Government Domestic Debt, Private Sector Credit, and Economic Growth in Oil-Dependent Countries: a Dynamic Panel Data Analysis

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Abstract

Banks are more liquid, better capitalised, and more profitable in oil-dependent countries. However, bank credit to the private sector is relatively low as a percentage of GDP. The low level has been blamed, amongst other reasons, on governments' reliance on the banking sector to finance fiscal deficits. This study examines the crowding out effect of government domestic borrowing using a panel data model for 28 oil-dependent countries over the period 1990-2012. We estimate the model, using both fixed-effects and generalised method of moments estimators and find that a one percent increase in government borrowing from domestic banks significantly decreases private sector credit by 0.22 percent and has no significant impact on the lending rate banks charge to the private sector. This finding suggests that government domestic borrowing has resulted in the shrinking of private credit and works through the credit channel and not the interest rate channel.

The economic dynamics of oil-rich countries are mainly determined by the world prices of oil and gas and thus possess certain characteristics not shared by other economies. Over the last decade, oil-dependent countries have made some attempts to diversify towards the non-oil sector; in particular, significant priority has been given to the financial sector. This study explores the impact of bank credit in the growth of oil-rich economies and tests if it differs in

the emerging non-oil sectors. We utilize both the panel cointegration and pooled mean group techniques for 28 oil-dependent countries spanning 1990-2012. The findings suggest that bank credit has a positive significant effect on GDP per capita growth (i.e by 0.06 percent) but no significant impact on non-oil GDP per capita growth. Hence, banks do not yet provide adequate credit to stimulate non-oil economic growth. The growth of non-hydrocarbon activity depends mainly on government spending through hydrocarbon revenues.

Keywords: Private sector credit, Government domestic borrowing, Non-oil economic growth, Oil-dependent economies, Pooled mean group, Generalised method of moments.

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Chapter 1

Introduction

1.1 Background to the Problem

Hydrocarbons account for a substantial share of total export and/or government revenues in oil-rich countries. Hydrocarbons are directly linked to the petroleum and gas industries, for example, (i) exploration and production, (ii) transport by pipelines (iii) processing facilities (oil refineries, liquefaction terminals); while non-hydrocarbons are not directly linked to them. A country is oil-rich if the share of hydrocarbons contributes at least 25% of total fiscal revenues and/or total exports (IMF, 2012). Such dependence is as high as 90% in Algeria, Angola, Azerbaijan, Nigeria, Equatorial Guinea and Venezuela, etc. and as low as 25% in Malaysia, Indonesia, and Vietnam (WDI, 2014). Natural resources (even though agriculture, forestry, fishing could be classified as natural resources, this research study defines 'natural resources' as the extractive industries or resources in the form of oil and gas) are a gift of nature and countries with this resources are expected to be better-off than countries that do not have them. Theoretically, abundant natural resources are expected to promote growth, for the reason that resource richness can give a 'big push' to the economy through added investment in economic infrastructure and human capital. However, in spite of the additional economic opportunities offered by resource abundance, economic development in resource-rich countries has been disappointing on average – a phenomenon known as the *Natural Resource Curse* (Sachs and Warner 1995, 2001).

Various reasons have been identified for failures to effectively transform natural resources to growth and development, notably (i) Dutch disease – based on the generally assumed experience of the Netherlands after a resource boom in the 1960s. This is a situation when revenues increase in the resource sector, which increases the demand for non-traded goods, draws production factors away from non-resource-traded sectors, and makes the nation's currency stronger (appreciates) which then renders other important sectors, i.e. the manufacturing sector, less competitive (Corden and Neary, 1982; Van Wijnbergen, 1984). Another explanation popular among researchers is (ii) transmission of commodity price volatility (especially when exports and revenues are concentrated) – this is when a national economy dominated by resource extraction is heavily exposed to the relatively high commodity price volatility and thus to macroeconomic volatility (Van der Ploeg, 2011; Frankel, 2010),

which is not conducive for economic growth; and more importantly (iii) rent-seeking, and deterioration of institutions – that is differences in the quality of institutions such as bureaucratic quality, legal and political systems, rule of law as well as property rights determine whether natural resources are beneficial or harmful to an economy (Mehlum et al., 2006).

Natural resources represent a large and growing prospect in resource-rich countries but the wealth has not led to sustainable and inclusive growth. Abundance of natural resources does not automatically or always lead to poor outcomes and, in fact, there is no monotonic effect of natural resource abundance on economic growth. For instance, United Arab Emirates turned the resource curse into a blessing by investing massively in modern infrastructure, creating employment, and improving social indicators (Fasano and Zubair, 2003); North America produces more oil than Africa, but it has one of the lowest resource rents as a share of GDP (International Energy Statistics, 2013); Norway is one of the top exporters of crude oil in the world while maintaining a persistent lead in the United Nations Human Development Index (Human Development Report, 2015). There are also a few other 'success stories' explored in (Maehle, 2012): Chile, a copper producing country has diversified out of copper dependency and greatly reduced poverty; Indonesia, an oil-producing country with one of the most pro-poor growth episodes in modern economic history has made so much progress in agriculture and rural sector development; Peru, a mineral producing country has experienced stellar growth record in the last decade while reducing poverty by half; Botswana, a diamond-rich country is a successful story with a steady growth record.

These experiences show that contrary to the conventional 'resource curse' assertions that natural resource endowments bring about economic stagnation, it is possible to transform mineral wealth into sustained development with significant welfare improvements for large segments of the population. In fact, dependence and the 'curse' is not caused by an abundance but by policy failures. Therefore, the natural resource curse is neither universal nor inevitable. The resource curse could be the result or combination of, meagre productivity growth, abysmal labour force participation, poor institutions, stagnant human capital, Dutch disease, volatility of resource rents, or other factors. Therefore, there could be different channels through which this 'curse' may have manifested. Financial development constitutes a potentially important mechanism and thus financial sector might have played a role since finance is a major determinant of economic growth (King and Levine, 1993, Levine, 1997; Rajan and Zingales, 1998). In other words, natural resource dominance could have a direct or indirect effect on economic growth through the financial sector (Hattendorff, 2014).

The financial sector comprises of bank-based (dominated by banks) and market-based financial systems (dominated by stock markets). The transfer of funds from agencies with surplus to agencies with deficit through financial intermediaries is called financial intermediation (Greenbaum, 2007). Financial intermediaries mediate between the providers and users of financial capital; they are financial institutions specialized in the activity of buying and selling of assets and financial contracts (Freixas and Rochet, 2008). Broadly defined, financial intermediary is an institution that facilitates the channelling of funds between lenders and borrowers indirectly. That is, savers (lenders) give funds to an intermediary institution (such as a bank), and that institution gives those funds to spenders (borrowers), this may be in the form of loans or mortgages (Wright and Quadrini, 2007). Alternatively, they may lend the money directly via the financial markets and eliminate the financial intermediary, which is known as financial disintermediation. Financial intermediaries include mainly banks, but also building societies, credit unions, insurance companies, collective investment schemes, pension funds, cooperative societies, micro-credit providers, etc.

The existence and services of the financial markets are explained through the lens of information asymmetries and the agency theory which are aptly captured by the lack of complete information, high cost of transaction, and the method of regulation. The asymmetry can be ex ante generating the problem of adverse selection which is associated with moral hazard, or ex post leading to applying some costly verification and scrutiny measures. In the model of perfect financial markets espoused in Arrow-Debreu (1954), perfect markets are characterized by certain conditions: access to the financial markets is free; information about borrowing and lending opportunities is freely available; and there are many traders, and no single trader can have a significant impact on market prices. The information asymmetry generates imperfections of the market which deviates from the core concepts of perfect capital markets. Asymmetric information and the inability of lenders to monitor borrowers lead to 'agency costs' that increase the cost of external financing (Bernanke and Gertler, 1989). With imperfect information, capital is only available at a higher interest rate.

Some of the imperfections caused by asymmetric information lead to the emergence of some form of transaction costs. Transaction costs are expenses incurred when buying or selling a good or service. The notion of transaction cost incorporates not only the costs regarding the transaction but also those for research, evaluation and monitoring. Transaction costs diminish returns, and over time reduce the amount of capital available to invest. When transaction costs diminish, the economy becomes more efficient, and more capital and labour are freed to produce wealth (Benston and Smith, 1976). However, the development of financial

intermediaries also hinges on the method of regulation. Government actions can significantly influence the path of development for financial intermediations (Merton, 1995). In fact, adequate institutional framework can influence the health, ability for refinancing and the method for recovering debts of financial intermediaries (Diamond and Rajan, 2000).

Banks dominate the financial systems in resource-rich countries and most of the stock markets are in their nascent stages of development. In other words, market-based financial systems (dominated by stock markets) are small and in most cases, illiquid. For instance, in Nigeria, deposit money banks dominate the financial sector and account for 91% of transactions within the financial system, which is measured as percentage of total assets of deposit money banks to all financial institutions (Central Bank of Nigeria, 2014). In Zambia, banks dominate the financial landscape and account for more than 90% of total financial industry assets (Simpasa, 2013). In Papua New Guinea, commercial banks dominate the financial sector and owe 68 percent of total financial sector assets; the capital markets is shallow (Bank of Papua New Guinea, 2015). The case is rife in most resource-rich countries though in varying degrees.

Banks accept deposits from individuals and institutions and intermediate funds from the surplus sector to the deficit sector of the economy. Though banks are subject to certain regulations by the regulatory authorities, financial intermediaries determine the rules for allocating funds, and thus play a significant role in determining the type of investment activities, the level of job creation and the distribution of income (Gross, 2001). The banking industry has changed significantly buoyed by competition, mergers and acquisitions, the advent of globalization, and the emergence of technological advances in information and communication technologies (Hawkins and Mihaljek, 2001). Banks in resource-rich countries are more liquid, more profitable, and better capitalised; sustained by resource revenues (Beck, 2011). However, they disburse less private credit than in most non-oil countries. For instance, bank private credit from 2000-2012 on average in Azerbaijan and Nigeria were 12% and 19% of total GDP, respectively in oil-rich countries; while bank private credit in Tunisia and Bangladesh were 55% and 33% of total GDP, respectively in non-oil countries. In oil-rich Democratic Republic of Congo, over the same period, bank credit to the private sector accounts for less than 7% of GDP (WDI, 2014). This is particularly surprising given the massive amount of excess liquidity (which is also evident in the relatively small bank credit to the private sector as a per cent of total banking assets) in the banking sector of oil-rich countries and reflects a weak level of financial intermediation. A low rate of expansion of the credit volume is not only a symptom of weak economic growth, but can also be one of its causes (Bundesbank, 2005)

Natural resource sectors have easier access to bank credit and other ways of accessing funds than the non-oil sectors. For that reason, the banking system may be more important for the non-natural resource sector than the natural resource sector. But banks are reluctant to hand out loans, especially in sectors of the economy outside natural resources. One of the explanations for the lack of export diversification in oil-rich countries is the presence of incomplete financial markets (Acemoglu and Ziblotti, 1997; DeRosa, 1992). For example, agriculture in Nigeria contributed 40% of GDP and 60 per cent of employment in 2013, but over a decade, the sector received an average of 3% of the total loans available in Nigerian banks (Central Bank of Nigeria, 2014). In Dem. Rep. of Congo, agriculture contributed 45% of GDP and over 60 per cent of employment in 2012, but over the decade, bank credit represents an average of 7% of total GDP and this was mainly given to the mining companies (African Development Bank, 2013). It seems the non-oil sector receives disproportionate bank credit even though they contribute more to total GDP and this reflects a skewed level of financial intermediation. This could be fuelling the vicious cycle of a mono-product economy and export concentration inherent in oil-rich countries (Ledermand and Maloney, 2007). Does financial intermediation promote economic diversification? Economic diversification herein means developing the non-oil sectors and reducing dependence on oil revenues (i.e., diversification of exports, government revenue, and economic base). For this reason, there is a need to appraise the influence of financial intermediaries on the growth of non-oil sector.

More so, government domestic debt could be clogging the wheels of financial intermediation; increased government borrowing encourages banks to invest in government treasury bills as opposed to actual intermediation of funds to the private sector. Governments issue debt for two reasons. The first reason is about conducting monetary policy in which government bonds facilitate the pricing of corporate bonds and equities by providing a benchmark yield curve (Reinhart and Sack, 2000). The second reason is about balancing government budgets. The relationship between government debt and economic growth has been studied extensively by economists and policymakers without a clear consensus (Kumar and Woo, 2010; Reinhart and Rogoff, 2010; Panizza and Presbitero, 2012; Herndon et al., 2013). The method of financing government expenditures plays a significant role in shaping budget deficits, and inflation – when central banks respond to higher deficits by increasing the growth of the money supply. The key outcomes from the literature indicate that both the method of financing the deficit (i.e. borrowing or printing money) and the components of government expenditures (i.e. consumption or investment) could have different effects on private investment and growth. The overall result from the empirical literature on the impact of government expenditure is ambiguous: most of the empirical studies find a significantly negative effect of government

consumption expenditure on growth, and a significantly positive effect of government investment expenditure on growth (Saleh, 2003)

Governments in developing countries face extraordinary constraints in raising revenues given the policy instruments available are limited (Sah and Stiglitz, 1992). For example, high unemployment and low per capita income coupled with a large informal sector make it difficult to use income tax and indirect taxes to raise revenue (Paula De and Schienkman, 2007). Developing countries lost a significant and reliable source of income from tariffs due to trade liberalization, but failed to recoup the lost revenue through tax reform in the form of sales and value added tax. The reliance on inflation tax (when the government prints more money; it floods the market with cash, which raises inflation in the long-run and reduces the relative value of previous borrowing) is majorly discouraged in order to maintain macroeconomic stability. More so, access to international credit market is limited unlike the developed countries. Therefore the restricted sources of finance faced by governments in developing countries led them to borrow more from domestic markets and this borrowing has increased dramatically since the late 1990s (Emran and Farazi, 2009). For the oil-rich countries, government borrowing is fairly volatile which is associated with resource revenues.

Banks are the major lenders to the government as the bond and equity markets are very much undeveloped. This could lead to crowding-out effect which occurs when increased government borrowing reduces private investment. The crowding-out effect occurs mainly through debt and tax channels as government expenditure is usually financed via increased taxes or greater government debt. In theory, higher taxes reduce disposable income, aggregate demand and private investment while increased government debt induces higher interest rates which reduces aggregate demand and private investment; however, government borrowing is often utilised than taxes in developing countries. Increased government domestic debt could affect interest rates but due to the limitations of the price mechanism to clear markets (which is more evident in developing countries) there may not be a significant relation between government borrowing and interest rates. For instance, banks might not increase the interest rate they charge even in the face of an excess demand for funds (Stiglitz and Weiss, 1992). More so, even if there is a significant relation between government debt and interest rates, this relation by itself provides little insight into the effect of government debt on economic quantities.

The available evidence in the literature (mostly in developed countries) shows that the relationship between government borrowing and equilibrium interest rate (price channel) is ambiguous. For example, in the U.S. alone, Gale and Orszag (2004) counted numerous studies that found significant positive effects of deficits on interest rates and similar amounts with no

positive effect. Given this heterogeneity in the empirical literature, it is easy to identify a large number of studies that support any preconceived stance. Most of the studies on the effect of government debts and deficits on interest rates are confined to the developed countries and there is paucity of studies on developing countries. The relationship between government borrowing and interest rate is assumed to be weak in developing countries because the financial sector has historically been subject to extensive government interventions and the interest rates have often been set administratively by the central bank. More so, even if the banking sector is liberalized, the effects of government borrowing are still mediated primarily through the credit availability (quantity channel), given that the bond markets are less developed and credit rationing is common (Emran and Farazi, 2009). Credit rationing occurs when banks limit the supply of additional credit to borrowers, even if the latter are willing to pay higher interest rates. This is an example of market imperfection as the price mechanism fails to bring about equilibrium in the market.

However, contrary to popular belief that an administered interest rate in developing countries is insensitive to market perceptions, such a rate could accommodate market signals. Gupta (1984) suggests the inter-temporal movement of the interest rate and its variability should be examined. This is particularly true for developing countries which are moving towards market liberalization: low interest rates that provided cheap credit to the public sector have been drifting towards market-determined rates; gradual withdrawal of directed credit is making more financial resources available to the private sector; and the cautious elimination of policies that had constrained free and fair competition in the banking sectors is leading to increased and diversified development of financial institutions. In many developing countries, markets have started to play a visible role unlike in the past. Therefore, this could leave more scope for the functioning of the interest rate channel. Do government debts affect the equilibrium interest rate in oil-rich countries? If the interest rates are not determined by market clearing, then the availability of credit, the quantity channel could be more important in understanding the effects of government borrowing on private investment. Hence, there is a need to understand the mechanism and magnitude through which large public domestic debts may affect private investment and subsequently economic growth.

1.2 Problem Statement

Many oil-dependent countries are undergoing structural reforms towards improving economic performance, and diversifying the economy in particular, however, there is a lack of understanding with regards to the main drivers of diversification (Agosin et al., 2011). One potential determinant is financial intermediation; banks intermediate funds and thus reduce

financing constraints, which plays a crucial role in expanding economic activities, enhancing efficiency and productivity, and inducing economic growth. International institutions continue to persuade oil-rich countries to implement policies towards more liberalised financial system to support access to finance for the financially constrained sectors. For example, the United Nations Economic Commission for Africa (2006) argues that the lack of development in the financial markets is a key reason for the limited economic diversification in resource-rich African countries. However, despite government efforts, progress to diversify the economy away from oil has been modest. The non-oil sector is the major driver of the economy; it is a labour intensive industry and generates more employment than the resource sector. The oil-sector is highly capital-intensive, as a result, it neither creates many jobs nor contributes significantly to employment, and its operations have fewer linkages to the rest of the economy. The non-oil sector is a key driver of economic diversification, and the performance of this sector can be used to gauge the effectiveness of macroeconomic and financial sector policies; these policies are judged to be successful if they promote real sector activities and raise societal welfare. The development of the private sector depends on the availability of private sector credit, however, bank credit to the private sector in oil-dependent countries is relatively low even though the banks are more liquid, better capitalised, and more profitable (Beck, 2011). Do bank credits stimulate growth in the non-oil sector?

Banks are more liquid, better capitalised, and more profitable in resource-rich countries, but lending to the private sector is relatively low as a percentage of total GDP. The lower level of bank credit to the private sector has often been blamed, amongst other reasons, on governments increasing reliance on the banking sector to finance budget deficits. In countries where domestic banks mostly finance the public sector, the private sector experiences problems in finding credit for its investment and this undermines economic growth. The effects of government borrowing can operate through different channels; however, many of the concerns have focused on the potential interest rate effect. Government borrowing can affect private investment by crowding out private sector credit directly (real crowding out), or indirectly through rising interest rates (financial crowding out), though the magnitude of these potentially adverse consequences depends on the degree to which government borrowing raises interest rates and/or reduces private credit (Engen and Hubbard, 2004). The analysis of the effects of government borrowing on private investment has been ongoing for more than three decades and empirical consensus about the transmission mechanism and magnitude differs given economic structure and regulatory constraints. The oil-rich countries have taken advantage of the commodity boom in the last decade to reduce public external debt but domestic borrowing from banks has not decreased accordingly. Does government borrowing from domestic banks qualitatively drive

up interest rates, or quantitatively shrink private sector credit and thus contribute to the low level of private credit in oil-rich countries?

1.3 Research Questions

1) Does bank credit promote non-oil economic growth?

2) What are the drivers of non-hydrocarbon output growth?

3) Does government borrowing from domestic banks drive up interest rates, or shrink private sector credit?

4) What are the determinants of private sector credit?

1.4 Objectives of the Study

The objectives of this study are:

1) To investigate the impact of financial intermediaries in promoting economic diversification in oil-dependent countries.

2) To examine the determinants of non-hydrocarbon output growth in oil-dependent countries.

3) To investigate whether government domestic borrowing hampers private sector credit and to ascertain the transmission mechanism in oil-dependent countries.

4) To explore the determinants of private sector credit in oil-dependent countries.

1.5 Significance of the Study

Banks dominate the financial systems in resource-rich countries. Banks promote economic growth and development through the process of intermediation by efficiently allocating funds mobilized from the surplus economic units to deficits units. This function suggests that financial intermediation serves as a catalyst for economic growth and development.

Liberalization of the financial sector (with an adequate institutional framework) allows financial deepening– which reflects an increasing use of financial intermediation by savers and borrowers and allows an efficient flow of resources among people and institutions over time. This encourages savings and reduces constraints on capital accumulation and improves allocative efficiency of investment by transferring capital from less productive to more productive sectors. The efficiency as well as the level of investment are thus expected to rise

with the financial development that liberalization promotes (McKinnon, 1973). Therefore, easing of credit constraints will help reduce the gap between actual and potential outputs. The development of the financial system facilitates portfolio diversification for savers, which reduces risk and offers more choices to investors seeking increasing returns. Another important function of the financial system is to collect and process information on investment projects in a cost effective manner which reduces the cost of investment for individual investors (King & Levine, 1993).

This study is important because there is a need to move away from the present monolithic economy and diversify a country's economic base away from natural resources and explore other sources of revenue which would promote economic growth and development and help reduce the high rate of unemployment persistent in most resource-rich countries. The role of the non-oil sector is paramount and the performance of this sector can be used to gauge the effectiveness of macroeconomic policies and specifically financial sector policies. These policies are judged to be successful if they promote the production and distribution of goods and services that raise the societal welfare because vibrant real sector activities create more linkages in the economy than any other sector.

The high dependency on natural resources, particularly hydrocarbons, combined with the volatile price made the revenues and spending of resource-rich countries more volatile than non-natural resource countries. Volatility has negative effects on the macroeconomic level, productivity growth, and the rate of private sector investment (Addison, 2008). Therefore, diversifying the economy away from hydrocarbons or expanding the traditional non-hydrocarbon exports will help reduce volatility.

As government revenues is strongly associated with the price of natural resource, a negative shock could trigger low growth, or in some cases negative growth and with a high interest rate, financing debt becomes more expensive and may further drain credit from the private sector. In short, high debt makes public finances more vulnerable to future shocks, both by constraining the ability of governments to engage in countercyclical policies and by increasing the primary surplus needed to stabilize the debt ratio following an adverse shock to growth (Abbas et al., 2013). Expanding the traditional non-hydrocarbon sector would help dampen the impact of external events and foster more robust and resilient growth.

The private sector development is widely recognized by the international community as an engine of sustainable and inclusive growth, an avenue to reduce poverty. Thus, the way forward is to encourage private investment, which depends on the availability of private sector credit. Given that the capital market is not well-developed and the informal finance sector is limited,

identifying the effectiveness of banks in allocating funds mobilized from the surplus economic units to deficits units will help ameliorate impediments to intermediation.

This research study is important to examine the crowding out effects of government domestic borrowing on private sector credit and the effectiveness of private credit in promoting the growth of the emerging non-oil sector. This is because financial sector development is essential in mobilizing private sector credit to fund non-oil sector-led economic diversification as well as in providing a greater range of high-quality financial services (Cevik and Rahmati, 2013). The growth of the non-oil sector and thus a diversified economy is crucial to the creation of a more inclusive, resilient and sustainable economy.

1.6 Organisation of the Study

The rest of this study is structured into four chapters. Chapter 2 introduces the theoretical foundation and empirical studies of this study. Chapter 3 describes the data and methodology. Chapter 4 presents and discusses the result of the analysis. Chapter 5 provides the conclusion, policy implications, and limitations of the study.

Chapter 2

Literature Review

2.1 Financial development

2.1.2 Finance and growth

The endogenous growth theory postulates that the long-run growth rate of an economy is primarily the result of endogenous factors such as policy measures, human capital, technological innovation, and not external forces. Financial development is a potential source of long-run economic growth. McKinnon (1973) and Shaw (1973) expound that countries with sustained economic growth tend to have developed financial sectors and, in those countries, developed financial systems lead to higher economic growth by increasing the size of savings and improving the efficiency of investments. Bencivenga and Smith (1991) argue that financial intermediaries reduce the amount of savings held in the form of unproductive liquid assets and prevent misallocations of capital due to liquidity needs. Levine (1997) claims that financial systems influence growth by easing information and transaction costs, exerting corporate governance, supporting resource mobilization, promoting financial exchanges, strengthening information about possible investments, allocating capital accordingly, monitoring investments, facilitating the trading, diversification, and management of risk, mobilizing and pooling savings, and easing the exchange of goods and services. Ngai (2005) emphasizes the specific role of bank credit to the private sector in stimulating economic growth and as the most important source of financing for firms, especially in countries where capital markets are underdeveloped. Plamen and Khamis (2009) assert that bank credit enables firms to undertake investments that they would not make with their own funds, and hence as credit availability increases, consumption and investment expenditures increase and this promotes economic growth.

Financial development and economic growth nexus has four hypotheses. The first hypothesis is that financial development is *supply–leading*, in the sense that financial development is a causal factor for economic growth. One of the early contributors was Schumpeter (1911) who argued that the services provided by financial intermediaries encourage technological innovation and economic growth. This was further explored in the pioneering work of McKinnon (1973) and Shaw (1973) which emphasised the importance of having a banking system free from financial restrictions such as interest rate ceilings, high reserve requirements

and directed credit programs. They argued that financial repression disrupts both savings and investment, while the liberalization of the financial system allows financial deepening and increases the competition in the financial sector which in turn promotes economic growth.

The second hypothesis is that financial development is *demand–following*. In contrast to supply–leading, Robinson (1952) argued that financial development follows economic growth; as an economy develops, the demand for financial services increases and as a result more financial institutions, financial instruments and services appear in the market. A similar view was expressed by Kuznets (1955) who suggested that as an economy expands and approaches the intermediate growth stage, the demand for financial services begins to increase. This hypothesis postulates that economic growth is a causal factor for financial development because growth in the real sector stimulates the financial sector, that is, economic activities propel banks to finance enterprises, thus, where enterprises lead, finance follows (Gurley & Shaw, 1967).

The third hypothesis is that financial development is *bi-directional.* In other words, there is a mutual causal relationship between financial development and economic growth. This argument was put forward by Patrick (1966) who showed that given the level of economic development, there is a bidirectional causality between economic growth and financial development. Greenwood and Jonaviich (1990) supported this view by arguing that economic growth provides means for development in the financial sector and the financial sector in turns foster growth by allowing more savings and investment. Harrison et al. (1999) constructed a model in which causality runs both ways between economic growth and financial sector development. They argued that economic growth increases banking activity and profits, this promotes the entry of more banks and, as a result, the greater availability of banking services reduces the non-physical and physical distance between banks and clients, which in turn, lowers transaction costs and enriches economic growth.

The fourth hypothesis is that financial development and economic growth are *not causally related.* According to this hypothesis, there is no relationship between finance and growth. In other words, financial development does not cause growth or vice versa. This view was put forward by Lucas (1988) who said that economists place excessive emphasis on the role of financial factors in economic growth. Some frameworks equally highlighted the potential negative impact of finance on growth (De Gregorio and Guidotti, 1995; Loayza & Ranciere, 2004). They argued that high levels of liberalization of the financial sector (financial deepening) may shrink the total real credit to domestic firms which in turn lowers investment and slows economic growth.

2.1.3 Finance and economic diversification

Financial development is a source for comparative advantage (Kletzer and Bardhan, 1987). Countries with identical technology and endowments with no economies of scale could face different production costs; moral hazard issues in the international credit market under sovereign risk and imperfect information in the domestic institutions may lead some countries or firms to face higher interest rates or more credit rationing. This results in differences in comparative advantages in working capital, trade finance and marketing costs.

Beck (2002) shows that countries with well-developed financial systems tend to specialise in sectors with increasing returns. The model presents an open economy with two production technologies: the manufacturing (increasing returns to scale) and food (constant returns to scale). In this model, financial development is assumed to lower the search cost, increase external finance and encourage the production of goods with increasing returns to scale. The model predicts that economies with more developed financial systems are more likely to be net exporters of manufacturing products. Thus, the development of the financial system could lead to greater export diversification in resource-rich countries.

Industries that rely on external finance seems to gain more from financial development (Rajan and Zangales, 1998). The model considers the dependence on external finance of firms in the US as a proxy for other countries. Following Rajan and Zangales (1998), export diversification in resource-rich countries could benefit from financial development if the oil and mineral industries have relatively lower external finance dependence. If this is the case, then non-natural resource industries might benefit more from financial development; then it can be argued that financial development could help resource-rich countries to push their exports away from primary products and thus to greater economic diversification. Table (2.1) shows the external finance dependence for oil and mineral sectors, according to their index; the higher ratio means greater external financial dependence.

Table 2.1: External finance dependence for oil and mineral sectors

Industrial sectors	External finance dependence
Non-ferrous metal	0.01
Petroleum refineries	0.04
Non-metal products	0.06
Iron and steel	0.09
Metal products	0.23
Petroleum and coal products	0.33
Drugs	1.49
Plastic sectors	1.19

Source: Rajan and Zangales (1998)

2.1.4 Empirical studies

There is plethora of empirical literature on the finance-growth nexus. Most of the pioneering studies (e.g. King and Levine, 1993; Levine, 1997; Levine et al., 2000; Beck et al., 2000) show that the level of financial development is a good predictor of future rates of economic growth, capital accumulation, and technological change. The importance of financial institutions in promoting economic growth seems somewhat irrefutable, however, what seems very contestable is the nature and direction of causality.

The empirical study of Goldsmith (1969), one of the leaders of the view that financial intermediation promotes economic growth, assumed that there is a positive correlation between the size of financial systems and the supply of financial services. The author examines the relationship between the financial institutions' assets and GDP per capita growth using data of 35 countries over the period 1860-1963. Goldsmith found that banks and non-bank financial institutions develop as the economy grows and the author concludes that there is a positive link between financial development and economic growth. However, the author was unable to draw causal inferences.

King and Levine (1993) examined the data of 80 countries with pooled cross-country, time-series over the period 1960-1989. They found that various measures of financial development such as the ratio of liquid liabilities to GDP, credit issued to nonfinancial private firms divided by total credit, and credit issued to nonfinancial private firms divided by GPP were strongly associated with real per capita GDP growth. The authors conclude that the level of financial intermediation was a good predictor of long-run rates of economic growth, capital accumulation, and productivity improvements. However, they were also unwilling to draw causal inferences. Deidda and Fattouh (2002) examined the dataset of King and Levine (1993) with a pooled cross-country, time-series and separated high- and low-income countries. The authors conclude that in low income countries, there was no significant relationship between financial development and growth, whereas in high income countries, this relationship was positively significant.

While previous studies opine that the level of financial development is a good predictor of future rates of economic growth, they did not discuss the issue of causality. Rousseau and Wachtel (1998) examined the links between financial intermediation and economic growth in five industrialised countries in the period 1870-1929 using the Vector Error Correction Models (VECMs) and the Granger Causality test. They found that finance leads growth in real sector activity.

Levine et al. (2000) extended the study of King and Levine (1993). They used credit to private firms as a measure of bank development with GMM dynamic panel estimators and a cross-sectional instrumental variable estimator to address the potential biases induced by simultaneity, omitted variables, and unobserved country-specific effects. The authors conclude that the exogenous components of financial intermediation are positively related to economic growth.

Beck et al. (2000) used both the cross-sectional instrumental variable estimator and the system GMM dynamic panel estimator to improve their pure cross-country study; in other words, to extract the exogenous component of financial intermediary development and to control for biases associated with simultaneity and unobserved country-specific effects. The authors found that higher levels of financial intermediation produce faster rates of economic growth. They conclude that there is a positive link between the level of financial intermediaries and real GDP per capita growth.

Chistopoulos and Tsionas (2004) had some reservations on previous studies that did not consider cointegration properties of data. They investigate the long-run relationship between financial intermediation and economic growth using the fully modified OLS, panel unit root tests and panel cointegration analysis for 10 developing countries. The authors conclude that there exists a uni-directional causality from finance to growth.

Rioja and Valev (2004) suggest that the relationship between financial development and economic growth may vary according to the level of financial development of countries. They used dynamic panel data techniques and divided their sample into three regions and found that in the low-income countries with very low levels of financial development, additional improvements in financial markets has an uncertain effect on growth, in the middle-income countries, financial development has a large and positive effect on growth, and in the high-income countries, the effect was positive, but smaller. Hassan et al. (2011) examined the role of financial development in economic growth for low- and middle-income countries from 1980-2007 with vector autoregressive (VAR) models, weighted least square and the pooled data regressions. They found a positive relationship between financial development and economic growth in developing countries. But the direction of causality has mixed results: a two-way causal link between finance and growth for most regions, and a one-way causality from growth to finance for the poorest region.

Caporale et al. (2009) used a dynamic panel GMM technique to study the relationship between financial development and economic growth for ten new EU members. They conclude that the

stock and credit markets are underdeveloped and lack the financial depth to contribute to economic growth.

Demetriades and James (2011) utilized the panel cointegration methods to examine the link between bank credit and economic growth for 18 countries in sub-Saharan Africa. Their findings suggest that banking system development in the region follows economic growth. The authors conclude that there was no link between bank credit and economic growth.

Jun (2012) employ panel cointegration approach to investigate the relationship between financial development proxies and output growth for a panel of 27 Asian countries over the period 1960-2009. The author found a statistically significant positive bi-directional cointegration relationship between financial development and output growth. In other words, financial market development promotes output growth and in turn output growth stimulates further financial development.

Pradhan et al. (2013) employ a panel cointegration technique to examine the financial development-economic growth nexus for BRICS countries by constructing a composite index for financial development with the help of principal component analysis. They conclude that financial development and economic growth are cointegrated and there exist a bi-directional causality between them.

Rioja and Valev (2014) examine the effect of banks and stock markets on the sources of economic growth using a dynamic panel GMM technique for a set of 62 developed and developing countries. Their results show that stock markets do not have any significant effect on source of economic growth for developing countries whereas banks have a sizable growth effects. However, in case of developed countries they find stock markets to have a positive growth effects.

Time-series analysis have also been used extensively with vector autoregressive (VAR) models and vector error correction models (VECM). Most of the studies conclude that the causal relationship between financial development and economic growth is unidirectional, bidirectional or there is no causal relationship between these variables[1]. The outcomes depend on the selected countries, the period under examination and the financial development indicators used for the analysis. For example, Hansson and Jonung (1997) examined the long-run relationship between the volume of credit and level of GDP in Sweden from 1830 to the 1990. They found that prior to World War 11, the financial system had the most impact on

[1]Odedokun (1989) for Nigeria; Lyons and Murinde (1994) for Ghana; Wood (1993) for Barbados; Ford (1998) for Indonesia; Khan, et al. (2005) for Pakistan; Majid (2007) for Thailand; Mohamad (2008) for Sudan; Abu- Bader, et al. (2008) for Egypt; Singh (2008) for India; Safdari et al. (2011) for Iran.

GDP, and conclude that the role of the financial system in promoting growth is more significant during the intermediate stages of economic development. Fase (2001) appraised the relationship between financial development and economic growth in Netherlands between 1900 and 2000. The author found that causality runs from financial intermediation to economic growth until World War 11 and disappears afterwards. The author conclude that the development of the financial system has a greater impact on growth in developing countries than in the developed economies. A study by Shan et al. (2006) explored the relationship between financial development and economic growth in China and they not only found bidirectional causality between financial development and economic growth but also that the Granger causality of economic growth to financial development was stronger than that from finance to growth. Ang and McKibbin (2007) assessed whether financial development leads to economic growth or vice versa in Malaysia using data from 1960 to 2001 with cointegration and causality tests taking savings, investment, trade and real interest rate into account. The results support the view that output growth causes financial depth in the long-run. The authors conclude that the reasons finance follows growth is because the returns from financial development depend on the mobilization of savings and allocation of funds to productive investment projects but due to information gaps, high transaction costs and misallocation of resources, the interaction between savings and investment and its link with economic growth is not strong in developing countries.

In resource-rich countries which is the focus of our study, Gylfason and Zoega (2001) used cross-country OLS regression analysis across 85 countries from 1965 to 1998 and found that natural capital crowds out physical and human capital, thereby hindering economic growth. Their results suggest that across countries, heavy dependence on natural resources hurts savings and investment indirectly by restraining the development of the financial system. However, the cross-sectional analysis of this study did not address the problems of omitted variables bias that is prevalent in growth models. Our research study uses an improved methodology that addresses the above-stated problems.

Nili and Rastad (2007) applied a dynamic panel estimation technique (GMM) to examine the effects of financial development on economic growth on 12 oil-exporting countries from 1975-2000. They find a lower level of financial development for the oil-based economies than the rest of the world; a higher rate of investment in the oil-based economies is explained mainly by the oil, and that the weakness of financial institutions is associated with the poor performance of the private sector. The reservation with this study is the sample; the 12 oil-exporting countries is relatively small since there are more than 25 oil-exporting countries. Second, their findings may be attributed to the fact that during the period under analysis, the financial sector was still

relatively under-developed because measures of financial development such as bank credit have increased tremendously since the year 2000. Third, while their methodology addressed the problems associated with growth models, the authors did not disentangle the impact of financial development in the oil and non-oil sectors of the sample countries. Our study addresses the afore-said downsides.

Beck (2011) tested the relationship between financial development and economic growth in resource-rich economies using cross-country regression analysis. The author found that the finance and growth relationship is important in resource-based economies as in other economies. But firms in resource-based economies use less external finance and a smaller proportion use bank loans, although the level of demand is similar to other countries, thus pointing to supply constraints. Beck conclude that there is some indication of a natural resource curse in financial development. The drawback with this study is that it is not clear which sector of the economy has fewer or severe finance supply constraints because such constraints would not be the same for the different sectors of the economies.

Al-Malikawi et al. (2012) examined the relationship between financial development and economic growth in a panel dataset of thirteen Middle Eastern and North African (MENA) countries for the period 1985-2005 using pooled OLS regression and a fixed effect model. Their result suggests the relationship between financial development and economic growth is positive and concludes that financial development plays an important role in economic growth. However, it would be more informative if the hydrocarbon and non-hydrocarbon sectors were separated to give a better insight into the effects of financial development on economic growth since the two sectors are markedly different. Our study improves on this and addresses the problems of endogeneity that is prevalent in pooled OLS regression and fixed effect models.

Barajas et al. (2013) used a dynamic panel estimation technique (GMM) for 150 countries over the period 1975–2005 and conclude that the beneficial effect of financial deepening on economic growth displays measurable heterogeneity; it is smaller in oil exporting countries and in lower-income countries and the differences are driven by regulatory/supervisory characteristics and differences in the ability to provide widespread access to financial services.

Hasanov and Huseynov (2013) examined the impact of bank credits on the non-oil tradable sector output in Azerbaijan based on the ARDL Bounds Testing approach, Engle-Granger two-step methodology, and Johansen's approach. Results from the three approaches indicate that bank credits have a positive impact on non-oil tradable sectors' output both in the long- and short-run.

Cevik and Rahmati (2013) investigated the causal relationship between financial development and economic growth in Libya during the period 1970–2010. The OLS estimation shows that financial development has a statistically significant negative effect on real non-hydrocarbon GDP per capita growth. However, the VAR-based estimations present statistically insignificant results, albeit still attaching negative coefficient to financial intermediation. The authors conclude that non-hydrocarbon economic activity depends largely on government spending which is determined by the country's hydrocarbon earnings.

Samargandi et al. (2014) explore the effect of financial development on economic growth in the context of an oil-rich economy– Saudi Arabia. They allowed for the effect of financial development to be different for the oil and non-oil sectors of the economy in the long-run using the Autoregressive Distributed Lag (ARDL) bounds test technique. The authors found that financial development has a positive impact on the growth of the non-oil sector in Saudi Arabia. In contrast, its impact on total GDP growth is negative but insignificant.

Mirzaei and Moore (2015) examined the effect of bank performance on the non-oil industry sectors in Qatar over the period 2000–2006. The authors conclude that the quantity of finance does not seem to matter for industry growth but rather a competitive, efficient and stable banking system enhances financially-dependent industries to grow faster.

This study differs from the existing empirical studies in several ways: other empirical studies are country-specific cases; most estimates are obtained with relatively small samples and, as such, inference may be unreliable. The research study avoid this problems by combining the time series and the cross sectional dimensions of the data resulting in more observations; this generates remarkable improvements in the reliability of statistical inference. We circumvent the limitations of conventional panel cointegration methods by allowing for cross-country dependence. Moreover, we make provisions for short-run and long-run estimates. This study investigates the role of finance in promoting non-oil economic growth using panel cointegration approach and pooled mean group estimator in a dynamic heterogeneous panel setting. This study contributes to the literature on the role of finance in resource-rich economies.

Table 2.2 Literature Review for Oil-Exporting Countries

No	Topic	Country/Region	Model/Variables	Main Findings
1	Addressing the growth failure of the oil economies: The role of financial development (Nili and Rastad, 2007)	Oil exporting countries (1975-2000)	GMM (M2, bank credit to private sector to GDP, liquid liabilities to GDP, total deposit to GDP, stock market capital to GDP, etc.)	The findings of this paper report a lower level of financial development for the oil-economies compared with the rest of the world.
2	Natural resources, education, and economic development (Gylfason, 2001)	Across 85 countries (1965-1998) with emphasis in oil-exporting countries.	OLS (Natural capital, investment, enrolment rate, initial income and economic growth, etc.)	Natural capital appears to crowd out human capital, thereby slowing down the pace of economic development.
3	Finance and Oil. Is there a Resource Curse in Financial Development? (Beck, 2011)	Resource-based economies (1970-2007)	Fixed-effect (GDP per capita, private credit, natural resource exports, trade, inflation, real exchange rate, fixed assets, government consumption, liquid liabilities, initial GDP per capita, etc.)	Banks are more liquid, better capitalized and more profitable, but give fewer loans to firms. Overall, there is some indication of a natural resource curse in financial development, which falls more on enterprises than on households.
4	Finance-Growth Nexus: Evidence from a Panel of MENA Countries (Al-Malkawi et al., 2012)	Thirteen Middle Eastern and North African (MENA) countries for the period 1985-2005)	Pooled OLS regression and a fixed and random effect model (real GDP growth, domestic credit to private sector, government expenditure, trade openness, inflation, etc.)	The relationship between financial development and economic growth is positive and that financial development played an important role in economic growth.
5	Financial development and economic growth in an oil-rich economy: The case of Saudi Arabia (Samargandi, Fidrmuc and Ghosh, 2014)	Saudi Arabia (1968-2010)	Autoregressive Distributed Lag (ARDL) Bounds test technique (Real GDP per capita, private credit, oil price, trade openness, non-oil GDP per capita, etc.)	Financial development has a positive impact on the growth of the non-oil sector but its impact on the oil-sector growth and total GDP growth is either negative or insignificant.

6	The Finance and Growth Nexus Re-examined: Do All Countries Benefit Equally? (Barajas, A., R. Chami and S.R. Yousefi, 2013)	150 countries (1975-2005) with emphasis in oil-exporting countries.	OLS and GMM (private credit, bank deposits, liquid liabilities, market capitalisation, GDP, growth, non-oil GDP, education, FDI, oil, etc.)	The beneficial effect of financial deepening on economic growth displays measurable heterogeneity; it is generally smaller in oil exporting countries; in certain regions, such as the Middle East and North Africa (MENA); and in lower-income countries.
7	Bank credits and non-oil economic growth: Evidence from Azerbaijan (Hasanov and Huseynov, 2013)	Azerbaijan (2000-2010)	ARDL Bounds Testing approach, Engle–Granger two-step methodology, and Johansen's approach.	Bank credits have a positive impact on non-oil tradable sector output both in the long- and short-run.
8	Searching for the Finance-Growth Nexus in Libya (Cevik and Rahmati, 2013)	Libya (1970-2010)	OLS and VAR-based estimations (nonhydrocarbon GDP per capita growth, government spending, price of crude, etc.)	Financial development has a statistically significant negative effect on real non-hydrocarbon GDP per capita growth.

2.2 Government Debt and Crowding-Out Effect

2.2.1 The interest rate channel

The literature identifies two variants of crowding out in an economy: real and financial (Blinder and Solow, 1973). The *real* crowding out occurs when the increase in public investment displaces private capital formation, which is also called *direct* crowding out. Direct crowding out refers to the substitution relationship between public and private spending that occurs not through changes in prices, interest rates, or required rate of returns in the public sector, but through the public sector consumption and investment (Buiter, 1990, p. 34). On the other hand, the phenomenon of partial loss of private capital formation in the economy due to increase in the interest rates emanating from the pre-emption of financial resources by the government through bond-financing of fiscal deficit, is termed *financial* crowding out, which is also known as *indirect* crowding out. Indirect crowding out is the consequences of public actions that affect private behaviour either by altering the budget constraints or by influencing the prices faced by private agents through the interest rate

The standard benchmark for understanding the potential effect of changes in government borrowing on interest rates is a model based on an aggregate production function for the

economy in which government debt crowds out productive physical capital.[2] In this simple model; interest rate (r) determined by the marginal product of capital (MPK), would increase if capital (K) decreased, or was crowded out, by government debt (D). The Cobb-Douglas production function is given as:

$$Y = AK^{\sigma}L^{(1-\sigma)} \quad \textbf{(2.1)}$$

Where L denotes labour units, A is the coefficient for multifactor productivity, and σ is the coefficient on capital in the production function, then the total return to capital in the economy (MPK*K) as a share of output (Y) equals:

$$\sigma = (\text{MPK} \times \text{K})/\text{Y}.$$

The interest rate is determined by:

$$\text{r} = \text{MPK} = \sigma \times (\text{Y/K}) = \sigma \times \text{A} \times (L/K)^{1-\sigma}$$

If government debt completely crowds out capital, so that ∂K/∂D = -1, then an exogenous increase in government debt (holding other factors constant) causes the interest rate to increase:

$$\partial\text{r}/\partial\text{D} = (\partial\text{r}/\partial\text{K})(\partial\text{K}/\partial\text{D}) = \sigma \times (1- \sigma) \times (\text{Y}/K^2) > 0$$

(Because $0< \sigma <1$ and Y, K >0)

Here, the level of the interest rate is determined by the level of the capital stock and, thus, by the level of government debt. It is the change in the interest rate that is affected by the change in government debt.

Economists view the aggregate effect of government borrowing on interest rates from three perspectives (Bahmani-Oskooee, 1999). First, the Neoclassical School which advocates crowding-out believes that the determination of prices, outputs, and income distributions in markets is through supply and demand, often mediated through a maximization of utility by income-constrained individuals and of profits by cost-constrained firms employing available information and factors of production, in accordance with rational choice theory (Antonietta,1987, p. 323). It encompasses the neo-classical theory of interest rates which

[2] See Ball and Mankiw (1995), Elmendorf and Mankiw (1999)

explains that the balancing of savings and investment is achieved by the interest rate mechanism. Thus, fluctuations in the rates of interest arise from variations either in the demand for loans or in the supply of loans. In the case of an increase in government debt, interest rates have to increase to bring the market into equilibrium, hence dampening private investment (Voss, 2002; Ganelli, 2003). Financing a budget deficit by borrowing from the public implies an increase in the supply of government bonds and, in order to improve the attractiveness of these bonds, the government offers them at a lower price which leads to higher interest rates. The increase in interest rates discourages the issue of private bonds and private spending. In turn, this results in the crowding out of private investment (Premchand, 1984)

Second, the Keynesian model which supports crowding-in believes that private sector decisions sometimes lead to inefficient macroeconomic outcomes and require active policy responses by the public sector, in particular, fiscal policy actions by the government, in order to stabilize output over the business cycle (Blinder, 2008). It assumes that there is usually unemployment in the economy and that the interest rate sensitivity of investment is low. Therefore, expansionary fiscal policy will lead to little or no increase in the interest rate and instead an increase in output and income. Hence, there is crowding-in rather than crowding-out (Aschauer, 1989; Baldacci, et al., 2004). Inspired by the work of Barro (1991), a number of studies (such as Oshikoya, 1994; Serven, 1996; Odedokun, 1997; Ahmed and Miller, 2000; Pereira, 2000; Saleh, 2003) argue that some public investments could be conducive to private investment and growth by raising the return to private capital. For example, public capital, particularly infrastructure capital, such as water systems, sewers, airports, roads and transport, power projects, expenditures on research, and education outlays are likely to exhibit a complementary relationship with private capital. Hence, higher public investment may raise the marginal productivity of private capital and, thereby, 'crowd-in' private investment.

Third, the Ricardian Equivalence Theorem proposed by Barro (1974) advocates neutrality whereby increases in the deficit financed by fiscal spending will be matched with a future increase in taxes leaving interest rates and private investment unchanged. This view assumes that asset holders completely discount future tax liabilities implied in the deficits, which implies that budget deficits are irrelevant for financial decisions. In other words, a deficit induced by a lump-sum tax cut today followed by a lump-sum tax increase in the future will be fully offset by an increase in private savings, as taxpayers recognize that the tax is merely postponed, not cancelled. The offsetting increase in private savings means that the deficit would have no effect on national savings, interest rates, exchange rates, future domestic production, or future national income (Gale and Orszag, 2004). A similar view is found in the Capital Inflow Hypothesis

which is based on the idea that the demand for government debt is infinitely elastic (Dwyer, 1985). That is, an increase in the deficit will be financed partly or wholly not by domestic savings but by an inflow of capital from abroad. If the hypothesis holds, interest rates could remain unchanged.

2.2.2 The Credit Channel

In principle, government borrowing affects private investment through the lending rate, however in financially repressed economies, particularly in many developing countries, the equilibrium interest rate could be somewhat insensitive to market perceptions**.** Financial repressions are measures that governments employ to channel funds to themselves, which in a deregulated market would go elsewhere. Government debt could still have no effect on interest rates but have a significant effect on private credit due to intervention by the government, such as administrative controls imposed on interest rates; a high legal reserve ratio; the existence of direct intervention on credit allocation; government ownership or control of domestic banks and financial institutions; and barriers that limit other institutions seeking to enter the market (Reinhart and Sbrancia, 2011). With the existence of these 'artificial' constraints, financial institutions will not take risks because higher interest rates cannot be charged which results in many high-yielding projects facing credit rationing (Fry, 1988, p. 18). Hence, private credit will not be allocated according to the expected returns on the projects, but according to the quality of collateral, loan size, political pressure, and covert benefits to loan officers (King & Levine, 1993, p. 31). The credit rationing behaviour of banks could also be a result of the weakness of the legal institutions in enforcing contracts (Porta et al., 1998; Levine et al., 2000). In this case, interest rate variability will have no or at best a weak relationship with government borrowing. Thus, if the interest rate channel is weak, the quantity channel will capture the effects of government borrowing.

Consequently, the degree of quantitative crowding out depends on the nature of the endogenous response of the banks to higher government borrowing and how they alter their balance sheets. Banks respond to higher government borrowing by adjusting their loan portfolio optimally given the risk-return characteristics of different assets and liabilities (Emran and Farazi, 2009). First, if banks have excess liquidity, a higher lending to the government may not result in any significant reduction of credit to the private sector. Secondly, access to safe government assets could allow the banks to take more risk and thus increase their lending to the private sector which is known as the 'safe asset model' of which without the availability of public debt, borrowers would face higher borrowing costs (Kumhof and Tanner, 2005). Such endogenous response by banks will 'crowd-in' private credit or partially offset the traditional crowding-out

effect. The third is the 'lazy bank model' which posits that a high degree of lending to the government may discourage banks from lending to the risky private sector and thus stifle their incentives to seek out new profitable investment opportunities in the private sector (Hauner, 2009). For instance, Ghana has been offering an interest rate of over 15 percent on its Treasury Bills in the last five years[3]. The high single-digit to double-digit returns could encourage banks to 'invest' in government treasury bills as opposed to actual intermediation of funds to the private sector.

2.2.3 Empirical Studies

There is a plethora of empirical literature on the effect of government borrowing on interest rates but a large body comes from developed countries whereas studies on developing countries are thin. In developed countries, empirical studies exhibit diverse results. Dewald (1983) examined the impact of deficits on both short-and long-term interest rates, with Vector Auto-regression approach (VAR) using annual data and data averaged over the business cycle. The author found that, in both cases, deficits has a statistically significant effect on long-term rates but not short-term rates and conclude that deficits did not have a consistent effect on interest rates. However, one can interpret the same result differently since deficits affect long-term interest rates. A similar view was echoed by Hoelscher (1983) who used a loanable funds model to investigate the impact of fiscal deficits on short-term interest rates (one year T-bond rates) with expected inflation and output, and found no impact whatsoever, and conclude that short term interest rates are determined by inflation, monetary and general economic activities. However, with the inclusion of long-term interest rates (ten year T-bond rates) in an updated (1986) paper, over the period 1953-1984, Hoelscher found that fiscal deficits has a positive significant impact on long-term interest rates but found no evidence regarding short-term interest rates.

Barro's (1987) study on fiscal deficits shows an impact on long-term rates in the UK from the 1700s through to 1918. However, the author did not overcome the endogeneity problems. In the "pure exogenous" case, the author found that fiscal deficits did not affect interest rate. To address the problem of endogeneity, Cebula (1988) examined the relationship between fiscal deficits and a variety of real long-term rates (i.e. 10 year T-bond & high grade municipal bonds) and also allowed for international capital flows and inflationary expectations, with 2SLS estimation. The author found that deficit has a significant positive effect on long-term rates.

[3] http://www.mofep.gov.gh/financial-news

A novel approach called an 'announcement effect' used by Wachtel and Young (1987) shows that an increase in the projected deficits leads to an increase in interest rates, but long-term rates react more than short term interest rates. This was followed by a comprehensive study by Dua and Arora (1989) which used the IS-LM framework and the loanable funds flow model; the authors conclude that expectations of fiscal deficits have no effect on interest rates, rather the expected interest rates are dependent on money growth, expected unemployment, and inflation uncertainty. Quigley and Porter-Hudak (1994) used a different approach called an 'intervention analysis' of Box and Tiao (1975) and found less support for Wachtel and Young's (1987) results. Intervention analysis is used to assess the impact of a special event on the time series of interest. The main focus is to estimate the dynamic effect on the mean level of the series. Quigley and Porter-Hudak's results shows that interest rates respond only 40 percent of the time to deficit announcements and when they do respond the impact is only temporary, but this depends on the size of the announced change in deficits.

Makin (1983) used a univariate regression equation to estimate the changes in the three-month Treasury bill rate as a function of the change in the actual deficit, and found that the coefficient for the deficit variable is not statistically significant. Similar results for the deficit variable were also reported for long-term interest rates. However, this result is unlikely to be robust because Makin's estimation did not include other important determinants such as money supply and inflation. Evans (1985) incorporates more determinants such as the nominal interest rate, real government spending, real deficit, real money stock and expected inflation for the period 1979 to 1983. The author used two-stage least squares estimation to deal with the problem of endogeneity of the deficit, and still found an insignificant or negative relationship between interest rates and deficits. While the deficits lowering interest rates do not conform to economic theory, disruptions in the market mechanism such as price controls and rationing may have been the cause since much of Evan's analysis pertain to the wartime period. By contrast, Cebula et al. (1990) used two quarterly models (instrumental variables technique and the Cochrane-Orcutt procedure) which directly parallel Evans' IS-LM framework, and extend the time period from 1971-1985. The authors found strong empirical evidence that the federal budget deficit raised the *ex post* real rate of interest.

Darrat (1990) tested the direction of causality between interest and deficit using long-term Moody's AAa-bond interest rates and deficits, and found that deficits do not Granger-cause interest rates and interest rates do not Granger-cause deficits, and conclude that deficits and long rates do not have a long-term relationship. However, Raynold (1994) argues that poor relationships between deficits and interest rates occurred because previous studies ignored

liquidity constraints. The author ran a Vector Auto-regression approach (VAR) using the same variables on short-term and long-term corporate rates but added two variables (real value of liabilities of failed firms and real value of deposits of failed banks) as proxies for liquidity constraints. The author found that when these variables are included into the model, deficits have significantly negative effects on interest rates.

Deviating from time series analyses, Hutchison and Pyle (1984) regressed short-term rates on the "pooled" deficits of seven major industrialised countries with money growth, unemployment rate and country-specific data, and found that pooled government deficits caused the real short-term rates to rise. A similar study by Correia-Nunes and Stemitsiotis (1995) tested the impact of nominal interest rate on fiscal deficit on the cross-country data of ten OECD countries, and found that there was evidence of crowding out as the interest rate was positively linked to the deficit. The same result was echoed by Ford and Laxton (1995) who examined the data for nine OECD countries with simultaneous equation models and conclude that the increase in government debt since the early 1970s was a major factor in the rise in real interest rates in the 1980s and early 1990s.

Barro and Sala-i-Martin (1990) regressed world average expected short-term interest rates on world stock returns, oil prices, world monetary growth and world deficits for ten OECD countries during 1959-88. The authors found deficits and debts are insignificant while all the other variables are significant and conclude that each country's expected real interest rate depends primarily on world factors, rather than own-country factors, thereby suggesting a good deal of integration of world capital and goods markets.

Baldacci and Kumar (2010) examined the impact of fiscal deficit and public debt on interest rates for a panel of 31 advanced and emerging market economies over the period from 1980 to 2008 with fixed effect and system GMM estimation. Results suggest that higher deficits and public debt lead to a significant increase in long-term interest rates but this is greater in countries with weak initial fiscal conditions; weak or inadequate institutions; structural factors (such as low domestic savings); and limited access to global capital.

Laubach (2011) used a Structural Vector Autoregression (SVAR) to measure the effects of fiscal policies on interest rates and other variables in the United States prior to the onset of the financial crisis. The author concludes that fiscal tightening, defined as either increasing the surplus or decreasing the deficit, reduces interest rates.

Bayat et al. (2012) studied the causal relationship between budget deficit, and its ratio to gross domestic product, and interest rates in the Turkish economy during years between 2006 and 2011, employing the linear Granger type causality test. Results show that there is no causal

relation between budget deficits, nominal interest rates, supporting the existence of the Ricardian equivalence hypothesis. Odionye and Ebi (2013) empirically examined the relationship between the budget deficit and interest rates in Nigeria using a Vector Error Correction (VEC) model for the period from Q1 1970 to Q4 2010. They authors conclude that budget deficit has a positive and significant impact on interest rate.

A comprehensive study by Aisen and Hauner (2013) estimated the impact of budget deficit on interest for advanced and emerging economies using system Generalized Method of Moments (GMM)) over a panel dataset of 60 advanced and emerging economies and found a highly significant positive effect of budget deficits on interest rates, but the effect depends on interaction terms and is only significant under one of the several conditions: deficits are high, mostly domestically financed, or interact with high domestic debt; financial openness is low; interest rates are liberalized; or financial depth is low.

Cebula (2015) provides empirical evidence on the impact of net U.S. government borrowing (budget deficits) on the nominal interest rate yield on ten-year Treasury notes using annual data for the period 1972-2012. The GLM (Generalized Linear Model) estimates imply that the federal budget deficit exercise a positive and statistically significant impact on the nominal interest rate yield on ten-year Treasury notes.

Kelikume (2016) applied panel Vector Auto regression techniques (PVAR) across 18 countries of sub-Saharan Africa (SSA) over the period 2000 to 2014 and concludes that interest rate response to government fiscal deficit is insensitive.

Capener et al. (2017) used auto-regressive, i.e., AR (1), two-stage least squares to investigate the impact of the federal budget deficit GDP) in the U.S. on the ex-ante real interest rate yield on Moody's Baa-rated corporate bonds from 1960 through 2015. The authors found that if the federal budget deficit were to rise by one percentage point, say from 3% to 4% of GDP, the ex-ante real interest rate would rise by 58 basis points.

Despite the large attention given to developed economies, the economies with the highest interest rates in the world and a history of fiscal mismanagement are in the developing countries. In the context of developing countries which is closest to the focus of our study, empirical studies on the link between budget deficit and the interest rate are limited. A pioneering study by Ahmad (1994) investigates the relationship between interest rates and government deficits in Pakistan over the period 1970-1991 with IS-LM model and found that government budget deficits did not exert significant influence on nominal or real interest rates. A similar study by Mukhtar and Zakaria (2008) examined the relationship between government debt and long-term interest rates with the Cointegration analysis and Granger causality test from 1960-2005 and

conclude that budget deficits do not have a significant effect on nominal interest rates. Pandit (2005) examined the relationship between long-term nominal interest rates and budget deficit variables in Nepal with Cointegration and Error-Correction Mechanism (ECM) techniques for the period 1975-2003. In the model, the nominal interest rate is a function of the inflation rate, income, fiscal policy variables, and the central bank holding of government securities. The author found evidence that there exists a positive but insignificant positive relationship between the long-term nominal interest rate of government securities and budget deficit variables. The author concludes that both supply of and demand for long term government securities are not market based.

Akinboade (2010) investigates the budget deficit–interest rate relationships in South Africa with two econometric methods: the London School and the Granger-causality methods. The author's results suggest that budget deficits have no effect on interest rates in South Africa.

A different result was found by Anyanwu (1998) who applied regression analysis to pooled cross-section and time-series data for Nigeria, Ghana and the Gambia. The author's results indicate that fiscal deficits and government debts have a positive impact on interest rates. Obi and Nurudeen (2008) conduct an empirical test on the effects of fiscal deficits and government debts on interest rates in Nigeria using a Vector Auto Regressive (VAR) approach. Their findings confirmed a positive interest rate effect of debt and fiscal deficits. This implies that interest rates react to changes in credit markets in Nigeria, Ghana and Gambia. However, the two studies ignored other important determinants such as money supply and inflation. For instance, Nigeria has had double-digit inflation on average in the last decade, so expected inflation could have a huge impact which was not captured in. Secondly, Nigerian banks are awash with excess liquidity but money supply was not included.

A study by Chakraborty (2012) examined whether there was any evidence of financial crowding out in the recent years of the financially deregulated interest rate regime in India with Vector Auto Regressive (VAR) model between 206-2011. The author found no significant relationship between the two. In fact, the results reveals that neither the long-term nor short-term interest rate was determined by fiscal deficits in India.

However, credit markets rarely reach equilibrium through changes in interest rates alone (Temin and Voth, 2005). Changes in the quantity of credit could give a better insight into the effect of government borrowing. With regard to the quantity of private credit, Temin and Voth (2005) argued that examinations of interest rates are fundamentally misguided, and that the 18th- and early 19th-century private loan market balanced through quantity rationing in England. The authors used a VAR approach with a unique set of observations on lending

volume at Hoare's Bank and conclude that there was substantial crowding out: a 1% rise in government debt led to a 1% decline in private lending.

Christensen (2005) regressed private sector lending on domestic debt in 27 sub-Sahara African countries over the period 1980–2000. The author's results showed significant support for the crowding-out hypothesis: on average across countries, an expansion in domestic debt of one percent relative to broad money causes the ratio of private sector lending to broad money to decline by 0.15 percent. Christensen*'s* study used a pooled OLS which is likely to have potential biases induced by simultaneity, omitted variables, and unobserved country-specific effects. Second, there have been some changes since 2000 as many developing countries have moved towards market liberalisation.

Abdel-Kader (2006) conducted a survey of some state owned and private banks and 351 firms from various sectors in Egypt. The study investigates the extent of credit decline to the private sector in Egypt and whether it was due to supply factors (credit crunch), demand factors (credit slowdown), or other factors (e.g., crowding out). The study found that interest rates were no longer the decisive factor in lending decisions. More so, due to the problem of non-performing loans, banks were becoming more risk-averse, as reflected by the reduction in private credit and investment in more liquid and less risky assets, such as treasury bills and government bonds.

A comprehensive study by Emran and Farazi (2009) explored the crowding-out of private investment in developing countries. The study measured the effect of government borrowing on private credit with system-GMM from 1975-2006 on 60 developing countries. The estimates indicated that $1.00 more of government borrowing reduces private credit by $1.40, which is generally consistent with a 'lazy bank' model of bank behaviour in developing countries. This study improved on previous studies by using system-GMM to control for endogeneity; however, its major drawback was lumping all developing countries together; there are 30 resource-rich countries in the 60 developing countries. Furthermore, Emran and Farazi (2009) assumed the relationship between government borrowing and interest rate in developing countries is 'very weak at best' without substantiating it.

Riccardo de Bonis (2010) investigates the role of total government debt on the size of bank loans to the private sector with system-GMM in 20 emerging economies. The results shows that there are mainly two channels which the credit size is affected by government debt. First, government debt reduces the size of private sector credit. Second, the low private credit corresponds to a large size of government activities.

Fayed (2012) used a co-integration approach to investigate the relationship between government borrowing and private credit and found evidence that government borrowing from

domestic banks does crowd-out private credit which reflects the domestic banks' preference to invest in a low-risk high-return investment.

Shetta and Kamaly (2014) used a VAR model on quarterly data spanning 1970-2009 to gauge the crowding out effect of government domestic borrowing on private credit in Egypt. The authors' estimates indicate that a $1.00 more of government borrowing reduces private credit by $1.80. Ahmed (2016) estimated bank supply side equation in Pakistan using 3SLS from 1990-2013. The author found that Government borrowing leads to crowding credit away from possible productive use by the private sector, as the coefficient on the Treasury bill rate turns out to be negative and significant. Choudhary et al. (2016) analyzed the pressure fiscal expansion exerts on the economy via credit markets in Pakistan from 1975-2008. Their dynamic stochastic general equilibrium modeling (DSGE) captures the counter cyclical behavior of government borrowings that leads to counter cyclical spreads in loans market. The authors conclude that government borrowing leads to crowding out of private credit and rise in interest rate spreads.

This research study quantifies the effect of government domestic borrowing on lending interest rate and private credit in oil-dependent countries. Economies dominated by hydrocarbons possess certain characteristics not shared by other economies because their economic dynamics are mainly determined by the prices of oil and gas at world markets rather than by domestic economic activity, thus the volatility and uncertainty of resources revenues pose challenges for the design of appropriate policy framework

Table 2.3: Literature Review for Developing Countries

No	Topic	Country/Region	Model/Variables	Main Findings
1	Fiscal spending and crowding out. A comparison between developed and developing countries (Mahmoudzadeh et al, 2013)	Developed and developing countries (2000-2009)	Engle-Granger cointegration (private investment; government investment government consumption, inflation government deficit, etc.)	Financing budget deficits crowd out private investment in developed countries whereas it crowds in private investment in developing countries.
2	Interactions Between Public and Private Investment: Evidence from Developing Countries (Atukeren, 2005)	Developing Countries (1970–2000)	Cointegration, Granger causality and Probit regression (private investment, public investment and GDP)	There is no bottom-line on the impact of public investments on private investments i.e. crowding out/crowding in. The results differ from country to country.

3	Lazy Banks? Government Borrowing and Private Credit in Developing Countries (Emran and Farazi, 2009)	Developing Countries (panel data on 60 developing countries period 1975 to 2006)	GMM (Private credit, government borrowing, GDP, growth rate of per capita GDP, inflation rate, institutional quality, and lending rate)	The estimates prove the strong negative effect of government borrowing from the domestic banking sector on the volume of private credit.
4	Does Public Borrowing Crowd out Private Investment? The Bangladesh Evidence (Majumder, 2007)	Bangladesh (1976-2006)	SVECM (GDP, public and private sector gross fixed capital formation, etc.)	Public capital accumulation crowds out private investment in India over1950-2012, the opposite is true when we restrict the sample post 1980. This change can most likely be attributed to the policy reforms which started during early 1980s
5	Has Government investment crowded out Private Investment in India? (Mitra, 2005)	India (1969-2005)	SVAR (government investment, private investment, and gross domestic product)	The findings do not establish a substantive link between government and private investment or more specifically deficits and interest rates.
6	Crowding-Out or Crowding- In? Analysing the Effects of Government Spending on Private Investment in Turkey (Sen and Kaya, 2013)	Turkey (1975-2011)	Modified version Aschauer's (1989) model, Johansen Cointegration (private investment, government current spending, government current transfer spending, government capital spending, government interest spending, GDP)	There is crowding out of private investment in response to government current transfer spending, government current spending, and government interest spending whereas government capital spending crowds-in private investment.
7	Crowding Out Effect of Public Borrowing: The Case of Egypt (Fayed, 2012)	Egypt (1998-2010)	VECM (private credit as a percentage of industrial production, government borrowing also as a percentage of industrial production, log of industrial production, level of financial intermediation, institutional quality, the lending rate)	Greater than proportional crowding out of private sector credit due to government borrowing. Increase in banks' holdings of government securities also show banks' behaviour of investing in a low risk high return.
8	Does government investment crowd out private investment in China? (Xu and Yan, 2014	China (1980 to 2011)	SVAR model VAR framework (private fixed asset investment, government fixed asset investment in the public goods and state infrastructure, government fixed asset investment in private goods, mainly through SOEs)	The results propose that government investment in public goods "crowds in" private investment significantly, while government investment in the private goods, "crowds out" private investment

9	Government Budget Deficits and interest Rates: An Empirical Analysis for Pakistan (Burney et al., 1989)	Pakistan (1970-1989)	OLS (overall government budget deficit, deficit financed through domestic borrowing, deficit financed through borrowing from the domestic banking system, call money rate, inflation)	There is no relationship exists between the overall government budget deficit and the nominal interest rates. However, they linked the deficit with higher nominal interest if financed through borrowing from the banking system and suggest that it may end up in crowding-out private investment.
10	Effectiveness of Government Expenditure Crowding-In or Crowding-Out: Empirical Evidence in Case of Pakistan (Hussain et at., 2009)	Pakistan (1975-2008)	OLS, ECM, Co-Integration (defense expenditure, health and education expenditure, Social Welfare expenditure, transportation, infrastructure and communication expenditure, debts servicing expenditure, GDP, gross fixed)	Research concludes that expenditure on defense and debt serving crowds-out private investment whereas spending on infrastructure, health and education crowds-in private investment.
11	The Dominant Borrower Syndrome: The Case of Pakistan (Choudhary et al., 2016)	Pakistan (1975-2008)	Vector Auto regression (VAR) model (real output, credit spread, government borrowing, borrowing by private sector, inflation)	Dominant Borrower Syndrome (DBS) leads to crowding out of private sector investment and rise in interest rate spreads
12	Domestic Debt Markets in sub-Saharan Africa (Christensen, 2005)	Sub-Saharan Africa countries (1980-2000)	Pooled OLS (private sector credit and domestic debt, etc.)	An expansion in domestic debt of one percent relative to broad money causes the ratio of private sector lending to broad money to decline by 0.15 percent.
13	Does The Budget Deficit Crowd- Out Private Credit From Banking Sector? The Case of Egypt (Shetta and Kamaly, 2014)	Egypt (Q1-1970 to Q2-2009)	VAR (private credit , government borrowing, GDP, etc.)	A greater than proportional crowding out of private credit was observed owing to government borrowing from domestic banks.
14	The Crowding Out Effect of Budget Deficits on Private Investment in Nigeria (Asogwa and Okeke, 2013)	Nigeria (1981-2010)	OLS and Granger Causality (private investment , budget deficit, external debt stock, inflation, etc.)	Crowding out of private investment is confirmed while analysing the budget deficits.

Chapter 3

Data and Methodology

3.1 Data description

This study estimates (i) the link between finance and the non-oil sector growth and (ii) government domestic borrowing and changes in private sector credit and lending rates for a panel of 28 oil-dependent countries. The study used annual data (unless stated otherwise) for all the variables spanning 1990 to 2012. The data are obtained from World Bank World Development Indicator (WDI). The sample of country is listed in Table 3.1

Table 3.1 Oil-rich countries: descriptive statistics (2006-2012)

Country	Resource exports % of total exports	Resource revenues % of total fiscal revenues	Oil as a % of GDP
Algeria	94	74	22
Angola	96	77	24
Azerbaijan	95	65	28
Bolivia	5	33	6
Bahrain	80	81	6
Cameroun	47	27	7
Chad	85	68	22
Congo Rep	80	70	19
Dem. Rep. Congo	88	30	12
Ecuador	55	35	14
Equatorial Guinea	93	92	31
Gabon	80	60	30
Indonesia	10	25	3
Iran	79	63	25
Kuwait	93	95	45
Kazakhstan	60	40	16
Malaysia	11	25	4
Mexico	15	36	3
Nigeria	96	70	21
Oman	73	83	26
PNG	80	32	10
Qatar	88	58	19
Saudi Arabia	87	79	45
Syria	40	25	19
Trinidad	38	49	7
Venezuela	93	58	17
Yemen	82	68	28
Vietnam	14	25	4

Source: Author's calculations

A country is oil-dependent if the share of hydrocarbons contributes at least 25 percent of total fiscal revenues and/or total exports (IMF, 2012). Norway is excluded because it is a highly developed country. Russia is excluded because it is borderline on most developed-country metrics. Due to missing data issues, Iraq and Libya are also excluded. From Table 3.1, natural resource dependence is as high as 90% in Algeria, Angola, Azerbaijan, Dem. Rep. Congo, Equatorial Guinea and Venezuela, and as low as 25% in Malaysia, Indonesia, Mexico, Bolivia and Vietnam. Oil as a percentage of GDP in each country varies and has been changing over the years; it is a lot higher in Kuwait, Saudi Arabia, Angola, Oman, Azerbaijan, Iran, Equatorial Guinea, Yemen, Gabon and Algeria than in most oil-rich countries. Nigeria used to be as high as 30% but with the rebasing which increased Nigeria's GDP to 89 per cent in 2014, oil contribution has shrunk to a mere 9%. Indonesia, Malaysia, Mexico and Vietnam have been at the forefront of diversifying their economies, not surprisingly, they have the lowest oil contribution to GDP. Figure 3.1 shows the trajectory of world oil price; oil price rose steadily between 1995 and 2008, thereafter, it nosedived to $60 per barrel due to the global financial crises, it increased for a while and plunged again in 2013. For the study period 1990-2012, world oil price rose steadily with intermittent volatility.

Figure 3.1: World Oil Price

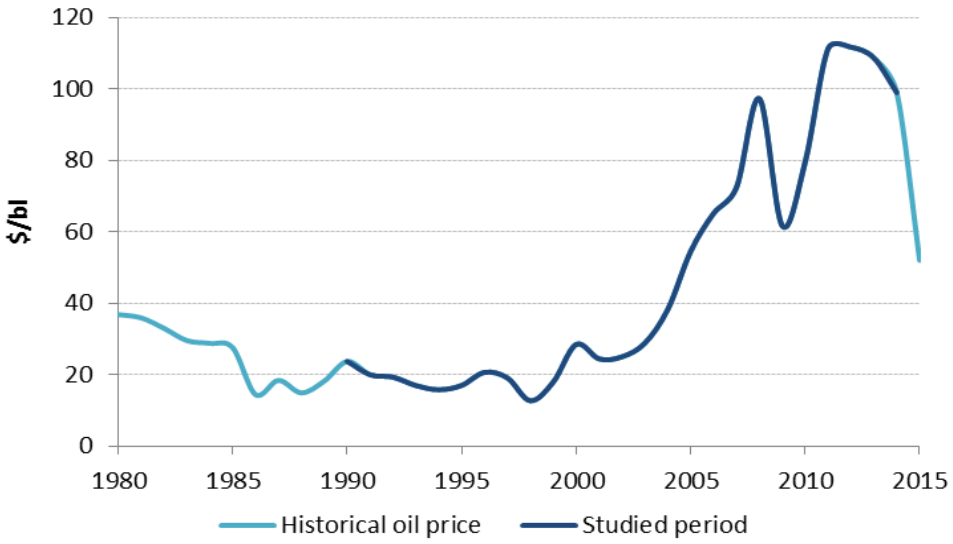


Table 3.2 shows government domestic borrowing exhibits the most fluctuation. Countries with higher resource revenue as a percent of total fiscal revenue tend to borrow less from domestic banks. It also noteworthy that borrowing from domestic banks fluctuates in line with resource rents; countries with higher resource revenue as a percent of total fiscal revenue borrow less from banks when prices of hydrocarbons are high and more from banks when prices are low.

For instance, countries like Saudi Arabia, Algeria, Angola, Oman and Congo Republic etc. borrowed less over the given period whereas countries like Yemen, Vietnam, Malaysia, Mexico and Indonesia borrowed more. The Institutional Quality Index (as shown in Table 3.2) assigns a score (0-100) to each country's performance and higher scores correspond to higher levels of institutional quality with components such as fiscal burden, government intervention, monetary policy, banking and finance, property rights, etc. Countries with 'good' quality of institutions have index of over 80 (i.e. Australia, 81; New Zealand, 83) but the worst index in oil-rich countries are Dem. Rep Congo, 35; Venezuela, 42; Congo Republic, 43; and Angola, 45; while a few countries score relatively high: Trinidad, 70; Qatar, 71; and Bahrain, 75.

Table 3.2 Oil-rich countries: further descriptive statistics (2006-2012)

Country	Government Debt	Bank Credit	Institutional Quality	Government Consumption	Lending Rate
Algeria	-35	22	56	20	8
Angola	-3.8	15	45	19	25
Azerbaijan	-1.5	17	58	13	9
Bolivia	10	49	60	17	12
Bahrain	-2	57	75	16	8
Cameroun	-3.5	10	53	12	18
Chad	-0.3	5	46	5	19
Congo Rep	-18	1	43	18	25
Dem. Rep Congo	0.5	3	35	15	15
Ecuador	-3	22	52	14	12
Equatorial Guinea	-6	2	51	21	15
Gabon	-2	10	55	15	18
Indonesia	8	40	56	10	13
Iran	-2.5	33	42	11	12
Kuwait	-3	60	62	25	7
Kazakhstan	1.2	45	58	11	11
Malaysia	4	119	65	13	6
Mexico	15	43	62	12	8
Nigeria	-3	19	54	12	18
Oman	-12	32	66	27	6
PNG	3	29	52	14	11
Qatar	10	71	71	20	6
Saudi Arabia	-40	10	64	30	7
Syria	3	15	47	10	13
Trinidad	-12	32	70	16	10
Venezuela	3	23	42	15	17
Yemen	8	7	50	13	22
Vietnam	7	84	51	6	13

*Government debt, bank credit, and government consumption are measured as percentage of GDP

Source: Author's calculations

The volatility of resource rent and its relation with government fiscal stance is what makes oil-rich countries different from other countries. From Table 3.2, countries with higher resource revenue or higher resource exports tend to have lower bank credit on average, which highlights the depressing effect of resource revenues on financial intermediation. For instance, bank credits in Angola, Algeria, Azerbaijan, Congo Rep, Dem. Rep Congo, Chad, Equatorial Guinea, Gabon, Venezuela, and Yemen are relatively lower than in other oil-rich countries. Conversely, countries with lower resource revenue or resource exports have higher bank credit; for instance, Mexico, Vietnam, Malaysia, Indonesia and Bolivia. However, even though Bahrain, Qatar, and Kuwait have high resource revenue, they also have relatively higher bank credit; not surprisingly, financial services have increased tremendously in these countries and the growth of the non-oil sector has been growing steadily which shows that increased bank credit is positively associated with economic diversification.

On average, fiscal size (measured by the government consumption share in GDP) is particularly high in Saudi Arabia, Qatar, Algeria, Angola, Equatorial Guinea, Kuwait and Oman which are heavily resource-dependent economies and this is an indicator of the dominant role of government, whereas government size is relatively low in Vietnam, Mexico, Chad and Indonesia. Bank lending rate seems to be lower in Bahrain, Kuwait, Mexico, Malaysia, Oman, Qatar and Saudi Arabia and these countries have better Institutional Quality Index which shows there is some relationship between quality of institutions and financial intermediation. Conversely, countries with higher lending rates like Yemen, Congo Republic, Chad, Angola and Nigeria have lower Institutional Quality Index which reaffirms that the quality of institutions has a potential impact on financial intermediation.

The dataset encompasses the 1990-2012 period. The sample data includes all the countries for which data were available. However, some variables are limited to a much smaller group. The time span is 23 years and the panel is unbalanced. We have some reasons for choosing this period; financial sector development has only started to gather pace in the 1990s (Ranjan and Zingales, 2003). More so, this study period started from 1990 to reduce the problem of missing variables, and the timeframe ended at 2012 because data were not readily available when this research study started. There are also some missing variables worth mentioning; Kazakhstan, Iran and Dem. Rep of Congo have five years each of missing lending rates, though randomly. Oman and Venezuela have four years each of missing Inflation. The dataset for Syria ends at the year 2009 for all variables, rather than 2012. The last two research questions require all the variables to be used annually with OLS and Fixed-effect, but the Difference and System Generalised Method of Moments take non-overlapping four-year averages to remedy missing

data, mitigate high degrees of persistence, smooth short-term fluctuations and to reduce the potential bias arising from having a large number of time observations in a dynamic panel estimation. The first two research questions are estimated with Westerlund Panel Cointegration, Mean Group, Dynamic Fixed effect, and Pooled Mean Group; they do not incorporate the missing variables, five variables are used for the estimations, the variables with missing data are excluded.

3.1.2 Dependent variables

Domestic Lending Rate → This measures the bank lending rate that usually meets the short- and medium-term financing needs of the private sector. Given that most interest rates are highly correlated, the banks' lending rate is used as a proxy for the nominal interest rates (e.g. Bhalla, 1995; Deepak et al., 2002).

Bank Credit → This is the credit provided by the banking system to the private sector as a percentage of GDP. This measure indicates the extent to which funds are channelled into the private sector by financial intermediaries. This measure is better than other measures of financial development because it is more directly linked to investment and growth (Calderón and Liu, 2003, p. 326; Fitzgerald, 2006).

Non-hydrocarbon GDP Per Capita Growth → This study follows the convention in the literature by using real per capita GDP as an indicator of growth. Hence, we measure economic development in terms of real GDP per capita growth. Thereafter, we differentiate the hydrocarbon sector and the non-hydrocarbon sector.

3.1.3 Independent variables of interest

Domestic Debt → This measures the claims on the central government by the domestic deposit money banks and other financial institutions. The sign for this variable is expected to be negative because increased government borrowing could crowd out private credit as espoused (e.g. Christensen, 2005; Emran and Farazi, 2009; Shetta and Kamaly, 2013).

Bank Credit → The proxy for financial intermediation is the credit provided by financial intermediaries to the private sector. This measure indicates the extent to which funds are channelled into the private sector by the domestic banks. One of the most critical factors when investigating the relationship between financial development and economic growth is how to attain a reasonable measure of financial development. Most of the proxies used in previous studies are ambiguous and may give misleading results (Zingales, 2003). Bank credit is better

than other measures of financial development used in the literature (i.e. M2 and M3 as a ratio of nominal GDP) because it is more directly linked to investment and growth, that is, credit granted to the private sector by the banks. The nominal value of the flow of credit to the private sector is deflated by the GDP deflator to obtain real credit flow. Bank credit captures financial intermediation and thus the quantitative development of the banking sector. The ratio of liquid liabilities to GDP is another popular proxy used in quantifying financial development. However, some studies such as Demetriades and Hussein (1996), Favara (2003), Khan and Senhadji (2003), and Ang and McKibbin (2007) argue that M2 and M3 are poor proxies, especially in countries with underdeveloped financial systems because a high level of monetization might be linked to financial underdevelopment and vice versa. More so, the ratio of liquid liabilities to GDP mostly captures the ability of the financial system to provide transaction services rather than the ability to channel money from savers to borrowers in the economy (Khan and Senhadji, 2003). Several studies (e.g. Atje and Boyan, 1993; Beck and Levine, 2003; Ang and McKibbin, 2007) used stock market indices such as stock market capitalization to GDP and the ratio of traded value to GDP to quantify financial development; but they are not directly linked to investment and growth. Moreover, we use bank-based financial proxy due to the dearth of long-span time series data for the stock market indices in most of our sample countries.

3.1.4 Other explanatory variables

GDP Per Capita → This study follows the convention in the literature by using real per capita GDP as an indicator of growth. We control for income level, as richer countries tend to have a more developed financial sector. Also, per capita income growth is important as rapidly growing economies are likely to have greater demand for and supply of credit (e.g. Djankov et. al., 2007; Emran and Farazi, 2009).

Money Supply → This measures the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. We control for this variable because an increased money supply might lead to liquidity surges – thus to credit expansion.

Trade Openness → The Openness Index is calculated as the ratio of the country's total trade, the sum of exports plus imports, to the country's gross domestic product. To capture openness, the indicator trade openness is used. The sign for this variable is expected to be positive since a relatively open economy could dampen the effect of government borrowing. This will

possibly facilitate economic growth by increasing domestic firms' markets and by allowing them to acquire inputs at competitive prices (Shan et al., 2006).

Institutional Quality → Institutions are the sets of rules and norms that shape social, political, and economic interactions among the members of a society. Better institutions are associated with more transparency and accountability, less corruption, and better protection of property rights. As a proxy for the quality of institutions, we use the *Heritage Foundation's Index of Economic Freedom*. This index aggregates 10 components with equal weight namely: trade policy, fiscal burden, government intervention, monetary policy, capital flows and foreign investment, banking and finance, property rights, wages and prices, regulation, and black market. The index assigns a score (0-100) to each country's performance and higher scores correspond to higher levels of institutional quality. The sign for this variable is expected to be positive because better institutions are an important determinant of private credit (e.g. La Porta et al., 1997). The sign is expected to be positive because better institutions such as political and legal structures boost economic growth (e.g. Barro, 1997).

Inflation → This is the growth rate of the annual consumer price index (CPI). It is commonly included as a measure of macroeconomic stability. The sign for this variable is expected to be negative. We control for this variable because high inflation could undermine the supply of loanable funds (e.g. Miguel et al., 2014). The literature on the relationship between inflation and economic growth has shown that there might be no relationship (Sidrauski, 1967), a negative relationship (Fisher, 1993) or a positive relationship (Mallik and Chowdhury, 2001) between these two variables. However, this nexus has gone beyond a simple relationship to what level of inflation can affect economic growth. The coefficient of this variable is expected to be negative (e.g. Barro, 1997).

Price of Crude Oil → Oil prices, generally recorded in barrel per USD, usually refer to crude oil prices of the front month futures contract of the benchmark crude oil grades WTI (WTI; traded at the NYMEX, New York) or Brent (traded at the IPE, London). We use annual average Brent Crude oil spot price as a major benchmark price for purchases of oil worldwide. Using the oil price index as an independent variable allows us to measure the impact of world oil price fluctuation on the oil and non-oil sectors. We deflate this variable by the consumer price index (CPI) to obtain the real crude oil price in each country. The sign of the coefficient for this variable is expected to be positive since an increase in the price of crude oil will increase government revenues and spending. The sign for this variable is expected to be positive because an increase in the price of crude oil will result in a windfall and presumably increase bank

credit. We control for this variable because high crude oil prices could dampen the effect of government borrowing on bank credit.

Government Size →This is measured by the share of government consumption as a percentage of GDP. It excludes expenditure on capital, transfers and debt servicing. Countries with relatively higher government expenditure are more likely to experience lower economic growth because higher government spending requires more tax revenue which leads to misallocation i.e. by transferring additional resources from the productive sector of the economy to the government, which uses them less efficiently. This indicator is particularly important in natural resource-rich economies because of the high level of fiscal leakage coupled with transparency and accountability issues (Ades and Di Tella, 1999).

3.2 Econometric Analysis (A)

In this section, we review the general framework for panel data analysis**.** We discuss common econometric issues in panel data: panel unit root test, panel cointegration, static models, and dynamic models. Following this, we rationalize the use of a panel ARDL model based on the three estimators: the mean group (MG), pooled mean group (PMG), and dynamic fixed effect (DFE) estimators developed by Pesaran et al. (1999). This section also discusses the rationale, efficiency and consistency of the preferred method.

3.2.1 Model Specification

The basic empirical model we postulate for modelling financial intermediation and economic development, which are denoted by FD_{it} and Y_{it} respectively, is the following log-linear function.

$$\ln(Y_{it}) = u_i + \beta_i \ln(FD_{it}) + e_{it} \qquad \textbf{(3.1)}$$

where the index i = 1,...,*N* denotes countries , t =1, 2,...., *T* denotes time.

Estimating a model in the form of equation (3.1) could pose some endogeneity issues. This is due to the simultaneity bias arising from a simultaneous determination of the independent and the dependent variables (Kumar and Woo, 2010). For instance, fast-growing economies may have more capital available for lending, or countries with higher growth rates may have more demand for credit, which may result in the misleading inference that additional bank lending causes growth or increased growth causes additional bank lending.

Another reason is related to potential omitted-variable bias that results when an excluded variable is correlated with both the dependent variable and one or more of the independent

variables. For example, countries that have well-developed banking sectors tend to have better institutions to support the rule of law and protect property rights and researchers may mistakenly attribute higher growth to banking capacity or vice versa rather than to better institutions (Cevik and Rahmati, 2013).

3.2.2 Estimation Approach

The estimation approach is presented under sub-themes: panel unit test, panel cointegration test, mean group, dynamic fixed effect and pooled mean group estimators.

3.2.3 Panel unit root test

The first step is to test for stationarity in the variables to ensure that no series exceeds I (1) order of integration. This study employs a Fisher-type test based on augmented Dickey-Fuller (Fisher ADF Chi-square) and Phillips-Perron (Fisher-PP Chi-square) unit root tests. The advantage of the Fisher-type test is that it does not require a balanced panel. It has the advantage of using completely heterogeneous specifications and the possibility of using different lag lengths in the individual ADF or PP regressions. In addition, Maddada and Wu (1999) compared Fisher-type, Im, Pesaran and Shin Levin (2003), and Lin and Chu (2002) panel unit root tests in the case of cross-sectional dependence among the variables and presented Monte-Carlo simulations in favour of Fisher-type tests. Maddada and Wu (1999) pointed out that when a mixture of stationary and nonstationary series in the group is included in the alternative hypothesis, the Fisher-type is the best among others because the test is more powerful in distinguishing the null and alternative hypotheses.

Maddala and Wu (1999) and Choi (2001) suggest using non-parametric and Fisher-type tests based on the idea of combining the p-values of the test-statistics from the arbitrary unit root test (the ADF test or other nonstationary test) in each cross sectional unit. Maddala and Wu (1999) argue that pooling on the basis of p-value has the advantage of allowing for as much heterogeneity across units as possible. If the statistics from different unit root tests are continuous, the significance levels (p-values) p_1 (1, 2…..N) are independent uniform (0, 1) variables and -2$log_e\ p_1$ has a X^2 distribution with two degrees of freedom.
Using the additive property of the X^2 variables, we obtain the Fisher test (1932):

$$\lambda - \ -2\sum_{i=1}^{N}\log p_i$$

Which has a X^2 distribution with 2N degrees of freedom.

Choi (2001) considers the following model using the properties of the Fisher test:

$$Y_{it} = d_{it} + X_{it} \quad \textbf{(3.2)}$$

Where i = 1, 2… *N* represents the cross sectional units t =1, 2, ..., *T* represents the time period. Moreover, the observed data comprises two components, namely a non-stochastic component (d_{it}) and a stochastic component (X_{it}): $d_{it} = \beta_{io} + \beta_{i1} t + \cdots + \beta_{imi} t^{m} i$

and $X_{it} = p_i x_{1\,(t-1)} + u_{it}$

Where u_{it} is integrated of zero and may be heteroskedastic. The null hypothesis is given as: $H_o : p_i - 1$ for all *i.* Which implies the presence of a unit root. The alternative hypothesis is: $H_a : |p_i| < 1$ for at least one *i* for finite *N* or $H_a : |p_i| < 1$ for some *i's* for infinite *N*. Next, let G_{iTi} be a one sided unit test statistics (ADF and PP in our study) for i-th group in Eq. (3.2), based on the following assumptions:

i) Under the null, as $T_i \to \infty$, $G_{iTi} \to G_i$, (G_i being a non-degenerate random variable)

ii) u_{it} is independent of u_{js} for all *t* and *s* when $i \neq j$

iii) $\frac{Nk}{N} \to K$ as $N \to \infty$, (K being a fixed constant)

Then then the asymptotic p-value for the G_{iTi} under assumption 1 is defined as $p_i = F(G_{iTi})$

Where F (.) is the distribution function of G_i .

The proposed inverse chi-squared Fisher type panel unit root test statistics has the following form: $P = -2 \sum_{i=1}^{N} \log p_i$ **(3.3)**

Equation (3.3) combines the *p*-values from the unit root tests for each cross sectional unit *i* to test for unit root in the panel. Under the null hypothesis of unit root, *P* is distributed as $X^2\,(2N)\ as\ T_i \to \infty$ for all *N*.

3.2.4 Panel cointegration test

The second step tests whether financial and economic development are cointegrated. The concept of cointegration was first developed by Granger (1981) and further explored by Engle and Granger (1987), Phillips and Ouliaris (1990), Johansen (1988), and Pedroni (2004). The basic idea is that if two or more time series variables are individually integrated of order *n*, then there is a possibility of at least one linear combination of them. Such a relationship between variables implies cointegration. Cointegrated variables exhibit strong steady-state relationships over long runs having common trends and co-movements.

Similarly to the panel unit root, extension of time series cointegration tests to panel data is a recent phenomenon. Panel cointegration tests can be divided into two groups: the first group of tests has cointegration as the null hypothesis (McCoskey and Kao, 1998; Westerlund, 2005)

and the other group does not take cointegration as the null hypothesis (Pedroni 1999; Kao 1999; Larsson et al., 2001; Groen and Kleibergen, 2003).

In this study, we use the four panel cointegration tests of Westerlund (2007), which have good small-sample properties and high power relative to the popular residual-based panel cointegration tests (e.g. Pedroni, 2004). Second, one advantage of using Westerlund (2007) panel cointegration tests is that the time series are allowed to be of unequal length. The four panel cointegration test of Westerlund (2007) tests is designed to test the null hypothesis of no cointegration by testing whether the error correction term in a conditional error correction model is equal to zero. If the null hypothesis of no error correction is rejected, then the null hypothesis of no cointegration is also rejected.

Westerlund (2007) considers the following error correction model where all variables in levels are assumed to be integrated of order 1;

$$\Delta Y_{it} = \delta_i' d_t + \alpha_i(Y_{i\,t-1} - \beta_i' x_{i\,t-1}) + \sum_{j=1}^{pi} \alpha_{ij}\Delta Y_{i\,t-j} + \sum_{j=0}^{pi} Y_{ij}\,\Delta x_{it-j} + e_{it} \qquad \textbf{(3.4)}$$

Where $d_t = (1, t)'$ holds the deterministic components, $\delta_i' = (\delta_{1i}, \delta_{2i})'$ are the associated vector of parameters. In order to allow for the estimation of the error correction parameter α_i by least squares;

$$\Delta Y_{it} = \delta_i' d_t + \alpha_i Y_{it-1} - \lambda_i' x_{it-1} + \sum_{j=1}^{pi} \alpha_{ij}\Delta Y_{i\,t-j} + \sum_{j=0}^{pi} Y_{ij}\Delta x_{it-j} + e_{it} \qquad \textbf{(3.5)}$$

Here the parameter α_i provides an estimate of the speed of error correction towards the long run equilibrium. The parametrization of the equation (3.5) takes the parameter α_i which remains unaffected by imposing an arbitrary β_i. Next, it is possible to construct a valid test of H_o versus H_a that is asymptotically similar and whose distribution is free of nuisance parameters. Westerlund (2007) proposes four tests based on the least squares estimates of α_i and its *t-ratio* for each individual *i.* The first two are called group mean and given as:

$$G_t = \frac{1}{N}\sum_{i=1}^{m} \frac{\hat{\alpha}_i}{SE(\hat{\alpha}_i)} \qquad \text{and} \qquad G_\alpha = \frac{1}{N}\sum_{i=1}^{m} \frac{T\hat{\alpha}_i}{\hat{\alpha}_i(1)}$$

Where SE ($\hat{\alpha}_i$) is the standard error of $\hat{\alpha}_i$. G_t and G_α test the null of H_o: $\alpha_i = 0$ for all *i* versus the alternative of H_a: $\alpha_i < 0$ for at least one *i*. In other words, the G_t and G_α test the null hypothesis of no cointegration for all cross-sectional units against the alternative that there is cointegration of at least one cross-sectional unit. The rejection of the null should therefore be taken as evidence of cointegration of at least one of the cross-sectional units.

The other two tests are called panel statistics and given as follows:

$$P_t = \frac{\hat{\alpha}}{SE(\hat{\alpha})} \quad \text{and} \quad P_\alpha = T\hat{\alpha}$$

The P_t and P_α test H_o: $\alpha_i = 0$ for all *i* versus the alternative of H_a: $\alpha_i < 0$ for all *i*. In other words, P_t and P_α test statistics pool information over all the cross-sectional units to test the null of no cointegration for all cross-sectional units against the alternative of cointegration for all cross-sectional units. The rejection of the null should therefore be taken as evidence of cointegration for the panel as a whole.

With a small dataset, such as the one in our study with T=23, Westerlund (2007) warns that the results of the tests may be sensitive to the specific choice of lag and lead lengths, which means if there is a cross sectional dependence over the units, the group mean and panel statistics are no longer valid. Hence, to avoid over-parameterization and the loss of predictive power, robust critical values can be obtained through bootstrapping.

3.2.5 Dynamic Fixed Effect, Mean-Group and Pooled Mean-Group Estimators

The panel cointegration test of Westerlund (2007) shows whether there is a long-term relationship or not; it does not show the short-run and long-run estimates. Recent advances in the non-stationary panel literature offer different estimation techniques to identify efficient parameters for relatively large (N) and (T) panels. In this study we applied three alternative estimation techniques, namely, the dynamic fixed effect (DFE) estimator, the mean-group (MG) estimator of Pesaran and Smith (1995) and the pooled mean-group (PMG) estimator of (Pesaran et al., 1999).

The DFE estimator pools each of the countries; it makes the estimators of the cointegrating vector, the speed of the adjustment coefficient and the short run coefficients to be equal across all countries. Thus in the DFE model, the slope coefficients and error variances, except the intercepts, are constrained to be equal across panels (Pesaran et al., 1999).

In contrast, the MG estimator relies on estimating N time-series regressions and averaging the country specific and time-series parameter estimates. The parameters are simply the un-weighted means of the individual coefficients. This estimator allows the intercepts, slope coefficients, and error variances to vary across groups. Under heterogeneity of slope coefficients, the MG is consistent because it considers complete parameter heterogeneity across cross-sections. However, the estimator does not recognise that some economic conditions could be common across group of countries in the long-run (Pesaran et al., 1999).

The PMG estimator provides efficiency gains as it recognises the common economic features across the countries. The PMG estimator combines both pooling and averaging and recognizes the diversity within each cross section. It allows the intercepts, speed of convergence, short run coefficients, and error variances to differ freely across groups, but imposes homogeneity on the long-run coefficients. The long run coefficients are a nonlinear function of short run parameters (Pesaran et al., 1999).

There are several gains in using the PMG estimator over other commonly used dynamic panel data estimators i.e. panel dynamic OLS (DOLS) of Pedroni (2001); panel fully modified OLS (FMOLS) of Pedroni (2000); GMM of Arellano and Bond, (1991) and Blundell-Bond (1998). DOLS and FMOLS require pretesting for unit roots in the dependent and independent variables as well as pre-testing for cointegration between integrated regressors. The stationary variables that do not appear to be part of the estimated cointegrating vector are usually eliminated (Pedroni, 2000, 2001). For example, if any of the variables, say bank credit, and government consumption are stationary, I (0); and other variables such as oil price, and non-oil GDP per capita are non-stationary, 1(1); some variables will be dropped in the DOLS/FMOLS in order to keep the same order of integration. Therefore, we ignore these dynamic panel data estimators.

Generalised methods of moment (GMM) addresses potential misspecification and obtains consistent estimates in the presence of endogenous regressors. However, Pesaran et al. (1999) argue that the GMM estimation procedure for the dynamic panel data model can produce inconsistent and misleading coefficients of the long run coefficients. The problem is exacerbated when the time denomination of the panel is large. GMM captures only the short-run dynamics and the stationarity of the variables are ignored because the models are mostly restricted to short time series. Thus, it is not clear whether the estimated panel models represent a long-run equilibrium relationship or a spurious one (Christopoulos and Tsionas, 2004). More so, the imposition of homogeneity assumptions on the slope coefficients of lagged dependent variables could lead to serious biases (Kiviet, 1995)

Pesaran et al. (1999) showed the consistency of the PMG estimator even if the variables of interest are integrated or stationary, endogenous or deterministic. Therefore, in estimating the PMG estimator one might not need to check for the presence of unit roots in the panel variables. The PMG assumes cross-sectional independence of the regression residuals. In panels with large N and large T, it is also important that the regression errors are serially uncorrelated. The inclusion of sufficient lags of the right-hand side regressors will ensure that the regression errors are serially uncorrelated and the explanatory variables are exogenous and thus provide consistent and efficient parameters of interest (Pesaran et al., 1999)

There are good reasons to believe that the long run equilibrium relationship amongst the variables of interest should be identical across the oil-rich economies (i.e. the presence of a global common factor, oil prices), while the short run dynamics are heterogeneous. Thus, the PMG estimator is likely to capture the true nature of the data. However, making a choice between DFE, MG and PMG can be tested using the Hausman test. Under heterogeneity of slope coefficient, the DFE approach would produce inconsistent and potentially misleading results (Baltagi at al., 2000). The Hausman test checks the validity of the DFE estimator against the MG estimator. Under the assumption of homogenous long-run elasticities, both the PMG and MG estimators are consistent. But if the true long-run parameters are heterogeneous, the PMG estimation will produce inefficient and inconsistent estimates. In this case, the MG estimates are consistent.

The Hausman test examines the trade-off between consistency and efficiency in the choice between the two estimators. It first calculates the difference between the MG and PMG estimators, then it compares the difference (scaled by the variance-covariance matrix of the efficient model) to critical values from the chi-squared distribution. Under the null hypothesis of cross-section parameter homogeneity in the long-run, one would expect the difference to be small. Therefore, if the p-values are > 0.05) (i.e. insignificant, use PMG)[4]
Let us assume that the long-run growth relationship is given by:

$$Y_{it} = \theta_{0i} + \theta_{1i}BANKCREDIT_{it} + \theta_{2i}\,GOVERNMENTSIZE_{it} + \theta_{3i}\,TRADEOPENNESS_{it} + \theta_{4i}OILPRICE_{it} + \alpha_{1i}t + u_{it} \quad \textbf{(3.6)}$$

Assume the variables in equation (3.6) are I (1) and cointegrated. This implies u_{it} is an I (0) process for all *i* and is independently distributed across *t.* They are also assumed to be distributed independently of the regressors. Suppose our maximum lag of every variable is one, the autoregressive distributed lag, ARDL (1, 1, 1, 1, 1), model becomes:

$$Y_{it} = u_{it} + \delta_{10i}BANKCREDIT_{it} + \delta_{11i}BANKCREDIT_{it-1} + \delta_{20i}GOVERNMENTSIZE_{it} \delta_{21i}GOVERNMENTSIZE_{it-1} + \delta_{30i}\,TRADEOPENNESS_{it} + \delta_{31i}\,TRADEOPENNESS_{it-1} + \delta_{40i}\,OILPRICE_{it} + \delta_{41i}\,OILPRICE_{it-1} + \beta_{1i}t + \lambda_i Y_{it} + e_{it} \quad \textbf{(3.7)}$$

[4] (Pesaran et al., 1999)

The error correction equilibrium representation is derived as:

$$\Delta Y_{it} = \phi_i (Y_{it-1} - \theta_{0i} - \theta_{1i}BANKCREDIT_{it} - \theta_{2i} GOVERNMENT\ SIZE_{it} - \theta_{31}TRADEOPENNESS_{it} - \theta_{4i}OILPRICE_{it} - \alpha_{1i}t) - \Delta\delta_{11i}BANKCREDIT_{it-1} - \Delta\delta_{21i}GOVERNMENTSIZE_{it-1} - \Delta\delta_{31i} TRADEOPENNESS_{it-1} - \Delta\delta_{41i} OILPRICE_{it-1} + e_{it} \quad \textbf{(3.8)}$$

Where $\theta_{0i} = \frac{u_{it}}{1-\lambda_i}$, $\theta_{1i} = \frac{\delta_{10i}+\delta_{11i}}{1-\lambda_i}$, $\theta_{2i} = \frac{\delta_{20i}+\delta_{21i}}{1-\lambda_i}$, $\theta_{3i} = \frac{\delta_{30i}+\delta_{31i}}{1-\lambda_i}$, $\theta_{4i} = \frac{\delta_{40i}+\delta_{41i}}{1-\lambda_i}$, $\phi_i - 1 - \lambda_i$

The results obtained using the mean group (MG) and the dynamic fixed effect (DFE) will be reported to facilitate comparison.

3.3 Econometric Analysis (B)

This section presents the empirical model and the estimation approach used in this study.

3.3.1 Model Specification

In line with the modified Emran and Farazi (2009) theoretical framework, equation (3.9) constitutes the baseline specification of the empirical dynamic panel data model involving government domestic borrowing and changes in private sector credit and/or lending rates.

$$C_{it} = \rho\, C_{i,t-1} + x_{it}\beta + u_{i,t} \quad \textbf{(3.9)}$$

More specifically, the estimated model is in the form:

$$C_{it} = \rho\, C_{i,t-1} + x_{it}\beta + v_i + \varepsilon_{it} \quad \textbf{(3.10)}$$

Where ρ is a scalar such that $|\rho| < 1$; ρ is an unknown parameter of the lagged endogenous variable, β is the unknown parameter vector of the K exogenous variables, $X_{i,t}$ as row vector of explanatory variables with the dimension of $K = n$ x 1 with n equals the number of exogenous variables, but it is acknowledged that these variables may not be exogenous, it has unobservable country-specific, time-invariant effects, (v_i) and the residuals (ε_{it}), such that $u_{i,t} = v_i + \varepsilon_{it}$. Where the residuals ($\varepsilon_{it}$) are white-noise such that the $\varepsilon_{it} \sim$ IID $(0, \sigma_\varepsilon^2)$, $v_i \sim$ IID (σ_v^2), $i = 1, 2, 3, \ldots N$ is an index for individual sample of oil-dependent countries, where $N = 28$, $t = 1, 2,3, \ldots T$ is an index for time-variant periods, in this case, years, so that $T = 6$ for four-

year average base estimation such as 1990-1993, 1994-1997, 1998-2001, 2002-2005, 2006-2009, 2010-2012 whilst $T = 23$ for the estimations involving the study period, 1990-2012.

This model is based on the assumptions that (i) the error term is orthogonal to the exogenous variables so that $E\ (x_{it}\ \varepsilon_{it}) = 0$; (ii) the independently and identically distributed error terms are uncorrelated with the lagged endogenous variable implying that $E(C_{it-1}\ \varepsilon_{it}) = 0$; (iii) the exogenous variables might be correlated with the individual effect, for which reason $E\ (x_{it}\ v_i) \neq 0$; (iv) the past value is prone to affect the present such that $E\ (C_{it}\ C_{i,t-1}) \neq 0$, so there is a need to capture the dynamic effects of the dependent variable and, (v) the country-specific effect and the disturbance error are independent of each other $E\ (v_i\ \varepsilon_{it}) = 0$

3.3.2 Estimation Approach

The estimation approach is presented under four sub-themes: Static panel (OLS, Fixed effect), Dynamic OLS, Dynamic panel (i.e. Difference and System Generalised Method of Moments (GMM) estimators), and sources of bias i.e. instruments proliferation, the Sargen test for over identifying restrictions, and the Arellano-Bond test for second-order serial correlation.

3.3.2.1 The pooled OLS estimator:

$y_{it} = x_{it}\,\beta + (v_i + \varepsilon_{it})$, $t = 1, 2\ldots T$; $i = 1, 2\ \ldots N$ **(3.11)**

Assumption (a): v_i is uncorrelated with x_{it} : $E\ (v_i\ x_{it}) = 0$

Assumption (b): $E\ (x_{it}\ \varepsilon_{it}) = 0$; ($x_{it}$ is a vector of independent variables that can be exogenous or endogenous)

The problem is that we do not observe v_i which is constant over time for each individual but varies across individuals. Hence if we estimate the model in levels using OLS then v_i will go into error term. But if v_i is correlated with x_{it}, then putting v_i in the error term will lead to an omitted variable problem. In other words, OLS estimation will lead to biased and inconsistent results if i.e. $E\ (x_{it}\ v_i) \neq 0$

If the dynamic panel model is used to estimate OLS, the problem is even worse, because the lagged dependent variable, $y_{i,t-1}$ in addition to other independent variables may likely be correlated with the error term. There is a clear simultaneity problem as the lagged dependent variable is correlated with the error term by virtue of its correlation with the time-invariant component of the error term. Bond (2002) showed that standard results for omitted variable bias indicate that the OLS levels for the lagged dependent variable, $y_{i,t-1}$ is biased upwards.

3.3.2.2 The Fixed-effects ("Within") estimator:

We have seen that if v_i is correlated with the variables in the x_{it} vector, there will be an endogeneity problem which will bias the OLS estimates. Under these assumptions, we can use the fixed effect estimator to obtain consistent estimates of β allowing v_i to be freely correlated with x_{it}. To see how the fixed effect estimator solves the endogeneity problem that contaminates the OLS estimates, we begin by taking an average of equation (3.11) for each individual. This yields:

$$\bar{y} = \bar{x}_i\beta + (v_i + \bar{\varepsilon}_{it}) \qquad \textbf{(3.12)}$$

$\bar{y} = (\sum_{t=1}^{t} y_{it})/T$, and so on. Next subtract equation (3.12) from (3.11)

$$y_{it} - \bar{y}_i = (x_{it} - \bar{x}_i)\beta + (v_i - v_i + \varepsilon_{it} - \bar{\varepsilon}_{it})$$

$$y_{it} - \bar{y}_i = (x_{it} - \bar{x}_i)\beta + (\varepsilon_{it} - \bar{\varepsilon}_{it})$$

Since v_i is constant over time, v_i term in the equation does not have the over-bar. Notice that this transformation eliminates the fixed effect v_i. Note also that this transformation eliminates the constant as well

Which we write as:

$$\ddot{y}_{it} = \ddot{x}_{it}\beta + \ddot{u}_{it}, \qquad t = 1, 2\ldots T: \; i = 1, 2\ldots N \qquad \textbf{(3.13)}$$

The problem of estimating equation (3.13) as a 'fixed effect' is that it will not account for dynamics; many processes display dynamic adjustment over time and ignoring the dynamic aspect of the data is not only a loss of potentially important information, but can lead to serious misspecification biases in the estimation. Secondly, it does not control for simultaneity whereby $\ddot{y}_{it}$ could be causing $\ddot{x}_{it}$ and vice versa. For example, if we estimate the fixed effect model with a dynamic setting (i.e. with a lagged dependent variable to account for dynamics) such as $\ddot{y}_{it} = \rho\, y_{i,t-1} + \ddot{x}_{it}\,\beta + \ddot{u}_{it}$. The Within-Group estimator transforms the equation by eliminating v_i. However, (most especially for panels where the number of times periods available is small) the transformation induces a correlation between the lagged dependent variable ($y_{i,t-1}$) and even the ($\ddot{x}_{it}\,\beta$) with the error term ($\ddot{u}_{it}$). Then, strict exogeneity which implies that the regressors are orthogonal to the error term for all observations such that $E\,(x_{it}\,\varepsilon_{it}) = 0$, is violated. One implication of this is that the fixed effect model may not yield consistent estimates if $x_{i,t}$ contains lagged dependent and independent variables. Bond (2002) shows the standard

results for omitted variable bias indicates that the fixed effect lagged dependent variable, $y_{i,t-1}$ is biased downwards.

3.3.2.3 Difference Generalised Method of Moments:

We then apply the Difference GMM approach proposed by Arellano and Bover (1995). This estimation procedure is especially appropriate when: (1) the explanatory variables are endogenous; and (ii) unobserved country-specific effects are correlated with regressors. Under the assumption that the explanatory variables are endogenous i.e. $E(\, x_{it}\, u_{i,t}.) \neq 0$.

Arellano and Bond (1991) showed that the following moment conditions hold for the equations in first differences.

$$R_{it} = x_{it}\,\beta + (\,v_i + \varepsilon_{it}\,),$$

$$R_{it} = (\rho\, R_{i,t-1} - \rho\, R_{i,t-2}) + (\beta x_{i,t} - \beta x_{it-1}) + (u_{i,t} - u_{i,t-1})$$

$$E\,(\,\Delta u_{i,t}\, R_{i,t-r}) = 0; \qquad E\,(\,\Delta u_{i,t}\, x_{i,t-r}) = 0;$$

Where $r \geq 2$,….. and $t = 3$,……T

$$R_{it} = (\Delta\, R_{i,t-1}) + (\Delta\, x_{i,t}) + (u_{i,t} - u_{i,t-1}) \qquad \textbf{(3.14)}$$

Therefore the lagged values of endogenous variables dated $t-2$ and earlier are valid instruments for the equations in first differences. Arellano and Bond (1991) noted that although there is a correlation between the level of right-hand side variables $\Delta X_{i,t}$, $\Delta R_{i,t-1}$ and the disturbance error $\Delta u_{i,t}$, no such correlation exists between $(\,R_{i,t-2})$ $(\Delta R_{i,t-2})$ and the error term, $(u_{i,t} - u_{i,t-1})$ because $(\,R_{i,t-2})$ $(\Delta R_{i,t-2})$ are mathematically related to $(\Delta R_{i,t-1}) = (R_{i,t-1} - R_{i,t-2})$ but not the error term, $(u_{i,t} - u_{i,t-1})$. Instrumenting with $(R_{i,t-2})$ rather than $(\Delta R_{i,t-2})$ is preferable because $(\Delta R_{i,t-2})$ is not available until T = 4, where as $(R_{i,t-2})$ is available at T = 3. However, in the context of the model specification in equation (3.14), there are possible problems with the use of the first-differenced GMM estimator. When the lagged values of the series are weakly correlated with the first difference, they can yield parameter estimates that suffer from large finite sample bias because of weak instruments. Secondly, when the individual series for the lagged dependent and independent variables are highly persistent, the problem is more severe because it will difference out the variables.

3.3.2.3 System Generalised Method of Moments:

Blundell and Bond (1998) showed that the moment conditions defined for the first-differenced equation can be combined with the moment conditions defined for the level equation to estimate a system GMM. The assumptions still hold: the explanatory variable is treated as endogenous. The GMM system estimator utilizes the following moment conditions:

$$R_{it} = (\Delta R_{i,t-1}) + (\Delta x_{i,t}) + (u_{i,t} - u_{i,t-1}) \quad \textbf{(3.15)}$$

$$R_{it} = (\rho R_{i,t-1}) + (\beta x_{i,t}) + (u_{i,t}) \quad \textbf{(3.16)}$$

$$E(\Delta u_{i,t} R_{i,t-r}) = 0; \qquad E(\Delta u_{i,t} x_{i,t-r}) = 0;$$

Where r = 2,….. t – 1 and t = 3,….T

$$E(u_{i,t} \Delta R_{i,t-r}) = 0; \qquad E(u_{i,t} \Delta x_{i,t-r}) = 0;$$

Where r = 1,….. t – 1 and t = 3,….T

The estimator combines the equation in differences in equation (3.15) with the equation in levels in equation (3.16) into a single equation. It uses the lagged levels of dependent and independent variables as instruments for the difference equations and the lagged differences of dependent and independent variables as instruments for the level equation. Thus by allowing for more instruments the estimated coefficients of the Blundell and Bond (1998) are not only more efficient, but also more consistent than other alternative techniques of dynamic panel analysis. The Blundell and Bond (1998) GMM is popularly referred to as a System-GMM because it is composed of moment restrictions for equations in differences and levels resulting in an efficient estimator that is robust to panel-specific autocorrelation and heteroscedasticity.

3.3.3 Sources of Bias

The main econometric concern with the GMM approach is the problem of instruments proliferation (Roodman, 2007). The instrument proliferation is when a large collection of instruments over-fits the endogenous variables. Roodman (2007) concludes that symptoms of proliferation become noticeable only when T >15, implying a longer time horizon reduces instrument validity. In a simulation exercise, when T=20, the full instrument variant detects it with an average *P*-value on the *Hansen J test* of 1.00. This implies that System GMM is not suitable for longer periods. The two conventional techniques to address instrument over-fitting in dynamic GMM panels are to limit the lag depth by selecting some of the lags to be included in the instrument set. Another approach is to collapse the instrument set to the extent that the orthogonal condition no longer needs to be valid for any one time period but still for each lag.

Furthermore, if a dynamic panel-data model is over-identified, it should be possible to verify if the excluded instruments are correctly independent of the residual process. Therefore, to test for the joint validity of the instruments used, the study adhered to the suggestions by Arellano and Bond (1991), and Roodman (2007) inter alia by conducting the Sargan-Hansen test for over-identifying restrictions after the System GMM estimation. The routine Sargan-Hansen test is formulated with the null hypothesis that the instruments used as a group are exogenous, therefore, the higher the *p*-value of the test statistic, the better. The Sargan-Hansen test is often weak in small *N* where the number of instruments is large and exceeds the number of groups. This suggests that System GMM is not suitable for small numbers of groups, firms and countries, and more appropriate when T < N.

If heteroscedasticity is present, the GMM estimator is more efficient than the IV estimator, whereas "if heteroscedasticity is absent, the GMM estimator is no worse asymptotically than the IV estimator" (Baum et al., 2003: 11). There is no proof suggesting, however, that in the presence of homoscedasticity, other panel-data estimators in a dynamic context are more efficient than the sys-GMM estimator. According to Baltagi (2008:87) "homoscedastic disturbances when heteroscedasticity is present will still result in consistent estimates of the regression coefficients, but these estimates will not be efficient" because of biased standard errors. This requires the researcher to compute robust standard errors to correct for possible heteroscedasticity (Baum et al., 2003; Roodman, 2007; Baltagi, 2008; Chan et al., 2012). Robust estimation by two-step GMM automatically generates homoscedastic standard errors.

Following the recommendations by Arellano and Bond (1991) which were later substantiated by Blundell and Bond (1998), Greene (2003), and Baltagi (2008), the Arellano-Bond test for autocorrelation is examined. The A-B test is specially designed to detect second-order serial correlation (AR (2)) in the idiosyncratic disturbance term within a GMM framework. Arellano and Bond (1991) proved that the A-B test is critically important because the consistency of the GMM estimator is dependent upon the realism of the condition that $E\ (\Delta\varepsilon_{it}\ \ \Delta\varepsilon_{i,t-2}) = 0$. The A-B test for autocorrelation is based on a null hypothesis of no autocorrelation and it is applied to the differenced residuals. It is for this reason that the A-B test for AR (1) process in first differences usually rejects the null hypothesis essentially because ($\Delta\varepsilon_{it} = \Delta\varepsilon_{i,t} - \Delta\varepsilon_{i,t-1}$) and ($\Delta\varepsilon_{i,t-1} = \Delta\varepsilon_{i,t-1} - \Delta\varepsilon_{i,t-2}$), both have $\varepsilon_{i,t-1}$ (Arellano and Bond, 1991; Blundell and Bond, 2000). It is absolutely imperative that there is no second-order serial correlation.

Chapter 4

Empirical Results

4.1 Financial Intermediation

4.1.2 Panel unit roots

The dataset includes a time period of 23 years, though not too long it is very likely that the macroeconomic variables will have a unit root (Nelson and Plosser, 1982). We employ the panel unit root test to determine the order of integration for all the series in our dataset. We use Fisher-type panel unit root test because our dataset is unbalanced. The testing for the order of integration of variables is not important when applying the dynamic fixed effect, the mean-group, and the pooled mean-group estimators as long as the variables of interest are I(0) and I(1) (Pesaran and Smith, 1995; Pesaran, 1997; Pesaran et al., 1999). However, we carry out this tests to ensure that no series exceeds I (1) order of integration.

Table 4.1 reports the results of the unit root tests, which suggest that one of the variables under consideration (i.e. non-hydrocarbon GDP) is stationary of order I(0), while bank credit, government expenditure, trade openness, and the price of crude oil are integrated of order I(1). The results show all variables are stationary at first difference.

Table 4.1 Panel unit root tests

	Fisher-type test			
	Level		Ist Difference	
Variables	Test Values	P-values	Test Values	P-values
Non-Hydo. GDP	-4.8361	0.0001	-18.4309	0.000
Bank Credit	-0.6069	0.2719	-14.5823	0.000
Govt. Consumption	-1.3236	0.0929	-16.4452	0.000
Trade Openness	-1.4412	0.1747	-19.0764	0.000
Price of Crude Oil	1.7918	0.1634	- 21.4115	0.000

Notes: all unit roots are implemented with a constant and trend and take the unit root as the null hypothesis. The lags are chosen according to the Akaike criterion. Source: Author's calculations.

4.1.3 Panel cointegration tests

The cointegration test identifies the presence of long run relationships among the integrated variables. The right lag-length is crucial since excessively short lags may fail to capture the

system's dynamics, could lead to omitted variables, or bias the remaining coefficients, and be likely to produce serially correlated errors. Meanwhile too long a lag leads to a rapid loss of degrees of freedom and to over-parameterization (Kireyev, 2000). Given the small number of variables included in our study and the somewhat short time dimension of the time series, the system could not be tested for a lag length of more than two. In order to choose an optimal lag and lead length for each series, we use the AIC criterion while the Bartlett Kernel window width is set to 4/ $(T/100)^{2/9}$= 3. Since the results show all variables are stationary at first difference and integrated of order 1(1), our next step is to apply the panel cointegration test using the first-difference variables.

Table 4.2 summarizes the result of the Westerlund (2007) cointegration test. The cointegration test shows that bank credit and non-hydrocarbon GDP per capita are not cointegrated, whereas bank credit and GDP per capita are cointegrated. More specifically, in testing for the existence of a long-run relationship between bank credit and non-hydrocarbon GDP per capita, both the G_a and P_a test statistics accept the null of no cointegration; this suggests there is little evidence of cointegration. However, in testing for the existence of a long-run relationship between bank credit and GDP per capita; only P_t test statistics accepts the null of no cointegration. Hence, there is some evidence of cointegration.

Table 4.2 Westerlund (2007) Panel cointegration test

	Nonhydrocarbon GDP Per Capita			GDP Per Capita		
Test	Value	Z-value	P-value	Value	Z-value	P-value
Gt	-4.058	-11.212	0.000	-3.974	-10.658	0.000
Ga	-13.32	-1.132	0.129	-13.415	-1.207	0.000
Pt	-17.383	-7.225	0.000	-16.991	-6.767	0.114
Pa	-10.339	-1.227	0.110	-16.597	-6.771	0.000

Notes: the Westerlund (2007) tests take no cointegration as the null. The test regression is fitted with a constant, and a range of lags (1 2) and leads (1 2).
Source: Author's calculations

Westerlund (2007) warns that, in small datasets (such as this study with T= 23), the results may be sensitive to the choice of parameters such as lag and lead lengths and the kernel width. Hence, to avoid over-parametrization, we restrict the short-run dynamics and use a shorter kernel window (e.g. Westerlund, 2007; Demetriades and James, 2011). The test results still accepts the null of no cointegration for non-hydrocarbon GDP per capita, and rejects the null of no cointegration GDP per capita. The optimal changes in lags, leads and band width did not significantly alter the results. Panel data models are likely to exhibit significant cross-sectional

dependence in the errors, which could arise due to the presence of common shocks and unobserved components that become part of the error (Pesaran, 2004; Baltagi, 2005). One reason for this may be the increasingly economic and financial integration of countries, and particularly in our study, the common shock of oil price fluctuations that affects government spending, which implies a likely strong interdependencies between cross-sectional units. We use the Pesaran (2004) CD test on the residuals of the FE specification. The CD test statistic is normally distributed under the null hypothesis of no cross-sectional dependence. The absolute correlation is (Pesaran test of cross sectional independence = 40.368, Pr = 0.0000; Average absolute value of the off-diagonal elements = 0.292) is significant. This strongly indicates the presence of a common factor affecting the cross sectional units; thus the presence of cross-sectional dependence.

We bootstrapped robust critical values for the test statistics. Bootstrapping corrects critical values in tests; it reduces the difference between the true and nominal rejection probabilities. Our results show G_i test statistics accept the null of no cointegration for non-hydrocarbon GDP per capita and P_i test statistics accepts the null of no cointegration for the whole sample. However, for GDP per capita, the no cointegration null is rejected for G_i at the 5% level and for P_i at the 10% level (i.e. when P_i is restricted to be homogenous) which suggest that the whole panel is cointegrated. The results with the bootstrapped *p*-values provide stronger evidence of cointegration. The computed values of the asymptotic and bootstrapped *p*-values are presented in Table 4.3.

Table 4.3 Westerlund (2007) Panel cointegration test, bootstrapped

	Nonhydrocarbon GDP Per Capita				GDP Per Capita			
Test	Value	Z-value	P-value	Robust P-value	Value	Z-value	P-value	Robust P-value
Gt	-2.518	-0.985	0.162	0.136	-2.101	-0.736	0.048	0.027
Ga	-7.188	3.753	1.000	0.511	-7.812	-2.837	0.038	0.021
Pt	-11.021	0.179	0.571	0.351	-10.263	-9.462	0.046	0.034
Pa	-6.283	2.287	0.889	0.385	-8.173	-1.287	0.062	0.056

Notes: Because the Akaike optimal lag and lead search are time-consuming when combined with boot-strapping, we held the short-term dynamics fixed.

Table 4.4 Non-Oil GDP = *f*(Bank Credit, Govt. Consumption, Trade Openness, Oil Price)

	Pooled Mean Group		Mean Group		Hausman Test		Dynamic Fixed Effect	
Variable	Coef.	Std. Error	Coef.	Std. Error	H-test	P-value	Coef.	Std. Error
Long-Run Coefficients								
Bank Credit	-0.014	0.008	0.228	0.129			0.024	0.019
Government Consumption	0.149***	0.047	0.828	0.636			0.055	0.102
Trade Openness	0.003	0.005	-0.138	0.128			-0.013	0.012
Price of Crude Oil	0.222***	0.033	0.713	0.894			0.168	0.129
			Hausman Text[1]		2.57	0.636		
			Hausman Text[2]		2.21	0.595		
Error Correction Coefficient	-0.106***	0.022	-0.531***	0.078			0.116***	0.016
Δ Bank Credit	0.239	0.141	0.152	0.108			0.009**	0.018
Δ Government Consumption	0.135	0.077	-0.008	0.096			0.079**	0.016
Δ Trade Openness	0.003	0.016	-0.012	0.023			0.007*	0.002
Δ Price of Crude Oil	-0.192**	0.062	-0.059	0.119			-0.115*	0.031
Intercept	3.562**	1.486	6.824*	3.679			-3.424*	0.894
Country	28		28				28	
Obs	539		539				539	

Note:*, **, and *** indicate significance at 10 %, 5 % and 1 %, respectively.

Estimations are estimated using (xtpmg) routine in Stata. Pooled mean group, mean group, and dynamic fixed effects all control for country and time effects.

The first panel (LR) shows the long-run effects. The second panel reports both short-run effects (SR) and the speed of adjustment (ec).

The Hausman test indicates that PMG is a more consistent and efficient estimator than MG and DFE. The lag structure is ARDL (1, 1, 1, 1, 1) and the order of variables is non-hydrocarbon GDP per capita growth, bank credit, government consumption, trade openness, and oil price.

[1] PMG is a more efficient estimator than MG under the null hypothesis

[2] PMG is a more efficient estimator than DFE under the null hypothesis.

Annual data 1990-2012

Source: Author's estimations

4.1.4 Dynamic Fixed Effect, Mean-Group and Pooled Mean-Group

We proceed to estimate the long-run coefficient of non-hydrocarbon GDP per capita as the dependent variable. Table 4.4 presents the results of the parameter estimates of the short and long-runs. We prefer the results obtained using the PMG estimator given its gains in consistency and efficiency over the other error-correction based estimations. For comparison purposes, we also report the results obtained with the Mean Group and Dynamic Fixed Effect models.

As discussed in the previous section, the consistency and efficiency of the PMG estimates rely on several specification conditions. The first is that the regression residuals be serially uncorrelated and the explanatory variables are treated as exogenous. We address this endogeneity concerns in two ways: we augment with lags of the regressors and dependent variables to minimize the bias and to ensure the regression residuals are serially uncorrelated. The sufficient augmentation of the order of the ARDL model can correct for the problem of residual serial correlation and endogenous regressions (Pesaran, 2004). In choosing the optimal lag structure, we apply the Akaike Information criterion and the Schwartz Bayesian criterion and we constrain our lags to a maximum of three, due to our times series dimension and the number of regressors. We could not unnecessarily expand the lag structure any further because we would run into problems of the lack of degrees of freedom.

The second condition refers to the existence of a long-run relationship (dynamic stability) and requires that the coefficient on the error-correction term be negative and not lower than -2 (Loayza and Ranciere, 2006). We report the estimates for the pooled error-correction coefficient and its corresponding standard error. This coefficient falls within the dynamically stable range in the PMG, MG, and DFE estimators.

The third condition is that the long-run parameters be the same across countries. We test the null hypothesis of homogeneity and the validity of the long-run homogeneity restriction across countries, and hence the efficiency of the PMG estimator over the other estimators, with the Hausman test. The Hausman test accepts the null hypothesis of the homogeneity restriction on the regressors in the long run, which indicates that PMG is a more efficient estimator than MG. Similarly, in comparing the results of DFE and PMG, the Hausman test again clearly favours the PMG specification over DFE. The *p*-values associated with the Hausman Test for PMG, MG, DFE are greater than 0.05 and do not reject the long run homogeneity restriction hypothesis. The constraint of common long-run coefficient in our preferred estimator, the PMG, has lower standard errors and slower speed of adjustment.

The PMG estimator indicates that financial intermediation has an insignificant, albeit negative impact in the long-run and a positive and insignificant impact in the short-run on non-hydrocarbon GDP per capita growth. The MG estimator suggests financial intermediation has a positive and insignificant impact on non-hydrocarbon GDP per capita growth both in the short and long-run. The DFE model suggests financial intermediation has a positive and insignificant impact in the long-run and a positive and significant impact in the short-run. Since, the Hausman test clearly favours the PMG specification over the other error correction based estimations, we focus exclusively on PMG. While the PMG results indicate that financial intermediation has no significant impact on non-hydrocarbon GDP per capita growth in the long-run; it is noteworthy to mention that when pooled together (the oil and non-oil economies), financial intermediation has a positive and significant effect on GDP per capita growth in the long-run (see Table 4.5), and not surprisingly only oil price boosts hydrocarbon GDP per capita (see Appendix B.3)

Next, we move to the economic explanation of the results reported on Table 4.4. The results show that a 1% increase of bank credit to the economy as a whole increases GDP per capita by 0.06 percent on average, whereas, 1% increase of bank credit to the non-hydrocarbon sector decreases non-hydrocarbon GDP per capita by 0.01 percent on average, though statistically insignificant. A 1% increase in government consumption increases non-oil GDP per capita by 0.14 percent; however, this decreases GDP per capita by 0.15 percent. A $1 increase in the world price of crude oil increases non-oil GDP per capita by 0.2 percent. Trade openness has no significant effect in non-oil per capita growth. Across countries and over the sample period, bank credit has no significant effect on the growth of the non-hydrocarbon sector. In other words, banks do not yet provide adequate credit to stimulate non-oil economic growth.

Our results are consistent with that of Cevik and Rahmati (2013**)** who reported a negative and insignificant relationship between financial intermediation and non-hydrocarbon GDP per capita, but inconsistent with those of Hasanov and Huseynov (2013), Samargandi et al. (2013) and Mirzaei and Moore (2015) that reported a positive and significant relationship. Our results indicate that financial intermediation made no significant contribution to non-oil GDP per capita growth which is, however, inconsistent with general evidence in the empirical literature of the finance-growth nexus; although, this is not surprising in the case of oil-rich countries.

Table 4.5 GDP = *f*(Bank Credit, Govt. Consumption, Trade Openness, Oil Price)

	Pooled Mean Group	
Variable	Coef.	Std. Error
Long-Run Coefficients		
Bank Credit	0.0567***	0.014
Government Consumption	-0.158**	0.047
Trade Openness	-0.075	0.005
Price of Crude Oil	0.071***	0.033
Error Correction Coefficient	-0.289***	0.025
Bank Credit	0.631	0.054
Government Consumption	0.132	0.113
Trade Openness	0.057	0.205
Price of Crude Oil	0.178	0.175
Intercept	3.563	2.247
Country	28	
Obs	539	

Note: ** and *** indicate significance at 5 % and 1 %, respectively
Source: Author's calculations

The weak economic activity in the non-oil sector reflects the low level of bank credit in oil-rich countries. The non-oil sector cannot bank on growth without lending. The previous related studies are all case studies based on time series analysis and more importantly reported results that are different. Without delving into the advantages of panel data analysis over time-series data (see Hsiao et al., 2007); our panel data analysis shows banks failed to function in a growth-enhancing manner. The connection between finance and the growth of the non-oil sector is weak. This study finds that higher bank lending increases real GDP growth in oil-rich economies, though, some studies (Nili and Rastad, 2007; Barajas et al., 2013) argue that the beneficial effect of private credit on economic growth is generally smaller in oil-exporting countries due to weaker regulatory

characteristics and more limited access to financial services. However, combining the oil and non-oil economies as one entity could be misleading because the oil sectors have more access to finance than the non-oil sector, though the oil sector depend less on bank credit, but in the case that disproportionate bank credits are lent to the resource sector and we misidentify that as the whole sector, then the effect of financial intermediation on growth may be unreliable – could be overstated or understated.

There are possible explanations for the broken link (i.e. inability of banks to support economic diversification). First, the financial system in most of the oil-rich countries is still in the rudimentary state or at best, transition phase, and has only made modest attempt to lend to the non-oil sector in the last decade. Financial intermediation needs to reach a certain level of development before it could promote economic growth (Berthelemy and Varoudakis, 1996; Cherif and Gazdar, 2015). Second, the weak institutional environment inherent in the oil-rich economies could explain the reluctance of banks to lend outside the oil related businesses as banks avoid risks associated with eventual difficulties in loan recovery. Third, the returns from financial intermediation depends on the mobilization of savings and allocation of funds to productive investment projects, but due to frictions in the market in the form improper allocation of resources, the interaction is not strong in the non-oil sector. Fourth, the low level of bank credit reflects mostly supply constraints such as lack of competition (given the high profitability of banks in resource-rich economies) which allows banks to keep their credit levels low. Be that as it may, the financing needs of the non-oil sector is 'unattended' which has resulted in the level of investment and economic activity running below potential. The banking sector does not seem to fulfil its traditional role of a financial intermediary by turning customers' deposits into loans. The 'broken' link between the real economy and bank credit goes a long way in explaining why bank credits do not result in additional economic growth in the non-oil sector. Fixing this link is essential to support economic diversification.

The coefficient of government consumption is positive and statistically significant at the 1 percent level. It shows government spending drives growth (i.e. directly and indirectly) through spill over effects on non-oil investments and demand for the goods and services provided by private businesses. Similar results was found by Treichel (1999) who used cointegration analysis in oil-rich Oman to study the link between the growth rate of total real expenditure and non-oil real GDP growth from 1981-1997. The author found that the non-oil GDP growth could be explained mainly by government expenditure. The same result was reported by Kireyev (1998) for the case of Saudi Arabia using a pairwise Granger causality from 1969-97. The author found a significant and

positive relationship between government spending and growth in the non-oil real GDP growth. Cevik and Rahmati (2013) used VAR analysis in oil-rich Libya from 1970–2010 and conclude that government spending is strongly associated with non-hydrocarbon economic activity.

The coefficient for the price of crude oil is positive and significant at 1 percent level. It shows the economic performance in oil-rich countries depends significantly on developments in world oil prices. Several studies have documented the importance of movements in energy prices in determining economic activity. For energy and oil exporters, movements in output are strongly related to oil prices changes (Baldini, 2005; Kumah and Matovu, 2005; Husain et al., 2008).

Our results shows the non-oil economic growth in oil-rich countries is determined by movements in oil prices, through their impact on fiscal policy.

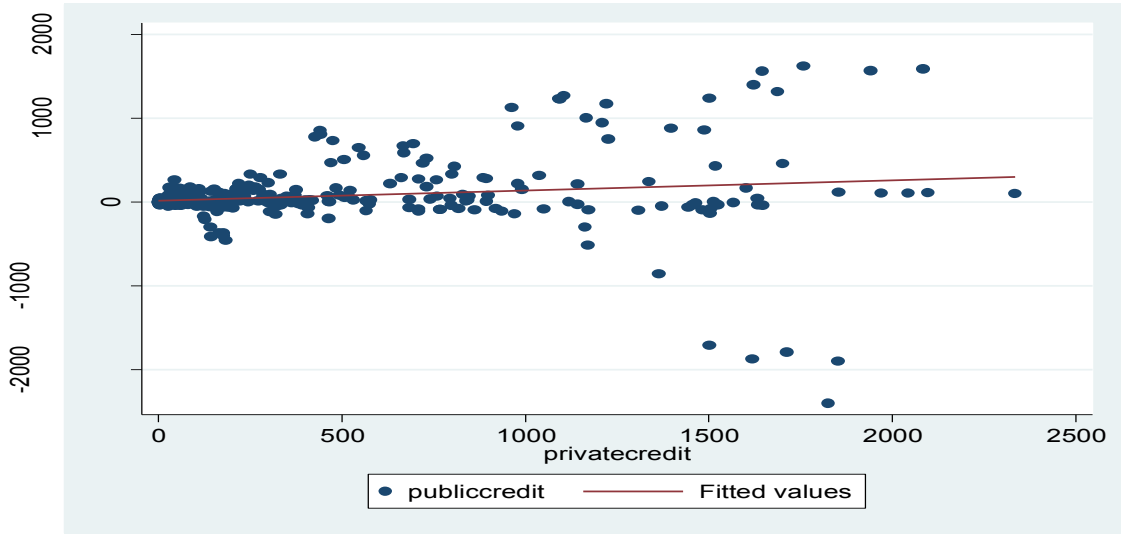
4.2 Crowding Out Effect

We consider a variety of estimation methodologies, such as pooled OLS, dynamic OLS, fixed-effects (FE) panel regression, and difference and system GMM (Generalised Method of Moments) dynamic panel regression.

4.2.1 Government borrowing and private sector credit

This study deviated from the bank specific factors such as overhead cost, competition, interest spread, etc. These explanatory variables were omitted as we improvised the specification according to the purpose of our study which is to assess the role of government borrowing from domestic banks on private credit to understand the transmission channel of the crowding out phenomenon. This simple time series plot in Figure 4.1 indicates that there is a positive correlation between public credit and private credit; that is they move together over time. This gives an impression of a crowding in effect rather than a crowding out. However, this relationship needs to be further investigated using a suitable econometric model.

Figure 4.1 Public credit and private credit financed by the banking sector



Source: World Development Indicators

4.2.2 OLS & Fixed Effect

The estimated coefficients using pooled OLS is presented in Appendix A.1, with the baseline model including all the variables in the last column. The regression results show that the effect of government borrowing on private credit is negative and statistically significant across all specifications. The estimated size of the coefficient of private credit ranges between -0.144 and -0.147, with the baseline specification of the model generating the largest impact. In other words, over the sample period 1990-2012, government domestic borrowing negatively affected bank credit to the private sector. This model does not control for unobserved cross-country heterogeneity, but provides a useful baseline case. Indeed, if there are time-invariant individual effects, they will be absorbed in the error term, causing correlation between the explanatory variables and the residual. Standard results for omitted variable bias indicate that, at least in large samples, the OLS levels estimator is biased upwards (Bond, 2002). Next, we use fixed-effect panel regression on pooled data. The Hausman test was used to select whether a fixed or random effect model was appropriate and the test rejected the hypothesis that the individual effects were uncorrelated with the other regressors for the baseline model at the 1-percent level. Using a joint F test, we find that our sets of variables are jointly significant in all specifications presented.

The estimated coefficients for the fixed effect model is presented in Table 4.6. The regression results show that the effect of government borrowing on private credit is negative and statistically significant across all specifications. However, the estimated size of the coefficient on private credit is now bigger and ranges from -0.207 and -0.272. In other words, when the government borrows $1 from domestic banks, it crowds out private credit by $0.20. From all indications, private credit to the private sector depends on government borrowing, money supply, institutional quality, and income growth. The fixed effect estimator is a better model as it mitigates the omitted variable problems by drawing fixed effects out of the error term. Standard results for omitted variables bias indicate that, at least in large samples, the fixed effect estimator is biased downwards (Bond, 2002). The estimates could be biased due to endogeneity arising from simultaneity as private and public credit are mostly determined by the highest achievable performance of the banks given regulatory constraints. But we suspect reverse causality might be a trivial issue given the nature of oil-rich economies and their banking system (i.e. the close connection between governments and the banks); thus, it is likely that public credit will somewhat dictate the direction.

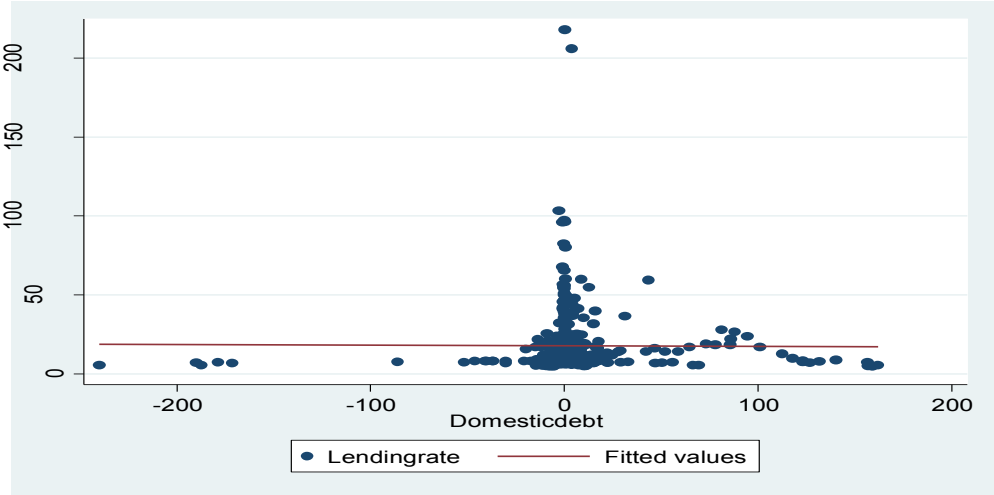
4.2.3 Government borrowing and lending interest rate

This study has not drawn heavily on the determinants of the interest rate model such as government consumption, private consumption, private savings, etc. These omitted variables are not required for our analysis as we improvise the specification according to the purpose of our study, which is to assess the role of government borrowing on the lending rate to understand the transmission channel of the crowding out effect. Figure 4.2 shows there is no correlation between government borrowing and lending rate over time. This gives an impression of no relationship between the two. However, this relationship needs to be further examined using an appropriate econometric model.

4.2.4 OLS & Fixed Effect

The estimated coefficients using OLS are presented in Appendix A.2. The regression results show that the effect of government borrowing on lending interest rate is positive and statistically insignificant across all specifications. The estimated size of the coefficient on lending rate ranges between 0.016 and 0.028 basis points with the baseline specification of the model generating the largest impact. In other words, over the sample period 1990-2012, government borrowing contributed to higher domestic lending rates.

Figure 4.2 The relationship between domestic debt and lending interest rate



Source: World Development Indicators

As discussed earlier, the simple OLS estimates are likely to be biased as they omit country fixed effects and thus are likely to suffer from omitted variables bias. Such unobserved cross-country heterogeneity could be from differences in the relationships between banks and governments which could be in the form of directed lending to the government by domestic banks, explicit or implicit caps on interest rates, public ownership of banks, or through 'moral suasion' which is the explicit or implicit threats by authorities in order to provide incentives to comply with the authorities, or a 'hands-off' system where there is little or limited role for the government.

We then used fixed-effect panel regression on pooled data. The Hausman test rejects the hypothesis that the individual effects are uncorrelated with the other regressors for the baseline model at the 1-percent level. Using a joint F test, we find that our sets of variables are jointly significant in all specifications presented. Thus we present evidence for the fixed effect model. The estimated coefficients represented in Table 4.7, with the baseline model including all the variables in the last column. Contrary to the OLS result, the regression results show that the effect of government borrowing on lending interest rate is negative and statistically insignificant.

Table 4.6 Determinants of private credit

	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit
Domesticdebt	-0.372	-0.276	-0.275	-0.190	-0.190	-0.192	-0.204
	(10.83)**	(15.03)**	(14.95)**	(10.12)**	(10.12)**	(9.95)**	(9.36)**
Moneysupply		0.653	0.641	0.679	0.666	0.660	0.623
		(38.92)**	(32.37)**	(34.22)**	(27.96)**	(26.66)**	(22.42)**
Oilprice			0.172		0.153	0.147	0.096
			(1.18)		(1.02)	(0.93)	(0.45)
InstQ				3.729	3.649	4.374	4.350
				(4.10)**	(3.99)**	(4.23)**	(3.42)**
Inflation						0.024	-0.063
						(1.19)	(1.59)
GDPpercapita							0.472
							(4.52)**
Lendingrate							1.630
							(2.47)*
_cons	273.197	29.576	26.737	-190.973	-188.429	-224.958	-264.513
	(37.11)**	(4.01)**	(3.44)**	(3.79)**	(3.73)**	(3.97)**	(3.64)**
R2	0.17	0.77	0.77	0.79	0.79	0.79	0.80
N	620	620	619	452	452	429	363

The dependent variable is real private credit.
All variables are in log, except oil price, institutional quality, inflation and lending rate.
The model is estimated with Fixed effect estimator with * and ** indicating significant at the 5 and 1 per cent levels, respectively.
Source: Author's estimations

The estimated size of the coefficient on lending rate ranges from -0.020 and -0.045. In other words, if the government borrows 1% of total GDP, it decreases interest rate by three basis points, though insignificant. The fixed effect estimator improves the OLS model by mitigating the omitted variable problems, the estimates could be affected by endogeneity resulting from a loop of causality between the lending interest rate and government borrowing. Again, this could be inconsequential given the relatively strong grip of governments on domestic banks in the oil-rich economies.

4.2.5 Dynamic OLS & Endogeneity

We employ dynamic OLS as represented in equation (3.9) to check for endogeneity arising from simultaneity (i.e. by adding the lagged dependent variable to see if it acts as a regressor). The result shows (in Table 4.8) the adjusted R^2 increases from static to dynamic OLS which reflects the presence of reverse causation (Wintoki et al., 2012). If the lag terms belong there, then they should be included to avoid bias. The results also shows "Private credit L.1" and "Lending rate L.1" are statistically significant at 1% level respectively which means past values of private credit and lending rate explain significant variations in current values and thus confirms dynamic relationships. A dynamic process modelled with a static model is invariably misspecified and therefore incorrect (Keele and Kelly, 2006). Static models omit dynamics which causes dynamic panel bias (Bond, 2002; Baum, 2006), and as a result do not allow us to study the dynamics of adjustment (Baltagi, 2008). Omitted dynamics imply that such models are misspecified because they omit the entire history of the right hand side variables (Greene, 2008). There are numerous ways to address endogeneity: (i) the Structural Equation Modelling (SEM); (ii) the Two Stage Least Square (2SLS) regression model; and (iii) the Generalized Method of Moments (GMM) estimators. The first two require valid external instruments which are difficult to obtain (Flannery and Hankins, 2013; Wintoki et al., 2012). Because of the lack of valid external instruments suitable in a panel setting, the GMM estimator approach proposed by Blundell and Bond (1998) is the most suitable method to deal with endogeneity issues that arises from dynamic nature of the model. The GMM estimator deals with several problems encountered in estimating dynamic panel models, such as endogeneity, measurement errors and omitted variable bias. There are 28 countries (N) in our sample analysed over a period of 23 years (T) and as a result there are more countries (N) than years (T). Many authors argue that the dynamic panel model is specially designed for a situation where 'T' is smaller than 'N' in order to control for dynamic panel bias (Bond, 2002; Roodman. 2006; Baltagi, 2008). For long panels (i.e. small N and large T), the fixed effect estimator may be a better choice because its bias decreases as more periods are added (Nickel, 1981). The fixed effect estimator tends to

have a relatively small variance when compared to consistent GMM-type estimators. (Harris at al., 2008). Further, Judson and Owen (1999) show that the biases of fixed effect estimates of coefficients are relatively small. For all these reasons and considering that our dataset is neither particularly wide nor long, we present both the fixed effect and GMM estimation results.

The GMM estimator is best suited to handle biases induced by simultaneity, omitted variables, and unobserved country-specific effects and provides for potentially improved efficiency. For instance, the problem of potential endogeneity is easier to address in the dynamic panel estimates than in static models that do not use internally generating instruments. More so, in dynamic GMM estimation, all variables from the regression that are not correlated with the error term (including lagged and differenced variables) can be potentially used as valid instruments (Greene, 2008).

4.2.6 Difference & System Generalised Method of Moments

Finally, we apply a generalised method of moments (GMM) dynamic panel estimator. The system-GMM estimation approach is to take the first differences to remove unobserved time-invariant country-specific effects, and instrument the right-hand variables in the first differenced equations using levels of the lagged two periods or more. The system-GMM combines this set of equations with an additional set of equations in levels with lagged first-differences as instruments. Having identified the dynamic panel data model as the most appropriate econometric technique for our estimation, we have to decide which dynamic panel approach to use. Even though the GMM is the method of estimation of dynamic panel models that provides consistent estimates (Baum, 2006; Roodman, 2006), one has to decide whether to use ‘difference-GMM’ (DGMM) or ‘system-GMM’ (SGMM).

We used system-GMM over difference-GMM for the following reasons: The system-GMM estimate has an advantage over difference-GMM in variables that are random walk or close to being random-walk (Bond, 2002; Roodman, 2006). Since our model specification includes macroeconomic variables which are known in economics for the presence of random walk, the system-GMM approach seems to be the more appropriate choice. Differencing the variables will remove any variable that is constant, such as lending rate.

Table 4.7 Determinants of lending interest rates

	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate
Domesticdebt	-0.020	-0.035	-0.040	-0.044	-0.045	-0.053	-0.031
	(0.75)	(1.31)	(1.57)	(1.32)	(1.40)	(3.05)**	(1.60)
Moneysupply		-0.086	0.029	-0.100	0.021	-0.010	-0.098
		(3.64)**	(1.02)	(3.00)**	(0.53)	(0.45)	(2.82)**
Oilprice			-0.160		-0.142	-0.098	-0.104
			(6.90)**		(4.99)**	(6.16)**	(6.54)**
InstQ				-0.555	-0.459	0.030	-0.033
				(3.37)**	(2.86)**	(0.31)	(0.34)
Inflation						0.051	0.051
						(30.44)**	(30.61)**
GDPcapita							0.123
							(1.43)
Bankcredit							0.123
							(2.84)**
_cons	17.804	21.237	23.421	52.489	48.360	18.753	21.669
	(31.05)**	(19.29)**	(21.24)**	(5.71)**	(5.40)**	(3.50)**	(3.98)**
R2	0.00	0.03	0.11	0.06	0.12	0.76	0.77
N	543	543	542	408	408	386	386

The dependent variable is the nominal lending interest rate
All variables are in log, except oil price, institutional quality, inflation and lending rate.
The model is estimated with Fixed effect estimator with * and ** indicating significance at the 5 and 1 percent levels, respectively
Source*:* Author's estimations

The results of the statistical tests and checks for system-GMM reported in Table 4.9 are:
As documented by Arellano and Bond (1991), the GMM estimator requires that there is first-order serial correlation AR (1) but that there is no second-order serial correlation AR (2) in the residuals. Since the null hypotheses imply that there is no first-order AR (1) and second-order serial correlation AR(2), it means that one could reject the null hypothesis in the AR(1) test but not reject the AR(2) test to get appropriate diagnostics. The results satisfy this test specification, 0.48 and 0.359 for private credit and lending rate respectively (see Table 4.9)

The Hansen J-statistic tests the null hypothesis that the model specification is correct and all over identifying restrictions are valid, i.e. validity of instruments. The rejection of the null hypothesis implies the estimates are questionable. Our Hansen test of over identifying restrictions does not reject the null at any standard level of significance ($p = 0.86$; $p = 0.66$ receptively). Hence, it is an indication that the model instruments are valid.

Roodman (2006) suggests checking for steady-state assumption which can be used to investigate the validity of the instruments. In other words, the estimated coefficient on the lagged dependent variable in the model should indicate convergence by having a value less than absolute unity, otherwise system-GMM is invalid. The estimated coefficient on lagged dependent variables are 0.72; and 0.52 respectively, which means the steady-state assumption holds.

Roodman (2007) suggests that one should report the number of instruments used in the dynamic panel, since they can generate potentially "weak" instruments that can cause biased estimates. First, the number of instruments should not exceed the number of observations, which is the case here (26 instruments < 148 observations for the interest rate model; and 24 instruments < 145 observations for the private credit model). Furthermore, 'a tell-tale' sign is a perfect Hansen J-statistic with the p-value equal to 1.00. At the same time, the p-value should have a higher value than 0.25 (Roodman 2007, p. 10). The Hansen J-test reports p-values of 0.86 and 0.66, respectively which satisfies this condition.

Furthermore, Roodman (2006 & 2007) suggests reporting how one has obtained the 'optimal' number of instruments. In our case, the instruments came from the use of two lags for levels and two for difference. We estimated a number of regressions by increasing or decreasing the number of instruments, using a special user-written command 'collapse', but other limits did not yield better diagnostics, indicating that this number of instruments is the most favourable.

Table 4.8 The effect of government domestic debt on private credit and lending rate

	Static Models		Dynamic Models	
	OLS		OLS	
	Private Credit	Lending Rate	Private credit	Lending Rate
Private credit L.1			0.765*(0.000)	
Lending rate L.1				0.628* (0.000)
Domestic debt	-0.147*(0.000)	0.028 (0.051)	-0.091*(0.000)	0.016(0.140)
Money supply	0.725*(0.000)	-0.071*(0.004)	0.190*(0.000)	0.053**(0.011)
Price of crude oil	0.109 (0.675)	-0.050*(0.001)	0.054 (0.710)	0.030 (0.056)
InstQ	0.183** (0.044)	-0.253*(0.000)	0.018 (0.718)	-0.101 (0.069)
Inflation	-0.074 (0.159)	0.055*(0.000)	-0.044 (0.146)	0.029* (0.000)
GDP Per Capita	0.143** (0.032)	-0.137*(0.003)	0.090**(0.019)	-0.092 (0.104)
Lending rate	0.157 (0.053)		-0.096 (0.058)	
Private credit		0.062(0.053)		0.0529(0.057)
Constant	-137	30	-114	19.9
N	363	386	360	377
R^2	0.77	0.68	0.98	0.79

This table presents results of static OLS and dynamic OLS. Asterisk * and ** indicate significance at 1% and 5% respectively. The p-values are reported in parenthesis. Source: Author's estimations.

Table 4.9 Base model- System-GMM dynamic panel-two step robust estimate

		Private Credit		Lending Rate
	D-GMM	SYS-GMM	D-GMM	SYS-GMM
Constant	-782	-77.39	-8.65	86.69**
	(224)	(0.563)	(-1.99)	(0.016)
Private Credit L.1	0.261	0.725**		
	(0.110)	(0.018)		
Lending Rate L.1			0.895	0.521**
			(1.704)	(0.050)
Domestic Debt	-0.191**	-0.221**	-0.051	-0.033
	(0.036)	(0.031)	(0.263)	(0.257)
Money Supply	0.534**	0.318**	-0.367	-0.125
	(0.047)	(0.032)	(-0.075)	(0.109)
Oil Price	0.674	0.236**	-0.075	-0.038
	(0.811)	(0.045)	(0.162)	(0.642)
Inst. Quality	0.812	0.602**	-0.082	-0.148
	(3.821)	(0.042)	(0.111)	(0.155)
Inflation	-0.017	-0.023	0.049***	0.043***
	(0.094)	(0.538)	(0.001)	(0.000)
Lending Rate	-0.801	-0.695		
	(0.256)	(0.627)		
Private Credit			0.094	0.157
			(0.061)	(0.155)
GDP Per Capita	0.063	0.105	0.282	-0.009
	(0.070)	(0.052)	(0.115)	(0.913)
Countries	28	28	28	28
Observations	148	148	145	145
No. of instruments	18	26	16	24
Hansen J- test	0.847	0.866	0.506	0.661
Diff. in Hansen test	0.265	0.924	0.678	0.999
2nd Order Correlation	0.703	0.482	0.397	0.359

P-values in parenthesis.
***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.
Private credit, domestic debt, money supply. Source: Author's calculation.

The F-test of joint significance reports that we reject the null hypothesis that the independent variables are jointly equal to zero (p = 0.000) at any conventional level of significance. Based on our various statistical tests, there is satisfactory evidence to conclude that our obtained estimates satisfy the key assumptions of GMM estimation.

Next, we move to the economic explanation of the results reported in Table 4.9. One percent increase in government domestic borrowing significantly decreases bank credit by 0.22 per cent. An increase in the institutional quality index by 1 increases bank credit by 0.6 percent. A $1 increase in the world price of crude oil increases bank credit by 0.2 percent. The first variable of interest (Domestic Debt) is negative and statistically significant at the 5 percent level; there is some crowding out effect on private credit by government borrowing of (-0.22) in absolute value which is smaller than the (-1.4) recorded by Emran and Farazi (2009) in a panel of 60 developing countries. It is also significantly smaller than the (-1.8) reported for Egypt (Shetta and Kamaly, 2014). There could be several reasons for this; one might be due to the banking structure in oil-rich countries because banks in resource-based economies tend to display higher profitability and are more liquid and better capitalized. Therefore, if banks have excess liquidity, a higher lending to the government may not result in any significant reduction of credit to the private sector. Second, banks in oil-rich economies disburse a small amount of private credit to the private sector, that is, the banks are already ineffective in channelling resources to the private sector and thus, increased government borrowing would have a smaller effect on the already small bank credit. Third, resource firms have better access to global financial markets because government ownership often play a big role in the resource sector (Wolf, 2009). Therefore, the resource sectors' access to international loan market might contribute to the excess liquidity in the banking sector and thus mitigate government borrowing from crowding out banks' lending to the private sector.

The second variable of interest (Lending Rate) is statistically insignificant; government borrowing does not affect the lending rate banks charge to the private sector. The reason for the insensitive interest rate in oil-rich countries could be the increasingly competitive nature of the domestic financial system, though unlikely given the high profitability of the banks. It might also be a result of the integration among international financial markets, though disputable since financial integration is associated with features like liquid equity market, a lower cost of capital, and good credit ratings; a rarity in these countries. Then which of the theorems conform to our results: the Neo-classical theory of interest rates explains that fluctuations in the interest rate arise from variations either in the demand for loans or in the supply of loans. This mostly takes place in market-based economies; our research results do not conform to this. The Ricardian

equivalence theorem expounds that increases in the deficit financed by fiscal spending will be matched with a future increase in taxes leaving interest rates unchanged. This happens mainly in economies that have workable tax system; our research results do not conform to this. The Capital inflow hypothesis proposed that an increase in the deficit will be financed partly or wholly not by domestic savings but by an inflow of capital from abroad, thus interest rates will remain unchanged. This occurs mostly in economies with well-developed financial system; our research results do not conform to this. The Keynesian model assumes expansionary fiscal policy will lead to little or no increase in the interest rate because there is usually unemployment in the economy and the interest rate sensitivity of investment is low. Though our results lean towards Keynesian model, but it is very likely the reason for the little or no increase in the interest rate in oil-rich economies is because the financial markets are underdeveloped and/or governments still exert some control on domestic banks since loans are mostly not given according to the expected returns on projects but mostly on non-market based considerations.

The coefficient of 'Quality of Institution' is positive and statistically significant at the 5 percent level. This shows good institutions enhance banks' ability to lend to the private sector. The law and finance literature emphasizes the critical role of institutional framework for financial development and output growth (see La Porta et al., 1998). The ability of a country's institutions to protect private property and provide incentives for investment is a vital explanation for the persistent disparity in financial market development and economic performance across countries (Osili and Anna, 2004). Hooshmand et al., (2013) show that oil rent has negative effect on financial development (through institutional quality channel) for some selected oil-exporting countries. Cherif and Dreger (2016) also show that institutional conditions are important to explain the development of the financial market in the oil-rich Middle East and North African (MENA) region.

The coefficient of 'Oil Price' is positive and statistically significant at the 5 percent level. The results show that crude oil price is a key driver of financial intermediary development in oil-rich countries. Movements in crude oil price influence fiscal spending (Poghosyan and Hesse, 2009) which determines the level of economic activities and the demand and supply of financial intermediary services. Movements in crude oil prices influence both the liquidity decisions and the systematic risk exposure of financial intermediaries in oil-exporting countries which in turn influence their ability to make credit available to the private sector (Nwani et al., 2016).

Government domestic borrowing has a depressing effect on private credit, however, private credit in oil-rich countries depends mainly on money supply (which depends on resource revenues) and the quality of institutions.

Chapter 5

Conclusion, Policy Implications, and Limitations

5.1 Bank Credit and Non-hydrocarbon Economic Growth

5.1.2 Introduction

Oil-rich economies struggle to develop sectors outside the production of raw materials. Natural resource sector especially oil and gas do not require as much external financing as other industries (Rajan and Zangales, 1998; Guriev et al., 2009). Even though resource sectors in oil-rich countries depend less on external funding, they have better access to international capital markets (Wolf, 2007). In other words, the hydrocarbon sector is better positioned to source for bank credit and financial services than the non-hydrocarbon sector due to their better cash flows, government ownership, higher profits and better collateral. Financial sector development is thus more important for industries with high dependence on external financing. The oil-rich economies are dominated by hydrocarbons and thus possess certain characteristics not shared by other economies, and the need to diversify is more pronounced because their economic dynamics is mainly determined by the prices of hydrocarbons rather than by domestic economic activities (Samargandi et al., 2014). Over the last decade, oil-dependent countries have been promoting diversification towards the non-oil sector. In particular, significant priority has been given to the financial sector. The oil-rich countries have made some attempts to modernize their financial systems despite challenges posed by the large hydrocarbon sector and an inefficient public sector. To this end, this study explored the impact of bank credit in the growth of oil-rich economies and tests if it differs in the emerging non-oil sectors. The result shows that, on average, bank credit significantly increased economic growth in oil-rich economies but has no significant impact in the growth of the non-oil sector. These research results have some policy implications.

5.1.3 Policy Implications

Oil price contributes significantly to the growth of the non-oil sector. The high dependency on oil revenues with swings in oil price adds to the volatility of government revenues and spending in oil-dependent countries. Swings in oil price weakens fiscal planning because it leads to revenue volatility and volatility has negative effects at the macroeconomic level, on productivity growth, and the rate of private sector investment. In fact, swings in oil price

undermines macroeconomic management. For long, oil-rich countries have enjoyed excess liquidity in the domestic financial system but recently the banking sectors are experiencing tightening of liquidity and declining private sector credit growth due to higher cost of funds and increased debt financing by governments. While some of the reduction in bank credit growth reflects weaker economic conditions and lower demand for loans, the drop in liquidity is mainly due to lower oil export receipts which has constrained credit supply, tightened lending and undermined the ability of the private sector to pick up amidst downsizing public sector, creating negative consequences for growth and job creation. The oil market is inherently cyclical, therefore diversifying the economy away from the oil sector will help curtail the downsides of swings in oil revenues.

One way is to increase access to credit available to the non-oil sector. The non-oil sector generates more employment and has the potential to absorb the burgeoning labour force. But banks are reluctant to hand out loans especially to sectors of the economy outside natural resources. Banks look for short-term, profit maximizing investments and fear the fundamental risk associated with investing in new activities (Kay, 2012). One of the key impediments of financial intermediation in resource-rich countries is the underdevelopment of the banking sector and the illiquid and small stock markets (Beck, 2011). Since banks dominate the financial system in oil-rich countries and they are reluctant to lend to the non-oil sector and stock markets are small with few listed securities, non-bank financial institutions, such as insurance companies and pension funds do not play an active role, then options to access the financial markets for the non-oil sector tend to be more limited, less efficient and more expensive. The outlays for developing the traditional financial system, and especially a larger, more effective and efficient market with several types of financial products, can be overwhelming for the oil-rich countries, and more importantly the process may take time. The question is then: are there alternative conduits through which the financially constrained sectors can fund their investment before a better-functioning financial system is put together? The role of governments in building inclusive financial sectors for development is critical. Governments should lead initiatives and encourage alternative sources of finance that are capable of fulfilling this gap. This sources can take the form of industrial finance and development corporations. The emergence of alternative sources will provide options to the non-oil sector to access financial services and also induce competition in the provision of financial services.

Financial development is critical to assembling domestic savings to fund private sector–steered economic diversification. Developing a growth-enhancing financial system requires set of structural reforms and policy measures such as re-establishing and maintaining macroeconomic

stability most especially through a countercyclical fiscal policy that minimizes the impact of volatile oil prices; for instance, policymakers should build up a liquidity fund in good times that can be tapped to smooth consumption spending when resource inflows fall short. More so, improving the legal framework to protect creditor rights and judicial enforcement, restructuring the insolvency system; maintaining and upholding high standards of corporate governance, improving competition in the banking sector since competition promotes financial inclusion and increases firms' access to finance (Love and Martinez-Peria, 2012). Improving credit information gathering and sharing system will enable banks to better assess credit risk. These policy measures will create a conducive environment and hence boost the quality and quantity of intermediation to the non-oil sector.

Government consumption drives the growth of the non-oil sector. But this ignores the fact that the economy has limited economic resources and that government spending could actually diverts economic resources away from the private sector. Increased government spending may induce the private sector to contract and conversely cuts in government spending might release economic resources the private sector could use more productively. A considerable share of the non-oil growth has been driven by the public sector, but this seems to be running out of steam, as government finances become tighter amidst falling oil prices. In other to cut government spending without undermining the non-oil economic growth, policymakers should increase capital expenditure and reduce recurrent expenditure. The added infrastructure will complement private sector investment and thus crowd-in government consumption in some areas, and with time scale back government consumption. This will weaken the structural dependence of non-oil activities on government spending.

5.1.4 Limitations and future research direction

Like any other study, our findings also suffer from some limitations. The impact of financial intermediation could possibly vary across the countries due to the heterogeneous nature of economic structures, institutional quality, financial markets, and non-hydrocarbon revenue to total gross domestic product. Although pooling the countries is the most efficient way to estimate the empirical model, parameter heterogeneity is a non-negligible concern. In view of this, caution should be exercised when interpreting the results. Furthermore, it is almost impossible to account for all possible factors that may foster growth; this is because there are many variables that could exert an effect on growth.

This research study used the ratio of commercial bank credit to private sector as a percentage of GDP to capture financial intermediation and the quantitative development of the banking sector. Future research should incorporate interest rate spread, which is the gap between bank

lending and deposits; used as an indicator for domestic banking sector quality, to look at the quality of financial intermediation. Other measures could also be incorporated to appraise the quality of lending. This indicator is particularly important in resource-rich economies because of the high level of leakage (loans are mostly given according to non-market based considerations) in addition to transparency and accountability issues.

In addition, further research could include other financial sector indicators, such as stock market capitalization and the ratio of traded value to GDP (was omitted due to the dearth of long-span time series data in some of our sample countries) and more importantly incorporate international debt issues (ratio of international debt issues to GDP, which indicates degree of access to international capital markets) and loans from non-resident banks (ratio of loans by non-resident banks to GDP, which indicates the use of foreign bank loans as a source of finance) to estimate the roles of international capital markets and foreign banks in oil-rich economies.

This research results shed more light on the link between finance and the growth of emerging non-oil sector in oil-rich economies; the growth of non-oil sector is crucial to the creation of a more inclusive, resilient and sustainable economy, but the reluctance of banks to lend them is a handicap. The findings will buttress the case to provide more access to finance for the non-oil sector and incentivize governments to inculcate policies that will bridge the 'broken' link**.** This also calls for intensified efforts in resource-rich economies to deepen and broaden the financial sector.

5.2 Government Domestic Borrowing and Crowding Out Effect

5.2.1 Introduction

One of the signs of economic development is the increasing role of the private sector. The level of domestic credit to private sector measures financial resources provided to the private sector by financial institutions. Credit is the oil that lubricates the engine of an economy; for this reason, it's watched closely to assess economic growth. The higher the credit to private sector, the higher the financial resources to the private sector and the greater the opportunity for the private sector to grow and develop. The higher this measure, the better is generally the health and development of the economy. Bank credit to the private sector is relatively low in oil-rich economies which invariably means the private sector has less role to play. Oil-rich countries disburse relatively less bank credit to the private sector even though the banks are more liquid. The persistent talks in policy cycles and media have increasingly blamed government borrowing for crowding out private credit. One of the most common forms of crowding out takes place when a government increases its domestic borrowing and because governments

have the power to borrow large sums of money, doing so can actually have a substantial impact on the real interest rate, raising it by a significant degree. This has the effect of absorbing the economy's lending capacity and discouraging businesses from engaging in capital projects. Because firms often fund such projects in part or entirely through financing, they are now discouraged from doing so because the opportunity cost of borrowing money has risen. Is government domestic borrowing a contributing factor to the low level of private credit in oil-rich economies? This study shows that government domestic borrowing has a significantly negative effect on private credit but it does not result in an increase in the interest rate charged by banks on loans to the private sector. These research results have several policy implications.

5.2.2 Policy Implications

The effect of government domestic debt in oil-dependent countries is 'substantial' though smaller than results recorded in other developing countries and thus shows the peculiar nature of oil-dependent economies. However, substantial and persistent levels of government debt can cause downward pressure on domestic loanable funds and thus hinder private investment and suppress economic growth. The importance of developing and maintaining strong institutions to control spending, manage debt and maximize domestic revenue collection cannot be overemphasized. There is no significant changes in lending rates as a result of government domestic borrowing, therefore governments in oil-rich countries should not be overly concerned about whether domestic borrowing affects lending rates, but rather focus on the levels of financial intermediation because the quantity of credit changes without concomitant increase in the interest rate.

The key macroeconomic variables in oil-rich economies display a high degree of volatility; revenue, debt and spending are highly correlated with the global crude oil price. This volatility obscures fiscal policy, requiring the government to turn to debt financing or draw on previously accumulated funds to smooth spending in periods when revenue falls below expectations. The limited and uncertain nature of hydrocarbon wealth creates challenges in which there is a need to transform finite assets and income from depleting natural resources into sustainable wealth in the form of financial assets and investment income. Therefore, policymakers should build up a liquidity fund in good times that can be tapped to smooth government spending when resource revenues fall short. In other words, oil-rich countries should establish an independent sovereign wealth fund so that in periods when revenue falls below expectations due to oil price volatility, spending can be maintained by drawing on reserves funds. However, without the sovereign wealth fund, or even with depleting reserve funds, oil-rich economies will resort to borrowing

from domestic banks to fund budget deficits which will exacerbate the already meagre loanable funds available to the private sector.

Banks are more willing to lend to the oil sector, it means the non-oil sector suffers most from the increased government borrowing on the already thin loanable funds. In other words, when the government borrows from domestic banks, the burden of crowding out falls heavily on sectors that struggle to access domestic credit and on borrowers that cannot borrow internationally, usually the non-oil sectors rather than the oil sector. While governments are encouraged to support alternative sources of finance that are capable of fulfilling this gap, they need to consider the potential implications of increased internal borrowing on the burden of crowding-out the financially constrained sectors.

The low credit to the private sector reflects both demand and supply factors. Potential factors that reduce credit demand could be a dearth of profitable investment opportunities and the availability of alternative financing instruments such as the capital markets. Factors affecting loan supply include liquidity, increase in uncertainty, lack of competition in the banking sector, underdeveloped capital markets, lack of information about the quality of borrowers, and imperfect legal environment. Low credit demand does not appear to be the main reason for the low levels of bank lending because alternative financing channels are not readily available, rather the low level of bank credit reflects mostly supply and institutional factors such as the lack of competition (given the high profitability of banks in resource-rich economies) which allows banks to keep their credit levels low. The quality of institutions is critical to boost private sector credit; in other words, improving the quality of institutions will curtail the negative effect of oil shock and also help to sustain private credit development.

5.2.3 Limitations and future research direction

This research study has some limitations that may provide a basis for additional research. Some governments tend to borrow less from banks due to their huge foreign reserves. In this case, this may have diluted the coefficients' estimates. Secondly, this research study shows that government domestic borrowing did not significantly affect the lending rate domestic banks charged to the private sector; however, it did not empirically buttress the reasons for the interest rate insensitivity.

Therefore, future research should empirically investigate whether liquidity fund (i.e. sovereign wealth fund) could mitigate government domestic borrowing. Secondly, future research should investigate whether oil-rich economies with more diversified financial sector (i.e. Malaysia) could ameliorate the suffocating effect of government domestic borrowing since more

diversified financial sector promotes competition and creates more opportunities for the private sector to source funds. While lots of research have been done on banking sector and private sector development since it is assumed that small and medium-size enterprises are more dependent on domestic banks, more research should look at whether bank-based or market-based finance plays a bigger role in private sector development for the case of oil-rich economies.

More study could beam more light to quantify the reasons for the insensitive interest rate in oil-rich economies. Could it be that it occurs mostly when deficits are high, high domestic debt is persistent, financial openness is low, interest rates are not liberalized (when central banks sets monetary policy based on quantitative targets, such as loan quotas, to a market system where policies are based on market forces setting the price of and hence allocating capital), when financial depth is low, or government intervention is high.

This research results are important for understanding the mechanism through which government domestic borrowing affects private investment in oil-rich economies. This is because private investment depends critically on the availability of private credit, hence, crowding out of private credit may have significantly disadvantageous effects on private investment and consequently on economic growth. Notwithstanding the aforementioned limitations, our results are interesting: government domestic borrowing has resulted in the shrinking of private credit in oil-rich countries but this works through the credit channel and not the interest rate channel.

Appendix A

A.1 Determinants of real private credit

	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit
Domesticdebt	0.274	-0.144	-0.145	-0.143	-0.142	-0.142	-0.147
	(4.66)**	(7.82)**	(7.77)**	(7.74)**	(7.58)**	(7.40)**	(7.14)**
Moneysupply		0.736	0.737	0.714	0.713	0.713	0.725
		(79.00)**	(76.77)**	(70.50)**	(69.10)**	(67.17)**	(60.70)**
Oilprice			-0.057		0.095	0.094	-0.109
			(0.32)		(0.49)	(0.46)	(0.42)
InstQ				2.135	2.130	2.238	1.827
				(3.43)**	(3.42)**	(3.33)**	(2.02)*
Inflation						0.018	-0.073
						(0.63)	(1.39)
GDPpercapita							0.143
							(2.14)*
Lendingrate							1.547
							(1.91)
_cons	243.915	-6.563	-4.400	-119.605	-123.736	-129.305	-137.356
	(13.63)**	(1.05)	(0.48)	(3.51)**	(3.52)**	(3.38)**	(2.41)*
R2	0.03	0.91	0.91	0.93	0.93	0.93	0.93
N	620	620	619	452	452	429	363

* p<0.05; ** p<0.01

The dependent variable is real private credit. All variables are in log, except oil price, institutional quality, inflation and lending rate. The model is estimated with OLS. Source: Author's estimations.

A. 2 Determinants of nominal lending interest rates, 1990-2012

	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate
Domesticdebt	-0.004	0.027	0.016	0.027	0.016	0.016	0.028
	(0.16)	(1.10)	(0.64)	(1.19)	(0.68)	(1.16)	(1.95)
Moneysupply		-0.060	-0.047	-0.032	-0.021	-0.026	-0.071
		(4.72)**	(3.60)**	(2.53)*	(1.64)	(3.34)**	(2.78)**
Oilprice			-0.083		-0.087	-0.061	-0.050
			(3.20)**		(3.29)**	(3.84)**	(3.12)**
InstQ				-0.584	-0.569	-0.261	-0.198
				(7.30)**	(7.18)**	(5.31)**	(3.63)**
Inflation						0.054	0.055
						(27.48)**	(27.97)**
GDPcapita							-0.137
							(3.20)**
Bankcredit							0.062
							(1.81)
_cons	17.736	19.930	22.957	50.663	53.514	33.562	30.568
	(23.02)**	(22.47)**	(17.81)**	(11.38)**	(11.94)**	(12.01)**	(10.09)**
R2	0.00	0.04	0.06	0.15	0.17	0.72	0.73
N	543	543	542	408	408	386	386

* p<0.05; ** p<0.01

The dependent variable is the nominal lending interest rate.
All variables are in log, except oil price, institutional quality, inflation, lending rate. The model is estimated with OLS. Source: Author' estimations

Appendix B

B.1 Pooled Mean Group, GDP per capita

Pooled Mean Group Regression
(Estimate results saved as pmg)

Panel Variable (i): region
Time Variable (t): year

Number of obs = 525
Number of groups = 28
Obs per group: min = 10
avg = 18.8
max = 22

Log Likelihood = -495.9059

D.gdppercapita	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ec						
bankcredit	.0657953	.0142898	4.60	0.000	.0377877	.0938029
govtconsumption	-.1583543	.0439463	-3.60	0.000	-.2444875	-.072221
tradeopenness	-.0076259	.0061817	-1.23	0.217	-.0197417	.0044899
priceofcrudeoil	.0712599	.0107336	6.64	0.000	.0502225	.0922973
SR						
ec	-.0289081	.0259764	-1.11	0.266	-.0798208	.0220047
bankcredit						
D1.	.0631761	.0541795	1.17	0.244	-.0430138	.169366
govtconsumption						
D1.	.1322143	.1148133	1.15	0.250	-.0928156	.3572442
inflation						
D1.	.1428261	.1352697	1.06	0.291	-.1222976	.4079498
priceofcrudeoil						
D1.	.178049	.1751988	1.02	0.310	-.1653344	.5214324
tradeopenness						
D1.	.0575828	.0205956	2.80	0.005	.0172162	.0979494
_cons	3.563039	2.247066	1.59	0.113	-.8411285	7.967207

B.2 Pooled Mean Group, Non-hydrocarbon GDP per capita

Pooled Mean Group Regression
(Estimate results saved as pmg)

Panel Variable (i): region
Time Variable (t): year

Number of obs = 539
Number of groups = 28
Obs per group: min = 12
avg = 19.3
max = 22

Log Likelihood = -748.593

D. nonhydrogdppe~a	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ec						
bankcredit	-.0149911	.0084211	-1.78	0.075	-.0314962	.0015139
govtconsumption	.1493759	.0476575	3.13	0.002	.0559689	.242783
tradeopenness	.003631	.0058722	0.62	0.536	-.0078783	.0151403
priceofcrudeoil	.2227737	.0335471	6.64	0.000	.1570227	.2885247
SR						
ec	-.1064617	.0225281	-4.73	0.000	-.1506161	-.0623074
bankcredit						
D1.	.239426	.1411097	1.70	0.090	-.0371439	.5159959
govtconsumption						
D1.	.1357577	.0773481	1.76	0.079	-.0158419	.2873572
priceofcrudeoil						
D1.	-.1926577	.0628731	-3.06	0.002	-.3158867	-.0694287
tradeopenness						
D1.	.0039609	.0116797	0.34	0.735	-.0189308	.0268527
_cons	3.562686	1.486563	2.40	0.017	.6490758	6.476297

B.3 Pooled Mean Group, Hydrocarbon GDP per capita

Pooled Mean Group Regression
(Estimate results saved as pmg)

Panel Variable (i): region
Time Variable (t): year

Number of obs = 539
Number of groups = 28
Obs per group: min = 12
avg = 19.3
max = 22

Log Likelihood = -692.3294

D. hydrogdpperca~a	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ec						
bankcredit	.0191355	.0267848	0.71	0.475	-.0333617	.0716327
govtconsumption	-.0586894	.0848242	-0.69	0.489	-.2249418	.1075631
tradeopenness	-.0794124	.0390784	-2.03	0.042	-.1560048	-.0028201
priceofcrudeoil	2.474101	.8913419	2.78	0.006	.7271026	4.221099
SR						
ec	-.0003717	.0108814	-0.03	0.973	-.0216989	.0209555
bankcredit						
D1.	-.2385321	.1784783	-1.34	0.181	-.5883432	.111279
govtconsumption						
D1.	.0107443	.18101	0.06	0.953	-.3440288	.3655174
priceofcrudeoil						
D1.	.3918285	.2201421	1.78	0.075	-.0396421	.8232991
tradeopenness						
D1.	.0533863	.0192336	2.78	0.006	.0156892	.0910833
_cons	1.776544	.8891215	2.00	0.046	.0338983	3.519191

B.4 Cointegration Test: Non-hydrocarbon GDP per capita

xtwest nonhydrogdppercapita bankcredit, lags (1 2) leads (1 2) lrwindow (3) constant trend westerlund

Test	Value	Z-value	P-value
Gt	-4.058	-11.212	0.000
Ga	-13.32	-1.132	0.129
Pt	-17.383	-7.225	0.000
Pa	-10.339	-1.227	0.110

B.5 Cointegration Test: GDP per capita

xtwest gdppercapita bankcredit, lags (1 2) leads (1 2) lrwindow (3) constant trend westerlund

Test	Value	Z-value	P-value
Gt	-3.974	-10.658	0.000
Ga	-13.415	-1.207	0.000
Pt	-16.991	-6.767	0.114
Pa	-16.597	-6.771	0.000

B.6 Bootstrap Panel Cointegration Test: Non-hydrocarbon GDP per capita

xtwest gdppercapita bankcredit, lags (1) leads (1) lrwindow (3) constant trend bootstrap (800)

Test	Value	Z-value	P-value	Robust P-value
Gt	-2.518	-0.985	0.162	0.162
Ga	-7.188	3.753	1.000	1.000
Pt	-11.021	0.179	0.571	0.571
Pa	-6.283	2.287	0.889	0.889

B.7 Bootstrap Panel Cointegration Test: GDP per capita

xtwest gdppercapita bankcredit, lags (1) leads (1) lrwindow (3) constant trend bootstrap (800)

Test	Value	Z-value	P-value	Robust P-value
Gt	-2.101	-0.736	0.048	0.027
Ga	-7.812	-2.837	0.038	0.021
Pt	-10.263	-9.462	0.046	0.034
Pa	-8.173	-1.287	0.062	0.056

B.8 Summary of variables used for the government borrowing and crowding out

Variables	Obs	Mean	Standard Deviation	Min	Max
Private Credit	622	257	447	0.0917	23335
Government Credit	620	45	300	-2400	1620
Interest Rate	580	17	18	5	218
Money Supply	622	366	595	0.1394	3272
Institutional Quality	558	55	10	24	78
Inflation	601	93	1023	-12	23773
GDP per Capita	637	63	106	2	926
Oil Price	639	42.3	31.21	13	111

B.9 Summary of variables used for the bank credit and non-oil economic growth

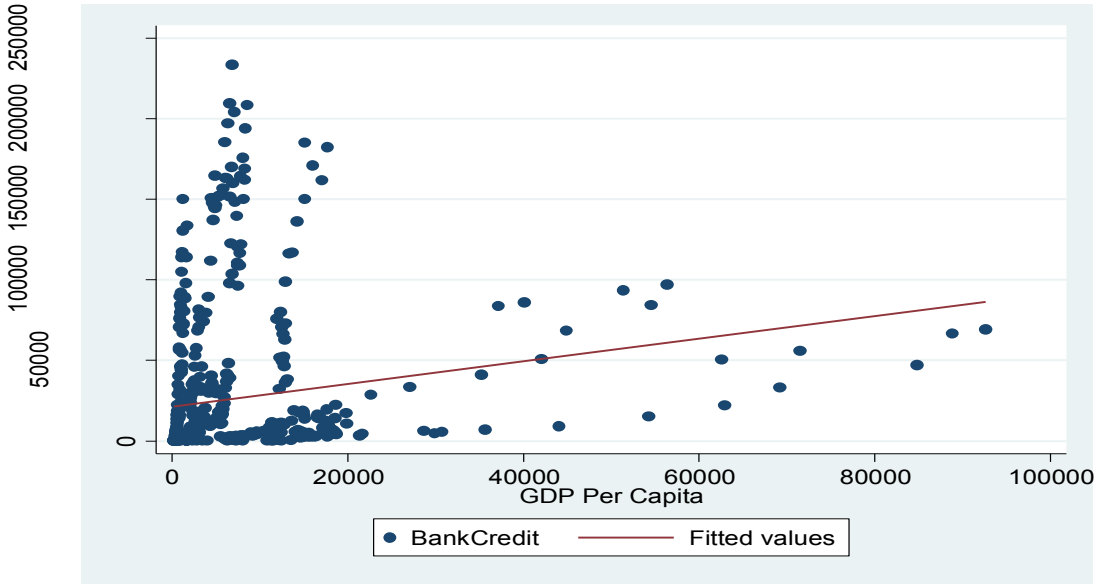
Variables	Obs	Mean	Standard Deviation	Min	Max
GDP Per Capita	637	63	107	2	926
Non-hydro GDP Per Capita	635	40	65.077	0.15	698
Bank Credit	622	257	447	0.091	2335
Trade Openness	608	616	999	2.68	6845
Price of Crude Oil	639	42	21	13	111
Govt. Consumption	593	117	214	0.215	1199

B.10 Sample of countries used in the regression analysis

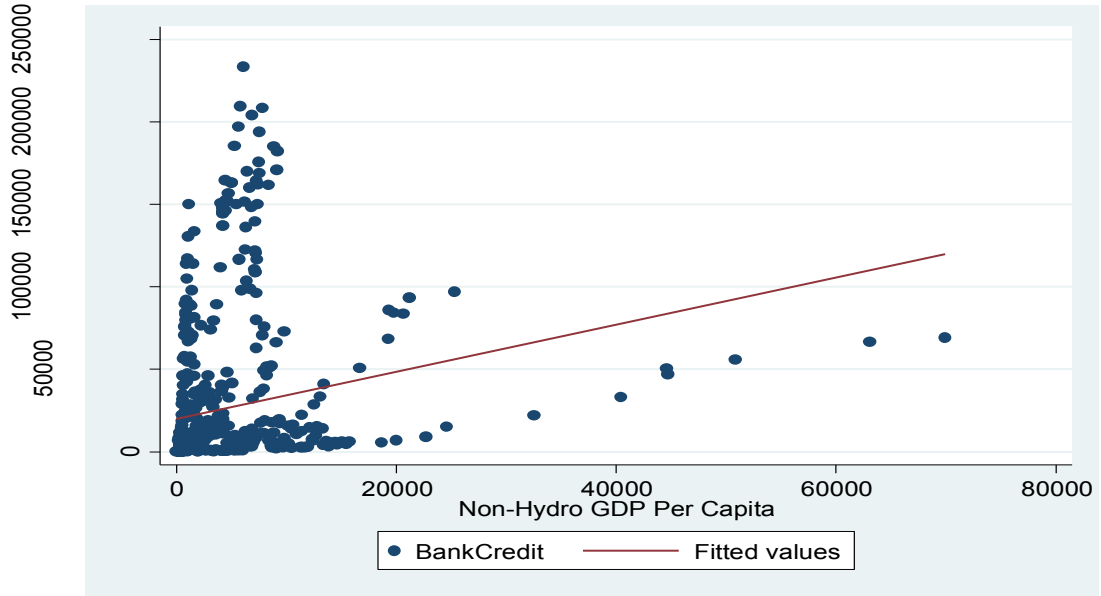
Africa	Latin America	Middle East	Eastern Europe	Asia Pacific
Algeria	Bolivia	Saudi Arabia	Azerbaijan	Papua New Guinea
Angola	Mexico	Qatar	Kazakhstan	Indonesia
Equatorial Guinea	Ecuador	Syria		Malaysia
Gabon	Trinidad	Kuwait		Vietnam
Nigeria	Venezuela	Iran		
Cameroon		Yemen		
Chad		Bahrain		
Congo Rep		Oman		
Dem. Rep. Congo				

Appendix C

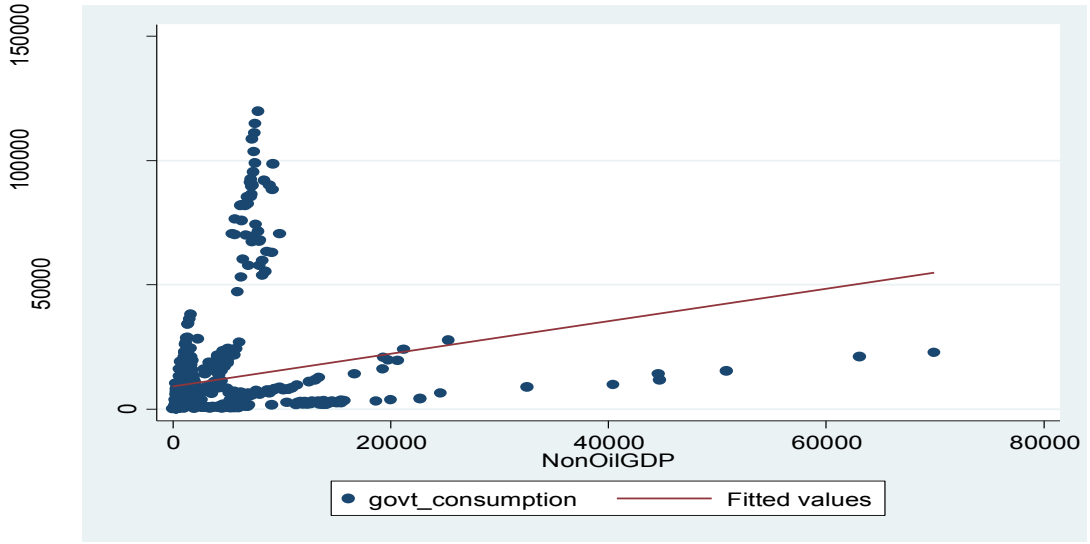
C.1 GDP Per Capita and Bank Credit



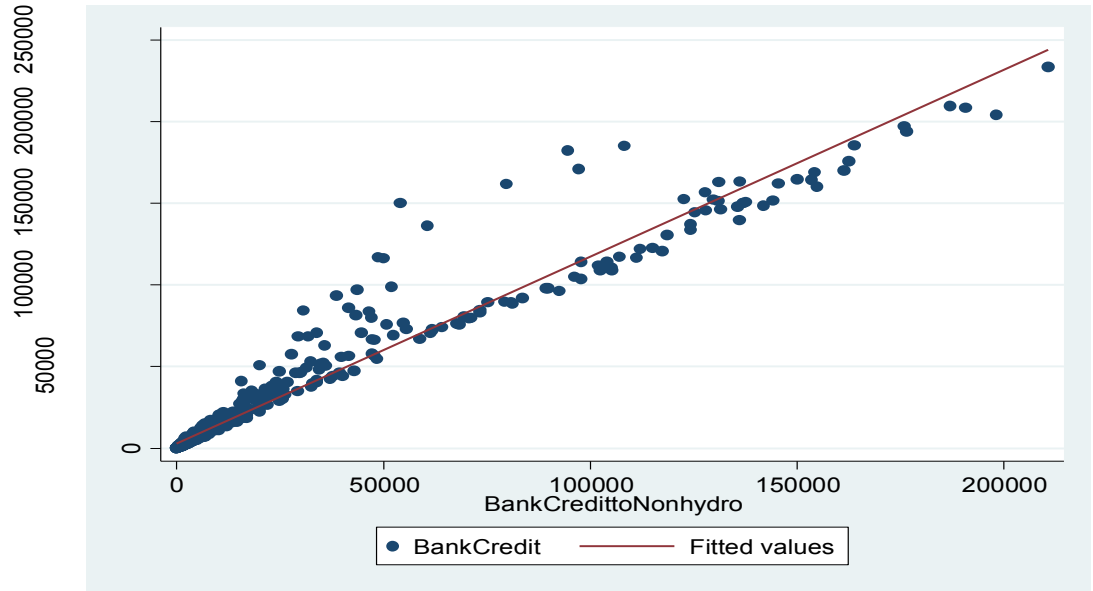
C.2 Non-hydrocarbon GDP Per Capita and Bank Credit



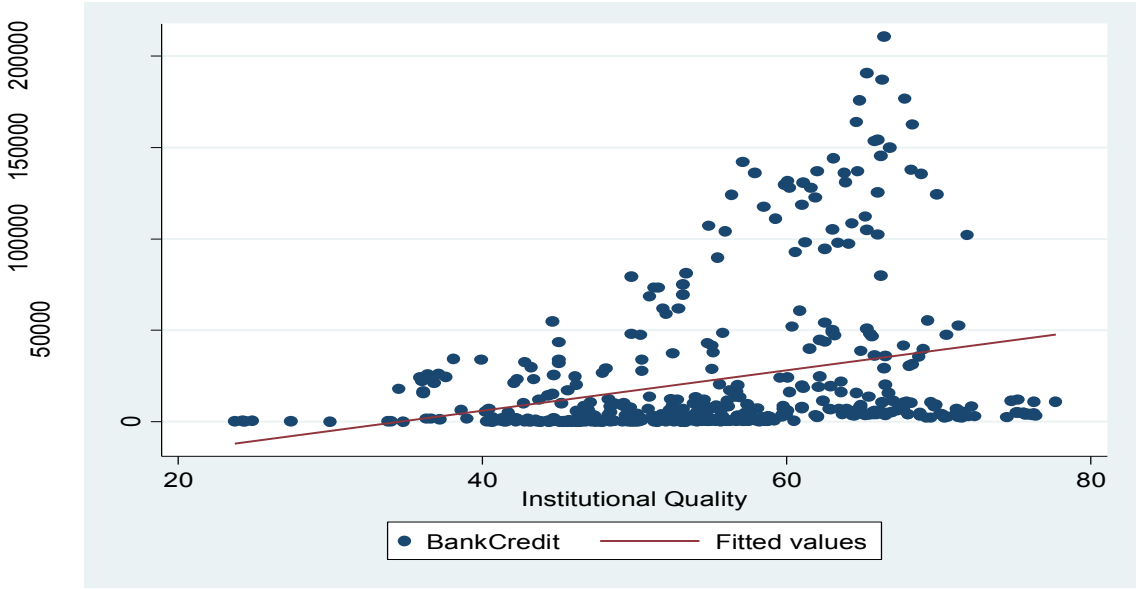
C.3 Non-hydrocarbon GDP Per Capita and Government Consumption



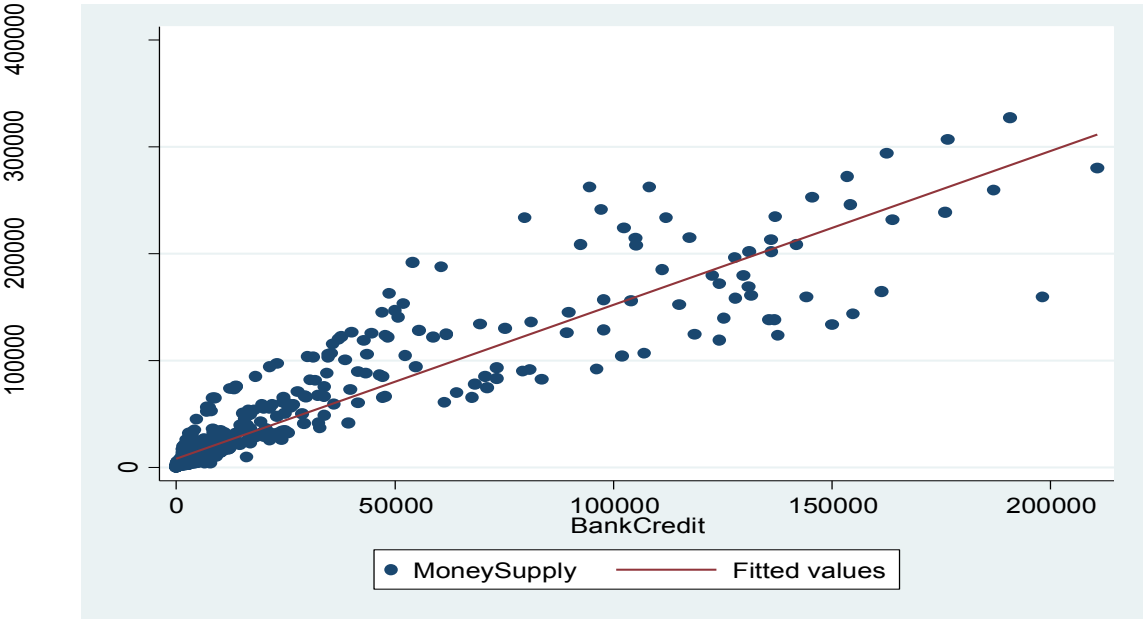
C.4 Bank Credit and Bank Credit to Non-Hydrocarbon Sector



C.5 Institutional Quality and Bank Credit



C.6 Money Supply and Bank Credit



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