Oil Curse and Finance-Growth Nexus in Malaysia: The Role of Investment

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Abstract:
We empirically examine the existence of an oil curse in the finance-growth nexus in Malaysia. We provide new insights into the oil curse phenomenon in Malaysia that challenges the conventional argument that Malaysia is a counter-example of an oil curse country. We do not find any significant evidence of direct effects of financial development on economic growth and TFP. However, there are direct and positive effects on the level of investment due to financial development and oil dependence. While we do not find statistical evidence of a direct negative impact of oil rent on economic growth, our results reveal that the symptoms of an oil curse exist. Specifically, we find that oil rent has a weak, indirect, impact on the finance-growth nexus through the quantitative channel or investment quantity. The policy implications of our findings are that the financial sector should be more involved in productive investment activities that can strengthen its role in economic growth and that policymakers should reduce dependence on oil and promote economic diversification.

Keywords: Oil Curse; Financial Development; Economic Growth; Investment; Malaysia.

JEL Classification: O13; O16; C22

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1. Introduction

The relationship between natural resource (oil) dependence and economic growth has received considerable attention among economists (Gelb, 1988; Auty, 1993; Sachs and Warner, 1995, 1999, 2001; Gylfason, 2001; Mehlum et al., 2006; Apergis et al., 2014; Apergis and Payne, 2014; Betz et al., 2015). In principle, oil and other non-renewable natural resources should offer huge benefits to economies. However, empirical evidence shows that these resources do not always lead to increased economic growth. This puzzling phenomenon is referred to as the “natural resource curse” (Auty, 1993). The term “natural resource curse” refers to the phenomenon of encumbering growth caused via a series of negative effects, due to excessive dependence on natural resources, such as oil and natural gas, in a country or a region (Shao and Yang, 2014). It occurs when natural resources interact with, and alter, various social, political and economic factors, resulting in slower economic growth and impeding development. “Oil curse” has often been used as a synonym for resource curse because it is primarily observed in oil-dependent economies.

The literature on the natural resource curse consists of two strands. The first strand has examined the direct effect of natural resource dependence on economic growth (e.g. Sachs and Warner, 1995, 1999, 2001; Sachs, 2007; Gylfason, 2001; Mevrotas et al., 2011 and Kim and Lin, 2015). The second strand of literature has examined the effect of natural resource dependence on macroeconomic and political economic factors, such as human capital, good governance, investment and savings that are associated with sustainable economic growth (e.g., Atkinson and Hamilton, 2003; Gylfason and Zoega, 2006; Mehlum et al., 2006; Dietz et al., 2007; Papyrakis and Gerlagh, 2007; Daniele, 2011; Blanco and Grier, 2012; Libman, 2013; Bhattacharyya and Hodler, 2014; Cockx and Francken, 2016).
One factor that is associated with sustainable economic development is financial development. According to Levine (1997), there are two channels through which financial development affects economic growth. These channels are depicted in Figure 1. The first channel provides liquidity services and mobilizes savings, which affects the scale of investment (quantitative channel). The second channel is the efficient allocation of resources to productive investments, which induces economic growth (qualitative channel). Oil dependence can influence the relationship between financial development and economic growth in various ways. On the one hand, oil revenue might be considered an extra resource for financial institutions, in which case the link between financial development and economic growth would be stronger. On the other hand, high natural resource dependence may hinder the ability of financial institutions to accumulate capital (quantitative channel) or to allocate credit efficiently to productive investments (qualitative channel), which are negative effects.

[Insert Figure 1]

Empirical evidence concerning how natural resource dependence affects financial development, and thus influences economic growth, is scant (Nili and Rastad, 2007; Beck, 2011; Yuxiang and Chen, 2011; Barajas et. al., 2013). Related research examines financial sector characteristics in resource-dependent economies (Kurronen, 2015), the effect of oil price fluctuations on the current account in oil exporting countries (Allegret and Mignon, 2014), and the effect of oil prices on financial markets (Narayan and Narayan, 2010; Kang et al., 2014; Demirir et al., 2015; Phan et al., 2015). The latter, however, does not consider if there is an oil curse, nor examine the effect of financial development on economic growth.

We examine the role of natural resource (oil) dependence on the finance-growth nexus in one of the largest oil-rich economies in Southeast Asia, Malaysia. We first examine whether oil
dependence has a direct effect on economic growth. We then examine whether oil dependence has an indirect effect on the finance-growth nexus via the investment quantity (quantitative) and investment efficiency (qualitative) channels. While we do not find evidence of a direct negative impact of oil dependence on economic growth, we do find that oil dependence has a weak, indirect, impact on the finance-growth nexus through the investment quantity channel. Our results are generally robust to several alternative ways of measuring financial development as well as oil dependence.

We situate the study in Malaysia because there is considerable debate over the role of oil in facilitating economic development in that country. Prior to the Asian financial crisis, Malaysia was one of the fastest growing economies in the world and was widely considered to be one of those countries that had escaped the resource curse (Gylfason, 2001; Rosser, 2006). However, recently, Doraisami (2015) has argued that over dependency on natural resources has led the Malaysian government to engage in inefficient activities and provide funding for unproductive investments, casting doubt on whether Malaysia really has escaped the resource curse. This finding, along with the current destabilized economic situation in Malaysia that is associated with the prolonged global fall in oil prices, motivates us to dig deeper to explore empirically whether the conventional argument about Malaysia is still valid.

We contribute to the literature in the following important ways. First, as noted above, there are very few papers that specifically examine how natural resource dependence affects the relationship between financial development and economic growth and the associated channels through which this occurs. We contribute to the scant evidence on the effects of oil dependence on the relationship between financial development and economic growth and the channels through which oil dependence affects the finance-growth nexus.
Second, of the few studies that explicitly examine how natural resource dependence affects the relationship between financial development and economic growth, almost all provide cross-sectional and/or panel evidence for large numbers of countries (Nili and Rastad, 2007; Beck, 2011; Barajas et. al., 2013). Beck (2011) has emphasized that understanding how natural resource dependence influences the finance-growth nexus is critical for policymakers. He states (at p.2):

“Policymakers who care about the development of their countries need to understand the relative importance of different policy areas and the effectiveness of specific policies. Understanding channels through which resource abundance can stimulate or dampen economic development can be important to develop policies to maximize the benefits of natural capital”.

Yet, findings from large multi-country studies are of limited value for policy-making in specific countries. The use of cross-sectional or panel data has led previous studies to ignore the existence of large variations among countries in terms of the degree of dependence on natural resources, type of resources or stage of financial development. One exception is Yuxiang and Chen (2011), who discussed the direct effect of natural resource dependence on the financial development in Chinese provinces. However, these researchers ignored the indirect effects of natural resources on the relationship between financial development and economic growth. We provide the first single country evidence of the effect of oil dependence on the financial development-economic growth relationship coupled with examination of the channels through which oil dependence affects the finance-growth nexus.
Third, existing studies focus on the direct relationship between natural resource dependence and financial development in terms of its depth or size, but largely ignore the impact on efficiency, or the ability of the financial sector to translate savings into optimum investments in one step, and translate this investment into economic growth in the subsequent step. Unlike the existing literature, we pay particular attention to the role played by the efficiency of the financial sector in understanding how the natural resource dependence might depress economic growth through the financial development channel.

Fourth, Beck (2011) calls for more detailed treatment of how natural resource dependence affects the financial development-economic growth relationship using better measures of natural resource dependence. In our main results, we use oil and gas rent as a proportion of GDP to measure oil dependence. Oil and gas rent has been the preferred measure of oil dependence in a number of recent studies on the natural resource curse (Collier and Hoeffler, 2009; Bhattacharya and Hodler, 2010, 2014). This is a better measure of oil dependence than used in some of the previous multi-country studies that have examined how natural resource dependence affects the financial development-economic growth relationship, such as Nili and Rastad (2007), who use a dummy variable to denote whether a country is oil exporting to capture oil dependence. Compared to our approach, that measure has the limitation that it masks differences in the degree of dependence on oil among oil exporters.

Our fifth contribution is to the debate on the role of oil dependence in the specific case of Malaysia. While we use Malaysia to illustrate arguments likely to have application to major oil producers more generally, in so doing specifically, we add statistical evidence to Doraisami’s (2015) observation; based on a reading of the descriptive data, on whether Malaysia has been successful in escaping the natural resource curse.
The remainder of this paper is organized as follows: the literature review is presented in section 2. In section 3, we provide an overview of the Malaysian economy. Section 4 focuses on data and methodology, and the empirical results and discussion are presented in section 5. Finally, section 6 concludes with policy implications.

2. Literature Review

Our study is related to four main strands of literature. The first is studies of the effect of natural resource dependence on economic growth (Gelb, 1988; Auty, 1993; Sachs and Warner, 1995, 2001; Sachs, 2007; Gylfason, 2001; Mehlum et al., 2006; Apergis et al., 2014; Apergis and Payne, 2014; Betz et al., 2015; Kim and Lin, 2015). Much of the literature on the natural resource curse is summarized in Frankel (2010). While there is wide country variation, there is considerable empirical evidence of a natural resource curse on economic development. Studies have shown that natural resource wealth provides the means for autocratic and other less than democratic governments to buy off opposition and avoid accountability and transparency. It also allows elites to hold on to power and facilitates inefficient rent seeking that impedes economic development. This can also result in conflict, as in some countries in Sub-Saharan Africa, that further curtails economic growth (see Collier and Hoeffler, 2009; Beck, 2010; Bhattacharya and Hodler, 2010, 2014).

The second strand of literature to which our study is related is studies on the relationship between financial development and economic growth. Beginning with Schumpeter (1934), a large literature has shown that financial development can encourage economic growth by channeling resources to highly productive investments (Patrick, 1966; McKinnon, 1973; Shaw, 1973). These studies have shown that that financial intermediation (banks) plays an important role in the economy by increasing saving and capital accumulation (Pagano, 1993;
King and Levine, 1993a, b; Levine, 1997, 2003; Hassan et al., 2011; Beck, 2011; Bittencourt, 2012).

Based on a sample of 77 countries for the period 1980–2007, Beck et al. (2014) found that, in the long run, financial intermediation increases growth and reduces growth volatility. Both effects have, however, become weaker over time. Law and Singh (2014) found that there is a threshold effect in the finance-growth nexus. They found that financial development is beneficial for economic growth up to a certain threshold; thereafter, financial development tends to adversely affect economic growth (see also Shen and Lee, 2006; Ergungor, 2008; Arcand et al., 2012; Cecchetti and Kharroubi, 2012; Ductor and Grechyna, 2015; Samargandi et al., 2015)\(^1\).

The third strand of literature to which our study is related is studies of the effect of natural resources on the financial sector and financial development. This literature includes the large number of studies on the effect of oil prices on the financial sector, and stock market in particular (see e.g. Narayan and Narayan, 2010; Kang et al., 2014; Demirir et al., 2015; Phan et al., 2015). Beginning with Jones and Kaul (1996) and Sadorsky (1999), several studies show that stock markets respond negatively to a positive oil price change; however, other studies find no relationship (see Filis et al., 2011 for a review). Narayan and Sharma (2011) found that the exact relationship depended on the sector in which the stock was located while Phan et al. (2015) found that the relationship depended on whether the stock was for an oil producer or oil consumer. Arouri and Rault (2011) found that in oil exporting countries, the relationship between oil price shocks and stock market returns was positive. None of these

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\(^1\) Refer to Ang (2009), Levine (2003) and Law and Singh (2014) for a comprehensive review on the relationship between financial development and economic growth.
studies, however, consider the effect of oil, or other natural resources, on the relationship between financial development and economic growth.

The literature to which this study directly contributes, which is how natural resource dependence affects the finance-growth nexus, is limited to a few studies. Nili and Rastad (2007) compared the effect of financial development on economic growth for 12 oil economies and 132 non-oil economies over the period 1992 to 2001, finding that the quality of investment is lower in oil economies, and that this originates from the low quality of the financial institutions, which translates into poor economic growth. For 153 countries over the period 1980 to 2007, Beck (2011) found that countries that depend more on natural resources tend to have an underdeveloped financial system, in which both private credit and stock market activities are weaker, and access to credit for businesses is more limited. Finally, for 146 countries over the period 1975 to 2005, Barajas et al. (2013) found a weaker finance-growth nexus in oil-dependent economies than in non-oil economies.

To summarize, the existing literature on how natural resource dependence affects the finance-growth nexus consists of large cross-sectional and panel studies of several oil and non-oil countries. There are no single country studies of the effect of oil dependence on the financial development-economic growth relationship that also examine the channels through which oil dependence affects the finance-growth nexus. This is a gap in the literature that we seek to address in the current study.

3. Malaysian Economy Overview

Malaysia is the second largest oil and natural gas producer in Southeast Asia, and the second largest exporter of liquefied natural gas globally; in addition, it is strategically located amid
important routes for seaborne energy trade. According to the Oil and Gas Journal, as of January 2013, Malaysia held proven oil reserves of 4 billion barrels, the fifth-highest reserves in Asia-Pacific after China, India, Vietnam, and Indonesia. Malaysia also has 83 trillion cubic feet of proven natural gas reserves, and, as of January 2013, it was the third largest natural gas reserves holder in the Asia-Pacific region. Total oil production in 2012 was estimated at 643,000 barrels per day (bbl/d).

The oil dependence indicator has witnessed fluctuations over the last 40 years caused by fluctuations in commodity prices in the international market. The indicator was 16% in the late 1970s, and then declined until the mid-1990s. Since 1995, the indicator rose to 18% in 2008, before the global financial crisis, which caused oil prices to decrease, and, thus, the natural resource dependence to decrease (WDI, 2013) (see Figure 2).

Since independence in 1957, Malaysia has experienced solid growth, with an average annual growth rate of 6% over the period 1970 to 1980. GDP growth decreased significantly during the economic recession in the mid-1980s. Then, the country recovered from the crisis in the mid-1980s and achieved an average GDP growth rate of at least 9% from 1990 to 1996. However, the GDP growth rate declined to -7% during the Asian financial crisis in 1997. Since then, the economy has shown a slow process of recovery that remained inconsistent, with an annual growth rate of 5% from 2002 to 2008. The growth rate also declined to -1.5% in 2009 during the global financial crisis. A critical element of success is the high savings rate that provided capital available for investment. Figure 3 presents the time series plot of the real GDP growth rate in Malaysia for the 1970 to 2013 period.
The financial system in Malaysia can be broadly classified into financial institutions that consist of a banking system, non-bank financial intermediaries and financial markets that are composed of money and foreign exchange markets, capital markets, derivative markets and offshore markets. However, because of limited development in the capital markets, the Malaysian financial system is predominantly bank-based (Ang, 2009).

The banking system is the largest component of the financial system. The system’s growth has been remarkable during the past few decades because of strong economic growth, a high savings rate and advances in telecommunications. The deposits and the domestic credit to the private sector have dramatically increased from approximately 30% and 20% of GDP in the 1970s to 130% and 135% of GDP, respectively at the beginning of the 2000s (refer to Figure 4). This growth was associated with a series of financial restructuring programs adopted by the Malaysian authorities. Furthermore, after the Asian financial crisis, a series of macroeconomic policy responses, such as capital controls and a reflationalary policy, have been adopted (Ang and Mckibbin, 2007).

4. Data, Model and Methodology

4.1 Data and Variables

This study employs data for Malaysia over the period 1970-2013. All data are obtained from the World Development Indicators (WDI). Real GDP per worker in constant 2005 USD

[Insert Figure 3]

[Insert Figure 4]

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2 The reason for beginning and finishing the study in 1970 and 2013 is the unavailability of data for a main variable of interest (i.e., oil and gas rent) before and after those years.
prices is used as the economic growth measurement, whereas the measurement of oil
dependence, financial development, and investment are chosen based on the following
justifications.

Oil Dependence

Following Collier and Hoefler (2009) and Bhattacharya and Hodler (2010, 2014), among
others, we use oil and gas rent to GDP as the oil dependence indicator. According to the
World Bank, the oil and gas rent is defined as the difference between the value of production
for oil and gas at world prices and their total cost of production.

Financial Development

Due to limited development in the capital markets and the dominant role of the banking
system, we initially use one proxy to measure the level of financial intermediation. This
proxy is domestic credit to private sector as a share of GDP. It is considered to be one of the
best indicators to measure financial development, and has been widely used in the literature
(e.g., King and Levine, 1993a; Nili and Rastad, 2007; Shahbaz and Lean, 2012). This proxy
provides information regarding the commercial bank’s credit allocated to the private sector,
compared with the size of the economy as a whole. Therefore, this indicator accurately

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3The Malaysian financial system is characterized by the limited development of the financial markets, where
banks are the main source of finance. The majority of the companies are not usually listed and the market
concentration ratio is rather high for Malaysia compared to other more advanced financial markets because
market capitalization is highly concentrated in the hands of the ten largest firms (see Ang and Mckibbin, 2007).
Thus, the Malaysian financial system can be described as a bank-based system rather than a market-based
system. Hence, the use of bank-based financial proxies is more appropriate to study the issue at hand.

4More proxies are reported for the robustness check. However, we could not include a variable for stock market
(e.g., market capitalization) due to the lack of this data, which only starts from 1981. Nevertheless, we perform
an unreported-test with the available data of market capitalization as percent of GDP and total value of stock
trade as percent of GDP. We do not find any significant impact of oil dependence on the finance-growth nexus
(result is available upon request). It can be inferred from this result that the oil curse is transmitted to economic
growth through the banking sector rather than the stock market. However, this result must be treated with
caution due to the data limitation.
measures the role of financial intermediation in channeling funds to the private sector. The higher ratio implies more financial services, and, therefore, greater financial development.

*Investment Quantity*

We use gross fixed capital formation as a share of GDP as a proxy for investment quantity. According to the World Bank, this indicator includes land improvements (fences, ditches, and drains) and plant, machinery, and equipment purchases; it also includes the construction of roads, railways, schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.

*Investment Efficiency/Quality*

In accordance with Dasgupta et al. (2002), investment efficiency is represented by total factor productivity (TFP). TFP is derived from a standard neoclassical Cobb-Douglas production function:

\[ Y = AK^{\alpha}L^{1-\alpha} \]

where \( Y \) is the real GDP, \( K \) is the real physical capital stock, and \( L \) is the total labor force. Therefore, TFP is measured as \( A = TFP = y/k^{\alpha} \), where \( y \) is the output-worker ratio (\( Y/L \)) and \( k \) is the capital-worker ratio (\( K/L \)). Ang (2009) set the capital’s income share (\( \alpha \)) for Malaysia to 0.3. \( K \) is constructed using the perpetual inventory method, \( K_t = I_t + (1 - \vartheta) K_{t-1} \), where \( I \) is real investment, and \( \vartheta \) is the depreciation rate, which is assumed to be 5% in accordance with Bosworth and Collins (2003). The initial capital stock is estimated using the Solow model steady-state value of \( I_0/(\vartheta + g) \) where \( I_0 \) is the initial real investment, and \( g \) is the growth rate in real investment over the 1970-2013 period.

\[^{5}\text{See Beck et al. (2000), Ang (2009) and Farhadi et al. (2015).}\]
4.2 Models

Our first objective is to identify whether oil dependence has a direct effect on economic growth. Therefore, in the first model, we augment the neoclassical Cobb-Douglas production function\(^6\) by incorporating financial development and oil dependence in addition to the capital and labor force (see Ang, 2009, Salim et al., 2014 and Lotz, 2015).

\[ Y = AK^{\alpha}L^{1-\alpha} \]

where \( Y \) = aggregate GDP, \( L \) = labor, \( K \) = capital and \( A \) = TFP.

Dividing by \( L \) and taking the natural logs,

\[
\begin{align*}
\frac{Y}{L} &= AK^{\alpha}L^{(1-\alpha)} \\
\frac{Y}{L} &= AK^{\alpha}L^{-(\alpha)} \\
\frac{Y}{L} &= A(K/L)^{\alpha} \\
\ln(\frac{Y}{L}) &= \ln A + \alpha \ln(K/L)
\end{align*}
\]

Denote TFP as a function of financial development and oil dependence:

\[ A = f(FD, OD) \] where FD is financial development and OD is oil dependence.

This suggests our first model:

**Model (1):**

\[
\frac{Y}{L_t} = a_0 + a_1FD_t + a_2OD_t + a_3\frac{K}{L_t} + \epsilon_t
\]

where \( \frac{Y}{L} \) is GDP per worker in constant 2005 USD prices, FD is the financial development indicator, OD is the oil dependence indicator, \( K/L \) is capital stock per worker.\(^7\) \( K \) is constructed using the perpetual inventory method as described above.

For the second objective, we focus on the link between financial development and investment quantity/quality to capture the impact of oil dependence in this relation.

\(^6\)The selection of the Cobb-Douglas production function was made on the basis of its merits. The Cobb-Douglas function is flexible and it can handle multiple inputs in its generalized form. In the presence of imperfections in the market, it does not introduce distortions of its own; and various econometric estimation problems, like serial correlation and heteroscedasticity, can be handled adequately and easily (Bhanumurthy, 2002).

\(^7\)All variables throughout this paper are transformed into natural logarithms.
The rationale for this argument is to determine whether oil dependence has an indirect weakening effect on the finance-growth nexus through the investment quantity and quality channels. Any negative effect on one of these two channels would weaken the relation between financial development and economic growth. This argument provides important policy implications in terms of a futuristic oil resource management policy in the country.

Inspired by Nili and Rastad (2007), the investment quantity model can be specified as follows:

**Model (2):**

\[ INV_t = \delta_0 + \delta_1 FD_t + \delta_2 OD_t + \delta_3 (FD*OD)_{t} + \delta_4 REX_{t} + \xi_t \]  

(2)

where \( INV \) is fixed capital formation to GDP and \( REX \) is the real exchange rate of the Malaysian Ringgit against the US dollar. Theoretically, exchange rate fluctuation has two opposite impacts on investment. The first is a positive effect when the exchange rate depreciates. The marginal profit of investment increases because of higher revenue from domestic and foreign sales. However, this positive effect is counterbalanced by the rising variable cost and the higher price for imported capital (see Harchaoui et al., 2005). Moreover, we include \( REX \) because of its important role in natural resource-based economies (Sachs, 1999). \((FD*OD)\) is the interaction term between oil dependence and financial development. This interaction term is expected to reveal the impact of oil dependence on the finance-investment nexus. At the margin, the total effect of increasing OD can be calculated by examining the partial derivatives of investment with respect to financial development.

\[
\frac{\partial INV_t}{\partial FD_t} = \delta_1 + \delta_2 OD_t
\]  

(3)

Eq. (3) indicates how the marginal effect of the financial development on investment quantity changes with the level of oil dependence.

If the coefficient on the interaction term was negative, this implies that a small increase in oil dependence would then result in a weaker finance-investment nexus. This would certainly be
the case if $\delta_1$ is positive. If, conversely, the coefficient on the interaction term is positive, a small increase in oil dependence would result in a stronger finance-investment nexus.

Finally, an efficient financial system performs the task of screening investment projects. With an effective risk evaluation of different investment opportunities, the selection of the most promising investment projects could improve the quality of investment (Ang, 2009). To assess the impact of oil dependence on the role of financial development on the quality/efficiency of investments, we propose the following model from Beck et al. (2000):

**Model (3):**

$$ TFP_i = \varphi_0 + \varphi_1 FD_i + \varphi_2 OD_i + \varphi_3 (FD*OD)_i + \varphi_4 EDU_i + \varepsilon_i, \quad (4) $$

where $TFP$ is the natural logarithm of total factor productivity representing investment efficiency. $TFP$ is calculated as described in Section 4.1. $EDU$ is the secondary school enrolment (% gross). $EDU$ is a proxy for human capital, which is considered to be a main determinant for TFP (Benhabib and Spiegel, 1994; Anwar and Sun, 2011). The interaction term between financial development and oil dependence captures the effect of oil dependence on the role of financial development in investment efficiency.

$$ \frac{\partial TFP_i}{\partial FD_i} = \varphi_1 + \varphi_3 OD_i, \quad (5) $$

In equation (4), the coefficient $\varphi_3$ represents the effect of oil dependence in the relation between financial development and investment efficiency. If $\varphi_3 < 0$, oil dependence has a negative effect on the role of financial development in boosting investment efficiency; this implies a weaker finance-growth nexus. However, if $\varphi_3 > 0$, oil dependence has a positive effect on the role of financial development in boosting investment; this implies a stronger finance-growth nexus. Eq. (5) indicates how the marginal effect of the financial development on TFP changes with the level of oil dependence. The sign on $\varphi_3$ shows whether oil dependence has a positive or a negative effect on the role of financial development on TFP.
4.3 Methodology

To test the long-run relationships among the variables, we adopt the auto-regressive distributed lag (ARDL) bounds testing approach to cointegration suggested by Pesaran et al. (2001). Most recent studies indicate that an ARDL model is preferable for estimating the cointegration relation because it is applicable irrespective of whether the underlying regressors are I(0) or I(1), and it performs well for a small sample size. In addition, one of the important statistical advantages of the ARDL approach for the cointegration test is that, as Pesaran and Shin (1998) note, appropriate modification of the orders of the ARDL model is adequate to correct the problem of endogeneity bias (see also Ang, 2009).

The ARDL version of the estimation model can be specified as:

\[ \Delta \left( \frac{Y}{L} \right) = \alpha_0 + \alpha_1 \left( \frac{Y}{L} \right)_{t-1} + \alpha_2 FD_{t-1} + \alpha_3 OD_{t-1} + \alpha_4 \left( \frac{K}{L} \right)_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta \left( \frac{Y}{L} \right)_{t-i} + \sum_{i=0}^{n} \alpha_i \Delta FD_{t-i} + \sum_{i=0}^{q} \alpha_i \Delta OD_{t-i} + \psi, \]

\[ \Delta INV_i = \beta_0 + \beta_1 INV_{i-1} + \beta_2 FD_{i-1} + \beta_3 OD_{i-1} + \beta_4 (FD^*OD)_{i-1} + \beta_5 REX_{i-1} + \sum_{i=1}^{m} \beta_i INV_{i-1} + \sum_{i=0}^{p} \beta_i \Delta FD_{i-1} + \sum_{i=0}^{q} \beta_i \Delta OD_{i-1} + \sum_{i=0}^{r} \beta_i (FD^*OD)_{i-1} + \sum_{i=0}^{s} \beta_i \Delta REX_{i-1} + \sigma_i, \]

\[ \Delta TFP_i = \delta_0 + \delta_1 TFP_{i-1} + \delta_2 FD_{i-1} + \delta_3 OD_{i-1} + \delta_4 (FD^*OD)_{i-1} + \delta_5 EDU_{i-1} + \sum_{i=1}^{m} \delta_i \Delta TFP_{i-1} + \sum_{i=0}^{p} \delta_i \Delta FD_{i-1} + \sum_{i=0}^{q} \delta_i \Delta OD_{i-1} + \sum_{i=0}^{r} \delta_i (FD^*OD)_{i-1} + \sum_{i=0}^{s} \delta_i \Delta EDU_{i-1} + \omega_i, \]

where \( m, p, q, r \) and \( s \) are the optimal lag lengths for each variable.

The coefficients \( (\alpha_1, \alpha_2, \alpha_3, \alpha_4) \), \( (\beta_1, \beta_2, \beta_3, \beta_4, \beta_5) \) and \( (\delta_1, \delta_2, \delta_3, \delta_4, \delta_5) \) of the first portion of the models measure the long-run relations, whereas the coefficients \( (\alpha_5, \alpha_6, \alpha_7, \alpha_8) \)

\( (\beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}) \) and \( (\delta_6, \delta_7, \delta_8, \delta_9, \delta_{10}) \) represent the short-run dynamics. The F-statistic is
used to test the existence of a long-run relation among the variables. We test the null hypotheses, $H_0: a_1 = a_2 = a_3 = a_4 = 0$; $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$; $H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ that there is no cointegration among the variables. The F-statistics are then compared with the critical values provided by Narayan (2005), which are appropriate for small samples. If the computed F-statistic is greater than the upper bound critical value, we reject the null hypothesis of no cointegration and conclude that a steady-state equilibrium exists among the variables. If the computed F-statistic is less than the lower bound critical value, the null hypothesis of no cointegration cannot be rejected. However, if the computed F-statistic lies between the critical values for the lower and upper bounds, the result is inconclusive. We then adopt the modified version of the Granger causality test developed by Toda and Yamamoto (1995), and Dolado and Lutkepohl (1996), hereafter (TYDL).

5. Empirical Findings and Discussion

Although the ARDL model does not require pre-testing variables, we need to ensure that that none of the variables are integrated in order 2 or beyond. Because of its reliability for a small sample size, the Dicky-Fuller GLS stationary test is employed to examine the time series properties for each variable and determine its order of integration. Table 1 reveals that all the variables are integrated in order one with the exception of OD and INV, which are I(0). Hence, it is confirmed that the ARDL approach can be applied to analyze the long-run relationship. To model the structural breaks, we implement the Narayan and Popp (2010) M1 and M2 two-break unit root test and the result is presented in Table 2. Both Narayan and Popp (2010) M1 and M2 unit root tests suggest the same break dates. We incorporate the structural breaks in the cointegration test and model estimation.

[Insert Table 1]
After investigating the time series properties for all variables, the ARDL approach is used to examine the potential long-run equilibrium relation. This test is sensitive to the number of lags used. Given the limited number of observations in this study, lags with a maximum of two years have been imposed on the first difference of each variable, and the Schwarz-Bayesian Criterion (SBC) is used to select the optimal lag length for each variable. The results of the ARDL bound test of cointegration are tabulated in Table 3. In this table, we divide the results into two parts. In the first part, we do the ARDL test without structural break. In the second part, we repeat the test after adding dummies for the break points suggested by the Narayan and Popp (2010) unit root test. In general, we do not find any significant differences for both sets of ARDL results.

Table 3 shows that the calculated F statistic is higher than the upper bound critical value at 5% in our third model. This result provides strong evidence for the existence of a long-run relation among the variables in these two models. However, we fail to prove the existence of a long-run relation through the F-statistic in our first and second models. According to Kremers et al. (1992), the significant coefficient of the lagged error-correction term (ECT) is an alternative, and more efficient, means of establishing cointegration. Our results show that the coefficient on the lagged ECT is negative and significant in all models. This finding confirms the existence of a long-run relation in all models.
Because there is cointegration among the variables, we can derive the long-run coefficient as the estimated coefficient of the one lagged level independent variable divided by the estimated coefficient of the one lagged level dependent variable and multiply it with a negative sign. Conversely, the short-run coefficients are calculated as the sum of the lagged coefficients of the first differenced variables.

[Insert Table 4]

Table 4 Panel A reveals that the level of financial development has a direct negative impact on economic growth in the long-run. The conclusion from this result is that an increase in credit to the private sector does not \textit{per se} contribute to growth. Most important is how this credit is used and how effectively it is allocated to finance growth-enhancing projects. Ang and Mckibbin (2007) argued that the financial sector in Malaysia has not been playing a vital role in allocating resources. Most of the credit provided to the private sector was issued for the purchase of shares and real estate property, rather than for investment in productive activities. This led to bubbles in the property sector and triggered many speculative activities in the share market prior to the financial crisis in 1997–98. This risky behavior resulted in the mismanagement of assets and generated many larger non-performing loans.

Nevertheless, the estimated long-run coefficient shows that oil dependence is not significant. The absence of a significant negative impact of oil dependence on economic growth is not surprising and supports the previous finding (Gylfason, 2001; Rosser, 2006) that Malaysia has escaped the resource curse. Conversely, we find that capital has played a crucial role in shaping Malaysia’s economic growth.
Because we could not find direct evidence of an oil curse from Model 1, we attempt to seek an indirect symptom of the oil curse from Model 2. The empirical results pertaining to Model 2 are presented in columns 2 and 5 of Panel A in Table 4. Financial development and oil dependence have positive and significant impacts on investment in the long run. However, this positive impact decreases by increasing the degree of oil dependence, as indicated by the negative sign on the interaction term between financial development and oil dependence. Therefore, we cannot assert that Malaysia has fully escaped the oil curse because we have found a symptom of the oil curse in the financial sector. Sachs (2007) argued that one reason for the oil curse is that the high dependence on oil adversely affects other economic sectors, particularly the sectors that can drive sustainable economic growth.

The result of Model 3 in columns 3 and 6 corroborates our previous argument that financial development does not affect TFP in the long run. Moreover, the coefficients of oil dependence and the interaction term between financial development and oil dependence are not significant. This result suggests that the financial sector in Malaysia may not be sufficiently developed to foster the efficiency of investment. These results expose the illusory role of oil revenue in Malaysia’s economy. Although oil revenue does not have a significant impact on economic growth in the long run, it would negatively affect the mechanisms of certain growth determinants in the long-run, such as the finance-investment nexus found in our long-run analysis.

Table 4 Panel B shows the short-run results. The results from Model 1 reveal that oil dependence has a positive, but insignificant, impact on economic growth in the short-run. Similar to our long-run results, financial development has a negative effect and capital stock has a positive impact on economic growth in the short run. The illusory role of oil
dependence is also reflected in the absence of a significant negative effect of the interaction term on investment in columns 2 and 5. These results for the short-run can be attributed to the fact that the oil curse symptoms most likely appear in the long-run as per the findings of Torvik (2001), and Collier and Godris (2008).

Finally, the coefficients for the estimated lagged error correction term are negative and significant in all models. This confirms the existence of a long-run relation among the variables. In addition, the coefficient suggests that a deviation from the long-run equilibrium following a shock is corrected by approximately 52%, 42% and 8% per year, respectively.

Panel C in the same table notes that all models pass all the diagnostic tests for serial correlation, autoregressive conditional heteroskedasticity and model specification. The CUSUMSQ in Figures 5 to 10 remain within the critical boundaries for the 5% significance level. These statistics confirm that the long-run coefficients and all short-run coefficients in the error correction model are stable.

[Insert Figures 5-10]

Theoretically, financial intermediation affects economic growth mainly by mobilizing savings and allocating funds to productive investment projects that will generate strong returns. Because financial development does not have a positive effect on economic growth, as reflected in Model 1, one may conclude that, although the financial sector channels funds to investment, the funds are not efficiently placed into productive investments that will expand the economy. The reason for this distortion may be the high dependence on oil rent in Malaysia. The high dependence on oil rent increases the dominant role of government in total

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8We did not find any evidence of a multicollinearity problem among our independent variables, except for the interaction term between financial development and oil dependence. However, multicollinearity associated with the interaction can be considered as one of the cases where we can safely ignore multicollinearity. This is because the effect of multicollinearity is mainly on the coefficients of the variables, and there is no effect on the p-value or the relationships in the models (see, Allison, 2012).
investment at the expense of private investment (Nili and Rastad, 2007). Because private investment is more efficient than public investment, the high dependence on oil rent replaces more efficient investment with less efficient investment, and thus, growth suffers (Banerjee, 2011). Therefore, we argue that the oil curse in Malaysia lies in crippling the mechanism of finance-growth, i.e., investment, as shown in Model 2. The oil curse is transmitted through the quantitative channel rather than the qualitative channel.

The ability of financial intermediaries to accumulate capital may be impaired because of the uncertainty that stems from the volatile nature of oil prices. Subsequently, this uncertainty weakens the incentive of banks to invest and encourages banks to pursue lower risk activities, such as consumption or housing loans.9 The impact on the level of capital, rather than the productivity of capital, may be the reason that oil dependence biases the finance-growth nexus in Malaysia. These findings are in accord with the fact that, until the early 1970s, the bulk of financial sector credits were unproductive loans that were channeled into inefficient activities rather than into high quality investments (refer to Ghani and Suri, 1999; Hill, 2005).

Finally, the TYDL causality tests in Table 5 reveal that there is unidirectional causality running from capital stock to economic growth. We also find that the interaction term between financial development and oil dependence causes investment. This result supports our argument that the interactive relationship between financial development and oil dependence affects the level of investment in Malaysia.

(Insert Table 5)

5.1 Robustness Check

As a robustness check, we re-estimate our models using several alternative proxies for financial development and also a new oil dependence proxy. In addition, we conduct these

9Thiel (2001) argued that, in some countries, significant numbers of bank loans are provided to finance housing loans, instead of being channelled to finance productive investments.
estimations utilizing two other econometric approaches, which are FMOLS and DOLS. In general, the outcomes of our robustness check support our previous findings with the ARDL approach.

Our alternative financial development proxies are LIQ, which equals liquid liabilities divided by GDP. Many researchers have used this variable as a measure of financial depth. LIQ does not represent the effectiveness of the financial system. However, by assuming that the size of the financial intermediary system is positively correlated with the financial system’s activities, in our regressions, this can be used as a measure of financial development. The second proxy used is deposits to GDP (DPS), which equals the demand, time and saving deposits in deposit banks and other financial institutions as a share of GDP. The size of deposits is an indicator for the potential investment quantum. The third proxy is the PCA, which is a new proxy constructed by the previous three based on the Principal Components Analysis approach. This proxy is able to capture most of the information from the original dataset, which consists of the previous three financial development measures.

Additionally, we use an alternative proxy for oil dependence. This proxy is a dummy variable for the number of years where the oil rent is greater than 10% of GDP (see Beck, 2011). The results of our robustness check, which are tabulated in Table 6, are in line and in agreement with our main models that confirm our stated argument and conclusion.

[Insert Table 6]

6. Conclusion and policy implications

This paper empirically examines the oil curse in Malaysia and the role of investment as a mechanism of the oil curse. We do not find any significant evidence of the direct effect of financial development on economic growth and TFP. However, there is a direct and positive
effect of financial development and oil dependence, respectively, on the level of investment. Furthermore, a significant negative interaction term between financial development and oil dependence exposes the oil curse in Malaysia. This finding supports Doraisami (2005, p. 107), who stated, “Malaysia has certainly not been untouched by the [oil] curse”.

Nevertheless, given the absence of a significant impact of financial development on TFP, we argue that the financial sector in Malaysia channels funds inefficiently into non-productive investment. The reason for this distortion of financial development may be the high dependence on oil rent in Malaysia. Oil dependence weakens and cripples the mechanism of one of the most important economic growth motors, which is financial development. We argue that the oil curse in Malaysia exists and that the curse is transmitted through the quantitative channel rather than the qualitative channel.

Our findings contain a mix of policy implications for Malaysia. On the one hand, the Malaysian government should be aware of the indirect risk of oil dependence on the financial role in fostering investment activities. It is advisable to maintain the degree of oil dependence at a low level, enhance economic diversification activities and increase the contribution of other sectors to GDP. Additionally, the financial sector should be more involved in productive investment activities to enhance its role in fostering economic growth. In this regard, policymakers should pursue actions that enhance the efficiency of bank intermediation. Introducing improvements in information on prospective borrowers, including the establishment of credit bureaus and enhancing the legal protection of creditor rights, are all potential areas in which quality gains can be achieved.
Furthermore, one of the main oil curse channels in oil-dependent economies is mismanagement and neglect of human development. The easy access of oil rent may relieve the government from developing its human capital, which may negatively affect the performance of various economic sectors including the financial sector. Therefore, we suggest that policymakers need to work to enhance human development, which has an important positive role in investment efficiency.
References


Table 1: Results of Unit Root Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>DF-GLS</th>
<th></th>
</tr>
</thead>
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<tr>
<td></td>
<td>Level</td>
<td>1st Difference</td>
</tr>
<tr>
<td>Y/L</td>
<td>0.3196</td>
<td>-5.6460***</td>
</tr>
<tr>
<td>K/L</td>
<td>-2.5275</td>
<td>-3.4565**</td>
</tr>
<tr>
<td>FD</td>
<td>-0.2860</td>
<td>-2.1820**</td>
</tr>
<tr>
<td>OD</td>
<td>-0.9592***</td>
<td>-0.2789***</td>
</tr>
<tr>
<td>INV</td>
<td>-1.8223</td>
<td>-4.2180***</td>
</tr>
<tr>
<td>REX</td>
<td>-0.7042</td>
<td>-5.6012***</td>
</tr>
<tr>
<td>TFP</td>
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<td>-5.7807***</td>
</tr>
<tr>
<td>EDU</td>
<td>-0.6735</td>
<td>-5.0945***</td>
</tr>
</tbody>
</table>

Note: *** and* denote significance at the 1% and 10% levels, respectively.

Table 2: Results of Narayan-Popp (2010) two breaks unit root test

<table>
<thead>
<tr>
<th>Series</th>
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<th>M2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>k</td>
</tr>
<tr>
<td>Y/L</td>
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<td>0</td>
</tr>
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<td>INV</td>
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<td>1</td>
</tr>
<tr>
<td>TFP</td>
<td>-1.6532</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes: M1 is Narayan and Popp’s Model 1. M2 is Narayan and Popp’s Model 2. TB is the structural break and K is the lag length.
### Table 3: Result from ARDL Cointegration Test

<table>
<thead>
<tr>
<th>Equation</th>
<th>Without Structural Break</th>
<th>With Structural break</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model (1)</td>
<td>Model (2)</td>
</tr>
<tr>
<td>Optimal lag</td>
<td>(1,0,0,1)</td>
<td>(2,0,0,0,1)</td>
</tr>
<tr>
<td>F-statistic</td>
<td>2.7813</td>
<td>1.7688</td>
</tr>
<tr>
<td>EC_{t-1}</td>
<td>-0.5177***</td>
<td>-0.4152***</td>
</tr>
<tr>
<td>Critical Values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K=3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Bound</td>
<td>4.983</td>
<td>3.535</td>
</tr>
<tr>
<td>Upper Bound</td>
<td>6.423</td>
<td>4.733</td>
</tr>
</tbody>
</table>

Note: *** and ** denotes the significance at 1% and 5% level respectively. Critical values bounds are from Narayan (2005) with unrestricted intercept and no trend.
### Table 4: Long Run and Short Run Analysis

#### Panel A. Long Run Results

<table>
<thead>
<tr>
<th>Dependent variable</th>
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<th>With Structural Breaks</th>
</tr>
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<tr>
<td></td>
<td>Model (1)</td>
<td>Model (2)</td>
</tr>
<tr>
<td>Y/L</td>
<td></td>
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<tr>
<td>C</td>
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<tr>
<td></td>
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<tr>
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<td>(-6.7480)</td>
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<td>OD</td>
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<tr>
<td></td>
<td>(0.0294)</td>
<td>(2.1040)</td>
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<tr>
<td>K/L</td>
<td>0.8271***</td>
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<tr>
<td></td>
<td>(23.3740)</td>
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<tr>
<td>FD*OD</td>
<td>-</td>
<td>-0.3135**</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>(-2.2217)</td>
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<tr>
<td>REX</td>
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<td>0.5785*</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>(1.9773)</td>
</tr>
<tr>
<td>EDU</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-</td>
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<td>DUM1984</td>
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<td>DUM1997</td>
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#### Panel B. Short Run Results

<table>
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</tr>
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<tr>
<td>ΔFD</td>
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<td>ΔOD</td>
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<tr>
<td></td>
<td>(0.1309)</td>
<td>(0.2931)</td>
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<tr>
<td>( \Delta K/L )</td>
<td>0.9025***</td>
<td>-</td>
</tr>
<tr>
<td>----------------</td>
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<td>---</td>
</tr>
<tr>
<td></td>
<td>(9.3539)</td>
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</tr>
<tr>
<td>( \Delta (FD*OD) )</td>
<td>-</td>
<td>-0.0305</td>
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<td>(-0.3835)</td>
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<td>( \Delta REX )</td>
<td>-</td>
<td>0.6799***</td>
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<tr>
<td></td>
<td>(3.2475)</td>
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<td>( \Delta EDU )</td>
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<td>( EC_{t-1} )</td>
<td>-0.5177***</td>
<td>-0.4152***</td>
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<tr>
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<td>(-4.2334)</td>
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**Panel C Diagnostic Tests**

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<tr>
<th>Test</th>
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<th>F-Statistic</th>
<th>F-Statistic</th>
<th>F-Statistic</th>
<th>F-Statistic</th>
<th>F-Statistic</th>
</tr>
</thead>
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<tr>
<td>LM</td>
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<td>0.4716</td>
<td>0.5331</td>
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<tr>
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<td>[0.2303]</td>
<td>[0.2420]</td>
<td>[0.6542]</td>
<td>[0.1836]</td>
<td>[0.6286]</td>
<td>[0.5926]</td>
</tr>
<tr>
<td>ARCH</td>
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<td>0.8540</td>
<td>0.8089</td>
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<td>RESET</td>
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Note: ***, **, * denotes the significance at 1%, 5% and 10% levels respectively. t-statistic is in the parenthesis, P-value is in the brackets.
### Table 5: Results of TYDL Causality Tests

<table>
<thead>
<tr>
<th>Relationship</th>
<th>$\chi^2$</th>
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<tbody>
<tr>
<td>Y/L → FD</td>
<td>0.4277</td>
</tr>
<tr>
<td>FD → Y/L</td>
<td>3.7904</td>
</tr>
<tr>
<td>K/L → Y/L</td>
<td>8.7203**</td>
</tr>
<tr>
<td>INV → FD</td>
<td>1.5086</td>
</tr>
<tr>
<td>FD → INV</td>
<td>0.8429</td>
</tr>
<tr>
<td>(FD*OD) → INV</td>
<td>5.0655*</td>
</tr>
<tr>
<td>FD → TFP</td>
<td>0.1985</td>
</tr>
<tr>
<td>TFP → FD</td>
<td>3.5056</td>
</tr>
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### Table 6: Robustness Check

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th></th>
<th></th>
<th>Model 2</th>
<th></th>
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<th>Model 3</th>
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<td></td>
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</tr>
<tr>
<td>ODd</td>
<td>-0.248***</td>
<td>-0.299***</td>
<td>-0.196***</td>
<td>-0.807***</td>
<td>-0.248***</td>
<td>-0.299***</td>
<td>-0.248***</td>
<td>-0.299***</td>
<td>-0.196***</td>
</tr>
<tr>
<td></td>
<td>(-3.392)</td>
<td>(-3.308)</td>
<td>(-5.019)</td>
<td>(-3.533)</td>
<td>(-3.392)</td>
<td>(-3.308)</td>
<td>(-5.019)</td>
<td>(-3.392)</td>
<td>(-3.308)</td>
</tr>
<tr>
<td>K/L</td>
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<td>0.703***</td>
<td>0.751***</td>
<td>0.723***</td>
<td>0.708***</td>
<td>0.703***</td>
<td>0.751***</td>
<td>0.723***</td>
<td>0.708***</td>
</tr>
<tr>
<td>FD*ODd</td>
<td>-</td>
<td>-</td>
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Note: ***,**,* denotes the significance at 1%, 5% and 10% levels respectively. t-statistic is in the parenthesis.
Figures

**Fig 1.** Oil Dependence Transmission Mechanism into Finance-Growth Nexus

**Fig 2.** Oil and Gas Rent to GDP (%)
*Source:* WDI
Fig. 3. Annual Growth Rate of GDP (%)  
*Source: WDI*

Fig. 4. Domestic Credit to Private Sector to GDP (%)  
*Sources: WDI*

Fig. 5. Plot of cumulative sum of squares of recursive residual (without structural break) (Model 1)

Fig. 6. Plot of cumulative sum of squares of recursive residuals (with structural break) (Model 1)
**Fig. 7.** Plot of cumulative sum of squares of recursive residual (without structural break) (Model 2).

**Fig. 8.** Plot of cumulative sum of squares of recursive residuals (with structural break) (Model 2).

**Fig. 9.** Plot of cumulative sum of squares of recursive residual (without structural break) (Model 3).

**Fig. 10.** Plot of cumulative sum of squares of recursive residuals (with structural break) (Model 3).