the VIF should be less than 5 (Hair *et al.*, 2013: Hair *et al.*, 2011).

Table 6.21
Variance Inflation Factor (VIF) and Condition Index

Construct and Items	**Tolerance**	**VIF**
Attractive Petroleum Fiscal Regime		
AFR1	.589	1.697
AFR2	.519	1.928
AFR3	.716	1.397

Thus, Table 6.21 above shows that multicollinearity was not an issue among the formative indicators. However, AFR3 was dropped in the subsequent analysis due to a lack of significant indicator weight as indicated by the *t*-statistics and p-values in Table 6.20, which is consistent with the assertion of Hair *et al.* (2011) that no justification exists for maintaining an indicator whose weight and loading are insignificant.

6.4.7.3 PLS Structural Model Results

Having evaluated the measurement model, the study examined the structural model. A standard bootstrapping procedure with 5,000 bootstrapped samples and 120 cases was applied in assessing the significance of path coefficients of the structural model (Hair *et al.*, 2013: Hair *et al.*, 2011). In line with Henseler *et al.* (2009) and Hair *et al.* (2011), the evaluation of PLS-SEM structural model was performed in five phases: (1) evaluation of significance of path coefficients (2) evaluation of R-squared value, (3) evaluation of effect size (f^2), (4) evaluation of predictive relevance, and (5) testing of moderating effect.

6.4.7.3.1 Evaluation of the Significance of Path Coefficients

The significance of path coefficients was evaluated using *t*-statistics and *p*-values obtained from structural model of PLS-SEM using 5,000 bootstrapped samples (Hair *et al.*, 2011; Preacher & Hayes, 2004, 2008) Therefore, Figure 6.18 and Table 6.21 below present the statistical estimates of the path coefficients for the structural model.

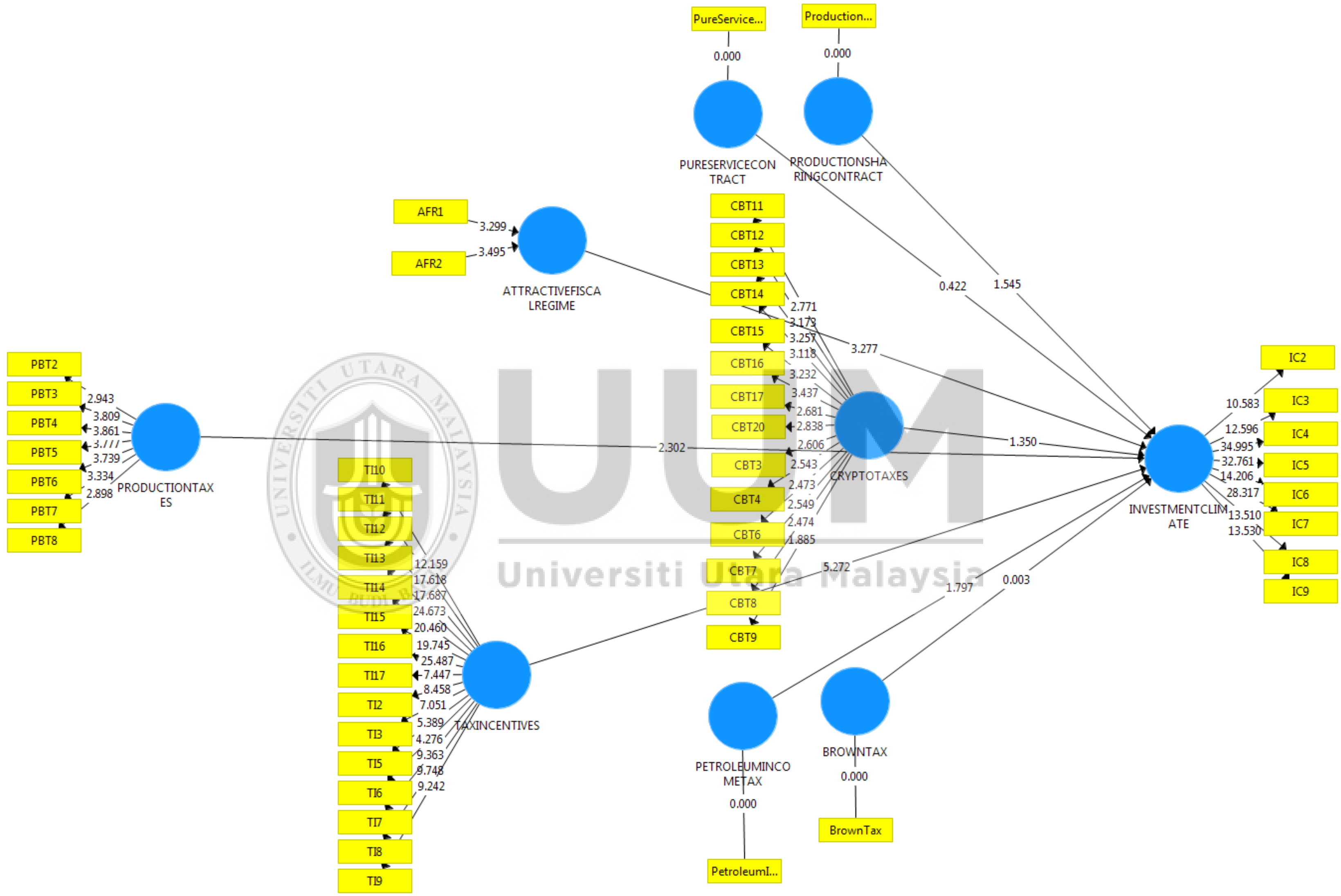

Figure 6.18

Structural Model of the Direct Effect

Table 6.22

Structural Model Evaluation – Direct Effect

Hypothesis	**Relationship**	**Beta**	**S E**	***t* -statistic**	**p-value**	**Findings**
H8a (i)	Brown Tax -> Investment Climate	0.000	0.082	0.003	0.499	Not-Supported
H8a (ii)	Petroleum Income Tax -> Investment Climate	0.147	0.082	1.797	0.036**	Supported
H9a (i)	Production Sharing Contract -> Investment Climate	0.128	0.083	1.545	0.061*	Supported
H9a (ii)	Pure Service Contract -> Investment Climate	-0.032	0.076	0.422	0.337	Not-Supported
H10a	Production-based Tax -> Investment Climate	-0.330	0.144	2.302	0.011**	Supported
H11a	Crypto-based Tax -> Investment Climate	-0.204	0.152	1.350	0.089*	Supported
H12a	Tax Incentives -> Investment Climate	0.383	0.073	5.272	0.000***	Supported

Note. ***Significant at .01 (1-tailed), **significant at .05 (1-tailed), *significant at .1 (1-tailed)

In hypothesizing the relationship between dependent and independents variables, H8a (i) postulated that a brown tax would have a significant positive relationship with the investment climate of marginal oil fields. However, the results in Figure 6.18 and Table 6.22 showed that such a relationship was insignificant (β = .000, t = .003, *p* = .499). H8a (ii) postulated that petroleum income tax would have a significant positive relationship with the investment climate of marginal oil fields; this hypothesis was supported (β = .147, *t* = 1.797, *p* = .036). H9a (i) postulated that a production-sharing contract would have a significant positive relationship with the investment climate of marginal oil fields, and results in Figure 6.18 and Table 6.22 supported this hypothesis (β = .128, *t* = 1.545, *p* = .061). H9a (ii) postulated that a pure service contract would have a significant positive relationship with the investment climate, and the results showed the influence was positive but insignificant (β = -.032, *t* = .422, *p* = .337).

Furthermore, H10a postulated that production-based tax would have a significant negative relationship with the investment climate of marginal oil fields; the result supported this hypothesis as proposed (β = -.330, *t* = 2.302, *p* = .011). H11a postulated that a crypto-based tax would have significant negative relationship with the investment climate of marginal oil fields; this hypothesis was also supported (β = -.204, *t* = 1.350, *p* = .089). H12a postulated that a tax incentive would have a significant positive relationship with the investment climate of marginal oil fields; this hypothesis was supported (β = .383, *t* = 5.272, *p* = .000).

6.4.7.3.2 Evaluation of R-squared

R-squared or the coefficient of determination is an important criterion used in evaluating structural model in PLS path modeling (Hair *et al.*, 2011; Henseler *et al.*, 2009). R-squared elucidates the variance in endogenous construct explained by one or more exogenous constructs (Hair *et al*, 2010; Hair *et al.*, 2006). Hair *et al.*, (2011) identified acceptable levels of R-squared varies in research disciplines for researchers who use PLS-SEM, saying that R-squared values of .25, .50 and .75 could be described as weak, moderate and substantial respectively, whereas Chin (1998) classified the R-squared of .19, .33 and .67 as weak, moderate and substantial respectively. The R-squared of the overall model is presented in Figure 6.19 below.

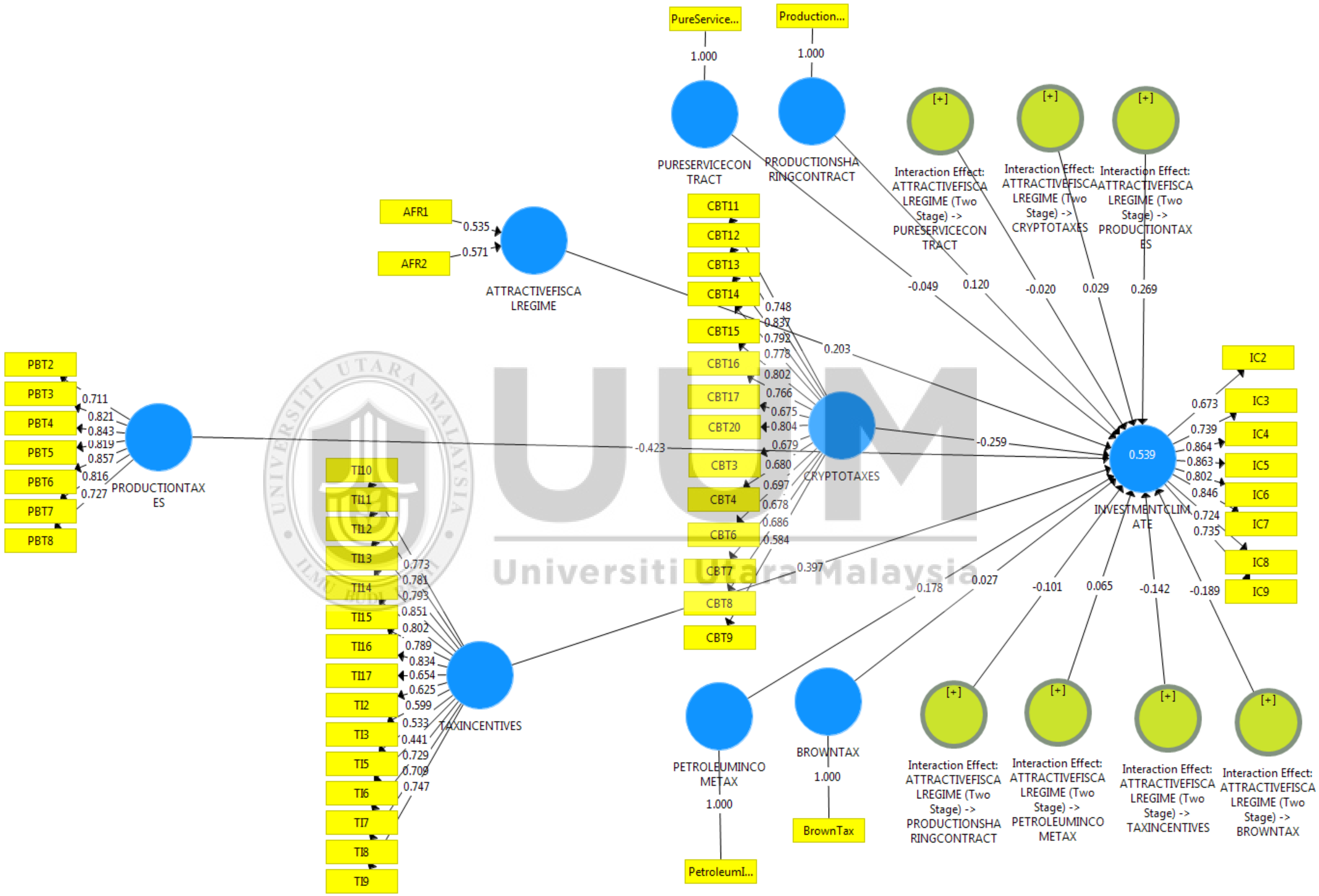

Figure 6.19
R-squared of the Model

For this study, the R-squared was .539, which means that the predictor variables collectively explained 53.9% of the variance in the investment climate of marginal oil fields, while other factors not included in the model explained the remaining 46.1%. Looking at this value, the model can be classified as moderate based on Chin (1998) and Hair *et al.* (2011).

6.4.7.3.3 Evaluation of Effect Sizes of Exogenous Variables (f^2)

Effect size is another criterion for evaluation of structural model. Effect size is defined as the specific change in R-squared of the endogenous variable (a) caused by particular exogenous variable (Chin, 1998; Hair *et al.*, 2011) Effect size (f^2) for multiple regression is computed according to the Chin (1998) and Cohen (1988) as:

$$\text{Effect size } (f^2) = \frac{\text{R-squared Included- R-squared Excluded}}{\text{1 - R-squared Included}}$$

Cohen (1988) classified effect size as weak, moderate and strong with values of .02, .13 and .35 respectively. Table 6.23 below presents the effect sizes of exogenous variables on the R-squared of the endogenous latent variable.

Table 6.23
Effect Size (f^2)

Exogenous Variables	**f-squared values**	**Effect Size**
Brown Tax	.015	None
Crypto-based Tax	.091	Small
Petroleum Income Tax	.057	Small
Production-based Tax	.039	Small
Production Sharing Contract	.219	Medium
Pure Service Contract	.019	None
Tax Incentive	.229	Medium

As shown in Table 6.23 above, the f-squared of the brown tax, crypto-based tax, petroleum income tax, production-sharing contract, pure service contract, and tax incentive were 015, .091, .057, .039, .219, .019, and .229 respectively. Following Cohen (1988), the effect sizes of these variables were none, small, small, small, medium, none and medium respectively.

6.4.7.3.4 Evaluation of Predictive Relevance (Q^2)

Predictive relevance (Q^2*)* measures the extent to which the model predicts the omitted data cases (Chin, 1998; Hair *et al.*, 2013). The Stone-Geisser test using the blindfolding procedure is the most commonly used method of computing predictive relevance (Geisser, 1974; Stone, 1974). The Stone-Geisser test of model predictive relevance is an auxiliary method of evaluating goodness-of-fit in PLS-SEM (Duarte & Raposo, 2010), and the test is only applicable to a study that has an endogenous latent variable with reflective measures (Sattler, Völckner, Riediger, & Ringle, 2010). Thus, because the endogenous latent constructs in this study had reflective measures, the Stone-Geisser test of model predictive relevance was applied.

Specifically, the study applied the cross-validated redundancy measure in evaluating the predictive relevance (Geisser, 1974; Stone, 1974; Hair *et al.*, 2011; Hair *et al.*, 2013; Hair *et al.* (2011) posited that a research model with a Q^2 larger than zero is considered to have predictive relevance. More specifically, Chin (1998) said that research models with Q^2 of .02, .15 and .35 have small, medium and large predictive relevance respectively.

In line with the aforementioned literature, the present study used cross-validated redundancy based the suggestions of Hair *et al.* (2011, 2013). Table 6.24 below presents the predictive relevance of the Q^2 of this study's research model.

Table 6.24
Predictive Relevance Q^2

	SSO	SSE	1-SSE/SSO
Investment Climate	960.000	672.771	.299

As shown in Table 6.24 above, with the value of Q^2 standing at .299, the exogenous variables in the current study have a predictive relevance to the endogenous latent variable (Hair *et al.*, 2011). Specifically, using Chin's (1998) criteria the predictive relevance of exogenous variables on endogenous latent construct in this study was classified as medium. In sum, with a Q^2 of greater than zero, the value of .299 suggests a predictive relevance of the model.

6.4.7.3.5 Testing the Moderation Effect

Four main approaches are used to test the interaction (moderation) effect in PLS path modeling (Henseler & Chin, 2010). These are: (1) the product indicator approach (Chin, Marcolin, & Newsted, 2003), (2) a 2-stage approach (Chin *et al.*, 2003), (3) a hybrid approach (Wold, 1982) and (4) the orthogonal approach (Little, Bovaird, & Widaman, 2006). However, in a model with a formative independent variable or moderator, pairwise multiplication is not feasible (Chin *et al.*, 2003; Henseler & Chin, 2010). Hence, when the moderator is formative, a 2-stage approach is the most feasible (Chin *et al.*, 2003; Henseler & Chin, 2010; Henseler & Fassott, 2010).

Following Chin *et al.* (2003), Henseler and Chin (2010) and Henseler and Fassott (2010), this study employed a 2-stage approach in testing the moderation affects because the moderator was formative. In evaluating the strength of moderating effect, the study used Cohen's (1988) approach for evaluating effect size. The results of a moderation effect using 2-stage approach as aforementioned are presented in Figure 6.20 and Table 6.25 below.

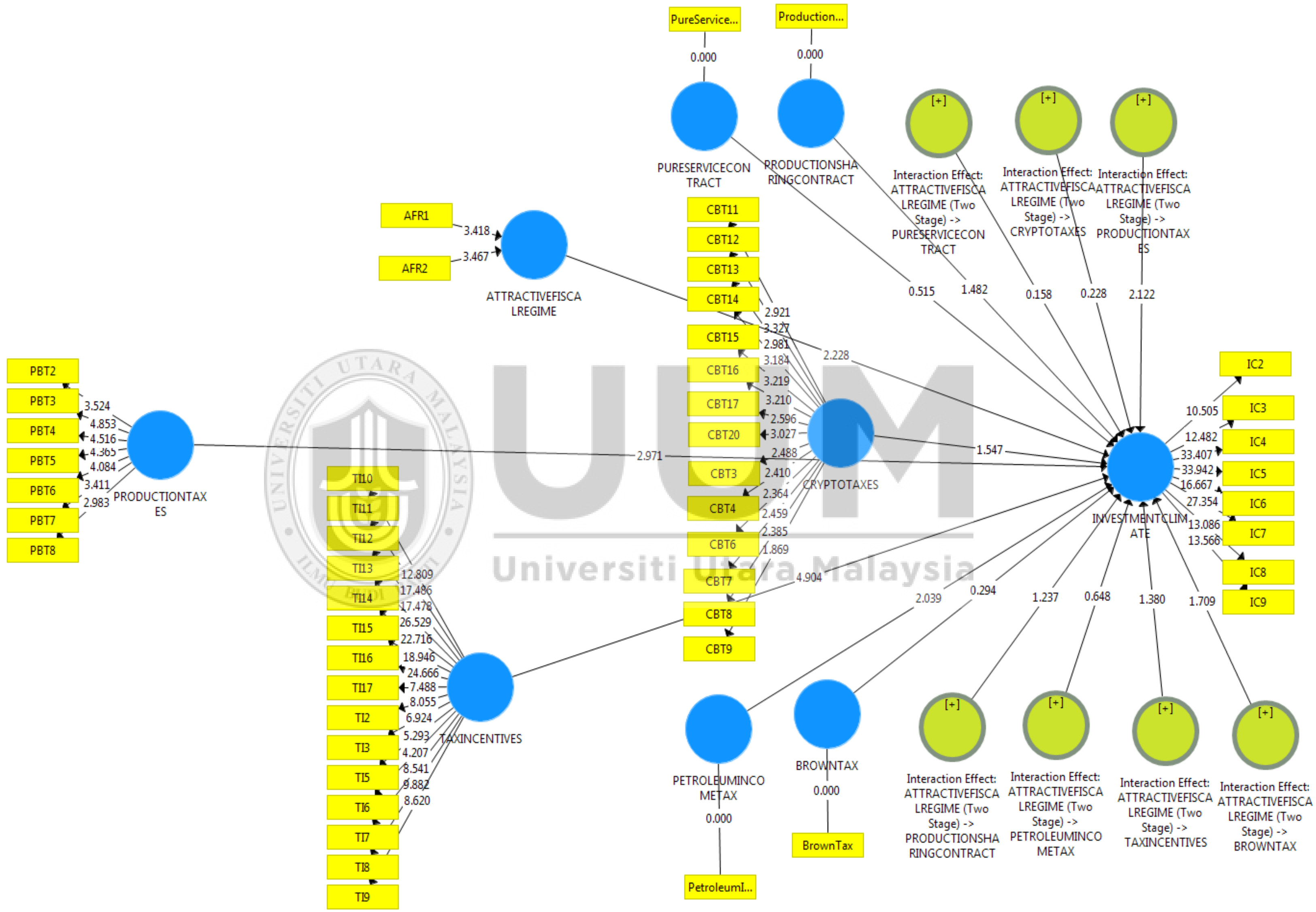

Figure 6.20

Structural Model for Indirect Effect

Table 6.25

Structural Model Evaluation – Indirect Effect

Hypothesis	Relationship	Beta	S E	t-statistic	p-value	Finding
H8b (i)	Attr. Petro. Fiscal Regime*Brown Tax -> Investment Climate	-.189	0.111	1.709	0.044**	Supported
H8b (ii)	Attr. Petro. Fiscal Regime*Petroleum Income Tax -> Investment Climate	.065	0.100	0.648	0.259	Not-Supported
H9b (i)	Attr. Petro. Fiscal Regime*Prod. Sharing Contract -> Investment Climate	-.101	0.082	1.237	0.108	Not-Supported
H9b (ii)	Attr. Petro. Fiscal Regime*Pure Service Contract -> Investment Climate	-.020	0.124	0.158	0.437	Not-Supported
H10b	Attr. Petro. Fiscal Regime*Production-based Tax -> Investment Climate	.269	0.127	2.122	0.017**	Supported
H11b	Attr. Petro. Fiscal Regime*Crypt-based Tax -> Investment Climate	.029	0.126	0.228	0.410	Not-Supported
H12b	Attr. Petro. Fiscal Regime*Tax Incentives -> Investment Climate	-.142	0.103	1.380	0.084*	Supported

Note. ***Significant at .01 (1-tailed), **significant at .05 (1-tailed), *significant at .1 (1-tailed)

This study hypothesized that an attractive fiscal regime would moderate the relationship between brown tax and the investment climate of a marginal oil field. Specifically, the study posited that influence would stronger with a highly attractive fiscal regime, than with a low attractive fiscal regime. As expected, the results in Figure 6.20 and Table 6.25 above showed that the interaction effect of an attractive fiscal regime and brown tax (β = -.189, t = 1.709, p = .044) was significant. Hence, the result fully supports hypothesis 8b (i) of the study. The information for the path coefficients for the moderation effect of attractive petroleum fiscal regime on the relationship between brown tax and investment climate was then plotted in a graph, following the recommendation of Dawson (2014). Figure 6.21 below shows the interaction effect.

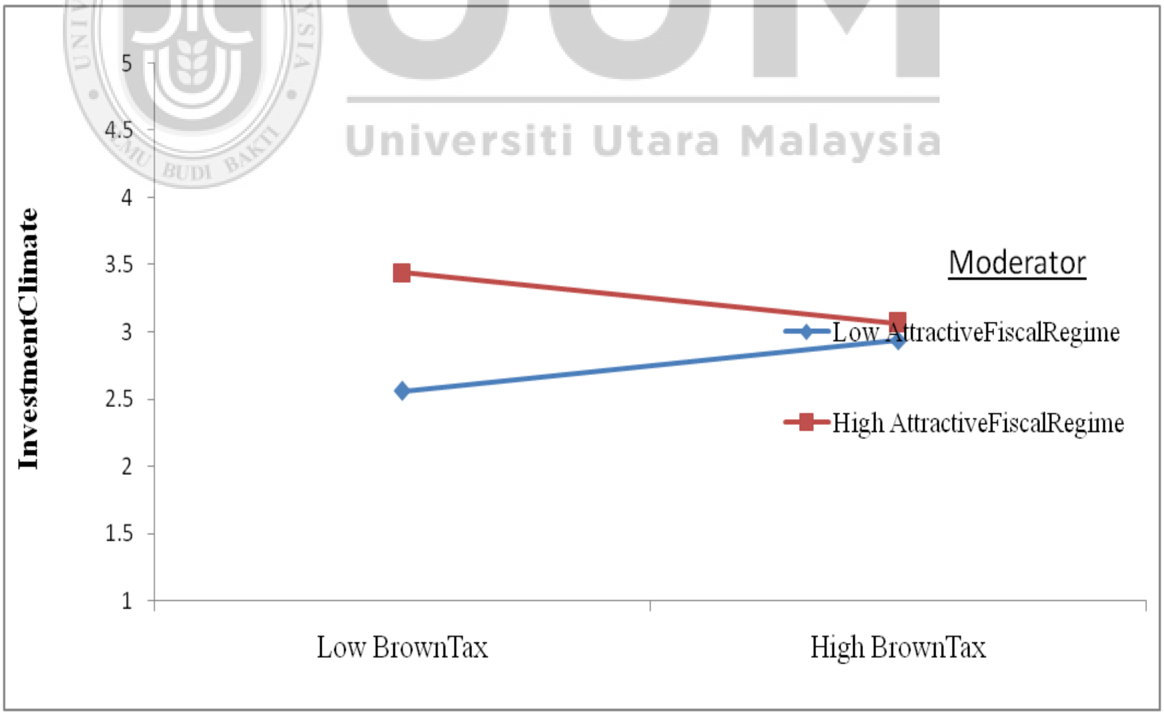

Figure 6.21
Interaction Effect of Brown Tax and Attractive Petroleum Fiscal Regime on the investment climate of marginal oil fields.

Hypothesis 8b (ii) posited that an attractive petroleum fiscal regime would moderate the relationship between the petroleum income tax and the investment climate of marginal oil fields. Specifically, the expectation was that the relationship between the petroleum income tax and the investment climate of marginal oil fields would be stronger with a higher attractive petroleum fiscal regime than with low attractive petroleum fiscal regime. The results in Figure 6.20 and Table 6.25 indicated that this hypothesis was supported (β = .065, t = .648, p = .259). Likewise, hypothesis 9b (i) postulated that an attractive fiscal regime would moderate the relationship between production sharing contract and the investment climate of marginal oil fields. Specifically, the expectation was that relationship would be stronger with a high attractive petroleum fiscal regime than with a low attractive petroleum fiscal regime. However, this postulation was not supported based on path coefficients of the interaction effect (β = -.101, t = 1.237, p = .108). Furthermore, hypothesis 9b (ii) postulated that the relationship between a pure service contract and the investment climate of marginal oil fields would be moderated by an attractive petroleum fiscal regime. Specifically, the expectation was that the relationship between a pure service contract and the investment climate of marginal oil fields would be stronger with a high attractive petroleum fiscal regime than with a low attractive fiscal regime. However, this hypothesis was not supported based on the path coefficient of the interaction effect (β = -.020, t = .158, p = .437).

Hypothesis 10b postulated that an attractive petroleum fiscal regime would moderate the relationship between a production-based tax and the investment climate of marginal oil fields. This was fully supported (β = .269, t = 2.122, p = .017). Specifically, the influence was weaker with a high attractive fiscal regime than with low attractive fiscal regime. Figure 6.22 below shows the interaction effect.

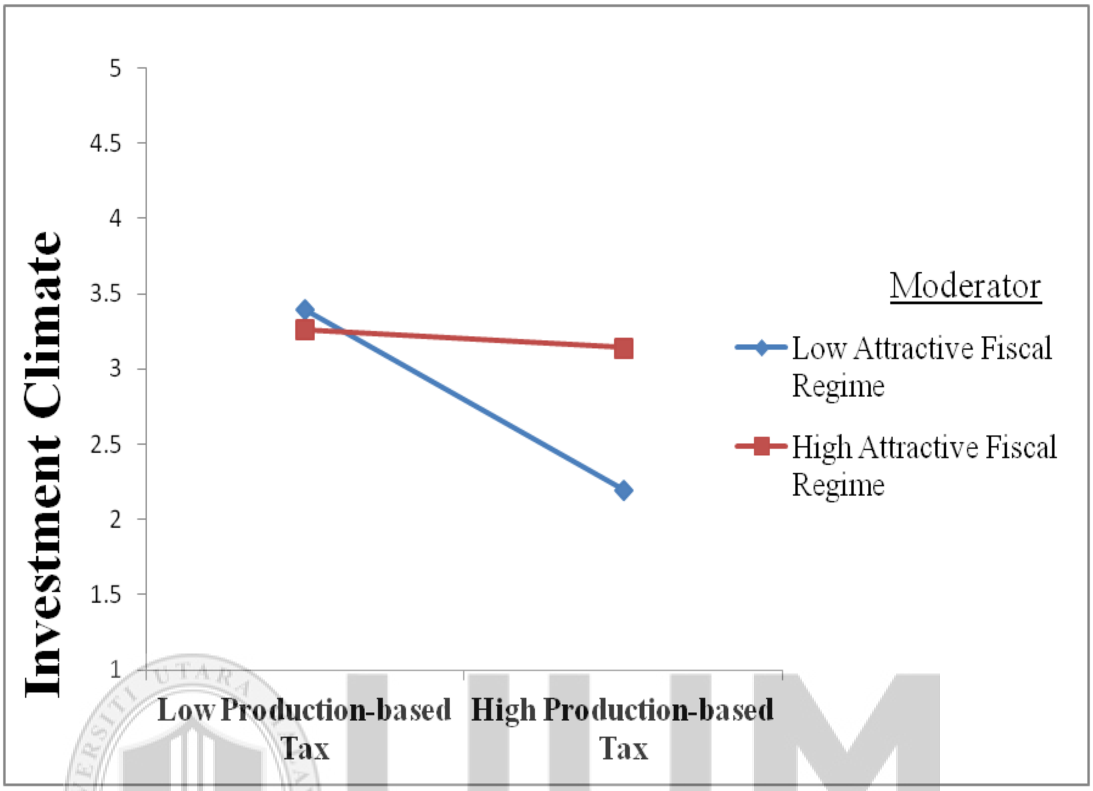

Figure 6.22
Interaction Effect of Production-based Tax and Attractive Petroleum Fiscal Regime on the investment climate of marginal oil fields

Furthermore, from the results in Figure 6.20 and Table 6.25, hypothesis 11b, which posited that an attractive petroleum fiscal regime would moderate the relationship between crypto-based tax and the investment climate of marginal oil fields, was not supported (β = .029, t = .228, p = .410). The expectation was that the influence would be stronger with a high attractive fiscal regime than with a low attractive fiscal regime. However, this was not supported. Hypothesis 12b postulated that an attractive fiscal regime would moderate the relationship between tax incentives and the investment climate of marginal oil fields. Specifically, the postulation was than the influence would be stronger with a high attractive petroleum fiscal regime than with a low attractive fiscal regime. Looking at the path coefficients results in Figure

6.20 and Table 6.25, this hypothesis was supported (β = -.142, t = 1.380, p = .084). The interaction is shown in Figure 6.23 below.

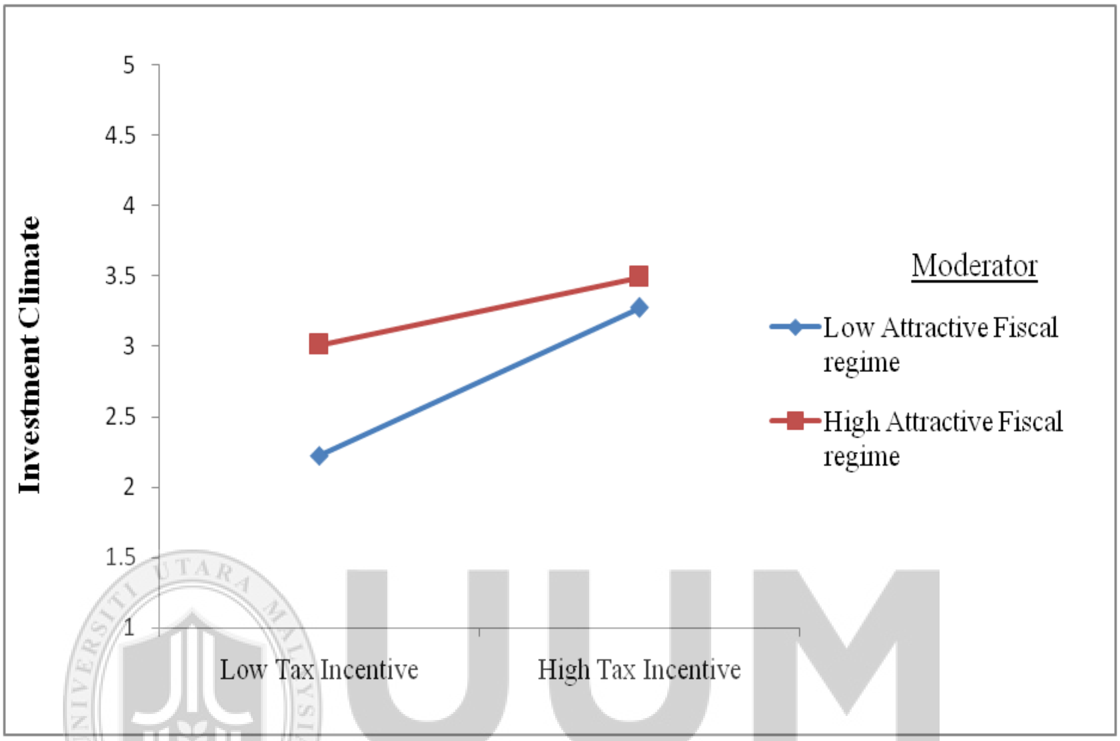

Figure 6.23
Interaction Effect of Tax Incentives and Attractive Petroleum Fiscal Regime on the investment climate of marginal oil fields

6.4.7.3.5.1 Determination of the Effect Size of the Moderator

To determine the effect size of the moderating role of an attractive petroleum fiscal regime on the relationship between brown tax, petroleum income tax, production sharing contract, pure service contract, production-based tax, crypto-based tax, tax incentives and the investment climate of marginal oil fields, Cohen's (1988) effect sized was computed. Henseler and Fassott (2010) asserted that the effect size of a moderator is estimated by comparing R-squared value of the main effect with the R-squared value of the overall model that incorporates both direct and moderation effects. Thus, following Cohen's (1988) and Henseler and Fassott's (2010) guidelines, the effect size of the moderator was computed using the formula below:

$$\text{Effect size } (f^2) = \frac{R^2 \text{ of model with moderation effect} - R^2 \text{ of model without moderation effect}}{1 - R^2 \text{ of model with moderation effect}}$$

The thresholds for evaluating the effect size of moderator (f^2) are .02, .15 and .35 for weak, moderate and strong effect sizes respectively (Cohen, 1988; Henseler & Fassott, 2010). Moreover, a low effect size does not mean that the effect size under consideration is insignificant (Chin *et al.*, 2003). Following this guideline, the results of the moderating effect of attractive petroleum fiscal regime are presented below in Table 6.26 below.

Table 6.26
Effect Size of Moderator

Endogenous Variable	**R-Squared**			
	Included	**Excluded**	**f-squared**	**Effect Size**
Investment climate of marginal oil fields	.539	.467	.156	Moderate

Table 6.26 shows that the f^2 of the moderator was .156. Therefore, following Cohen's (1988) and Henseler and Fassott, (2010), the effect size of the moderator is classified as moderate. Following the assertion of Chin *et al.* (2003), the assumption can be made that the moderator contributed significantly to the overall model.

6.4.7.4 Robustness of the Analyses

The analyses conducted in the current study, had to a greater extent achieved strong robustness of measures. The measurement model had achieved a GoF of .52 which can be considered large. Likewise, the SRMR residual obtained from Smart-PLS 3 was .084 which is very close to the acceptable value of .08 (Hu & Bentler, 1999). Thus, considering the small sample in the current study, the SRMR of 0.084 which can scientifically be approximated to 0.08 can be considered sufficient following the assertion of Hooper *et al.* (2008) that the larger the sample size, the lower the SRMR residual.

For the structural model, the R^2 of 53.9% which is higher than medium value of 50% (Hair *et al.*, 2011) can be considered robust as the independent variables selected in the current study explained more than half of the variation in the dependent variable. The Q^2 of .299 which is above zero implied that the structural model in the current study has a good predictive (Geisser, 1974; Stone, 1974; Hair *et al.*, 2011; Hair *et al.*, 2013; Hair *et al.* 2011). Finally, the inclusion of the moderator variable has also improved the robustness of the model as it increased the R^2 value from 46.7% to 53.9%.. Similarly, the effect-size of the moderator variable can be considered as moderate with f^2 above the medium threshold of .15 (Cohen, 1988).

6.5 Summary

Section 6.1 of the chapter was the introduction, in which each of the analyses conducted was related to its corresponding objective. Scenario analyses were performed using investment appraisal tools (NPV, IRR, PI, AGR, and SI), which compared fiscal regimes under the R/C factor PSC and RSC. For NPV, the investment climate was found to be more favorable in four scenarios for fiscal regime under RSC, compared to the five scenarios under the R/C factor PSC. For IRR, the investment climate was found to be more favorable in five scenarios under the fiscal regime for RSC compared to three for the R/C factor PSC. In the remaining scenario, the two regimes might have equal investment climates. For PI, the investment climate was found to be more favorable in the four scenarios under the fiscal regime for RSC compared to the five scenarios for R/C factor PSC. For AGR, the investment climate was found to be more favorable in the five scenarios under the fiscal regime for RSC compared to the four for R/C factor PSC. Lastly, for SI the investment climate was found to be more favorable in the three scenarios for RSC compared to the six for the R/C factor PSC.

Trend analyses results revealed that a significant change in trend was present between old and the new regime. After controlling for inflation, the result showed that increase in trend was more visible and significant under the new regime for both individual investors and the industry.

PLS path modeling was used for assessing path coefficients, and results of both direct and moderating effect were presented. For the direct effect, some path coefficients revealed significant positive relationship between petroleum income tax, production sharing contract and tax incentive and the investment climate of marginal oil fields. Contrarily, a significant negative relationship between production-based tax, crypto-based tax and the investment climate of marginal oil fields was revealed.

Nonetheless, an insignificant relationship between brown tax, the pure service contract and the investment climate of marginal oil fields was found.

For the moderation effect, significant moderation effects of an attractive petroleum fiscal regime were found on the relationship between brown tax, production-based tax, tax incentive and the investment climate of marginal oil fields. However, insignificant moderating effects of an attractive fiscal regime were found on the relationship between petroleum income tax, production sharing contract, pure service contract, crypto-based tax and the investment climate of marginal oil fields. Generally, the effect size of the moderator variable was moderate.

Table 6.27 below presents a summary of all the hypotheses tested and their respective outcomes.

Table 6.27
Summary of Findings

Hypothesis	**Statement**	**Finding**
H1a	RSC has higher NPV under High Oil Price-High Reserve	Not Supported
H1b	RSC has higher NPV under High Oil Price-Medium Reserve	Not Supported
H1c	RSC has higher NPV under High Oil Price-Low Reserve	Not Supported
H1d	RSC has higher NPV under Medium Oil Price-High Reserve	Supported
H1e	RSC has higher NPV under Medium Oil Price-Medium Reserve	Not Supported
H1f	RSC has higher NPV under Medium Oil Price-Low Reserve	Not Supported
H1g	RSC has higher NPV under Low Oil Price-High Reserve	Supported
H1h	RSC has higher NPV under Low Oil Price-Medium Reserve	Supported
H1i	RSC has higher NPV under Low Oil Price-Low Reserve	Supported

Table 6.27 Cont

Hypothesis	Statement	Finding
H2a	RSC has higher IRR under High Oil Price-High Reserve	Not supported
H2b	RSC has higher IRR under High Oil Price-Medium Reserve	Not supported
H2c	RSC has higher IRR under High Oil Price-Low Reserve	Not supported
H2d	RSC has higher IRR under Medium Oil Price-High Reserve	Supported
H2e	RSC has higher IRR under Medium Oil Price-Medium Res.	Not supported
H2f	RSC has higher IRR under Medium Oil Price-Low Reserve	Supported
H2g	RSC has higher IRR under Low Oil Price-High Reserve	Supported
H2h	RSC has higher IRR under Low Oil Price-Medium Reserve	Supported
H2i	RSC has higher IRR under Low Oil Price-Low Reserve	Supported
H3a	RSC has higher PI under High Oil Price-High Reserve	Not supported
H3b	RSC has higher PI under High Oil Price-Medium Reserve	Not supported
H3c	RSC has higher PI under High Oil Price-Low Reserve	Not supported
H3d	RSC has higher PI under Medium Oil Price-High Reserve	Supported
H3e	RSC has higher PI under Medium Oil Price-Medium Reserve	Not supported
H3f	RSC has higher PI under Medium Oil Price-Low Reserve	Not supported
H3g	RSC has higher PI under Low Oil Price-High Reserve	Supported
H3h	RSC has higher PI under Low Oil Price-Medium Reserve	Supported
H3i	RSC has higher PI under Low Oil Price-Low Reserve	Supported
H4a	RSC has higher AGR under High Oil Price-High Reserve	Not supported
H4b	RSC has higher AGR under High Oil Price-Medium Reserve	Not supported
H4c	RSC has higher AGR under High Oil Price-Low Reserve	Not supported
H4d	RSC has higher AGR under Medium Oil Price-High Reserve	Supported
H4e	RSC has higher AGR under Medium Oil Price-Medium Reserve	Not supported
H4f	RSC has higher AGR under Medium Oil Price-Low Reserve	Supported
H4g	RSC has higher AGR under Low Oil Price-High Reserve	Supported

Table 6.27 Cont.

Hypothesis	Statement	Finding
H4h	RSC has higher AGR under Low Oil Price-Medium Reserve	Supported
H4i	RSC has higher AGR under Low Oil Price-Low Reserve	Supported
H5a	RSC has higher SI under High Oil Price-High Reserve	Not supported
H5b	RSC has higher SI under High Oil Price-Medium Reserve	Not supported
H5c	RSC has higher SI under High Oil Price-Low Reserve	Not supported
H5d	RSC has higher SI under Medium Oil Price-High Reserve	Not supported
H5e	RSC has higher SI under Medium Oil Price-Medium Reserve	Not supported
H5f	RSC has higher SI under Medium Oil Price-Low Reserve	Not supported
H5g	RSC has higher SI under Low Oil Price-High Reserve	Supported
H5h	RSC has higher SI under Low Oil Price-Medium Reserve	Supported
H5i	RSC has higher SI under Low Oil Price-Low Reserve	Supported
H6a	Fiscal Regime Adjustment Changed CAPEX Performance of Dialog Energy	Supported
H6b	Fiscal Regime Adjustment Changed CAPEX Performance of PETROFAC	Supported
H6c	Fiscal Regime Adjustment Changed CAPEX Performance of PETRONAS	Supported
H6d	Fiscal Regime Adjustment Changed CAPEX Performance of SapuraKencana	Supported
H7	Fiscal Regime Adjustment Changed CAPEX Performance of overall Subsector	Supported
H8a (i)	Brown tax will have significant positive relationship with the investment climate of marginal oil fields.	Not supported
H8a (ii)	Petroleum income tax will have significant positive relationship with the investment climate of marginal oil fields.	Supported
H9a (i)	Production sharing contract will have significant positive relationship with the investment climate of marginal oil fields.	Supported
H9a (ii)	Pure service contract will have significant positive relationship with the investment climate of marginal oil fields.	Not supported

Table 6.27 Cont.

Hypothesis	Statement	Finding
H10a	Production-based tax will have significant negative relationship with the investment climate of marginal oil fields	Supported
H11a	Crypto-tax has significant negative relationship with the investment climate of marginal oil fields.	Supported
H12a	Production sharing contract will have significant negative relationship with the investment climate of marginal oil fields.	Supported
H8b (i)	Attractive petroleum fiscal regime will moderate the relationship between brown tax and the investment climate of marginal oil fields. Specifically, the influence will be stronger under high attractive petroleum fiscal regime than low attractive petroleum fiscal regime.	Supported
H8b (ii)	Attractive petroleum fiscal regime will moderate the relationship between petroleum income tax and the investment climate of marginal oil fields. Specifically, the influence will be stronger under high attractive fiscal regime than low attractive fiscal regime.	Not supported
H9b (i)	Attractive petroleum fiscal regime will moderate the relationship between production sharing contract and the investment climate of marginal oil fields. Specifically, the influence will be stronger under high attractive fiscal regime than low attractive fiscal regime.	Not supported
H9b (ii)	Attractive petroleum fiscal regime will moderate the relationship between pure service contract and the investment climate of marginal oil fields. Specifically, the influence will be stronger under high attractive fiscal regime than low attractive fiscal regime. Specifically, the influence will be stronger under high attractive fiscal regime than low attractive fiscal regime.	Not supported
H10b	Attractive petroleum fiscal regime will moderate relationship between production-based tax and the investment climate of marginal oil fields. Specifically, the influence will be weaker under high attractive fiscal regime than low attractive fiscal regime.	Supported
H11b	Attractive petroleum fiscal regime will moderate the relationship between crypto-based tax and the investment climate of marginal oil fields. Specifically, the influence will be weaker under high attractive fiscal regime than low attractive fiscal regime.	Not supported
H12b	Attractive petroleum fiscal regime will moderate the relationship between tax incentives and the investment climate of marginal oil fields. Specifically, the influence will be stronger under high attractive fiscal regime than low attractive fiscal regime.	Supported

CHAPTER SEVEN
DISCUSSION, IMPLICATION AND FUTURE RESEARCH

7.1 Introduction

In this chapter, the findings in Chapter Six are discussed in relationship to the underpinning theories and prior research on tax instruments, and investment climate in oil and gas settings. The chapter is divided into five sections. The second section discusses findings in line with underpinning theories and prior literature; this is followed third section that discussed theoretical, methodological, and practical implications of the study. The fourth section discusses the study's limitations and makes suggestions for future studies. The last section is the conclusion drawn in line with the research findings.

7.2 Discussions

The discussions in this section were carried-out in line with relevant theories and previous studies. The subsections of this discussion are structured based on the research questions and objective of the study.

7.2.1 Investment Climate of Marginal Oil Fields in Malaysia under the New Fiscal Regime

The first research objective examined the extent to which the new fiscal regime improves the investment climate of marginal oil fields' in Malaysia. Five measures of investment climate (NPV, IRR, PI, AGR and SI) were used in achieving this research objective.

As contained in Table 7.1 below, the findings revealed that during a high oil price of USD 141.46 and above, the investors are likely to have higher NPV, IRR, PI, AGR and SI from the old fiscal regime with R/C factor PSC fiscal terms in all the three scenarios relating to high oil price, i.e., under a high oil price-high reserve, a high oil price-medium reserve, and a high oil price-low reserve in Malaysia. In sum, the investment climate of marginal oil fields would likely be more favorable under the old regime with R/C factor fiscal terms when the oil price reaches USD141.46 and above.

The results revealed mixed results under medium oil price, which was from USD 79.33 to less than USD 141.46. The old fiscal regime with the R/C factor PSC fiscal terms would likely have better NPV and PI under a medium oil price-high reserve and a medium oil price-low reserve scenarios while the new fiscal regime under RSC fiscal terms would higher NPV and PI under medium a oil price-medium reserve scenario. Contrarily, the new fiscal regime under RSC would be likely to have higher investors' IRR and AGR under a medium oil price-high reserve and a medium oil price-low reserve while the old fiscal regime under R/C factor PSC would be likely to have higher IRR and AGR under medium oil price-medium reserve. Differently, however, the old fiscal regime under the R/C factor PSC would be likely to have a higher investor SI under medium oil price-high reserve, medium oil price-medium reserve, and medium oil price-low reserve. In summary, mixed results for a better investment climate exist at medium oil price; in some scenarios the old fiscal regime is better while in others the new fiscal regime is better.

The results also revealed that, when the oil price is between USD 17.20 and less than USD 79.33 the investors' NPV, IRR, PI, AGR and SI are likely to be more favorable under the new regime with RSC fiscal terms in all the three scenarios relating to low oil price, i.e., low oil price-high reserve, low oil price-medium reserve, and low oil price-low reserve in Malaysia. In sum, the investment climate would likely be more favorable under the fiscal regime with RSC fiscal terms when the oil price is low, i.e., USD 17.20 but less than USD 79.33.

In summary, the findings revealed that the investment climate of marginal oil fields would likely be favorable under the old fiscal regime with R/C factor PSC fiscal terms when the oil price is USD 141.46 and above. Mixed results relating to investment climate were recorded between the R/C factor PSC and RSC when oil the price is USD 79.33 but lower than 141.46. However, when the oil price is USD 17.20 but less than USD 79.33, the investment climate would be more favorable under the new fiscal regime with RSC fiscal terms than that with R/C factor PSC fiscal terms. See Table 7.1 below for the results pertaining to objective one.

Table 7.1

Summary of Findings on Investment Climate of Marginal Oil Fields in Malaysia under the New Fiscal Regime

Criterion	High oil price-High Reserve		High oil price-Medium Reserve		High oil price-Low Reserve		Medium oil Price-High reserve		Medium oil price-Medium reserve		Medium oil price-Low Reserve		Low oil price – High reserve		Low oil price – Medium reserve		Low oil price-Low reserve	
	PSC	**RSC**	**PSC**	**RSC**	**PSC**	**RSC**	**PSC**	**RSC**	**PSC**	**RSC**	**PSC**	**RSC**	**PSC**	**RSC**	**PSC**	**RSC**	**PSC**	**RSC**
NPV (USD)	396.83	303.88	257.26	212.06	212.35	122.03	201.66	252.06	172.82	151.06	85.97	81.42	-195.75	-140.26	-243.08	-90.05	-307.96	-40.83
IRR (%)	61%	43%	43%	36%	39%	26%	22%	62%	27%	27%	17%	18%	0%	23%	0%	17%	0%	9%
PI (%)	117%	84%	87%	67%	84%	45%	87%	46%	58%	48%	34%	30%	-54%	39%	-82%	28%	1.12%	15%
AGR (%)	33%	23%	35%	28%	38%	32%	34%	64%	42%	39%	37%	49%	48%	120%	67%	142%	60%	191%
SI (₵)	0.22	0.10	0.22	0.10	0.20	0.10	0.19	0.10	0.19	0.10	0.20	0.10	-0.15	0.10	-0.31	0.10	-0.66	0.10

The finding on higher investors' NPV, IRR, PI, AGR and SI under the old fiscal regime with the R/C factor PSC under high oil price-high reserve, high oil price-medium reserve, and high oil price-low reserve scenarios is consistent with that of Onaiwu (2009) and the view of Daniel, Keen, and McPherson (2010b) that the R/C factor PSC with sliding scale profit oil splits is more progressive; that is, its profitability increases when the oil price increases. In essence, this may be the reason for higher investor NPV under the R/C factor PSC fiscal terms compared to RSC in Malaysia.

Moreover, mixed findings on investors' NPV, IRR, PI, AGR and SI under medium oil price-high reserve, medium oil price-medium reserve and medium oil price-low reserve is pioneered in this study. This means that prior studies did not investigate such scenarios. For instance, studies such as Nakhle (2007) and Njeru (2010) considered two or single price scenarios. Specifically, Nakhle (2007) used high and low oil price scenarios, while Njeru (2010) used a single oil price called based-case oil price scenario. The only study that used three oil price scenarios: low, medium and high was that of Saidu and Mohammed (2014); however, they employed a single reserve level scenario, while this current study employed three reserve level scenarios: low, medium, and high. The findings from the current study implied that the new fiscal regime under RSC fiscal terms improved the investment climate of marginal oil fields in some of the medium oil price scenarios in Malaysia.

Furthermore, the findings regarding the higher investors' NPV, IRR, PI, AGR and SI under RSC fiscal terms for low oil price-high reserve, low oil price-medium reserve, and low oil price- low reserve can be supported by Faizli's (2012) and Lee's (2013) view that, under the new fiscal regime with RSC, the fiscal terms of the investment climate would be more favorable because investors can recover any unexpired costs from the PETRONAS at the expiration of contract. Thus, in essence, this offsets investors' potential losses from a project during a period of low oil price.

Drawing from the above discussions, it can be said that Malaysian government secured investors against risk through RSC. RSC provides 100% recovery of unexpired cost. This implied that during low oil prices if investors are unable to recover its investment government provides reimbursement. To the fact that investors are more concerned about losses, irrespective of the fact that the old fiscal regime under PSC is more profitable during high oil price, investors may prefer RSC considering its 100% cost recovery. Notwithstanding, if the government is still keen to improve the attractiveness of RSC, offering a windfall incentives can further improve the investors' acceptability of RSC. Windfall incentives can be an opposite of windfall tax. Resources windfall tax is imposed on investors when they make an abnormal profit under PSC. The fact is that investor's profitability under PSC increases as oil prices increased. Hence, investors are taxed using windfall tax as they make an abnormal profit during high oil prices. Equally, as investors' profitability under RSC decreases as oil prices increase, the government can offer windfall incentives to a complement the decline in profitability to investors under RSC as oil price increases.

7.2.2 Investors' CAPEX Performance under the New Fiscal Regime

The second research objective examined the extent to which the investors' CAPEX performance improved under the new fiscal regime. In achieving this research objective, hypotheses six and seven were tested. Hypothesis six was divided into four sub-hypotheses 6(a), 6(b), 6(c) and 6(d), while seven was standalone.

On the influence of 2010 fiscal regime changes on investor's individual CAPEX performance, the results indicated that a change in a marginal oil field's fiscal regime through an adjustment in the fiscal arrangement from the R/C factor PSC to RSC as well as the introduction of new tax incentives improved the investors' CAPEX performance for marginal oil field development projects in Malaysia. Likewise, study found that the overall marginal oil fields' subsector CAPEX performance improved after 2010 fiscal regime adjustment.

Table 7.2
Summary of Findings on Investors' CAPEX Performance under the New Fiscal Regime

Influence of New Fiscal Regime on Investors CAPEX Performance	Decision
Fiscal Regime Adjustment => Diglog Energy CAPEX Performance	Supported
Fiscal Regime Adjustment => PETROFAC CAPEX Performance	Supported
Fiscal Regime Adjustment => PETRONAS Energy CAPEX Performance	Supported
Fiscal Regime Adjustment => SapuraKencana CAPEX Performance	Supported
Fiscal Regime Adjustment => Marginal Fields' Subsector CAPEX Performance	Supported

The results of the influence of the new fiscal regime on investors' CAPEX performance is consistent with the findings of Favero (1992) and Hann (1984) in the UK oil and gas industry in which tax rate reduction and investment incentives encouraged investors' appetite for the CAPEX that was required the execution of oil and gas projects. The result is also consistent with Kemp and Stephen (2012a) for the UK oil and gas industry who found that an increase in the allowance for oil and gas development through budget 2012 rendered incremental projects to productivity which had previously been considered uneconomic, thereby increasing the investor appetite for CAPEX. The results of the current study implied that capital spending in the Malaysian marginal oil fields' subsector increased significantly after the introduction of new fiscal regime in 2010. Specifically, the CAPEX spending by marginal oil fields' investors in the three years (2011, 2012 and 2013) after the introduction of the new fiscal regime was higher than that of the three years (2007, 2008, and 2009) before the introduction of the new fiscal regime. Thus, the implication is that achieving the required annual CAPEX of RM 101.3 to restore the decline in oil and gas production that has been falling by 1-2 annually as disclosed in the Economic Transformation Program (2010) is possible.

7.2.3 The Relationship between Tax Instruments and the Investment Climate of Marginal Oil Fields

The third research objective examines the relationship between tax instruments (types of profit-based tax, types of fiscal arrangement, production-based tax, crypto-based tax, and tax incentives) and the investment climate of marginal oil fields in Malaysia. Consequently, seven hypotheses were tested: 8a (i), 8a (ii), 9a (i), 9a (ii), 10a, 11a and 12a.

Hypothesis 8a (i) posited that the relationship between BT and the investment climate of marginal oil fields would be positive and significant. Contrary to the study's postulations such a relationship was found to be positive but not significant. The result implied that

BT is not desirable for improving the investment climate of marginal oil fields in Malaysia. BT was operationalized as dichotomous variable together with other types of profit-based tax such as PIT and CIT. However, the majority of the respondents did not believe that BT was the best type of profit-based tax to encourage investment in marginal oil fields. Consistent with the postulation of hypothesis 8a (ii), the relationship between PIT and the investment climate of marginal oil fields was found to be positive and significant. The result implied that PIT is desirable for encouraging a good investment climate in marginal oil fields. PIT operationalized as dichotomous variable as were other types of profit-based tax such as BT and CIT. Thus, respondents surveyed were asked to choose the one profit-based tax they perceived as the most likely to encourage investment in marginal oil fields. The majority of the respondents chose PIT, and the regression results implied that this was the most desirable tax to encourage investment into marginal oil fields' in Malaysia.

Supporting hypothesis 9a (i), the findings revealed that the relationship between PSC and the investment climate of marginal oil fields was positive and significant. This implied that PSC is desirable for the development of marginal oil fields' in Malaysia. PSC was operationalized as dichotomous variable with other types of fiscal arrangements such as the pure service contract and risk service contract. Respondents were asked to select the fiscal arrangement they perceived as the most desirable improve investment climate of marginal oil fields in Malaysia. The majority chose PSC, and, the regression results implied that PSC was desirable to encourage investment in marginal oil fields in Malaysia. Contrary to the postulation of hypothesis 9a (ii), the findings revealed that the relationship between the pure service contract and the investment climate of marginal oil fields was negative and significant. This implied that respondents perceived that the pure service contract is not desirable to encourage investment in marginal oil fields. Contrarily, the findings from hypothesis 10a showed that the relationship between production-based tax and the investment climate of marginal oil fields, as postulated, was negative and significant. Similarly, as postulated by hypothesis 11a, the relationship between crypto-based tax and the investment climate of marginal oil fields was negative and significant. Moreover, as projected, the relationship between tax incentives and the investment climate of marginal oil fields was positive and significant.

Table 7.3
Summary of Findings on the Relationship between Tax Instruments and the Investment Climate of Marginal Oil Fields

Relationship	**Decision**
Brown Tax => MOFs' Investment Climate	Not Supported
Petroleum Income Tax => MOFs Investment Climate	Supported
Production Sharing Contract => MOFs Investment Climate	Supported
Pure Service Contract=> MOFs Investment Climate	Not Supported
Production-based Tax => MOFs Investment Climate	Supported
Crypto-based Tax => MOFs Investment Climate	Supported
Tax Incentive => MOFs Investment Climate	Supported

Note. MOF stands for Marginal Oil Field

The relationship between BT and the investment climate of marginal oil fields was found to be insignificant, and this empirical finding contradicts the assertions of Freebairn and Quiggin's (2010) study, which found that BT had the desired efficiency and provided greater transparency in principle. The essence of the finding with respect to this current study may be that this type of profit-based tax has not yet introduced in the Malaysian oil and gas industry. This tax is applicable mainly to the UK oil and gas industry (Phina, 2005). Even though the concept was explained to the respondents in the survey, the respondents may have little actual knowledge of the BT; thus, they may perceive that BT was not attractive enough to encourage investment into marginal oil fields' in Malaysia.

The relationship between PIT and the investment climate of marginal oil fields investment climate was found to be significant, and the result is consistent with Zhang (1997) who posited that PIT was a unique tax to ensure neutrality, meaning that the threshold charge of extracting oil and gas reserves under PIT was same as it would have been without any other form of taxes. In this current study, the respondents' possibly perceived PIT as desirable for the development of marginal oil fields in Malaysia, and hence can influence the investment climate of marginal oil fields.

Similarly, the results for the relationship between PSC and the investment climate of marginal oil fields, which was found to be significant, can be supported by the assertion that PSC, especially R/C factor PSC is progressive due to a sliding scale formula for sharing profit oil (Daniel *et al.*, 2010; Onaiwu, 2009). The assertion has also been made that PSCs are the best form of petroleum arrangement for a situation in which large exploration risk exists (Likosky, 2009). Considering the great support from the literature in favor of PSC, it is not surprising that Malaysia oil and gas experts perceived that PSC could have a significant relationship with the investment climate of marginal oil fields.

The results about the relationship between the pure service contract and the investment climate of marginal oil fields was negative and significant, which can be supported by

Likosky's (2009) assertion that resource availability is among the key factors influencing the implementation of the pure service contract in many countries. For instance, high resource availability in Middle Eastern countries such as Iran, Iraq, Kuwait and Saudi Arabia, and South American countries such as Bolivia, Ecuador, and Venezuela is among the key factors that influence the decision of the OGCs to accept the pure service contract in such countries (Ghandi & Lin, 2013; Likosky, 2009). Low reserves in marginal oil fields in Malaysia, which contradicts resource availability, could be the reason why the pure service contract was not selected as desirable for marginal oil fields' development in Malaysia.

The results concerning the relationship between the production-based taxes and the investment climate of marginal oil fields in Malaysia is congruent with Menezes's (2005) argument, which posited that production-based taxes are regressive and non-neutral, thus having a negative effect on investment climate. The findings of this current study were also consistent with the view that a production-based taxes have distortion effects on investment (Akhigbe, 2007). The results indicated that, when production-based taxes are applied to marginal oil field development projects in Malaysia, an investment distortion could be created in those fields.

Similarly, the results for the relationship between crypto-based tax and the investment climate of marginal oil fields was negative and significant and is consistent with Iledare's (2014) view that crypto-tax instruments lower the profitability of oil and gas fields' in economic terms, and inflict obligations beyond those imposed by fiscal arrangements. Crypto-based taxes also compel investors to pay certain taxes even in loss-making years (McPhail *et al.*, 2009); hence, this evidence may justify the negative effects of crypto-based taxes on the investment climate of marginal oil fields in Malaysia.

Lastly, for the relationship between tax incentives and the investment climate of marginal oil fields, the result was positive and significant, which is consistent with previous studies such as those of Babatunde (2012), Clark (1999), Klemm and Van Parys (2012) and Lim (2001) who posited the effect of tax incentives on investment normally would be positive and significant. Thus, consistent with current finding and previous research, tax incentives significantly predict the investment climate of marginal oil fields in Malaysia.

7.2.4 Moderation Effect of Attractive Petroleum Fiscal Regime on the Relationship between Tax Instruments and the Investment Climate of Marginal Oil Fields

The fourth research objective examines the moderating effect attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields in Malaysia. Consequently, seven hypotheses were tested: 8b (i), 8b (ii), 9b (i), 9b (ii), 10b, 11b and 12b.

Hypothesis 8b (i) on the moderating effect of an attractive petroleum fiscal regime on the relationship between BT and the investment climate of marginal oil fields was found to be significant. Contrary to hypothesis 8b (ii), the findings revealed that attractive petroleum fiscal regime did not significantly moderate the relationship between PIT and the investment climate of marginal oil fields. Likewise, contrary to the postulation of hypothesis 9b (i), the findings also revealed that an attractive petroleum fiscal regime did not significantly moderate the relationship between the PSC and the investment climate of marginal oil fields. Moreover, contrary to the postulation of hypothesis 9b (ii), an attractive petroleum fiscal regime did not moderate the relationship between the pure service contract and the investment climate of marginal oil fields.

For hypothesis 10b on the moderation effect of attractive petroleum fiscal regime on the relationship between production-based tax and the investment climate of marginal oil fields, the results were found to be significant; however, the findings did not support hypothesis 11b which postulated a significant moderating effect of an attractive petroleum fiscal regime on the relationship between crypto-based tax and the investment climate of marginal oil fields. The findings revealed that an attractive petroleum fiscal regime had an insignificant moderating effect on the aforementioned relationship. Lastly, for the moderating effect of attractive petroleum fiscal regime on the relationship between tax incentives and the investment climate of marginal oil fields postulated by hypothesis 12b, the results were found to be significant. A summary of these findings is presented in Table 7.4 below.

Table 7.4
Summary of Findings on the Moderating Effect Attractive Petroleum Fiscal Regime

Note. MOFs – Marginal Oil Fields, APFR – Attractive Petroleum Fiscal Regime

Relationship	**Direct**	**Moderated by APFR**
BT => MOFs' Investment Climate	Not Supported	Supported
PIT => MOFs Investment Climate	Supported	Not Supported
PSC=> MOFs Investment Climate	Supported	Not Supported
Pure Service Contract=> MOFs Investment Climate	Not Supported	Not Supported
Prod.–based Tax => MOFs Investment Climate	Supported	Supported
Crypto-based Tax => MOFs Investment Climate	Supported	Not Supported
Tax Incentive => MOFs Investment Climate	Supported	Supported

With respect to the possible moderating effect of an attractive petroleum fiscal regime on the relationship between BT and the investment climate of marginal oil fields in Malaysia, the result was significant. This is congruent with the supposition of Artist (2009) that the influence of tax policy on an investor's cash flow can be moderated by the fiscal regime in place. The result can also be supported by Baron and Kenny's (1986) assertion that a moderator variable can strengthen or weaken a relationship between independent and dependent variable. In this study the intervention of attractive petroleum fiscal regime as a moderator on the relationship between BT and the investment climate of marginal oil fields strengthened the relationship. Moreover, Manaf, Mas'ud, Saad, and Ishak (2014) also highlighted the possibility of such a moderation effect. Put simply, even through BT is not desirable for marginal oil fields development in Malaysia; if the petroleum fiscal regime is attractive it will likely make BT desirable for marginal oil fields development in Malaysia. Because, attractiveness of the petroleum fiscal regime will likely stimulate the adverse effect of BT on the investment climate of marginal oil fields in Malaysia.

A moderation effect of an attractive petroleum fiscal regime on the relationship between PIT and the investment climate of marginal oil fields was not supported in this study. The possible explanation may be that the respondents' perceived that PIT is highly desirable for marginal oil fields development in Malaysia, to the extent that attractiveness of petroleum fiscal regime as a moderator may not add to the desirability of PIT for marginal oil fields development in Malaysia.

Similarly, the explanation for an insignificant moderating effect of an attractive petroleum fiscal regime on the relationship between PSC and the investment climate of marginal oil fields could be that the oil and gas experts' used in the survey perceived that PSC is still desirable for marginal oil fields development in Malaysia. Such that no matter how attractive the fiscal regime is it may not add to the desirability of PSC as a fiscal arrangement for marginal oil fields development in Malaysia.

Likewise, the possible explanation for insignificant moderating effect of an attractive petroleum fiscal regime on the relationship between the pure service contract and the investment climate of marginal oil fields in Malaysia could be that the respondents perceived that pure service contract is not desirable for marginal oil fields development in Malaysia. Such that no matter how attractive is the fiscal regime, it may not turn pure service contract from undesirable to a desirable fiscal arrangement for marginal oil fields development in malaysia.

The results of the moderating effect of an attractive petroleum fiscal regime on the negative relationship between production-based tax and the investment climate of marginal oil fields was consistent with Artist's (2009) supposition that the influence of tax policy on an investor's cash flow can be moderated by fiscal regime in place. Furthermore, the result can be supported by Baron and Kenny's (1986) assertion that the moderator variable could affect the strength of a relationship between an independent and a dependent variable. This possible moderation effect of an attractive petroleum fiscal regime was also highlighted by Manaf, Mas'ud, Saad, and Ishak (2014) who postulated that an attractive petroleum fiscal regime would likely moderate the negative effect of a production-based tax on the investment climate of marginal oil fields. Simply put, the attractiveness of petroleum fiscal regime will likely stimulates the negative effect of production-based tax on the investment climate of marginal oil fields in Malaysia.

The lack of a moderating effect of an attractive petroleum fiscal regime on the relationship between a crypto-based tax and the investment climate of marginal oil fields in Malaysia could be explained by the fact that the strength of the negative relationship between crypto-based tax and the investment climate of marginal oil fields in Malaysia cannot be outweighed by the attractiveness of its petroleum fiscal regime. This may be possible considering the fact that some obligations formed by a crypto-based tax fall outside the fiscal arrangements (Iledare, 2014). Thus, no matter how attractive the petroleum fiscal regime may be, it may not outweigh the negative effects of impositions that fall outside the fiscal arrangements on the investment climate of marginal oil fields in Malaysia. Put differently, due to high negative effect of crypto-based tax on investment climate of marginal oil fields in Malaysia, the attractiveness of petroleum cannot stimulates such negative effect.

Lastly, for the moderation effect of attractive petroleum fiscal regime on the relationship between tax incentive and the investment climate of marginal oil fields, the results revealed that that an attractive petroleum fiscal regime strengthened the positive effect of tax incentives on the investment climate of marginal oil fields, which is consistent with the assertions of Baron and Kenny (1986). It is also congruent with Artist (2009), who said that the influence of tax policy on an investor's cash flow can be moderated by fiscal regime in place. Moreover, Manaf, Mas'ud, Saad, and Ishak (2014) also postulated such a possible moderation effect of an attractive petroleum fiscal regime, implying that an attractive petroleum fiscal regime might likely moderate the influence of tax incentives on the investment climate of marginal oil fields in Malaysia. Put simply, attractiveness of petroleum fiscal regime enhances the positive effect of tax incentives on the investment climate of marginal oil fields in Malaysia.

7.3 Theoretical, Methodological, and Practical Contributions

In this section an in-depth discussion was carried-out on the theoretical, methodological and practical contributions made by the current study. For a clearer discussion, the section is divided into three subsections as follows.

7.3.1 Theoretical Contributions

The three conceptual frameworks of the study contained in Chapter Four were built in line with empirical and theoretical gaps not addressed by the extant literature. The frameworks were supported and underpinned by three theories: the Economic Theory of Regulation (Danielzyk & Ossenbruegge, 2001; Gaffikin, 2005; Peltzman *et al.*, 1989; Stigler, 1971), Economic Rent Theory (Hughes, 1975; Kyari, 2013; Menezes, 2005; Nakhle, 2007, 2008; Nakhle & Hawdon, 2004; Wessel, 1967), and Bargaining Theory (Hosman, 2006; Moran, 1974; Muthoo, 2000; Vivoda, 2011). As a theoretical contribution, the current study has incorporated the moderating effect of an attractive petroleum fiscal regime on the relationship between tax instruments and oil and gas investment climate – specifically the investment climate of marginal oil fields. Nevertheless, drawing from the research findings and the discussions above, the study has made numerous theoretical contributions to petroleum taxation, petroleum fiscal regime and oil and gas investment climate research.

7.3.1.1 Specific Contributions to Economic Theory of Regulation

In the domain of Economic Theory of Regulation, this study offered theoretical implications by providing additional evidence not addressed by the extant literature. The theory hypothesizes that regulations are made, designed and implemented for certain industries, which could have either a positive or a negative effect on them (Stigler, 1971). The theory highlights that those regulations associated with heavy taxation are classified as negative regulations but those associated with tax subsidies and incentives are classified as positive regulations.

This study has provided additional evidence to Economic Theory of Regulation in two ways. Chapter One noted that Malaysia introduced a new fiscal regulation in 2010 for marginal oil fields, which included new tax incentives capable of improving the fields' investment climate.

In line with the Economic Theory of Regulation, the findings from objective one provided evidence that the introduction of new fiscal regime which came up with some tax incentives improved the investment climate of marginal oil fields' under low oil price scenarios for five investment climate indicators (NPV, IRR, PI, AGR and SI) examined in the analysis. This implied that the new fiscal regulations could have a positive impact on the investment climate of marginal oil fields during periods of low oil prices. For high oil price scenarios, in line with postulation of economic theory of regulation (Stigler, 1971), the new regulations may likely have a negative effect on investment climate of marginal oil fields. This could probably be not because of tax incentives but because of the change of fiscal arrangements from the R/C factor PSC to RSC. In support of this viewpoint, literature has documented that the R/C factor PSC ensure more investor profitability during high oil prices due to its progressive sliding scale profit splits (Onaiwu, 2009). This means that the introduction of RSC as new fiscal regime reduces investors' profitability under high oil price compared to old regime under R/C factor PSC. To the best of the researcher's knowledge, these theoretical implications are new in the domain of the Economic Theory of Regulation, specifically in the Malaysian context and more generally in the global oil and gas perspective

The findings for objective two also provide additional evidence in the domain of the Economic Theory of Regulation. The theory highlights that regulations can be negative when they prevent certain behavior; they can also be positive if they encourage certain activity (Gaffikin, 2005). In line with this theoretical insight and the new fiscal regulations for the marginal oil fields introduced in 2010, the findings from this study revealed that CAPEX performance of marginal oil field operators as well as that of marginal oil field subsectors significantly improved after the introduction of the new marginal oil fields' fiscal regulations. This improvement in the CAPEX performance of both the investors and the entire subsector can be partially attributed to the new fiscal regulation for marginal oil fields' subsector, which created tax incentives capable of encouraging activities for oil and gas development projects and which, in essence, has been highlighted by the Economic Theory of Regulation. To the best of this researcher's knowledge, this theoretical implication is pioneering in the context of Malaysian oil and gas industry.

7.3.1.2 Specific Contributions to Economic Rent Theory

In the domain of Economic Rent Theory, this study offered theoretical implications by providing more evidence, which was not available in the extant literature. The theory highlights that oil reservoirs have different yielding capacities leading to differential economic rent (profitability) (Kyari, 2013; Menezes, 2005; Nakhle, 2004, 2007; Njeru, 2010). Thus, a fiscal regime to be applied to a field should consider the field's yielding capacity. By implication, the theory emphasizes that high taxes and obligations should be placed on larger fields that are more profitable and vice-versa. In support of this viewpoint, the imposition of economic rent tax determines either when a natural resource project would be terminated or predicts the investors' decision to close the field (Arnason, 2002). This theory indicates that that, when high taxes and obligations are applied to low yielding fields, the field would be closed early due to an unfavorable investment climate.

Therefore, this study has provided new evidence in the domain of Economic Rent Theory from the context of the Malaysian oil and gas industry in two ways. First, it provides new findings on how the application of different petroleum fiscal regimes affects oil and gas investment climates and particularly marginal oil fields. Second, with respect to the two petroleum fiscal regimes studied, the fiscal regime under the R/C factor PSC and the fiscal regime under RSC, have different fiscal impositions, thereby having differential impacts on the investment climate of marginal oil fields. Specifically, the findings support Economic Rent Theory, in that they show how the application of less-stiff fiscal impositions impact the investment climate of marginal oil fields more favorably, and specifically under low oil price scenarios. To the best of this researcher's knowledge, this theoretical evidence is pioneering in Malaysian oil and gas industry.

Furthermore, using a perception-based approach, the study also provides new evidence on the domain of Economic Rent Theory in that it shows how various tax instruments such as profit-based taxes, fiscal arrangements, production-based taxes, crypto-based taxes, and tax incentives predict the investment climate of marginal oil fields. Though it was already documented in the literature that taxation is an important determinant of oil fields' investment attractiveness (Nakhle, 2004), empirical evidence has been very scanty. Hence, this study filled this gap, providing new theoretical implications on the relationship between tax instruments and the investment climate for oil and gas project from a Malaysian perspective. More importantly, the study integrated the moderating effect of an attractive petroleum fiscal regime on the influence of tax instruments on the investment climate of marginal oil fields, which to this researcher's knowledge is new theoretical evidence from a global perspective.

7.3.1.3 Specific Contributions to Bargaining Theory and Moderating Effect of Attractive Petroleum Fiscal Regime

In the domain of Bargaining Theory, this study offered additional theoretical implications by providing empirical evidence not addressed by the extant literature. The theory explains how developing countries move up the negotiation learning curve with increasing operating and supervisory skills (Moran, 1974), thereby learning how to design an attractive petroleum fiscal regime capable of stimulating the relationship between tax instruments and an oil and gas project's investment climate. In the light of this theoretical insight, the study incorporated the moderating effect of an attractive petroleum fiscal regime on the relationship between profit-based taxes, fiscal arrangements, production-based taxes, crypto-based taxes, tax incentives, and the investment climate of marginal oil fields.

Interesting theoretical implications in the domain of Bargaining Theory were drawn from the findings of this study. First, the significant moderating role of an attractive petroleum fiscal regime was found for the relationship between BT and the investment climate of marginal oil fields. Second, another significant moderating effect of attractive petroleum fiscal regime was found for the relationship between production-based taxes and the investment climate of marginal oil fields. Lastly, a moderating effect of attractive petroleum fiscal regime for the relationship between tax incentives on the investment climate of marginal oil fields was also found. To this study's knowledge, these theoretical implications in the domain of Bargaining Theory are pioneering with respect to the global petroleum fiscal regime and investment climate literature.

7.3.2 Methodological Implications

Scenario analyses and economic models have dominated the methodologies used in evaluating the influence of petroleum fiscal regime and taxation on oil and gas investment. For instance, Smith's (2012, 2013) literature review documents 24 studies; of which 15 the used scenario approach to understand the impact of a country's petroleum fiscal framework on investment. Consequently, Smith (2012a) and Smith (2013) suggested that scholars should continue to explore more methods and models to examine that effect. In answering this call, a survey approach was employed in this current study. Perception-based measures of constructs such as investment climate, attractive petroleum fiscal regime, production-based tax, crypto-based tax, and tax incentive were developed, evaluated, and utilized in this current study.

Specifically, the measurement of new constructs developed in this study have satisfied the requirements relating to indictor loadings, the internal consistency which was evaluated using composite reliability, and the convergent validity which was evaluated using AVE of each of the constructs. The constructs also satisfied the discriminant validity requirement, because the square root of AVE of each construct was higher than its squared correlation with any other construct in the current research model. Thus, the study has provided measures for application and validation by future studies in different contexts and samples.

7.3.3 Practical Implications

Drawing from the research findings the study demonstrated several practical implications in relationship to petroleum fiscal regime design, and oil and gas investment climate. The study shows that fiscal regime design is an important issue in the governance of upstream oil and gas sector – more specifically the marginal oil fields' subsector. First, using about 45 scenarios under various oil prices and reserve levels, the study provides interesting practical implications on the influence the new fiscal regime introduced by Malaysian government in 2010 for marginal oil fields. The results implied that the new petroleum fiscal regime under RSC could significantly improve the investment climate of marginal oil fields when the oil price is low. It also highlighted that the old fiscal regime under the R/C factor PSC fiscal terms could significantly improve the investment climate of marginal oil fields during periods of high oil prices. In essence, while the incentives under the new fiscal regime are attached to performance (Lee, 2013), a need also exists for such incentives to be attached to high oil prices. Put differently, to improve attractiveness of marginal oil fields under the new fiscal regime with RSC fiscal terms, the investors' remuneration fee should also be attached to increase in oil price. This could be in form of windfall incentives that may be given by the government to

RSC investors when oil price is high, which is similar to windfall tax paid by PSC investors' as the make abnormal profits during high oil price.

Second, the study also provided important practical implications on how a petroleum fiscal regime design influences the CAPEX performance of oil and gas investors. Specifically, the study shows how the new fiscal regime introduced by the Malaysian government in 2010, which is associated with important tax incentives, encouraged more CAPEX spending in Malaysian marginal oil fields by individual investors and cumulatively in the marginal oil fields' subsector. The implication of this finding is that countries with the desire to attract foreign direct investment in their marginal oil fields should design a fiscal regime that contains incentives packages capable of inducing investors to incur a high amount of CAPEX. Incurring more CAPEX in a country's petroleum sector would have multiplier effect by creating more jobs, thus reducing poverty in its economy. In fact, FDI was found to have an association with poverty reduction in Malaysia (Karim & Ahmad, 2009), and other countries (Mirza *et al.*, 2004). Thus, the study could provide important policy insights to oil producing countries that have the desire to reduce poverty through increased FDI.

Finally, another important practical implication of this study evolved from the findings of perception-based methodology, which highlights the specific relationships between various tax instruments such as profit-based taxes, fiscal arrangements, production-based taxes, crypto-based taxes, tax incentives, and the investment climate of marginal oil fields. When the Malaysian government becomes keen in understanding how specific tax instruments relate to the investment climate in marginal oil fields, the findings from perception-based methodology could have practical implications. However, these finding should be applied with cautions, for instance even though tax incentive was found to have positive and significant relationship with investment climate of marginal fields, seven out of 17 tax incentives considered in the analysis are yet to be implemented in Malaysia. These are depletion allowance, tax rate reduction when oil price below trigger price to encourage oil and gas production, tax rate reduction to encourage deeper drilling, sliding scale royalty to encourage deepwater drilling, bonus for reserve addition, flow through shares and tax stabilization guarantee. The implication of this is that implementation of these tax incentives may further encourage investment into marginal oil fields.

Furthermore, not only the influence of specific tax instruments on investment climate, but the interaction of each instrument with an attractive petroleum fiscal regime could also provide insights for Malaysia policymakers and those of other oil producing countries. Specifically, the interaction effect implied that attractive petroleum fiscal regime stimulates the negative effect of taxes on investment, it also enhance the positive effect of tax incentive on investment.

7.4 Limitations of the Study and Future Research

Although the study provided answers to four research questions raised in Chapter One, interpretation of the findings should give cognizance to the study's limitations. First, the scenario analyses used in achieving objective one have been associated with a number of assumptions. Thus, while interpreting the findings, concern should be placed on such assumptions. Second, the data used for the scenario analyses is limited to KMB fields', which at the time of this study had the most comprehensive data available. As data of other fields became publically available or obtainable from the field operators, future studies should consider the application of such data to replicate findings.

Third, trend analyses conducted for achieving objective two of the study was only for six years: three years before the new regime and three years after. While the selection of this period has been associated with the time at which the current study was conducted, as time goes on, future studies should consider the increment of the number of years to replicate finding and confirm whether the trend in CAPEX performance would be consistent in long run.

Fourth, measuring the relationship between tax instruments and the investment climate of marginal oil fields as well as the moderating effects of attractive petroleum fiscal regime were carried-out using subjective data collected through survey questionnaires. The use of subjective measures has been reported as having susceptible judgmental bias (Dunlop & Lee, 2004). Thus, in order to minimize this type of bias future studies should explore the use of objective measures of tax instruments, and investment climate to replicate the findings.

Fifth, the cases used in this study were limited to 120 valid responses obtained from oil and gas experts in marginal oil field subsector in Malaysia. The sample was sufficient based on 361 questionnaires distributed, which resulted in a response rate of about 33.2% that was in line with Sekaran's (2003) guidelines. Nonetheless, future studies that conduct a similar study using larger population should increase the sample size relative to their total populations.

Sixth, the third model of this study helped attain objectives three and four and was able to explain 53.9% of the variation in the investment climate of marginal oil fields. This implied that other variables existed, which could significantly explain the investment climate of marginal oil fields that were not included in this study's model. Put differently, the remaining 46.1% of the variation in the investment climate of marginal oil fields in Malaysia could be explained by other variables not considered by the current study. Hence, consideration should be given by future studies on the possible factors such as legal certainty and political stability that Febriana (2011) highlighted, which could influence investments in the oil and gas industry.

Finally, the moderating effects of an attractive petroleum fiscal regime on the influence of petroleum income tax, production sharing contract, pure service contract and crypto-based tax on the investment climate of marginal oil fields were not established by the current study in the Malaysian context. Consideration should be given by future studies for exploring these moderating effects in other contexts. The fact is that petroleum taxation and fiscal regime are context specific with each country having different laws and regulations governing its oil and gas industry (A. C. Clark, 2001). Thus, due to these peculiarities among countries it might be possible that such moderating effects could be established elsewhere.

7.5 Conclusion

To conclude this thesis, recapping what it was intended to achieve is important. The study's four objectives were to: (1) examine the extent to which the new fiscal regime introduced in 2010 improved the investment climate in Malaysian marginal oil fields, (2) examine the extent to which the investors' CAPEX performance improved under the new fiscal regime, (3) examine the relationship between tax instruments and the investment climate of marginal oil fields, and (4) examine the moderating effect of an attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields. Despite some of its limitations, the study achieved all these objectives and answered the respective research questions.

The results of this study lend support to key theoretical propositions and other similar empirical evidence. It provides evidence on how an adjustment in a fiscal regime affects the investment climate of marginal oil fields in Malaysia. It also revealed how a change in fiscal regime affects investors' CAPEX performance in the marginal oil field subsector in Malaysia. Moreover, the study provides evidence about the relationship between tax instruments and the investment climate of marginal oil fields in Malaysia. Importantly, the study also revealed how an attractive petroleum fiscal regime theoretically moderates the relationship between tax instruments and the investment climate of marginal oil fields in Malaysia.

The conceptual framework of this study has added to the domain of three theories: Economic Rent Theory, Economic Regulation Theory and Bargaining Theory. For Economic Tent Theory and Economic Regulation Theory, the study provides evidence on the extent to which change in fiscal regime improves the investment climate in Malaysian marginal oil fields, the extent to which the investors' CAPEX performance improved after fiscal regime adjustment, as well as the relationship between tax instruments and the investment climate of marginal oil fields in Malaysia. For Bargaining Theory, the study provides evidence on the moderating effect of an attractive petroleum fiscal regime on the relationship between tax instruments and the investment climate of marginal oil fields in Malaysia.

In addition to the theoretical and empirical evidence lent to the growing body of knowledge, the study offers practical implications, which give direction for policy in relationship to petroleum fiscal regimes and taxation for the marginal oil fields subsector in Malaysia. Moreover, the study also lends support to the use of perception-based methodology in evaluating the influence of petroleum fiscal regime and taxation on oil and gas investment climate – more specifically marginal oil fields. In line with its limitations, the study offers directions for future research both in Malaysia and globally.

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Appendix A

Research Questionnaire

RESEARCH QUESTIONNAIRE

Dear Respondent,

Congratulations for being selected as a respondent for this study. The basis of your selection is your expertise in oil-and- gas accounting; taxation; and or finance related discipline, and your contributions to the development of the Malaysian Oil and Gas Industry in Malaysia.

For your information, this fundamental research project is funded by Malaysian government and undertaken by researchers at Universiti Utara Malaysia. The topic of the research is "**Is a New Fiscal Framework Required to Improve the Investment Climate of Marginal Oil Fields in Malaysia?** The aim of the study is to examine the effect of tax instruments on the investment climate of marginal oil fields in Malaysia.

The questionnaire will take approximately 20 minutes to complete. Your objective response would be highly appreciated as it will contribute immensely in generating reliable evidence that can assist in petroleum tax policy formulation and eventually will support the industry, government and practitioners in taking informed decisions on this important economic development issue. Please rest assured that your response will be treated with utmost confidentiality, as it will exclusively be used for academic purposes.

For enquiries relating to the research please contact any of the following:

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