ESSAYS ON THE RELATIONSHIP BETWEEN FINANCIAL SECTOR DEVELOPMENT AND ECONOMIC GROWTH

By

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ABSTRACT

This study investigates how financial sector development affects economic growth. The determinants of growth which include financial development have been a subject of academic investigation for the last three centuries. In all these efforts, it has been difficult for researchers to be definitive on the forces that affect growth and to explain the differences in the level of growth among nations. The neoclassical link growth to capital accumulation(CA) and total factor productivity(TFP). More recently, researchers report that financial sector development could result in capital accumulation, innovation, and total factor productivity. We investigate these claims and the various ramification of financial development and how they explain growth and the differences in the rates of growth in different contexts. For example, in chapter two of our thesis, we examine the nature of the finance-growth and finance-growth volatility functions in the context of Nigeria using time series data. To analyze the data, we use semi-parametric, Hansen sample splitting and threshold estimators. Our results are revealing.

Contrary to the recent literature, we have no evidence of “to much finance.” We had evidence of U-shaped functions in both the finance – growth, and finance – growth volatility relationships. We discuss policy implications of our findings and make recommendations for reforms based on our results.

In chapter three of our thesis, we follow up to examine the nature of the finance-growth relationship in the oil-producing countries and compare that with the same relationship in the non-oil producing countries. We purposely selected thirty countries based on the magnitude of the oil production from every continent, we also selected a sample of thirty non-oil producing countries and we sub-divided the samples into two based on the positive and negative indices for institutions in each country. We employ dynamic panel GMM and threshold regressors to analyze our data. We obtain very useful results. We

have evidence of "too much finance" and inverted U-shaped functions in all our models. The threshold points in the two samples and the sub-samples were quite revealing. In the oil-producing countries, the thresholds were at 10.62% for the whole sample, 5.38% for the sample with negative indices for institutions, and 79.11% for the sample with positive indices for institutions. The thresholds were different and better in the non-oil producing countries: 14.81% for the whole sample, 14.71% for the countries with negative indices for institutions and 142.25% for countries with positive indices for institutions. Based on our results, we suspected the syndrome of "resource curse" in financial sector development. The implications of our findings are discussed, policy suggestions and areas of further research are articulated.

In chapter four, we take up an interesting ramification of financial sector development - the structure of the financial sector (bank-based vs. market-based) and examine to see if it matters in economic growth and growth volatility. Our time series data came from the context of Nigeria from 1980 – 2015. We analyze our data using ARDL estimator. Our results were important for finance-growth literature and policymakers. Market-based financial structure distinguishes itself with a stronger effect on economic growth and growth volatility. These results agreed with the recent literature on the subject and had a huge implication for financial sector development in developing countries. We discussed these implications and suggested policy reforms for economic growth ambitions coming from the heels of financial development.

In our chapter five, we examine a unique and interesting aspect of financial sector development and how it solves funding problems for the small and medium scale enterprises (SMEs). Our focus in this chapter is the increase in the physical structure of the financial sector unlike the functional - the depth, efficiency, and access which we considered in the previous chapters. We examine how the creation of the second-tier

stock exchanges help SMEs to access funding when extant research believe that stock exchange services are spatial proximity bias. We use Logistic regression to analyze data from Nigeria and found evidence confirming the stock exchange spatial-proximity bias. We confirm the apparent discrimination of stock exchanges in the allocation of funds to firms located far away from the exchanges. We discuss the implication of this result including the skewness in development among regions, resources allocation efficiency and policy miscarriage in the existing practice. We recommend reforms to correct the situation.

Keywords: Financial Sector Development; Economic growth; Growth volatility; Oil-producing countries; Financial structure; SME financing; Spatial-proximity bias

RESEARCH OUTPUT

1. **Thesis:**

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2. **Peer-Reviewed Publications:**

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Declaration

I declare that this thesis is my work. It is submitted in fulfillment of the requirement for the award of Doctor of Philosophy(Ph.D.) in Finance at Wits Business School of University of the Witwatersrand. It has not been submitted before for any degree or examination in any other university.

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Signed ------------------------------------ Date - - - - - - - - - - - - - -

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Chapter 1

Introduction to the thesis

1.1 Background

The background to our research could be traced to the long-standing search for a credible theory to explain the rapid and sustained economic growth experienced in Europe and some parts of the world in the early eighteenth century. It could also be a continuation in the search for a framework to explain economic stagnation, slow growth or poverty in some parts of the world in the period when many countries are experiencing reasonable improvement in their economic welfare. It will be enlightening to mention that before the industrial revolution in Europe, economic growth had been sporadic, and the scale was such that there was no marked difference in the welfare of the people after the growth experience. The scientific discoveries of the seventeenth-century resulted in a sustained expansion in economic output in a scale that dramatically changed the standard of living first in England and after that in America and other parts of Europe. It became the pre-occupation of the thinkers starting with Adam Smith to explain this sudden and increasing upshot in economic output. The Enquiry into the Wealth of Nations, published in 1776 by Adam Smith was a logical outcome of this period.

O'Brien (2007) reports that the Wealth of Nations, as the book is popularly called, provides the intellectual basis for analyzing the concept of economic growth and the differences in the rate of growth among nations. The book, according to the author, describes the required institutional framework and the mechanics which operate within the framework to bring about growth. It becomes clear from the Wealth of nations that the required framework for economic growth includes well-defined and protected property rights which allow and protects ownership of private property and the provision of infrastructure which makes private investment capital more efficient. The book reveals the thinking of the classical Economists regarding the variables of interest in explaining economic growth. The variables include population growth, which caters to labor force; accumulated capital; specialization in production; and the technological progress which changes the efficiency of the production processes. Regarding the mechanics, the classical thinkers believed in private enterprise and self-interest which they trusted to provide for the societal needs. They, therefore, stood against public interferences through taxation, controls and other forms of the state actions.

Just after the period of Adam Smith, the classical thinking was driven by others including Thomas Malthus and David Ricardo. Malthus was concerned about the physical limit of land in conjunction with the exponential increase in population. He feared that such development would interrupt economic growth and bring about famine. He saw control of population growth as the solution. Similar fears also drove Ricardo's work. By this time countries adopted policies to protect farmers and against free trade. Ricardo's works supported free trade, comparative advantage, specialization, and diminishing returns but ultimately with economic growth in focus. The classical era lasted a century until the rise of the marginalists in the 1870s. It gave way to the Neoclassical era in the 1950s with the work of Solow (1956), Cass (1965) and Koopmans (1965), then later Romer (1986) and Barro (1986). With the neoclassical economic thinking, the name of the game did not change; it was still economic growth; variables were only streamlined and redefined. The Neoclassicals believe that growth is determined by human capital, physical capital accumulation, and total factor productivity. The link between FD and capital accumulation and total factor productivity appears to be the point where researchers understood the role of financial development in the economic growth model.

Levine (1997) explains that financial development (FD) affects growth by influencing capital accumulation and total factor productivity which have been identified as sources of growth in the neoclassical model. Levine (1997), using the functional characteristics of

FD, demonstrates how FD feed into capital accumulation and technological innovations to bring about economic growth. For example, Levine asserts that FD affects steady-state growth by influencing capital formation which is affected by the altering of savings rates or by efficient allocation of savings among different capital producing technologies. Financial systems improve market efficiency including improvement in liquidity through the operations of the secondary market operations to enable it to mobilize savings. Market liquidity also facilitates a shift to longer-gestation projects and high-returning technologies in the production process with increased efficiency. Besides risk diversification and capital accumulation according to Levine (1997), market liquidity can also affect technological innovations and therefore TFP growth. After this point, many researchers have reported a strong statistical association between financial sector development and economic growth.

1.2 Research objectives

The key objective of the study is to investigate the relationship between financial sector development and economic growth and growth volatility in Nigeria, oil-producing countries and to compare these with the same relationship in the non-oil producing countries. This objective has been split into four sub-objectives with each being treated in each of the four chapters of the thesis. The four sub-objectives are as follow:

To highlight the nature of the relationship between financial development and economic growth and growth volatility in Nigeria.

To understand the nature of the finance-growth relationship in the oil-producing countries and to compare the relationship in the oil-producing and the non-oil producing countries.

To know if the financial structure of a country affects the relationship between financial development and economic growth.

To establish the extent to which the Second-Tier Securities Market eases the funding needs of the Small and Medium Scale Enterprises (SMEs) in Nigeria. Two premises motivated this objective: first, we gathered that Stock Exchanges are discriminatory in their services based on the proximity of the clients to their location. We examine the probability of firms located in the regions of the country could access funding from the exchange. Secondly, we want to test if the objective of establishing the second-tier stock exchange to provide funding to the SMEs have been achieved.

1.3 Research questions

The following questions were asked and answered in the study to meet the above objectives:

What is the nature of the relationship between financial development, economic growth and growth volatility?

What accounts for the nature of the relationship (linear or non-linear) between financial development, economic growth and growth volatility? These two questions were addressed in chapter one of the report.

What is the nature of the finance-growth relationship in the oil-producing countries and what is the difference in this relationship between the oil-producing and non-oil producing countries? These questions are examined in chapter three.

Which – bank-based or Market-based financial structure best promote economic growth and growth stability in Nigeria? This question is asked and answered in chapter four.

Does proximity-bias-hypothesis of the security exchange hold in Nigeria?

Does the improvement in Technology and communication affect the proximity - bias-hypothesis of the stock exchange and allow SMEs to access funding in the market? These questions were addressed in chapter five of the report.

1.4 The Significance and contributions of the study

This study provides insight into the nature of the finance – growth, and finance – growth-volatility relationships in Nigeria and the oil-producing countries. In Nigeria, the study confirms the conclusion reached on the finance-growth relationship by Adeniyi et al. (2015). Our conclusion on the finance – growth-volatility relationship is perhaps the first to be reported for Nigeria. This conclusion agrees with that of Easterly et al. (2001). Our study also added information on the nature of the finance-growth relationship for the oil-producing countries. It is arguably the first that has been reported on this panel of countries. Our conclusion helps to indicate that oil-producing countries as a group appear to present a unique economic context which is quite different from the non-oil producing countries. Policy formulation and implementation should, therefore, consider this suspicion.

Our conclusion in chapter three highlights the importance of financial structure as it relates to economic growth and growth volatility. Our report on these subjects would be the first empirical work that has been done in the Nigerian context, to the best of our knowledge. We found capital market structure showing better promise in its effect on growth and growth volatility as compared to the bank-based structure. We also tested and reported evidence that securities markets are indeed sensitive to spatial proximity in the allocation of its funds. We have seen no other report where this has been tested empirically. We examined and concluded theoretically, that the spatial proximity behavior of the securities markets does not change even in the era of improved technology and communication. Our conclusion that the second-tier capital market does not appear to ease access to funding to SMEs appears to be the first call on the evaluation of this policy. Finally, our suggestions for policy reforms in each of the chapters could be very useful to policymakers.

1.5 The Organization of the thesis

This report is organized as follows: in chapter two, we examine the nature of the relationship between financial sector development, economic growth and growth volatility using time series data from Nigeria. In chapter three, we investigate the nature of the finance-growth relationship in the oil-producing countries. We also compare the nature of the relationship in the oil-producing countries with the same relationship in the non-oil producing countries. Also, in chapter three, we split our samples between countries with negative indices for institutions and those with positive indices for institutions. We investigate if the nature of the finance-growth relationship in each group depends on the quality of institutions. Our findings are relevant for policy. In chapter four, we examine how the finance-growth relationship changes with the change in the country's financial structure – bank-based vs. market-based. In chapter five, we tested the securities market spatial proximity hypothesis and argue that if the hypothesis is true, the SMEs located in the regions outside the vicinity of stock exchanges will be discriminated against in the allocation of funding. We discuss the developmental implication of such experience. Our study, therefore, is quite relevant as it makes some contributions to literature and makes empirically tested inputs for policy reforms.

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Chapter Two

The non-linear relationship between financial development, economic growth, and growth volatility: evidence from Nigeria.

Abstract

The purpose of this paper is two-fold: to examine the nature of the relationship between financial development and economic growth, and to examine the nature of the relationship between financial development and growth volatility using annual data from Nigeria between 1970 and 2015. We also aim to establish the thresholds in the two relationships. We employ two econometric models for these analyses. First, the semi-parametric, partially linear model used for model specification and second, the dynamic threshold estimator to estimate the point of inflection and observe the nature of the functions. Our results indicate no evidence of 'Too much finance' as claimed by many researchers in recent times. We show that the relationship between financial development(FD) and economic growth(EG) is U-shaped. We also report a U-shaped relationship between financial development and growth volatility(GV). We report the point of inflection in the two functions. From our analysis, the critical point at which FD begins to impact growth positively is 15.6199% of private credit relative to GDP. In the FD/GV function, it is 8.7099%. We discussed the policy implications of our findings and suggest policy reforms.

Keywords: Nigeria; Financial development; Economic growth; Threshold regression; Growth volatility.

2.1 Introduction

The object of this paper is to contribute to the age-long debate on the determinants of countries economic growth and growth volatility. We hope to make this contribution by examining the finance/growth and finance/growth-volatility relationships. These relationships are embodied in the neoclassical theory of economic growth made popular by Robert Solow. The neoclassical growth theory is modeled in the framework of the Cobb-Douglass production model. It maintains that growth and growth rate differences among nations are explained, essentially by three factors – the rate of capital accumulation, the size of labor and total factor productivity or the level of technology. Levine (1997) explains how financial development, through the provision of liquidity, facilitates capital accumulation and total factor productivity and therefore, economic growth.

From the above information on the growth model, the growth function could be linear or non-linear (Romer, 1986).To motivate our expectation of non-linearity in the growth function, we use the assumptions in the neoclassical growth theory which includes the constant return to scale, perfect competition, complete information, and no externality. In real life, things will not always be equal. Therefore, growth function could stray from being linear to being non-linear when those assumptions go out of equilibrium.

Another explanation in the neoclassical growth theory is the role of the financial sector development as a determinant of growth. This paper agrees with the explanation offered by Levine (1997). Levine argues that financial development which also implies more liquid financial markets motivate investors to hold long-term financial assets. These funds can then be used to finance innovation and purchase of modern technology because these investments require long-term capital. The author concludes that when this happens, the development in the financial sector could be affecting economic growth through its impact on capital accumulation and the improvement of total factor productivity.

Although some existing studies have examined the FD/EG and FD/GV relationships (King & Levine, 1993a; 1993b; Levine, 1997; 2002; 2005; Yeh & Lin 2013, Demirgüç-Kunt, Feyen, & Levine, 2013). A careful evaluation of these studies reveals some limitations: firstly, the conclusions reached by these studies are in most cases contradictory and inconsistent. For example, Atindehou, Gueyie, and Amenounve (2005) studied West African countries and reported that there was no relationship between financial sector development and economic growth. These authors suspected that their observation might have been caused by the large informal sector that characterizes these economies. King and Levine (1993a) and Akpan, Nwosu, and Eweke (2017) found a positive relationship between finance and growth. Akpan et al. (2017) made their report from the studies of Nigeria from 1985 to 2015 while King and Levine studied the economies of the developed countries. Nkoro and Uko (2013) who also examined the Nigerian economy between 1980 and 2009 reported that the relationship between financial sector development and economic growth was negative.

Secondly, there is no consistency among the existing studies regarding the nature of the finance/growth relationship. Several studies including King and Levine (1993a), Akpan et al. (2017) report that financial development relates linearly with economic growth. Many others, including the most recent studies (Rousseau & Wachtel, 2011; Arcand, Berkes, and Panizza, 2015), argue that the relationship between the variables is a non-linear. This argument has also been extended to include the fact that the relationship between the two variables (FD/EG) is an inverted U-shape (Arcand, Berkes, and Panizza, 2015; Sahay, Cihak, N'Diaye, Barajas, Ayala, Gao, Kyobe, Nguyen, Saborowski, Svirydzenka & Yousefi, 2015). There are also other researchers, for example, Adeniyi, Oyinlola, Omisakin & Egwaikhide (2015), using data from Nigeria from 1960-2010, who found that the relationship between FD and EG is a U-shaped.

Furthermore, the limitations of the existing studies on the finance/growth relationship also include our observation of paucity in research in the area most especially in the developing countries. Most of what we know about these relationships come from studies conducted using data from the developed economies. Our knowledge of finance/growth relationship in the developing countries is, therefore, limited.

The aim of this study is, therefore, to contribute to closing the research gaps identified. Our paper also aims to add to the availability of research in the area of the determinants of economic growth and growth volatility, principally using data from a developing country. We would, by examining the relationship between the variables, provide evidence to refute or support, not only, the existence of a relationship between FD, EG, and GV but the nature of such relationship. Furthermore, by providing evidence on the nature of the relationship between FD, EG, and GV, that is supporting whether the relationship is linear, inverted or U-shaped, policymakers and researchers would be motivated to investigate the determinants of financial sector development with the hope of stimulating economic growth and reducing growth volatility. Policymakers would also be better informed of the determinants of growth and the critical levels where these variables impact growth or reduce growth volatility.

However, our study has limitations. We are concerned only about the nature of the relationship between the variables. Our study will not measure the strength of the relationships. Measuring the strength of the relationships would added value to investigating the relationship between FD, EG, and GV.

This paper will proceed in the next section with a brief overview of the Nigerian economy, and the review of related studies; this will be followed by the section for data, methodology, research design, and data analysis. The next segment will discuss the results of the analysis, suggest policy recommendation and conclude the paper.

2.2 The brief overview of the Nigerian economy

Nigeria is one of the West African and sub-Saharan countries. It is a lower middle-income ranked as the 30th largest economy in the world judging from its nominal GDP. Nigeria is also the largest economy in Africa ranked by its nominal GDP. It has the GDP of $492.986 billion (nominal 2016) (WDI, 2017). It has a per capita GDP growth rate of 2.7% in 2015, an average of 1.726% between 1970 and 2015, a maximum of 30.356% in 2004 and a minimum of -15.454% in 1981 with a standard deviation of 19.6205 which stands it out as a country with high growth volatility. Between 1970 and 2015, Nigeria has an average population growth rate of 2.602, a maximum growth rate of 3.044 in 1984 and a minimum of 2.2849 in 1970. By 2015, the Nigerian GDP was composed of 55% services, 18% agriculture, 16% manufacturing, and 8% petroleum products. The revenue from oil constitutes 67% of its total revenue, but oil contributes only 9% toward its GDP (CBN, 2017).

Nigeria has an interesting architecture of financial sector development. Its money-market is regulated by the Central bank which was established in 1958. The country currently has 21 commercial banks from 89 legacy banks before the banking consolidation of 2005. It has 5 Merchant banks and six development finance institutions. In 2015, the country had 2991 Bureaux-de-change, 942 Micro-finance banks, and 64 finance companies which are actively involved in various stages of financial intermediation. Nigeria also has 36 primary mortgage banks, a stock exchange, one commodity exchange, 16 insurance companies, one capital market regulator and one insurance regulator. Apart from the regulators, most of these institutions are privately owned and managed for profit. One, therefore, expects these institutions to be run efficiently and to contribute to the economic growth of the country.

The Nigeria economy had witnessed several financial reforms including the structural adjustment programme of 1986 and the bank consolidation of 2005. There have been several shocks, economic and political, in the sample period, which may have had an impact on growth. The examples are the oil price upsurge of 1973, the military coup of 1975 and 1983, and the political disturbance of 1993. These events and the market regulation of the financial sector could explain our suspicion of non-linearity in the relationships between FD/EG/GV.

2.3 Literature review and hypotheses development

2.3.1 The relationship between finance and growth: theoretical literature

The literature on the finance-growth relationship is traced back to the early twentieth century with the initial influential paper of Schumpeter (1911). In his article, Schumpeter highlighted the need for financial institutions to finance productive investments and innovation to bring about economic growth. Patrick (1966) laid a foundation for understanding the link between financial development and economic growth. Patrick asserted that FD is connected to real output when financial assets and liabilities are connected with the real capital stock – its optimal consumption, the rate of growth, its efficient allocation and utilization. He maintains that the relationship between capital stock and real output is strong, direct and monotonic. Gurley and Shaw (1955) and Goldsmith (1969) supported Patrick's research and re-echoed that more developed financial markets promote economic growth by mobilizing savings to finance the most profitable investments.

McKinnon (1973) and Shaw (1973) in their contributions were concerned about financial repression especially in the developing countries. They argued that pervasive financial regulations involving interest rate ceilings and stringent reserve requirements would impede intermediation and frustrate economic growth. The authors, therefore, recommended financial liberalization that would lead to an increase in loanable funds and a more efficient allocation of the available investible funds.

In the 1980s and early 1990s, there was a new wave of interest in the relationship between FD and economic growth. The emergence of endogenous growth theory credited to Lucas Jr (1988) and Romer (1989) added further impetus to the interest to study the relationship between FD and growth. These authors posit that financial development bolsters economic growth through savings mobilization, efficient allocation of resources, reduction in information, transaction and monitoring costs, diversification of risks, and facilitation of exchanges of goods and services. They conclude that these services of the financial sector would transmit into the more rapid accumulation of physical and human capital as well as the faster technological progress that is needed to boost economic growth. This position in the finance-growth argument was supported by Greenwood and Jovanovic (1990) who argue that these services mentioned in the Lucas (1988) and Romer (1986) are provided by financial intermediaries who promote investment and growth by ensuring high rates of returns on capital. Greenwood and Jovanovic (1990) also show that the financial intermediation/growth process is self-sustaining because while intermediation spurs growth, growth also promotes the development of financial institutions. Bencivenga and Smith (1991)'s contribution in the argument was that the financial intermediaries do not only support investment and growth, they also help individuals to hold diversified portfolios to manage risks and bring their investment to the level of their liquidity preferences. In all, the theoretical link of FD and growth is canvassed by these studies. Do data also confirm this? Answering such a question is where we turn in the next paragraph.

2.3.2 The relationship between finance and growth: empirical literature

Formal empirical work investigating the relationship between FD and economic growth is associated with King & Levine (1993a, b,); Levine (1997); Levine and Zervos (1998);

Rajan and Zingales (1996); and Beck, Demirguc-Kunt, and Levine (2004). These authors, influenced by the works of Schumpeter, and the endogenous growth theory of Romer (1989) and Lucas (1988), empirically demonstrated that there is a positive and long-run association between FD and EG. They generally believe that a well-developed financial system is growth-enhancing, and agree with the assertion of "more finance, more growth." This linear-function of FD/EG relationship dominated the thinking of researchers until after the 2008 financial crisis. After the crisis, researchers began to imagine the possibilities of threshold(s) in the FD/EG relationship. This thinking drives a non-linear modeling technique for FD/EG relationship which has gained popularity in the recent literature.

However, a few studies on finance-growth nexus hold contrary opinions to those of the linear paradigm. They believe that the relationship between finance and growth is non-monotonic. Arcand, Berkes & Panizza (2015) and Cecchetti and Kharroubi (2012a) were among the first to formally report their contrary views on the finance-growth relationship. It is believed that their work may have been influenced by those of Minsky (1974), De Gregorio and Guidotti (1995), Kindleberger (1978), Singh (1997) and Rousseau & Wachtel (2011). In explaining the non-linearity, Minsky and Kindleberger were concerned about the increase in macroeconomic volatility which they suspected was caused by an extensive financial deepening. Tobin (1984) was worried about the misallocation of human resources away from the real sector of the economy by the excess financial deepening which affected economic growth. Tobin (1984) believes that expanding financial system would take talents from the real economic sector slowing down output growth. The misallocation, according to Tobin, explains the non-linearity in the FD/EG relationship. De Gregorio & Guidotti (1995) empirically show that the advanced economies may have reached a threshold where FD no longer increase investment efficiency and therefore constitute a drag on economic growth. A more recent

Rajan's (2005) paper warned that a large and complicated financial system could breed or make a system vulnerable to financial crisis and therefore inimical to economic growth. This warning appeared to have anticipated the financial crisis of 2008 that came from the heels of the complicated mortgage financing and its derivatives.

Several recent studies had supported the new findings of the non-linear and inverted U-shaped relationship between finance and growth. For example, Arcand, Berkes & Panizza (2015a) employ different estimation methods and types of data – cross-section, cross country panels, and industry-level data – and find that the relationship between FD and economic growth is non-linear and inverted U-shaped. In a study that employed data from Nigeria, Adeniyi et al. (2015), report findings not inverted U-shaped but a U-shaped in the FD/EG relationship.

To shed light on these inconsistent findings, we decide to test the following hypotheses:

H1: the relationship between FD and EG in Nigeria is non-linear

H2: the relationship between FD and EG in Nigeria is an inverted U-shaped

2.3.3 The point of inflection in the relationship between FD and EG

The point of inflection in the relationship between FD and EG where the relationship is is a U or inverted U-shaped is as important as knowing the nature of the relationship. The point of inflection represents either the location where FD has exhausted its power to influence growth in an inverted U-shaped relationship or a point where FD starts its positive influence on growth in a U-shaped relationship. The conclusions of the existing studies about the point of inflection were also inconclusive. For example, Law and Singh (2014) using dynamic panel threshold methods on data from 87 countries over a period 1980-2010, found that the threshold beyond which private credit no longer contribute to growth is 88% of GDP. Arcand, Berkes & Panizza (2015) in their contribution, report that they found the point of inflection in their study of the finance/growth relationship to be between 80 and 100% of the private credit to GDP. Sahay et al. (2015), however, maintain that the point of inflection varies depending on the level of institutions and the effectiveness with the which a country manages its macroeconomic policy. Some studies, for example, Adeniyi et al. (2015) never estimated the point of inflection in their analysis even though they report that relationship was a U-shape.

To get to the bottom of the argument and shed light on the confused conclusions, we tested the following hypothesis:

H3: the point of inflection in the FD/EG relationship in Nigeria is between 80% and 100% of the private credit to GDP

2.3.4 The nature of the finance-growth volatility relationship

The pioneering work on the nonlinear function of the FD/GV is credited to Easterly et al. (2001). The authors show that FD could dampen growth volatility up to a point and after that, a further increase in FD will amplify the volatility creating a U-shaped relationship between FD and GV. A group of authors – Denizer, Iyigun, and Owen (2002) in their contribution, analyzed a panel of 70 countries from 1956 -1998 and found that countries with highly developed financial sector experience less fluctuation in their real per capita output, consumption and investment growth. These authors also assert that the way the financial sector develops is important to how it dampens growth volatility. They highlight that the relative share of banks in the financial structure of the economy and the proportion of credit to the private sector would affect the system's effectiveness in dampening the volatility of consumption and outputs. Other authors, including Raddatz (2006) analyzed industry data in 48 countries and found that FD dampens a large proportion of volatility of outputs in the economic sectors that have high liquidity needs in their operations. In other words, if the economic sector is not liquidity dependent, FD may not be successful in dampening growth volatility. Again, this assertion requires further independent investigation which is outside the objects of the present study.

More recently, Dabla-Norris & Srivisal (2013) using data from 110 countries from 1974-2008 provided evidence to support the relationship between FD and GV and added that the relationship is a U-shaped function. These assertions were supported by Sahay et al. (2015) who explain that FD initially dampens growth volatility by expanding opportunities for economic agents to manage their risks effectively; however, as financial depth intensifies, risk rises and volatility is amplified. They conclude that the financial stability of a country depends on the penetration of financial intermediation and the pace of financial deepening. They believe that if financial intermediation intensifies, financial stability risks would be lower; and that the faster the pace of financial deepening, the greater the risk of financial crisis.

The argument with the FD/GV is not that of inconsistent research conclusions, but the paucity of studies using data from developing countries. We are not aware of any study that investigated the relationship between FD and GV particularly in Nigeria. Our knowledge of this relationship in Nigeria or the equivalent context is limited. We propose to investigate this relationship in Nigeria using the following hypothesis:

H4: the relationship between FD and GV in Nigeria is U-shaped

2.3.5 The point of inflection in the FD/GV relationship

A few studies have reported on the point of inflection in the FD/GV relationship. The foremost is the Easterly et al. (2001). These authors demonstrated that the negative relationship in the FD/GV relationship changes over to the positive at the trough when private credit gets to 100% relative to GDP. Raddtz (2006) and Dabbla-Norris and Srivisa (2013) who studied this relationship confirmed the U-shaped relationship but did not measure the point of inflection. A notable paper that contributed to the debate on the point of inflection in the FD/GV relationship has been Sahay et al. (2015). These authors maintain that the point of inflection in the FD/GV relationship follows symmetrically that of the FD/EG relationship. They added that the turning point in the relationship was unique to the context of the study and is dependent on macroeconomic management and institutions. No research, to our knowledge, has been done using data from the developing countries and in particular, Nigeria to investigate the point of inflection in the FD/GV relationship. Little, therefore, is known about this subject in Nigeria. We propose, therefore, to test the following hypothesis to investigate the matter.

H5: the point of inflection in the FD/GV relationship in Nigeria is 80 – 100% of the private credit to GDP

2.4 Data and methodology

2.4.1 Data description

This study uses time-series annual data of Nigeria from 1970 to 2015. Nigeria is important here because it is a good example of resource-dependent and undiversified-developing economy. A resource-dependent economy without effective macroeconomic management policies is expected to experience volatile growth. The choice of the period –1970 to 2015, allows us to examine the behavior of the finance/growth relationship in both the period of increased oil prices of 1973 (OPEC, and Suez-canal closure related) and the oil price collapse of the 1980s. It also allows us to see the influence of finance on growth subject to political instabilities in the country. Political instabilities consist of military take-over of government in 1975, political transition in 1979, a military coup in 1983 and 1985, political disturbance in 1993 after election cancellation, and several turbulent democratic political transitions before 2015.

In this analysis, our dependent variables are economic growth and economic growth volatility. Economic growth is measured by the growth rate of per capita GDP. Economic growth volatility is measured by exponential weighted moving average (EWMA) of the growth rate of per capita GDP used in Koop and Korobilis (2014). We use EWMA because we believe that countries' economic output grows or declines exponentially over time as confirmed by (Pritchett, 2000). Our per capita growth rate of the GDP figure comes from the World Development Index (WDI), and the GDP volatility is computed from that data.

For financial development, we use bank credit to the private sector as a percentage of GDP and the data comes from WDI. Additionally, we use the newly compiled composite index of financial development (FD) from the IMF database for the robustness check. In the composite index, FD is made up of a market index (MI) and bank index (BI). MI is further divided into the market depth index, market access index and market efficiency index. Similarly, BI is made up of the bank and other financial institutions depth index, access index, and efficiency index (Svirydzenka, 2016). Our control variables are the broad set of variables typically used for growth in the recent literature (Samargandi, Fidrmuc, & Ghosh, 2015). They comprise gross fixed capital formation (GFCF), which represents total investment in physical capital; population growth (POPG), which indicates growth in the labor force; trade to GDP (TGDP), which represents trade openness to international markets; government expenditure as percentage of GDP (GEXGDP), which captures public spending and also a distortion through taxation; consumer price index (cpi), which proxies macroeconomic policy management; initial income per capita (INI); and school enrollment (SCH), which represents human capital or social capabilities (Gong, Greiner and Semler, 2015). These annual data for control variables are sourced from WDI.

2.4.2 Methodology and model specification

Our methodology is in two steps: first, we investigate the potential nonlinearity in the relationship between FD and EG on the one hand, and FD and GV on the other. Where nonlinearity between the variables are confirmed, we take a further step to investigate if the nonlinearity is caused by FD or by the other determinants of growth such as the lag of per capita GDP and human capital. This further investigation is informed by the argument in the Ketteni et al. (2007) to the effect that FD correlates linearly with economic growth when we account for the nonlinear relationships between growth and the initial per capita GDP and human capital.

To do the first step, we use a quadratic polynomial of financial development in the model. This technique had been used in Yeh, Huang & Lin (2013) and Arcand et al. (2015). Additionally, we use a dynamic threshold estimator used in Kremer, Bick, and Nautz (2013) to investigate the potential existence of a discrete shift in the framework. This estimator is appropriate because macroeconomic variables such as GDP growth are highly persistent. The test for nonlinearity in the relationship is followed by another test for U and inverted U-shaped functions following the technique by Lind and Mehlum (2010).

To do the second step, we use a semi-parametric, partially linear (PLR), model. This model is chosen because it allows for the additive semi-parametric components and the graphical representation of the nonparametric components could be obtained which is used to arrive at a more suitable model specification.

2.4.2.1 Quadratic polynomial of financial development

We specify the following model:

$$gdpg_t = aFD_t + bFD_t^2 + Z_t + \mu_t \text{ - - - - - - - - - - - - (1)}$$

Where $gdpg_t$ = rate of gdp per capita growth; FD_t = financial development at time t; FD_t^2 = quadratic term of financial development; Zt = vector of control variables; and μ = error term $E_{(\mu)}$ = 0,

Then we test the joint hypothesis:

$H_0: (a + \mathrm{b}2FD_{min} \leq 0) \cup (a + \mathrm{b}2FD_{max} \geq 0)$ - - - - - - - - - - - - - - (2)

Against the alternative hypothesis:

$H_1: (a + \mathrm{b}2FD_{min} > 0) \cup (a + \mathrm{b}2FD_{max} < 0)$ - - - - - - - - - - - - - - (3)

Where FD_{min} *and* FD_{max} represent the minimum and maximum values of financial development, respectively. If the null hypothesis is rejected, it confirms the existence of an inverted U-shape and the opposite for U-shaped is also true.

2. 4.2.2 The dynamic threshold models

Another approach to examining the nonlinearity in the FD-growth-volatility nexus is the threshold estimate of Kremer et al. (2013).

The structural equation with one potential threshold – γ is given by

$gdpg_t = \mu_t + \beta_1 FD_t I(FD_t \leq \gamma) + \delta_1 I(FD_t \leq \gamma) + \beta_2 FD_t I(FD_t > \gamma) + \emptyset z_t + \varepsilon_t$ --- (4)

Where t = 1---T represents period; μ_t stands for country specific effect; I (.) is an indication function and depending on the value of threshold variable compared to γ, which divides the observations into two regimes separated by differing regression slopes β_1 *and* β_2; δ_1 is the regime intercept which is the same for all individuals; and Z_t is an m-dimensional vector of explanatory variables, including lagged GDP. The control variables entered the equation simultaneously.

2.4.2.3 Semi-parametric partially linear model specification:

$gdpg_t = x_t \beta + \theta(z_t) + \epsilon_t$ - - - - - - - - - - - - - - - - (5)

where gdpg is the rate of economic growth, x_t *and* z_t are determinants of dimension q and p respectively, of the rate of growth and β is a parameter and θ is an unknown functional form. E(ϵ_t / x, z) = 0. Our interest in this section is to specify the determinants of economic growth that belong to the linear component, x, and those to the unknown nonlinear component $\theta(z)$. Using a Kernel based approach as in Robinson (1988), we obtained estimate of β ($\tilde{\beta}$).

By obtaining $\tilde{\beta}$, the redefined variable $gdpg_t - x\tilde{\beta}$ can be expressed on z non-parametrically using the kernel technique to obtain the estimate of the unknown function θ(.). To obtain a graphical representation of the individual components of z to confirm the non-linearity, we assume that the components of z have additive structure.

To estimate the model in (5), we allow several variables including FD, initial per capita GDP and human capital to nonlinearly enter the model. This model is then specified thus:

$$\text{GDP}g_t = x_t\beta + \theta(z_1, z_{2,} \ldots z_p) + \varepsilon_t = x_t\beta + \textstyle\sum_{s=1}^{p} \theta_s(z_s) + \varepsilon_t \text{ - - - - - -(6)}$$

The components of the model in (6) are estimated using marginal integration used in Linton and Nielsen (1995).

Models analyzed for non-linearity include:

$$gdppcg_t = c + \{popg_t + gindex_t\} + \{credp_t\} + \in_t \text{ - - - - - - - - - - - - - - (7)}$$

$Equation\ 7\ could\ be\ specified\ as\ follow\ for\ purpose\ of\ testing\ for\ the\ thresholds$

$$\text{Growth} = \in_t + \beta_1 FD_t I(FDD_t \leq \gamma) + \partial_1 I(FD \leq \gamma) + \beta_2 FD_t I(FD > \gamma) + \emptyset Z_t + \mu_t \text{ - - (7a)}$$

$$gdpvola_t = b + \{cpi_t + gindex_t + popg_t\} + \{lifexp_t + credp_t + gdpvola(-1)\} + u_t - (8)$$

$gdppcg_t$ = annual per capita GDP growth rate; $popg_t$ = annual growth rate of the population; $gindex_t$ = index of the political stability. This index is a dummy of 0 for the years where there was a civil war, a coup, a national election, or political riots and 1 otherwise. $lifexp_t$ a = life eexpectancy as a proxy for human capital development. Life expectancy is regularly used in growth literature as proxy for human capital development (Lucas, 1988). $Creda\,pt$ = credit by banks to private enterprises as a percentage of GDP; $lifexp_t$ and $Credp_t$ are used as threshold variables while cpi_t,

$gindex_t$, $popg_t$ are non-threshold variables. Cpi_t = consumer price index to proxy for inflation or macroeconomic stability and is expected have negative relation with growth and positive relation with volatility; e_t and u_t represent disturbance terms respectively in the equations. I(.) is an indicator function and depending on the whether the threshold is greater or smaller than Υ. Υ divides the observations into two regimes distinguished by the changing values of $\beta_1 and\ \beta_2$; $\delta_1\ is\ the\ regime\ intercept\ which\ is\ the\ same\ for\ all,\ and\ Z_t$ is an m-dimensional vector of explanatory variables.

2.5 Results of the empirical analysis

This section reports the descriptive statistics of the variables used in the analysis.

Table 2. 1 Descriptive statistics

	CREDP_	GDPVOLA	GDPPCG	GINDEX	LIFEXP	LOGLIFE	POPG	LOGTRADE	CPI
Mean	13.314	0.1313	1.7263	0.7391	46.529	3.8382	2.6024	3.7984	32.604
Median	12.990	0.0893	0..970	1.0000	45.980	3.8283	2.5820	3.8679	5.1170
Maximum	38.390	0.4647	30.356	1.0000	52.977	3.9698	3.0440	4.4044	158.94
Minimum	4.7100	0.0048	-15.454	0.0000	40.965	3.7127	2.2840	2.9766	0.1010
Std. Dev.	6.3633	0.1228	7.7451	0.4439	2.8792	0.0612	0.1570	0.3819	45.398
Skewness	2.0182	0.9959	0.9883	-1.0891	0.4516	0.2872	0.9322	-0.5410	1.3805
Kurtosis	8.5554	3.0570	6.6749	2.1862	2.9600	2.9296	4.4014	2.2923	3.7586
Jarque-Bera	90.381	7.4456	33.374	10.363	1.5672	0.6419	10.428	3.2041	15.716
Probability	0.0000	0.0241	0.0000	0.0056	0.4567	0.7254	0.0054	0.2014	0.0003
Observations	46	45	46	46	46	46	46	46	46

Notes: CREDP_ represents credit to private enterprises; GDPVOLA = gdp volatility; GDPPCG = per capita GDP growth; GINDEX = governance index; LIFEXP = life expectancy; LOGLIFE = log of life expectancy; POPG = population growth; LOGTRADE = log of trade as % of GDP; CPI = consumer price index

Table 2. 2 Cross-correlation of variables

Correlation Probability	CREDP_	GINDEX	LIFEXP	LOGLIFE	POPG	LOGTRADE	CPI
CREDP_	1.000000						

GINDEX	-0.113411	1.000000					
	0.4530	-----					
LIFEXP	0.545768	0.010031	1.000000				
	0.0001	0.9472	-----				
LOGLIFE	0.556561	0.004133	0.999166	1.000000			
	0.0001	0.9783	0.0000	-----			
POPG	0.120456	-0.001358	0.202786	0.208970	1.000000		
	0.4252	0.9929	0.1765	0.1634	-----		
LOGTRADE	0.223511	0.148059	0.180658	0.205309	0.116255	1.000000	
	0.1354	0.3261	0.2296	0.1711	0.4417	-----	
CPI	0.358788	0.103426	0.904649	0.888699	0.087758	0.036854	1.000000
	0.0143	0.4940	0.0000	0.0000	0.5620	0.8079	-----

Notes: CREDP_ represents credit to private enterprises; GDPVOLA = GDP volatility; GDPPCG = per capita GDP growth; GINDEX = governance index; LIFEXP = life expectancy; LOGLIFE = log of life expectancy; POPG = population growth; LOGTRADE = log of trade as % of GDP; CPI = consumer price index.

Our discussion here starts with the examination of descriptive statistics in Table 2.1 and cross-correlation of variables in Table 2.2. Our descriptive statistics enable us to understand our data, choose method and techniques of analysis and choose methods and tools for diagnoses. From table 1, we observed that most of our series have low standard of deviation compared to their means except GDPpcg. It indicates that the variables have less than average volatility. We observe that most of our data are not normally distributed judging from the value of the Jarque-Bera statistics. Linear regression would, therefore, not be suitable here. In table 2.2, life expectancy highly correlates with private credit. To use the two variables in an equation simultaneously, we employ instrumental variables.

2.5.1 *Our regression results*

Recall that equation seven models the relationship between FD and EG. Here, the idea is to examine the nature of the relationship between the two variables. The results shown in Table 2.3 indicate that bank credit to private enterprises, used as a measure of FD, has a U-shaped relationship with economic growth, thus supporting our H1 and rejecting our H2. The threshold value at the point of inflection in this relationship is 15.6199% which is the point of equilibrium or a point where growth became zero even though finance was increasing. This result empirically rejects our H3 and supports the alternative hypothesis. In the first regime, financial development has a negative coefficient of -0.24092 (negative slope) with economic growth. In the second regime, it has a positive coefficient (positive slope) of 0.5674***, and the coefficient is highly significant at 1%. The changing signs of the coefficients from negative to positive at the point of inflection give us the idea of a U-shaped relationship. Governance index also relates positively to economic growth with a coefficient of 5.1553*** and population growth correlates with growth with a coefficient of -12.1297***.

In equation 8, we modeled the relationship between FD and GV. According to the results, private credit correlates negatively with GV in regime 1 with a coefficient of -0.0045*** and with a positive coefficient of 0.000441 in regime 2. The changing signs of the coefficients from negative to positive at the point of inflection indicate a U-shaped relationship. The results provide evidence to support our H4.

In the same equation, a log of life expectancy and the lag of GDP volatility correlate negatively with GV with coefficients of -2.6815 and -0.0958 in regime one respectively. In regime 2, the lagged GV correlated positively and logged life expectancy correlates negatively with coefficients of -0.0529 and 0.9296*** respectively indicating that life expectancy has a U-shaped relationship with growth volatility. The point of inflection in the relationship between FD and GV, according to our result in Table 2.4 is 8.7099% thus rejecting our H5 and accepting the alternative hypothesis.

2.5.2 Specification and diagnostic checks

We used recursive estimation and the CUSUM test to examine the stability of the models. The results in Figure one and two confirm that the models are stable. We tested for serial correlation using L M test. The alternative hypothesis of serial correlation was rejected. The coefficient diagnostic was done using the dual tests of coefficient restriction Wald – test and Variance Inflation Factors. The H0 in the Wald test was rejected, and the result of VIF test indicates that the coefficients were not abnormally loaded. The model selection criteria in the FD/growth /growth volatility regressions confirmed two regimes with the minimum sum of the square residual of 0.0015.

Table 2. 3 Results of the threshold regression analysis of equation 7

Regressors	Model 1	Regressors	Model 2
Threshold Value: Υ	15.6199	Threshold Value: Υ	243.984 = $(15.6199)^2$
Impact of FD			
β_1	-0.2409	β_1	-0.00904
	(0.3564)		(0.0168)
β_2	0.5674***	β_2	0.01001***
	(0.1552)		(0.00289)
Impact of covariates			
Governance index	5.1553***	Governance index	5.1123***
	(1.8833)		(1.9215)
Population rate	-12.1297***	Population growth	-12.4103***
	(4.6794)		(4.9372)
Adjusted R^2	0.3384	Adjusted R^2	0.3271
Observations	46	Observations	46

Note: ( ) = standard error; *** = significant at 1%; Model 1 uses private credit as a regressor; Model 2 uses the polynomial of private credit as a regressor.

Table 2. 4 Results of the threshold regression analysis of equation 8

Regressors	Model 1	Regressors	Model 2
Threshold Value: Υ	8.7099	Threshold Value: Υ	75.864 = $(8.7099)^2$
Impact of FD			
α_1	-0.0045***	α_1	-0.00037***
	(0.0008)		(0.00849)
α_2	0.00044***	α_2	0.000837***
	(0.00011)		(0.002111)
Impact of covariates			
Governance index	-0.00212*	Governance index	-0.00199*
	(0.00157)		(0.00154)
Population rate	0.00987	Population growth	0.00959
	(0.01289)		(0.01317)
Log life expectancy	-2.6815***	Log life expectancy	-2.6352***
	(0.2431)		(0.2513)
Gdp volatility (-1)	-0.09581	Gdp volatility (-1)	-0.8685
	(0.05916)		(0.0632)
Adjusted R^2	0.9972	Adjusted R^2	0.99726
Observations	46	Observations	46

Note: ( ) = standard error; *** = significant at 1%; Model 1 uses private credit as a regressor; Model 2 uses the polynomial of private credit as a regressor.

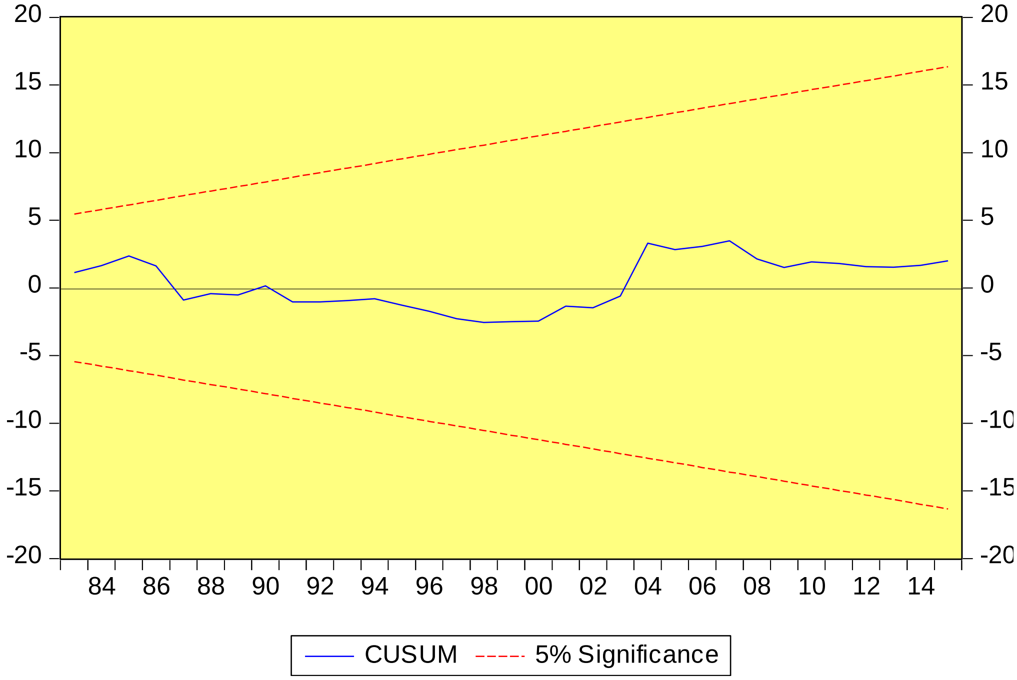

Figure 2. 1 Result of stability diagnostic for equation 7 model 1

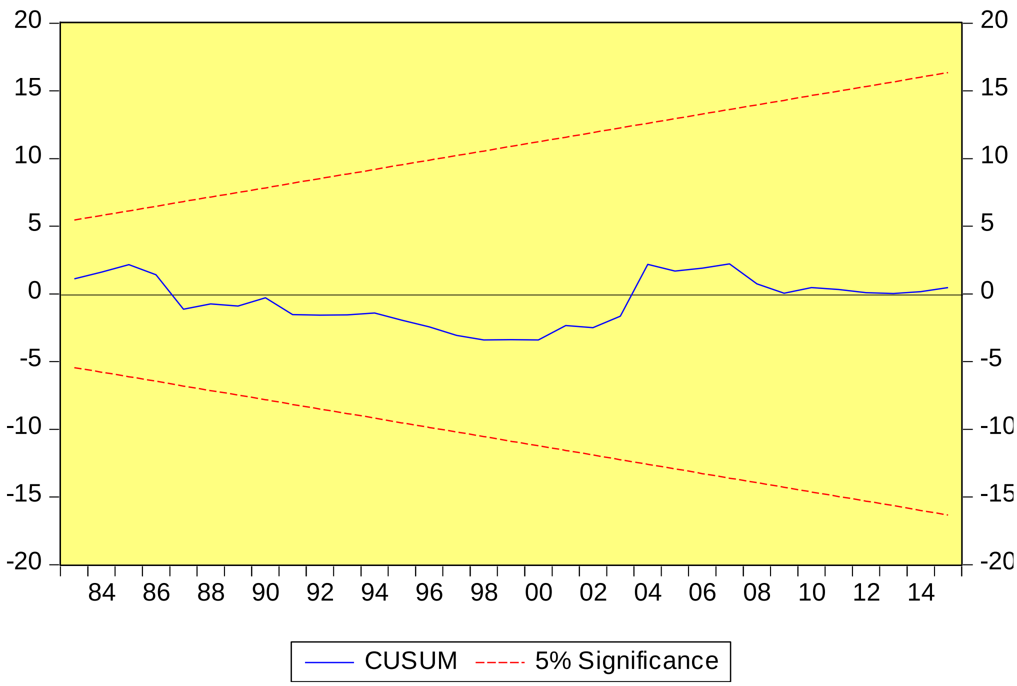

Figure 2. 2 Result of stability diagnostic for equation 7 model 2

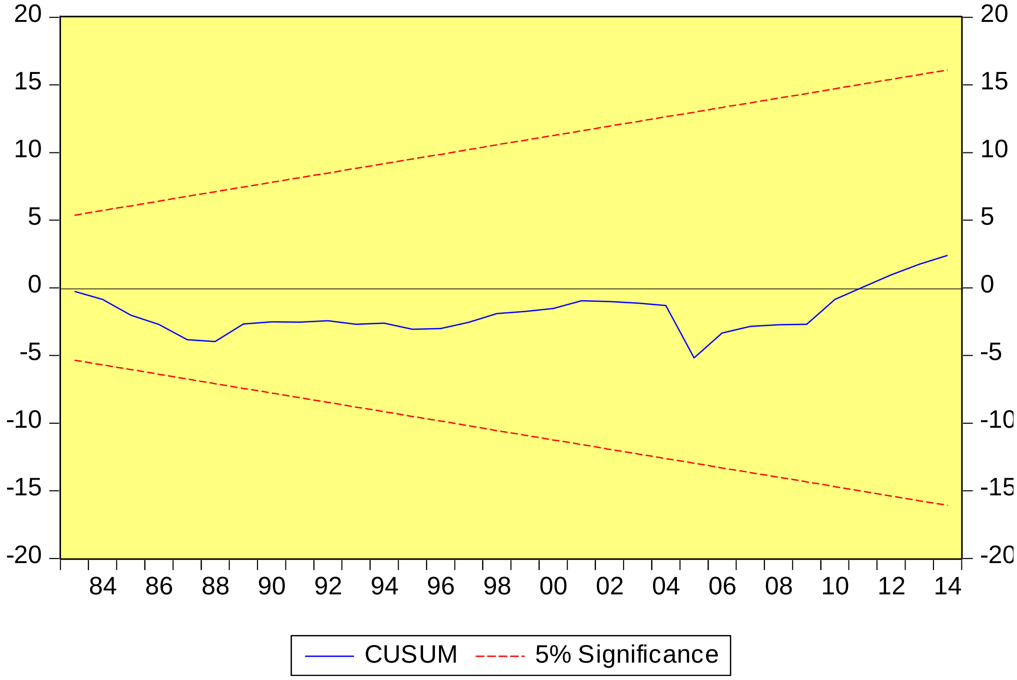

Figure 2. 3 Result of the CUSUM test of stability for equation 8 model 1

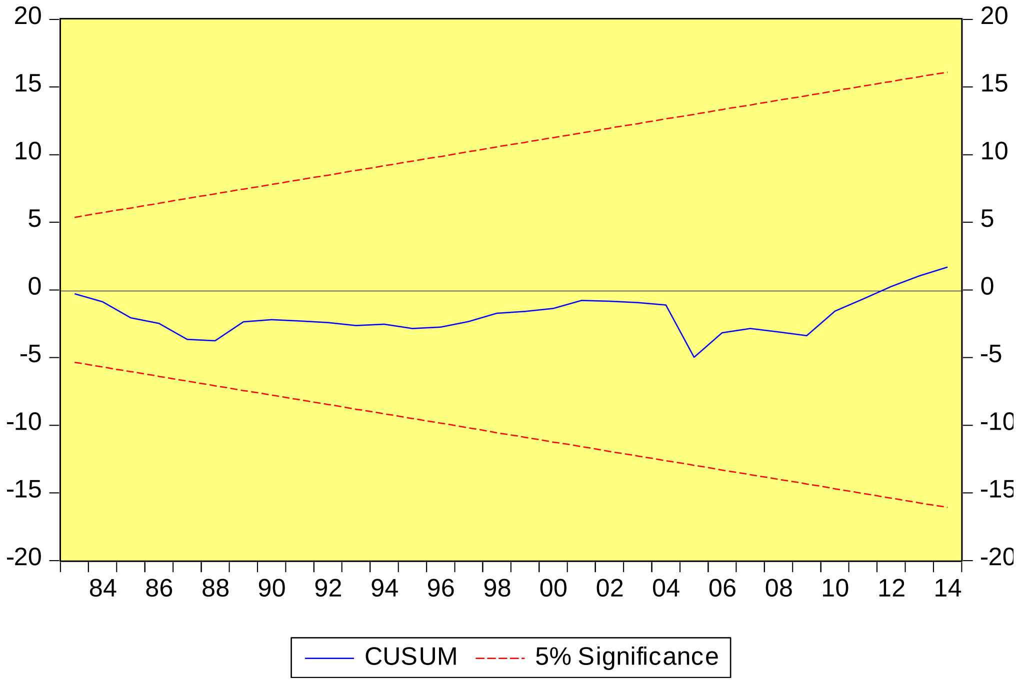

Figure 2. 4 Result of the CUSUM test of stability for equation 8 model 2

2.6 Discussing the empirical results

Our analysis indicates that the FD/EG and FD/GV relationships are U-shaped. The results also indicate that the point of inflection in the case of the FD/EG relationship is 15.6199% of the private credit to GDP, and in the case of FD/GV relationship, it is 8.7099%. Our discussion will aim to interrogate these results and compare them to the findings of the existing literature.

The U-shaped relationship in the case of the FD and EG appears to show that FD drags down growth in the initial part of the relationship until it crosses a critical value, then FD triggers growth. This result contradicts several other mainstream studies in this area of investigation. For example, Yeh and Shin (2013), Arcand et al. (2015) and Cecchetti and Kharroubi (2015) all reported inverted U-shaped in respect to the FD/EG relationship. The differences in the results appear to suggest the relevance of the level of FD in its relationship with economic growth. Our result also supports this line of thinking in that

FD begins to affect growth positively as soon as it crosses the critical point of 15.6199%. The existing research reported "Too much finance," ours appears to be the case of "Too little finance." Our report, though it appears to contradict several conclusions of the existing studies, it supports Adeniyi et al. (2015). These authors investigated the FD/EG relationship in Nigeria using a dynamic threshold model, like our model, to analyze their data. Their annual data covered 1960 – 2010 while ours covered 1970 -2015. The consistency in our findings point to the entrenched nature of the relationship in the context of Nigeria and supports the reliability of our investigation.

In the case of the FD/GV relationship, our result appears to be in line with the position of the mainstream literature. We report a U-shaped relationship for FD/GV for Nigeria. To explain the result, we use the well-considered explanation of Easterly et al. (2001). According to the authors, FD dampens GV because it smoothens consumption and investment. They add that growth fluctuates when investment and consumption fluctuate. The other side of the U-shape is explained by the increase in risk which accompanies FD through excessive debts to smoothen consumption and investment. In the case of Nigeria, there was no excessive credit increase but the fading volatility-dampening-capacity of the FD as we explain in the following paragraph.

Next, we discuss the low point of inflections both in the FD/EG and FD/GV relationships. According to our results, this point is 15.6199% in the FD/EG relationship and 8.7099% in the FD/GV relationship. According to Sahay et al. (2015), these points were supposed to be symmetrical, and they are not. As it is, it appears FD has a better capacity to drive growth than it has to dampen growth volatility. This could be a subject for further investigation.

Furthermore, the points of inflections in our study are far lower than those reported in the mainstream research. The range of the point of inflections reported in the existing research is 80 -100% of the private credit to GDP. We call this number "FD capacity to drive growth or dampen volatility" for want of a better description. This capacity, in our results, is quite low compared to those of the mainstream research. We have no evidence to explain the differences, but we are persuaded by the theoretical arguments raised by several authors which we discuss in the following paragraph.

First is the argument by Beck et al. (2014) and Beck (2015). The authors advance the case of the power of intermediation in the volume of credit which is used in the analysis. They argue that most credits in our credit-to-private-sector as a percentage of GDP in the database, represent credit for mortgage and other consumption purposes which do not add to funds going to businesses to affect investment and growth. The second argument is that of Law and Singh (2014). They associate the negative impact of the excess financial depth on growth to the excessive competition in the banking industry. According to the authors, banks provide credits to businesses but fail to provide the additional services needed to make those credit work efficiently. The lack of additional services, according to them, results in a high probability of investment failure. The last argument is the one advanced by Easterly et al. (2001). The authors demonstrate that FD brought about by the increase in the capital markets has more potential to dampen GV better than the one occasioned by the growth of bank credits. The three arguments appear to be credible. They are issues that need to be tested with data from Nigeria. Until we do that, our knowledge to explain the low capacity of FD in Nigeria is limited.

2.7 Conclusion and policy suggestions

We recall that our task in this paper was to examine the nature of the relationship in the FD/EG and FD/GV. We were also interested in locating the points of inflection in the two relationships. Our context was Nigeria, and our data were the annual data covering 1970 to 2015. In this section, we conclude that the two relationships are non-linear and U-shaped. The point of inflection in the FD/EG relationship is about 16% while that of FD/GV is about 9%.

Also in this section, we present a summary of our findings, their implications, the contributions of the study, our recommendation for financial reforms and suggestions for further research.

The summary of results: in the FD/EG relationship, the point of inflection was 15.6199%, regime one coefficient of FD(β_1) = -0.2409, and regime two coefficient of Fd (β_2) = 0.5674***. In the FD/GV relationship, the point of inflection = 8.7099%, regime 1 coefficient (a_1) = -0.0045***, regime 2 coefficient (a_2) = 0.00044***. These results lead us to conclude that the relationship between FD/EG is a U-shaped and the point of inflection is 15.6199%. Similarly, the relationship between FD/GV is a U-shaped, and the point of inflection is 8.7099% thus rejecting our null hypotheses and accepting the alternative hypotheses.

The implications of these results are as follow: in the FD/EG function, a negative slope of 0.2409 in the first regime changes over to a positive slope of 0.5674 in the second regime at the threshold of 15.6199% of FD. It implies that FD must reach a critical value of 15.6199% to trigger economic growth. FD below this point becomes a drag to economic growth. The Nigerian policymakers should ensure that the economy stays above a credit measure of about 16% to GDP to avoid a drag on growth. In the FD/GV relationship, similarly, a negative slope of 0.0045*** changed over at 8.7099% FD to a positive slope of 0.00044*** to record a U-shaped relationship. It implies that FD exhausts its power to dampen growth volatility at 8.7099%. After that point, further, increase in FD exacerbates growth volatility.

This study made a couple of contributions: first is in providing evidence to support prior study reported by Adeniyi et al. (2015) to the effect that the nature of the FD/EG relationship is U-shaped. Secondly, our study provided evidence of the point of inflection in the FD/EG relationship for Nigeria which Adeniyi or any other study for that matter did not provide. This threshold in the FD/EG relationship is important as a critical point where FD triggers growth. Thirdly, our study provides evidence of the nature of the relationship between FD and GV in addition to the point of inflection where FD no longer dampen growth volatility. We are not aware of any study that had investigated this relationship using data from Nigeria. Our research is also significant in that it provides information to policymakers to sequence financial reforms to improve FD through improvement to efficiency and access to financial services.

The limitation of this study was our inability to use other measures of FD such as market capitalization, and market liquidity to broaden our analysis due to the paucity of data.

For further research, it would be interesting to investigate the low point of inflection both in the FD/EG and FD/GV relationship as compared to what obtains in the prior studies. It will also be informative to investigate the role of institutions in the relationships and the point of inflections.

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Chapter Three

The Nature of the finance-growth relationship: evidence from a panel of oil-producing countries.

Abstract

The position of research on the nature of the relationship between financial sector development and economic growth has remained largely inconclusive. Several authors assert the relationship is monotonic while others have sought to show that it is non-linear. A section of growth literature indicates that this relationship varies, depending on the country's specific context and the quality of its institutions. This paper examines the nature of the finance-growth relationship in a panel of oil-producing countries. We aim at determining the point of inflection in the threshold where the relationship is non-linear and where the slope of the function changes abruptly. We employ a dynamic panel generalized method of moments (GMM) and panel threshold regressors to analyze data from 30 oil-producing and 30 non-oil producing countries. Our results confirm the negative effect on the growth of "too much finance" using evidence of a threshold in the relationship. We show that this threshold varies from country to country depending on the states of institutions maintained in each country. We compared the finance-growth relationship between oil-producing and non-oil-producing countries. The results reveal that non-oil producing countries outperform oil-producing countries. Our paper both agrees and disagrees with several recent studies on this topic. We discuss policy implications of our findings and make recommendations for reforms.

3.1 Introduction

There has been extensive research attention given to the relationship between financial development (FD) and economic growth (EG) in the last three decades. This increased research attention has highlighted the fact that FD has a verifiable influence on economic growth. The biggest influence behind the renewed interest in the FD/growth relationship arguably includes Ross Levine and Robert King. In their landmark publications, King & Levine (1993a) and King & Levine (1993b), standing on the shoulders of others such as Schumpeter (1912), Robinson (1953), Gurley and Shaw (1955), Patrick (1966), McKinnon (1973), Romer (1986) and Lucas Jr (1988), summarized their findings by demonstrating that finance leads to growth. Their conclusion is consistent with the notion of 'more finance, more growth' (a linear finance-growth nexus) which became the dominant thinking that shaped finance–growth policies until the late 2000s.

In the late 2000s, researchers, inspired by the global financial crisis of 2008, began to see the possibilities of a large financial system dragging down economic growth. Indeed, it became clear from the works of Arcand et al. (2015), Cecchetti and Kharroubi (2012b) and Rousseau and Wachtel (2011) that the relationship between finance and growth may not necessarily be linear as it was being imagined then by researchers. The authors demonstrate that finance's relationship to growth is non-linear in the long run. This finding has since been extended to include the fact that the actual relationship between finance and economic growth is an inverted U-shape as reported by Arcand et al. (2015), and the point of inflection ranges from 80 to 100% of private credits to GDP (Arcand, 2017; and Cecchetti & Kharroubi, 2015). Other researchers, however, argue that the point of inflection in the finance-growth relationship can vary depending on the states of institutions and macroeconomic management (Law & Singh, 2014; Sahay et al., 2015). Furthermore, Deidda and Fattouh (2002) believe that the non-linear relationship between finance and growth depends on the stage of economic development of countries.

It is of concern that most of these findings came from research conducted in developed countries and as a result, very little is known about the finance-growth relationship in developing countries. Additionally, the research community knows very little about the relationship in resource-intensive economies. Research, therefore, needs to incorporate the distinction between countries with highly developed institutions and macroeconomic management and those still struggling to put suitable institutions and macroeconomic administration in place. These are the gaps this study intends to fill.

In specific terms, this paper examines the nature of the financial development and economic growth relationship in a sample of oil-producing countries and compares it to the relationship in non-oil-producing countries. Ascertaining the nature of the relationship is important because it can lead to understanding the needs for different reform actions in each specific context. Where the relationship is confirmed to be linear, policy reforms aimed at increasing growth would typically concentrate on expanding financial systems. Where the relationship is non-linear, policymakers are better advised to shift their attention to identifying factors constraining growth even when the financial sector is expanding. Such policymakers will direct their research effort toward the quality of FD including financial depth, financial efficiency, and access in addition to their influence on growth.

Several researchers, for example, Law and Singh (2014), have demonstrated that the nature of the relationship between FD and EG depends on countries' state of institutions and macroeconomic management. This paper seeks to explore further the nature of the finance/growth relationship in both advanced and developing economies using a panel of the oil-producing countries. This distinction is important because the research community and policymakers need to understand the influence of FD on growth which is driven by the frailty of systems which depend solely on oil and are in turn driven by weak institutions. Additionally, among the oil-producing countries, there are those with strong institutions and effective macroeconomic management - for example, Norway and Canada. It would be unreasonable to expect the finance/growth relationship to be similar in both sets of countries (that is, between countries with quality institutions and those without).

We organize the remainder of the paper as follows: Section II examines the theoretical and empirical literature on the relationship between finance and growth; section III describes variables, data, and their sources, as well as the methodology employed in their analysis. Section IV presents and discusses the results of our analysis and section V set out our conclusions.

3.2 Literature review

3.2.1 The theoretical literature

Our review covers literature on the sources of economic growth according to the neoclassical tradition and the evolution of research on the nature of the finance/growth relationship which includes linear and non-linear frameworks. We also review studies which associate the finance/growth relationship with different contexts such as the level of development, macroeconomic management, and a country's financial structure. We examine the context of oil-producing economies. In doing these, we identify the research gaps in the literature that this paper aims to fill.

3.2.1.1 Sources of growth

Under the neoclassical tradition, growth is most likely to occur or is constrained by the presence or absence of capital accumulation (CA) and total factor productivity (TFP) (Romer 1986).

Capital accumulation involves investment in fixed physical and portfolio investments. It is measured by changes in the wealth/value of assets or the level of gross capital formation over and above depreciation. David Ricardo's model of growth places a greater emphasis on capital accumulation over other factors (Romer, 1986). Solow's growth model places value on capital, labor, and labor productivity. Solow also acknowledges the principle of diminishing returns to capital in his model. Thus, the endogenous growth models assert that capital accumulation and technological innovations are reasons for differences in the rate of economic growth among nations. However, Carl Marx and more recently Thomas Picketty, believe that capital untamed becomes a source of economic crisis and poverty. The authors emphasize that capital accumulation can become a self-enforcing phenomenon pushing the rate of return on capital above the rate of economic growth (r > g), and resulting in inequality and poverty (Piketty, 2015; Pritchett, 2000). Next, we examine TFP.

TFP is the portion of output not explained by the number of inputs used in the production process. TFP is measured by what economists called the 'Solow residual.' To measure the Solow residual accurately, the production function used should be neoclassical, the markets for inputs should be perfectly competitive, and the inputs' growth rates must be accurately measured (Comin, 2010). TFP plays a critical role in economic growth, economic fluctuations, and the differences in cross-country per capita income (Comin, 2010).

However, there appear to be some confusions over the context in which finance affects TFP. Rioja and Valev (2004) observe that finance has a strong positive influence on TFP growth primarily in more developed countries. In less developed economies, they find finance affects growth through capital accumulation. Quite contrary to this finding, Huang and Lin (2009) report that FD exerts a significant positive influence on TFP in developing countries. In support of Huang and Lin's findings, Jun and Yu (2005) found TFP growth being significantly and positively stimulated in the process of China's (a developing country) economic growth. Thus, Jun and Yu argue that the effect of FD on TFP is not limited to the so-called developed countries.

Given the importance of TFP in economic growth, it is important to examine what explains differences in TFP growth between countries and therefore, differences in per capita income. The question of what determines TFP is important because if any theory is to be relevant in explaining the differences in economic growth among countries, it must first explain the differences in TFP. We briefly examine the literature on this question.

Prescott (1998) demonstrates that the size of the differences in the income of countries primarily depends on the moment that the growth of sustained TFP takes root and the rate by which it grows. The author believes that the difference in income between countries is more likely to be explained by TFP growth than by capital accumulation, the stock of technical knowledge or research and development. Chen (1977), examining a group of Asian economies, found that TFP growth does not depend on the stage of economic development of countries. This argument was supported by Kuznets (1956) who explained the importance of usable knowledge and Clark et al. (1987) who identified the differences in work practices to explain the differences in TFP growth. Wolcott (1994), studying the textile industry in India and Japan, observed that workers in the two countries possessed a similar level of skills and were using similar machines but productivity grew faster in Japan than in India. She explained that Indian workers had the ability and incentives to resist the adoption of more productive work practice.

In summary, Wolcott claims that the difference in TFP growth is not explained by the stock of knowledge but by the quantity of the acquired knowledge used in the process of production. He points out that workers in India and Japan had an equal amount of knowledge, but workers in Japan choose to apply more of their knowledge in their work than did the Indian workers. Therefore, TFP growth could be seen to depend not only on knowledge but also on the motivation to apply the knowledge. We next examine how FD affects output growth through its influence on the determinants of growth.

3.2.1.2 Financial development and sources of growth

This section briefly examines the literature on how FD affects growth by influencing capital accumulation and total factor productivity which are identified as sources of growth. Levine (1997), using the functional characteristics of FD, demonstrates how FD feeds into capital accumulation and technological innovation to bring about economic growth. For example, Levine asserts that FD affects steady-state growth by influencing capital formation which is in turn affected by the altering of savings rates or by efficient allocation of savings among different capital producing technologies. Financial systems can also improve market efficiency including an improvement in liquidity through secondary market operations. Market liquidity also facilitates a shift to longer-gestation projects and high-returning technologies in the production process which increase efficiency. Besides risk diversification and capital accumulation market liquidity can also affect technological innovations and therefore TFP growth according to Levine (1997).

In contributing to the above discussion, other authors believe that financial markets can acquire information about investment and induce the efficient allocation of resources at a lesser cost than individual investors. This function of FD facilitates better returns on capital and helps to build capital formation that can positively influence economic growth (Greenwood & Jovanovic, 1990; Greenwood & Smith, 1997). FD achieves similar results where it enables the monitoring of managers and exercising corporate controls. The monitoring function of the financial markets reduces costs for investors and motivates savers to hold financial assets (Levine, 1997). As such, the monitoring function influences capital accumulation, resource allocation, and long-run economic growth. Besides capital accumulation, FD corrects the mismatch of resource allocation and thus promotes the growth of TFP (Han & Shen, 2015). All these arguments link FD to capital accumulation and TFP-growth which are the determinants of economic growth.

3.2.2 Literature on finance/growth relationship

This section examines literature in the eras when the finance/growth relationship was perceived to be linear as well as non-linear. The literature traces the views on the linear relationship between finance and growth back to the work of (Schumpeter, 1912). The author highlighted the role of financial institutions in financing profitable investment and in supporting innovation. Gurley and Shaw (1955) and Goldsmith (1969) also found linear relationships between finance and growth. They argued that more developed financial markets promoted growth by mobilizing savings that fed into capital formation and therefore growth. McKinnon (1973) and Shaw (1973) were concerned about financial repression especially in many developing countries because of their belief in the connection between finance and growth. They, therefore, advocated financial liberalization through deregulation of interest rates to ensure that there are loanable funds to finance investment that would result in economic growth.

The emergence of the neoclassical endogenous growth theory driven by Romer (1986) and Lucas (1988) added momentum to the notion of the linear relationship between finance and growth being reported in the literature. This group of authors who created the endogenous growth literature, highlighted, variously, the positive link between finance and growth particularly in mobilizing savings, allocating resources to the most profitable investments, reducing risk and the importance of transaction costs and facilitating growth. This period stimulated several theoretical postulates on finance in growth. For example, Greenwood and Jovanovic (1990) observed that financial intermediaries promoted growth by facilitating high returns on capital. Bencivenga and Smith (1991) found that financial intermediaries support the channeling of savings to investments because of the possibility for individuals to mitigate their risks by holding diversified portfolios. This stream of research was followed directly by those of King and Levine (1993a) and (1993b) who empirically demonstrated that finance has a first-order correlation with growth.

In summary, this research did not only establish that finance correlates with growth but also alluded to the notion of "more finance, more growth" which is a monotonic framework describing the relationship between finance and growth.

The second era of the finance/growth relationship is the non-linear which emerged around 2011 inspired by the global financial crisis of 2008. This era was based on the work of Deidda and Fattouh (2002) who adopted the threshold regression model to re-examine King and Levine's (1993b) data. They found evidence of non-linearity in the relationship between FD and growth. Since then, many more researchers have found an inverted U-shaped relationship between FD and economic growth (Cecchetti & Kharroubi, 2012a; Law & Singh, 2014; Shen & Lee, 2006). These findings imply that FD positively associates with economic growth up to a point and after that, becomes negatively associated.

Following our literature review in the earlier paragraphs, the inverted U-shaped relationship between the variables implies that there are diminishing marginal effects of capital accumulation (CA) and TFP growth as FD intensifies. This relationship reaches equilibrium at zero growth and becomes negative with the increase in FD. However, according to Sahay et al. (2015), the rate of the marginal decrease in the effects of CA and

TFP on growth varies from country to country depending on the level of institutional quality of each country.

Several researchers also report non-linear relationships between finance and growth, but with several qualifications. An example is that of Deidda and Fatouh (2002) who found a threshold effect in the finance/growth relationship only in high-income countries. Several researchers - for example, Rioja and Valev (2004a and b) – have confirmed this result. However, Huang and Lin (2009) using a panel sample of 71 high and low-income countries with instrumental variables found a non-linear link between finance and growth in low-income countries. They pointed out that the threshold effect was stronger in low-income than in the high-income countries. In other but similar research, Samargandi et al. (2015) demonstrate that the inverted U-shape noted in the FD-growth relationship is only observed in the long run and not in the short run. Further independent research has not yet confirmed this proposition. In a recent publication, Adeniyi et al. (2015) using data from Nigeria, reported a U-shaped relationship between FD and growth implying that as FD increases, growth falls up to a point when it begins to rise to form a U-shape function. This result appears to suggest the need to attain a critical take-off point in the accumulation of capital and growth of TFP to trigger growth. Additionally, Favara (2003) finds that FD is an S-shaped function of economic development. These assertions, which are not yet properly verified, deserves our research attention in the future.

3.2.3 An overview of the oil-producing economies

The proponents of resource-led development are upbeat about the potentials of oil-exporting countries to do well in economic growth and development. These proponents point to countries' ability to create and maintain social and economic infrastructure, alleviate poverty, build human capital by providing healthcare and education, pursue a transfer of technology and enhance economic growth. Quite to the contrary, the reality is different from the expectation. The consequence of the oil-led development is low or negative growth. There is also poor social welfare, economic inequality, unemployment, and poverty. Furthermore, corruption, poor governance, rent-seeking behavior, and a high potential for conflict and war are the characters of these economies (Karl & Gary, 2004).

Research shows that natural resource-dependent is a significant negative determinant of growth (Papyrakis & Gerlagh, 2004). Gylfason (2006) summarizes the characteristics of these economies and how it affects financial development in the following way: "that…. natural-capital-intensity tends to crowd out foreign capital, social capital, human capital, physical capital and financial capital thereby impeding economic growth across countries." What, according to research, explains these experiences in the oil-producing countries (the paradox of plenty or resource curse)? Theorists have hypothesized several explanations including the Dutch disease, oil-price volatility, the nature of the oil industry and the tendency for these countries to become rentier states. We examine these hypotheses in the following sections.

3.2.3.1 The Dutch disease

The 'Dutch disease' is a term coined by the Economist Magazine in 1977 to describe the woes of the Dutch economy after they discovered oil and gas in their territory. It is now used to explain the skewed development patterns observed in resource-dependent countries. Dutch Disease is a situation where a resource boom negatively affects other sectors of the economy by pushing up the real exchange rate and making exports in the other sectors non-competitive (Karl & Gary, 2004). It can also take other forms. The emerging oil sector can attract capital and labor resources away from manufacturing and agricultural production, creating a decline in output in those areas. Examples include the decline of British manufacturing when they discovered oil in 1970 and the decline of Dutch manufacturing after the discovery of natural gas in 1959 (Beck, 2010). The reduced competitiveness in the other sectors of the economy makes diversification of the economy particularly difficult and reinforces further dependence on oil, exacerbating unemployment and producing a decrease in economic growth (Gylfason, 2006).

However, research has not yet empirically verified these claims. Generalization of these claims is therefore difficult. There are oil-producing countries such as Malaysia, Indonesia, Canada, Norway and Thailand which are not falling into the general class of negative growth despite their oil-export dependence. Besides, researchers are yet to agree on the mechanism through which oil-production results in negative growth. One hypothesis of interest to us in this paper is the links between a resource-boom and weakening of the states' institutions (Ross, 1999). The resource-boom and the weak institution's hypothesis are interesting to us because financial development, the subject of this paper, relies on the quality of the institutions to influence growth (Beck, 2010).

3.2.3.2 Oil price volatility

Another theory explaining the resource curse is that of international primary commodity price volatility. Ding and Field (2005) recount that since 1970, oil price volatility has become more pronounced. It is shown to be double that of other commodities and thereby exposes countries depending on oil-exports to frequent economic shocks. In explaining the link between oil-price volatility and negative economic growth, Karl & Gary (2004) report that oil-price volatility exerts a strong negative impact on oil-producing countries' budgetary discipline and control of public finance. It also affects national planning, investment, income distribution, and poverty alleviation efforts. Researchers, for instance, Frankel (2010) believe that oil-price volatility appears to be a weak argument in the resource-curse phenomenon. Frankel argues that tools exist to enable countries to manage price volatility successfully. The tools, according to the author, include indexing of contracts, hedging of export proceeds, denominating debt regarding oil and the effective budget management. One or more of these tools was adopted by Chile and Chad successfully.

3.2.3.3 Nature of the oil industry

The oil industry is unique in several ways. It arguably requires a substantial capital outlay for the oil and gas production. The search, drill and transporting of its products require sophisticated equipment and skills. The oil industry has a very weak linkage with the broader economy and creates fewer jobs compared to what its capital outlay could do in other sectors. Opportunities for the diffusion of technology are limited in the oil industry compared to manufacturing and agriculture. Furthermore, infrastructure development in the oil industry provides limited flow-on advantages to the other sectors of the economy. Also, downstream processing in the oil industry has limited integration with other industries. Gylfason (2006) also reports that countries depending on oil for their revenue have a high probability of experiencing policy failure. Karl & Gary (2004) believe that the industry's characteristics explain why oil-dependent economies experience negative growth and development as dependency increases.

Researchers, including Deacon and Rode (2012) are quick to add that the nature of the oil industry may not frustrate the growth prospects of countries with quality institutions and effective macroeconomic management. They point to Norway, Canada, Malaysia, and Indonesia, oil-producing countries which are relatively developed notwithstanding the nature of the oil industry as discussed in the previous paragraph.

3.2.3.4 Emergence of rentier states

Sachs and Warner (2001) argue that oil-exporting countries have a higher propensity to develop into rentier states than the other countries. Rentier states are countries that rely almost wholly on rents reaped from the proceeds of their exports rather than relying on the surplus (through tax) that comes from their residents (Karl & Gary, 2004). This state of affair affects good governance, accountability, and the perceived civic value of electorates. The other characteristics of rentier states include a large state apparatus with weak administrative capacity, corruption, a civil service running not on merit, a weak rule of law and skewed institutional development.

Researchers argue that because the rentier states do not extract their revenues from their residents, they do not develop institutional capabilities that could enable them to mobilize and control revenue. Rentier states also lack the opportunity to develop an innovative civil service because the need for innovation would not be there in the first place (Karl & Gary, 2004; Ding and Field, 2005). The need for innovation would be apparent if resources were in short supply and there was, therefore, the pressure to devise ways to increase revenue. Sachs and Warner (2001) report that rentier states encourage rent-seeking behavior and develop a penchant for manipulating public organizations for private gains. Rentier states are also reputed to lack corporate cohesiveness and therefore the authority necessary to execute effective public policy. The lack of authority to execute public policy explains why the nature of these countries affects the finance-growth relationship. Furthermore, it is to be noted that finance affects growth mostly through policy reforms.

However, researchers are yet to examine the rentier state argument and its effects on institutions empirically. The first of the two not-so-logical claims forming the tenet of this argument is that oil-producing countries always have enough revenue and would not have a need for more. The second argument is that if state revenue declines, oil-producing states would formulate effective policies and adopt quality institutions. These arguments imply that states with lean resources which survive by imposing heavy taxes on their citizens have sounder economic policies and better institutions. Such claims cannot be confirmed independently from the experiences of the poor non-oil producing states of Benin Republic, Haiti, Togo and the Central African Republic.

3.2.4 Finance-growth relationship in oil-producing countries

Cross-country comparisons form the basis for most research on the finance-growth relationship (Levine 2003; Beck 2010). Researchers tend to believe that only oil fortunes drive economic growth in oil-producing countries. Beck (2010) however reports that finance is just as important to growth in oil-rich economies as it is in the other countries. Thus, in examining the relationship between finance and growth, it is important to demonstrate that resource-based economies present a distinct context from the other economies. Ross (1999) argues that the 'resource curse' is more entrenched in the oil-producing of the resource-rich economies. Researchers - for example, Beck (2010) - report that financial systems in the oil-rich countries are comparatively less developed. Banks in such economies are rich in deposit but give fewer loans to the firm. Moreover, firms in oil-producing countries tend to use less of external finance even when their financing needs are like non-oil-producing counterparts. Beck (2010) concludes that, based on these characteristics, there are indications of a 'resource curse' in the financial development in oil-producing countries. If this is true, we expect the finance-growth relationship in oil-producing countries to be different from that of non-oil-producing countries. In this paper, then, we investigate whether, indeed, the finance-growth relationship in oil-producing states is different from that of non-oil-producing states. It is intended that the result of this investigation will, therefore, add an important new dimension to the overall resource-curse debate.

3.3 Data and methodology

3.3.1 Data and variables

This paper uses panel data of 30 oil-producing and 30 non-oil producing countries grouped by their quality of institutions over the period 2006 to 2015 to examine the threshold in the finance/growth relationship. Table I provides a list of the oil-producing countries and Table II, the list of the non-oil producing countries included in the sample.

Table 3. 1 Sample of oil-producing countries

Countries with negative indices for institutions[1](19)	Countries with positive indices for institutions (11)
Algeria	Australia
Angola	Bahrain
Argentina	Canada
Equatorial Guinea	Denmark
Iran	Brunei
Iraq	Malaysia
Kuwait	Norway
Mexico	United Kingdom
Nigeria	United States of America
Russia	United Arab Emirates
Saudi Arabia	Oman
Tunisia	
Venezuela	
Yemen	
Indonesia	
Brazil	
Ecuador	
Egypt	
Kazakhstan	

Note Source = World Development Indicators (2016); Note: some oil-producing countries are omitted here because they lack complete data in other variables used in this study.

Table 3. 2 Sample of non-oil producing countries

Countries with negative indices for institutions	Countries with positive indices for institutions
Afghanistan	Belgium
Bosnia Herzegovina	Bulgaria
Cambodia	Germany
Ethiopia	Greece
Haiti	Iceland
Jordan	Ireland
Kenya	Israel
Mali	Portugal
Macedonia	Switzerland
Morocco	Singapore
Paraguay	Slovenia South Africa
Senegal	Uruguay
Sierra Leone	
Tanzania	
Zambia	
Mauritania	
Liberia	

1 Institutional indices as reported in WDI covering control of corruption, government effectiveness, regulatory quality, rule of law and political stability and absence of public violence.

Serbia

Source: CIA World Factbook – 2013;

(a) The dependent and control variables

The dependent variable is economic growth, measured as the growth of gross domestic product per capita. Other measures used for robustness checks include GDP growth rate and GDP at current US$ value. For the control variable used in measuring the tendency of growth rate convergence across countries over time, we use real GDP. We also use gross fixed capital formation (GFCF) to account for the state's investment in infrastructure. Trade as a percentage of GDP (Trade) is used to capture international factors influencing domestic growth. Government expenditure as a percentage of GDP (GNEXP) measures the value of public goods and any distortion in the economic system through taxation. Inflation provides a measure of macroeconomic stability. Control of corruption (CC); governance effectiveness (GE); regulatory quality (RQ); the rule of law (RL) and political stability and absence of violence (PV) are measures for the governance and legal indices.

(b) Measures of financial development

This study uses credit to the private sector (domcr) and different orders of its polynomial to proxy FD in line with studies by Arcand et al. (2012), King & Levine (1993a) and Liang and Jian-Zhou (2006) to capture the threshold impact of finance on growth. The importance of this measure is that it accounts for the rate of intermediation, and the amount allocated to investment which is expected to affect economic growth. We also use a financial development index, a financial market index, a financial institution index and a financial development depth adapted from Svirydzenka (2016). We were unable to use other measures which the FD literature uses (e.g., market capitalization, financial institution assets, monetary aggregates) given data for these measures were not available across countries to cover the period of our analysis.

We are confident however that the variables we used have the potential to measure the relationships of interest with reasonable accuracy. Various studies of the finance/growth relationship that use assorted variables which include those we have selected have produced results which do not greatly differ from those using variables not present in our study (Levine, 1997; Levine & Zervos, 1998).

3.3.2 Methodology and model specification

We commence this section by briefly examining the general framework for analyzing panel data regarding assumptions, efficiency, and consistency. We then justify the estimators and the methodology we have chosen for our analysis.

3.3.2.1 Static models

The standard model estimators for panel data such as pooled OLS, random effects and fixed effects are noted to have some serious shortcomings. For example, pooled OLS is restrictive imposing common intercepts and slope coefficients on all countries and ignoring a countries' heterogeneity. In the case of the fixed effects model, the estimators are assumed to have the same slope and variance but unique intercepts for individual countries (Samargandi et al., 2014). However, these estimators are known to face the acute problem of a loss of degrees of freedom. Furthermore, the parameters estimated by the fixed effects model are biased when some variables in the model are endogenous (Kinoshita & Campos, 2008). Endogenous variables are common in the growth model regression. Another static model with limitations is the random effect model. It assumes a common intercept for the sampled-countries. The model is also assumed to be time-invariant - that is, strict endogeneity (Arellano, 2003). In practice, this assumption does not usually hold. In general terms, then, static panel model regressions do not capture the dynamics of economic growth data.

3.3.2.2 Dynamic panel model

Several researchers recognize that when the number of countries (N) is greater than the time (T) in a panel data framework, the generalized method of moment (GMM) – difference, and GMM – system estimators work well in analyzing such data (Samargandi et al., 2014). The GMM estimators are used for micro-data Eberhardt (2012) and macro-data (Arcand et al., 2012). Where time (T) is larger than the number of countries (N), GMM estimators are likely to report spurious results (Roodman, 2006). Other issues with GMM include the fact that GMM captures only short-run dynamics in the data while ignoring the stationarity of the variables. Samargandi et al. (2014) argue that the imposition of the homogeneity assumption on the slope coefficients of the lagged dependent variable in GMM estimates may lead to serious biases unless we identify the slope coefficients.

Caner and Hansen (2004) used the GMM-type estimator to account for endogeneity bias. We have chosen GMM for our analysis in this paper for the same purpose and to account for unit root problem in the data. We consider the following model:

$$Y_{it} = U_i + \beta_1 Z_{it} I(q_{it} \leq \gamma) + \beta_2 Z_{it} I(q_{it} > \gamma) + \varepsilon_{it} - - - - - - - - -(1)$$

where i = 1- - - N = country; t = 1 - - - T = time

and Ui = country-specific fixed effect.

Here εit = iid o, σ2. I(.) which = the indicator function indicating the regime defined by the threshold variables qit and threshold level γ. Zit = m-dimensional vector of explanatory regressors.

We split the explanatory variables into Z_{1it} (exogenous variables) and Z_{2it} = (endogenous variables). Also, the model requires a suitable set of k ≥ m instrumental variables X_{it} including Z_{1it}.

3.3.2.3 Fixed-effects elimination

We start the analysis by eliminating the individual fixed effects Ui via a fixed effect transformation. The method applied by Hansen (1999) to eliminate such effect is rather prone to inconsistent estimates because the lagged dependent variables can correlate with the mean of the individual errors and with the transformed individual errors. Additionally, the first-differencing of the dynamic model (1) has not been completely successful in solving the problem. Kremer, Bick, & Nautz (2013) also have concerns about the success rate of the first-difference of the dynamic model. We, therefore, employ forward orthogonal deviation transformation to eliminate the fixed-effects. This model avoids the serial correlation of the transformed error terms.

The model we have chosen works by subtracting the average of all future available observations (rather than the previous or the mean of the variable) from the contemporaneous ones. For the error terms, we give this model as

$$\varepsilon it^* = (T-t)/(T-t+1)\ [\ \varepsilon it\ -1/(T-t)\ (\varepsilon i(t+1) + - - -+\varepsilon it]\ - - -\ - - - - - - - - - -(2)$$

After the elimination of the fixed-effects, we apply a GMM- IV method to obtain coefficient estimates. The GMM corrects for endogeneity, heteroskedasticity, and autocorrelation. Following Arellano & Bover (1995) and Kremer et al. (2013), we use the lagged dependent variables as instrumental variables.

3.3.2.4 Econometric estimation

We estimated three models comprising one based on the 30 oil-producing (which are compared to non-oil producing) countries; one based on 11 of the countries with positive indices for institutions and one based on 19 other countries with negative indices for their institutions. Our purpose in segmenting the estimations is to examine the influence of the oil industry and to separate that from the influence of the country's institutional quality. Next, we regress the three models using stepwise OLS to ascertain specification for each model. We report the results in Table III. We then regress the specified models using the GMM employing instrument variables for the variables' coefficients. We report these results in Table 3.4 and 3.6. Lastly, we use a dynamic panel threshold regressor as employed by Kremer et al. (2013). The Kremer model is a modified version of the regressor developed by Hansen (1999) and is used to ascertain the points of inflections in the finance/growth relationship in the three models. We include the results in Table 3.5 and 3.7.

3.4 Results of regression analysis

This section discusses regression results covering stepwise OLS, panel dynamic GMM and panel threshold regressions used in this paper.

3.4.1 Stepwise regression

The stepwise OLS regression reported in Table III highlights model specification suitable for the analysis. We divide the results in this table into three. Model 1 captures the analysis covering the whole sample of 29 countries, model II covers 17 countries where indices of governance are negative, and model III represents 12 countries with positive indices for governance indicators. Governance indicators here include control of corruption, governance effectiveness, regulatory quality, the rule of law, public violence, freedom of speech and accountability. In model I, the lag of growth per capita GDP, domestic credit and its polynomial, gross national expenditure, and the rule of law were all strongly significant. In model II, domestic credit, domestic credit square, gross national expenditure, gross fixed capital formation, governance effectiveness, the oil rent indicator, and total governance measures were all strongly significant. In model III, the lags of per capita GDP growth, domestic credit, and its polynomial were significant. The results thus provide a good indication of the variables that are important in explaining the changes in the dependent variable. These models as specified are stable as shown by the results of the CUSUM tests in figures 1-3.

3.4.2 Panel generalized methods of moment (GMM)

The results of the panel GMM reported in table 3.4 provide interesting results. In model I, domestic credit has a significant positive coefficient of 19.615, while the square of domestic credit has a significant negative coefficient of 0.10628. The result indicates that the intensification and rapid increase in domestic credit which is represented by domcr2 pushes the function of economic growth beyond equilibrium (the zero point) and into negative territory. This behavior of the growth function which is influenced by FD shocks indicates an inverted U-shape. Growth literature robustly supports this behavior of the growth function. The lag of the dependent variable shows a positive coefficient of 0.8434 indicating that the function is autoregressive. That is, its influence also drives the function. Trade as a percentage of GDP has a negative coefficient of 4.0822. This result appears to be contrary to the position which is jealously guarded by many economic growth researchers who posit that trade is good for growth (Frankel and Romer, 1999). This model can be judged to be stable and well-fitted given the Sargan statistic of 42% (the standard measure of this statistics ranges from 10%-95%).

In model II, reported in Table 3.4, domestic credit shows a significant positive coefficient of 18.4 while the square of domestic credit posts a significant negative coefficient of 0.10238 indicating an inverted U-shaped function as found above. Trade and inflation both produced significant negative coefficients of 5.44 and 237.90 respectively. Lags of dependent variables correlate significantly and positively to per capita GDP indicating the relevance of the level of growth per capita in explaining changes in per capita GDP growth. The Sargan statistic for this model showed an improvement rising to 66%.

In model III, reported in Table 3.4, the inverted U-shaped relationship between FD and growth is confirmed. Domestic credit is positive, and the square of domestic credit negative. Both are statistically significant. Inflation shows the usual negative relationship between growth and the lag of the dependent variable is positively related to per capita GDP growth. The Sargan statistic improves to 86% in this model.

We note here that the GMM accounts for various data issues such as unit root, multicollinearity, autocorrelation, and heteroskedasticity. Its operations acted to ignore some variables specified by the stepwise OLS estimates which explains why the models are parsimoniously smaller.

3.4.3 Results of the panel threshold regression

The purpose of using panel threshold regression was to identify the threshold at which the growth/FD function reaches equilibrium and FD begins to drag on growth. This was possible once we confirmed from the GMM and the stepwise OLS models that the relationship between FD/EG is non-linear and inverted U-shaped. As reported in Table 3.5, in model I, the result shows that the value of the threshold variable at the point of inflection is 10.62% of the domestic credit as a percentage of GDP at a 95% confidence interval of 5.64 – 14.508. In model II, this value is 5.38% at a 95% confidence interval of 5.068 – 53.35, and in model III, the value is 79.11% at a 95% confidence interval of 34.94 – 193.03. What is interesting in these results is that the threshold value of the panel of countries with strong indices for institutional indicators approximates those reported by the mainstream literature including Cecchetti and Kharrroubi (2015), Sahay et al. (2015), Arcand et al. (2015). The difference between the threshold value of model I and model III is that model III represents developed economies and model I represents a sample heavily influenced by countries with weak institutions. The result further confirms the conclusion in Sahay et al. (2015) to the effect that the point of inflection in the FD/EG relationship depends on the structure of the institutions and how effectively countries manage macroeconomic policies.

3.4.4 Comparing the finance-growth relationship in oil-producing and non-oil producing contexts

The results set out in Table 3.4, and 3.6 show that the finance-growth relationship is non-linear and has an inverted U-shape judging from the changing signs of the coefficient from negative to positive and from positive to negative. These inverted U-shapes have been confirmed using the Lind and Mehlum test. The control of corruption and governance effectiveness have the expected influence on growth with coefficients of -13.16 and 14.07 (Table 3.4) in the context of non-oil producing countries. The result contrasts with oil-producing economies where the variables appear to have no manifest relationship. Data on the non-oil producing countries appears to be more meaningful than those for oil-producing countries. Trade in the non-oil producing countries is positively and significantly correlated with growth as expected. In the oil-producing countries, trade negatively and significantly correlates with growth. The negative relationship between trade and growth appears to be contrary to the position of economic theory. The results would be further investigated.

In Tables 3.5 and 3.7 which show the threshold regressions, the point at which the threshold occurs is revealing. The threshold of financial development in developed economies for non-oil producing countries stands at 142%, and that of the oil producing countries at 79%. Similarly, for non-oil producing developing countries it is 14.76% compared to 5.38% for the equivalent group of oil-producing countries. These results suggest that financial development has a greater latitude to influence growth in non-oil producing countries than in oil-producing countries. We suspect that the difference in the quality of institutions in these sets of countries could explain the differences in the behavior of the financial development. We did not conduct additional research on this and therefore have no evidence to suspect other factors.

It is of interested to learn if the behavior in the two sets of countries (oil-producing and non-oil producing) should be expected to be the same. Our response is affirmative to a certain extent. Our positive affirmation would appear to affirm the findings of the extant literature we reviewed which did not indicate that the behavior of oil-producing high-income countries, for instance, would be different to that of the non-oil producing states. Moreover, there is evidence that most of the high-income economies reacted similarly to the 2006-2008 financial crisis. In a situation where there was no warning of a crisis, therefore, it could have been expected that the two sets of the economies would behave similarly. The causes of any variation in the behavior of these economies can be a range of factors including, among other things, changes in the behavior of economic agents, differences in the performance of their institutions and macroeconomic management capacities. In this paper, we elect to analyze the quality of their institutions with the aim of bringing in further relevant factors in future studies.

From our results, we argue that oil-producing economies operate in a fundamentally different economic context to that of non-oil producing economies. Thus, the response of variables to economic shocks in oil-producing economies would be different to those non-oil producing economies. These peculiarities should, therefore, be taken into consideration when policies are formulated and implemented in these economies especially when the policy is directed at influencing economic growth.

Table 3. 3 Results of the stepwise OLS analysis for model specification

Variable	Model I	Model II	Model III
Dependent variable	gdppcg	gdppcg	gdppcg
Gdppcg(-1)	0.61217*** (0.04645)	-	0.18006* (0.1042)
Gdppcg(-2)	-	-	-0.2810*** (0.0970)
Gdppcg(-3)	-	-	0.16158* (0.09210)
Domcr2	0.09688*** (0.03206)	0.4941*** (0.05803)	-0.0033*** (0.00087)
Gnexp	15.3921*** (3.08204)	112.134*** (20.6299)	-
Domcr	-36.0702*** (7.6491)	-165.16*** (11.8086)	0.2568*** (0.0769)
C	-	1091.037 (1991.13)	-2.3829*** (1.8570)
RL	937.738*** (175.221)	-	1.3678
Inflation	13.4547 (9.4779)	-	-
Gfcf	-	-106.92*** (41.031)	-
Ge	-	2688.057*** (612.1874)	-
Tgov	-	1063.85*** (210.055)	-
Oilrent	-	-70.3067*** (21.7367)	-
Trade	2.0626 (1.9991)	-	-
R^2	0.7689	0.8628	0.2012

Note: *, **, *** = significant at 10%, 5%,1%; ( ) = std error; gdppcg = per capita gdp growth; domcr = domestic credit; gnexp = gross national expenditure; RL= rule of law; oilren t= oilrent/gdp; Trade =t rade/gdp; ge = governance effectiveness; gfcf = gross fixed capital formation; Tgov = aggregate governance index; Inflation = rate of inflation. Model I = whole sample; Model II = countries with negative indices for institutions; Model III = countries with positive indices for institutions.

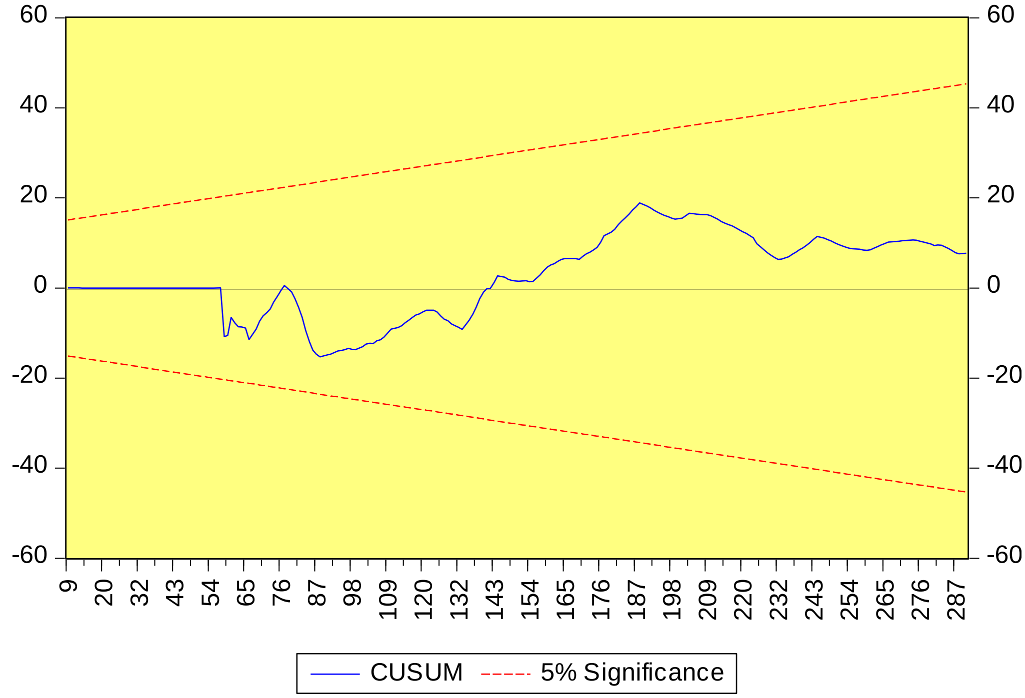

Figure 3. 1 The result of the CUSUM test for model I

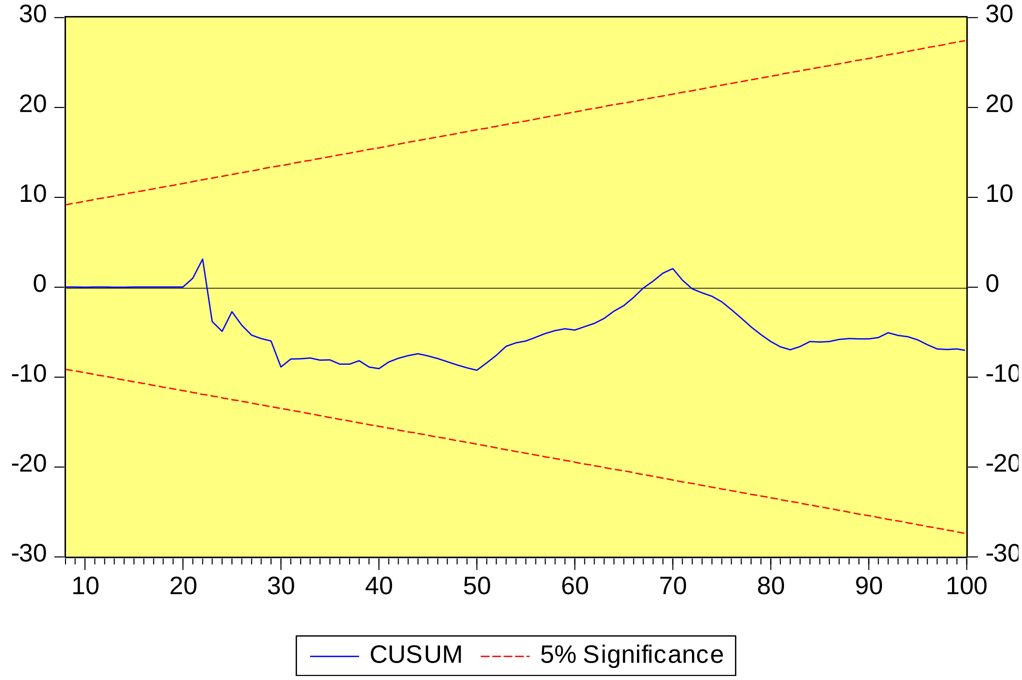

Figure 3. 2 The result of the CUSUM test for model II

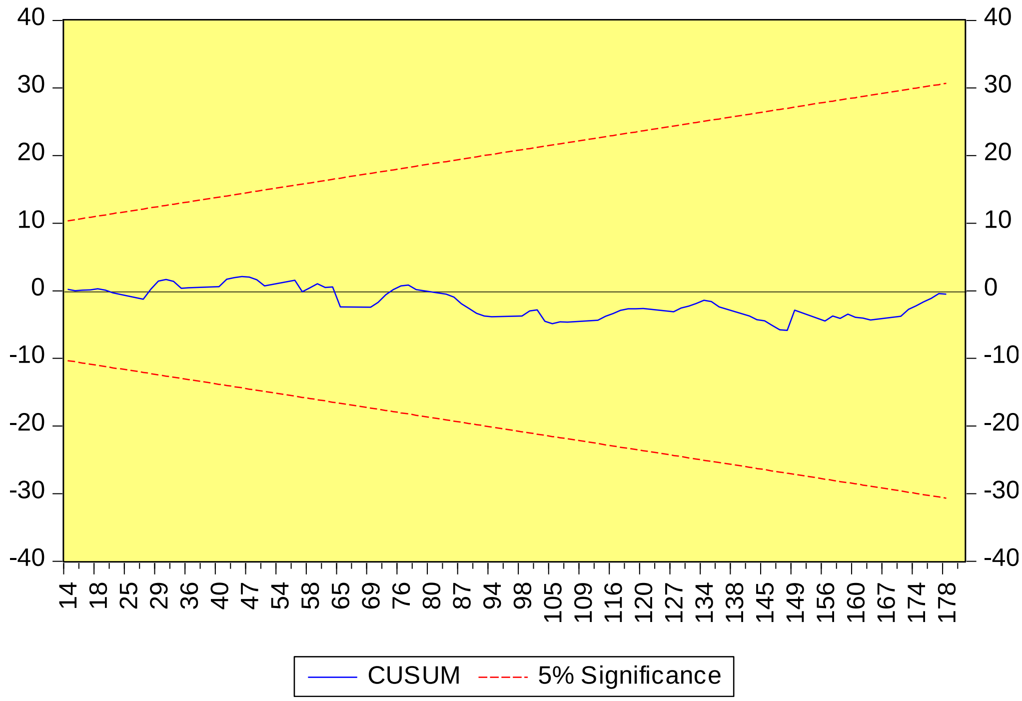

Figure 3. 3 The result of the CUSUM test model III

Table 3. 4 The results of the panel GMM analysis(oil-producing)

Variable	Model I	Model II	Model III
Dependent Variable	gdppcg	gdppcg	gdppcg
c	16.5389	717.36*	-3.3783
domcr	19.615***	18.4008**	0.3292**
domcr2	-0.10628***	-0.10238***	-0.00437**
trade	-4.0822***	-5.4479***	-
inflation	-20.6652	-237.904***	-0.05866*
gdppcg(-1)	0.8434***	0.3462***	0.3296***
gdppcg(-2)	-	0.4582***	-
R2	0.7166	0.7584	0.16402
Sargan test stat	0.4231	0.6588	0.8575

Note: *, **,*** = significant at 10%, 5%, 1%; c = constant; domcr = domestic credit; domcr2 = domestic credit square; trade = trade/gdp; inflation= annual rate of inflation; gdppcg(-1)= lst lag of gdppcg; gdppcg(-2) = 2nd lag of gdppcg.

Table 3. 5 Results of the panel threshold regression(oil-producing)

Variable	Model I	Model II	Model III
Dependent	gdppcg	gdppcg	gdppcg
Cross unit	29	17	12
Threshold estimates γ	10.62%	5.38%	79.11%
95% confidence interval	[5.64 – 14.508]	[5.068 – 53.35]	[34.94 – 193.03]
covariates(regime1)			
logtrade	18.93***	-0.3003	-5.34**
t-statistics	2.8958	-0.0469	-1.5774
gnexp	-0.4517***	0.0484	-0.0997**
t-statistics	-3.8666	0.6100	-2.0029
GE	4.4728	-0.1368	7.0967**
t-stats	0.5474	-0.7659	1.8957
Regime 2			
logtrade	7.6046***	-2.0811*	-9.0918***
t-stats	3.9911	-1.4322	-2.7808
gnexp	-0.0765*	-0.0565*	0.0638
t-stats	-1.9400	-1.5178	0.6512
GE	3.3541**	5.2684	4.7303
t-stats	2.1281	1.0742	1.2708

Note: Model 1= total sample; Model 2= countries with negative indices for institutions; Model 3= countries with positive indices for institutions; logtrade = log of trade as % of gdp; gnexp = gross national expd as % of gdp; GE = index of governance effectiveness; *, **, ***, significant at 10%, 5%, 1%.

Table 3. 6 The results of the panel GMM analysis(non-oil-producing)

Variable	Model I	Model II	Model III
Dependent variable	gdppcg	gdppcg	gdppcg
CC	-13.1610**	-	-
GE	14.0706**	-	-
gnexp	-0.5262***	-0.2900**	-0.2716***
domcr	-0.7551***	1.0540	-0.2456**
domcr2	0.0032**	-0.0152	0.00089**
trade	0.2458***	0.2499***	-
gdppcg (-1)	-0.0881*	-0.1732	0.4519
Sargan test stat	43%	62%	96%
Cross-section	29	17	12

Note: *,**,*** = significant at 10%, 5%, 1%; c = constant; domcr = domestic credit; domcr2= domestic credit square; trade = trade/gdp; CC= control of corruption; GE = governance effectiveness; gdppcg(-1) = lst lag of gdppcg; Model I = Total sample; Model II = countries with negative indices for governance; Model III = countries with positive indices for governance.

Table 3. 7 Results of the panel threshold regression(non-oil-producing)

Variable	Model I	Model II	Model III
Dependent	gdppcg	gdppcg	gdppcg
Cross unit	29	17	12
Threshold estimates γ	14.81%	14.76%	142.25%
95% confidence interval	[14.4300-15.1191]	[5.57 -15.119]	[58.21 – 165.78]
covariates(regime1)			
trade	0.0895***	0.0771**	0.1352***
t-statistics	2.9334	2.4061	5.0165
gnexp	-0.3231***	-0.2486**	-0.6775***
t-statistics	-3.1805	-2.4987	-3.8949
GE	-9.2475	-7.5828	-5.0060
t-stats	-1.4339	-1.0029	-1.3760
PV	-5.9891**	-6.1545**	2.2753
t-stats	-2.2316	-2.2119	1.4925
VA	-9.4087***	-9.2640***	1.8130
t-stats	-3.7902	-3.3215	1.0109
Inf	-0.2126	-0.2223	0.3761
t-stats	-1.2561	-1.2201	1.6264
gfcf	0.2574*	0.2429	0.8557***
t-stats	1.6433	1.5049	2.8953
Regime 2			
trade	0.1078***	0.0749**	0.1061**
t-stats	3.7356	2.0317	2.2711
gnexp	-0.1889***	-0.0565*	-0.8462***
t-stats	-2.9052	-1.5178	-4.9568

PV	3.3886***	4.5636***	-5.1928**
t-stats	3.1353	3.0467	-2.0835
GE	-2.3283	5.2684	15.5278***
t-stats	-1.2638	1.0742	3.3067
VA	1.6142	1.2668	12.2704***
t-stats	1.4422	0.7993	3.2265
Inf	0.2299*	0.2583**	-3117*
t-stats	1.8378	2.4251	-1.8985
gfcf	0.5082***	0.2658**	1.8053***
t-stats	3.5137	2.5054	7.1414
P-val	0.0000	0.0000	0.0000

Note: Model 1= total sample; Model 2= countries with negative indices for institutions; Model 3= countries with positive indices for institutions; logtrade= log of trade as % of gdp; gnexp= gross national expd as % of gdp; GE = index of governance effectiveness; *, **, ***, significant at 10%, 5%, 1%.

3.4.5 U and inverted U-tests of Lind and Mehlum (2010)

Having obtained results suggesting a U or inverted U-shaped relationship between the two variables, we conducted a Lind and Mehlum test to ascertain the results do indeed produce an inverted U-shape. These results are difficult to determine with only the signs of the coefficients. We use the following model:

$GDPpcg = aFD_i + bFD^2 + Z_c + \varepsilon_i$ (differentiating the function, it gives the functions in H0 and H1)

Then we test the joined hypothesis:

H0: (a + b2FDmin ≤ 0) ∪ (a + b2FDmax ≥ 0) against

H1: (a +b2FDmin > 0) ∪ (a+b2FDmax < 0)

Where FDmin = minimum value of FD; FDmax = maximum value of FD.

Where we reject H0, it means the acceptance of inverted U-shaped function. By our estimate, we reject H0. We also accept the alternative hypothesis.

3.5 Conclusion and policy recommendation

We recall our task in this paper was to examine and determine the nature of the relationship that exists between financial development and economic growth in the context of oil-producing countries and to compare this with the nature of the same relationship in non-oil producing economies. We aimed to identify the point of inflection where the relationship between the variables indicates a sharp reversal according to that reported in some of the literature. Lastly, we examine if the point of inflection depends on the quality of institutions in the sampled countries. This section draws some conclusions about these questions based on the results of our analysis and makes recommendations for policy reforms.

According to our results, we found evidence of a non-linear relationship between financial development and economic growth in the panel of oil-producing countries as well as in non-oil producing countries. The financial development indicator shows a sign change from positive to negative in its coefficients from one regime to the other in the two models (Table IV and VI). Our Lind and Mehlum test confirmed that the relationship is an inverted U-shape. This result, according to the literature reviewed, is driven by the financial depth of the economies. We see how low efficiency in financial services, weak institutions, and insufficient access to financial services act as factors driving the low threshold in model II which also drives the low equilibrium in model I. We confirm an inverted U-shaped relationship in the three models of our analysis. We, therefore, conclude that the relationship between financial development and economic growth is non-linear and is characterized by inverted U-shaped.

These results have significant implications for economic growth policy. First, as the finance-growth relationship is not monotonic, it would be unprofitable to automatically adopt policies aimed at improving economic growth by continuously expanding the financial sector. That is, policy makers need to accept that at some point, such a policy would become counterproductive depending on the point of inflection for that economy. As a result shows, in the period after the threshold is reached, a further increase in FD would constitute a drag on growth. A detailed look at FD to ascertain how to improve it by improving financial service efficiency and access to financial services is thus beneficial. FD has been seen to have three dimensions (Svirydzenka, 2016): financial depth (size), efficiency and access. Research has demonstrated that the aspect of FD that become "too much" for growth is financial depth (Beck, Degryse and Kneer, 2014). Expanding financial depth without a commensurate expansion of financial efficiency and access to financial services is known to be responsible for the rapid progress to the point of equilibrium in the relationship between FD and EG and at a low level of economic growth. We, therefore, suggest that governments give more attention to how to improve the efficiency and access dimensions of FD and the quality of economic institutions to ensure an enduring influence of FD on growth. Details of what are necessary to bring about the changes, we suggest, is a subject of further research.

On the question of identifying the threshold, our results in Table 3.5 indicate that thresholds occur in model I at around10.6% of domestic credit as a percentage of GDP. In model II, the threshold occurs at around 5.38% and 79% in model III. These thresholds indicate the point below which FD increases economic growth. Beyond the thresholds, a further increase in FD becomes a drag on growth. The interesting aspect of the results is the disparity in the threshold between model II and III. Our explanation for this disparity is the differences in the quality of institutions between the two sets of countries. It is also possible there are other factors not tested in this paper that could explain the disparity. The average measure for the institutions' indicators is negative for model II and positive for model III. In comparing the finance-growth relationship in the contexts of oil-producing and non-oil producing economies, the latter present stronger outcomes, confirming Beck's (2010) notion of a resource curse in financial development. The results in Table 3.7 show that financial development has a more enduring impact on growth in the non-oil producing countries than in the oil-producing countries. The difference in the context of the two sets of economies appears to be the relative differences in their quality of institutions. Further research may reveal other explanations for the differences in the behavior of the two sets of the economies.

An important policy implication of these results is the need for developing countries to improve governance indicators. These include the rule of law that gives confidence to investors to hold private property including financial assets and liabilities. Other improvement includes control of corruption to create certainty for investors when engaging in business relationships. The quality of market regulation that can protect the interests of market participants and ensure a liquid capital market should also be a further priority consideration. The general effectiveness of governance in public and private organizations and the absence of public violence are additional important issues. In summary, financial reforms to improve efficiency, access, and completeness of markets will also go a long way to improve market development and therefore economic growth.

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Chapter Four

Financial structure, economic growth, and growth volatility in Nigeria: a time series analysis

Abstract

In the continuing quest to explain both the determinants of economic growth and differences in growth rates among nations, researchers appear to have reached a consensus that a country's financial development is important in explaining these phenomena. However, one issue that has not been effectively dealt with in the debate is the issue of distinguishing among various theoretical views of the financial structure and its effects on both economic growth and growth volatility. This study investigates both issues using Nigerian data from 1980-2015 and employs the ARDL model for the analysis. The results show that the market-based financial structure tends to affect both economic growth and growth volatility. We find that market-based financial structure has a long-run relationship both with economic growth and growth volatility. This study contributes to the growth literature by helping us understand the relationship between economic growth, growth rate volatility and market-based financial structure in Nigeria. Policies to guide financial sector reforms for growth and growth rate stability are discussed in the paper.

Keywords: Economic growth; Growth volatility; Nigeria; ARDL model, Market-based financial structure.

JEL: C32; G23; D53; F43; O47

4.1 Introduction

The age-long debate on the relationship between financial structure (mix of banks and capital markets) and economic growth and growth volatility is not only still alive, but it is becoming more interesting with the proponents taking several amended positions in quick succession without necessarily killing the debate. Demirgüç-Kunt and Maksimovic (2002) initially denied that there is a relationship between the financial structure of a country and the rate of its growth. In 2011 one of these authors and a few others admitted that the relationship existed but depending on the level of economic development (Demirguc-Kunt, Feyen, & Levine, 2011). A few years later, the same group of researchers agreed that there is an optimum mix of banks and capital market in the financial system that is beneficial to economic growth.

The financial structure debate has also seen a rapid change in the methods of its analysis, from a case study of a few developed countries of the USA, the UK, Japan, and Germany with banks and market dominated financial structure to cross-country, panel and now time series method. In criticizing these methods, Levine (2002) argues that cross-sectional analysis beclouds the results of the individual countries and reduces their policy relevance. On panel analysis, the same author maintains that panel data can hardly be pooled making the result of such analysis spurious. These criticisms are supported by other researchers (Arestis, Luintel, & Luintel, 2005; Luintel, Khan, Arestis, & Theodoridis, 2008; Luintel, Khan, Leon-Gonzalez, & Li, 2016).

In all these changes, the debate is still not decided, and policymakers now live in confusion and await credible research output on which to base their financial reform policies. An example of such confusion is reported in the work of Sharma and Roca (2012) where the authors argue that developing countries should reexamine the merit of establishing stock exchanges because according to the authors, they have not seen their relevance.

4.2 Research objectives and motivation

The object of this study is to select the financial structure measures – bank-based or market-based – that better promotes long-run economic growth and growth stability in Nigeria. It evaluates which of the theoretical views on financial structure measures is more consistent with data. The leading views on the measure of the financial structure by researchers include bank-based, market-based, law and finance and financial service views (Levine, 2002). We aim to provide empirical evidence that (a) distinguishes among these competing theoretical propositions for measuring financial structure and (b) help policymakers design appropriate financial sector reform strategies.

Distinguishing among the competing views of the financial structure has critical policy implications. The policy implication is because whichever view is supported by our data, policymakers would be led to adopt distinct policies to promote economic growth and stabilize the growth rate given such financial structure. For example, if the evidence supports either the bank-based or market-based view of the financial structure, policymakers would focus on implementing policies and regulations that would encourage the development and efficient functioning of banks or capital markets. The choice of the policymakers may include but not limited to the development of a given mix of financial markets and financial intermediaries. If it is financial services view, more attention would be given to improving the functioning of both banks and markets. If it is law and finance view, the focus will shift to strengthening the rights of investors and improving efficient contract enforcement. Policymakers would, therefore, want to know which view of the financial structure will be most appropriate. However, law and finance, and financial service views are not in strict sense regarded as competing views of the financial structure. The proponents of these views argue that financial structure of an economy does not help and should be kept in the shadow, while regulations and policies that improve financial system's efficiency should be promoted as these would add more to economic growth and absorb more shocks affecting rates of growth.

The significance of this study, therefore, includes enhancing understanding of the relationship between long-run economic growth, growth stability (volatility) and a given measure of financial structure based on our statistical analysis. This study also helps policymakers in the formation of growth-enhancing and growth rate stabilizing public policies. Currently, no similar study has been done in Nigeria. Nigeria in this study is regarded as an example of a developing and resources intensive economy. The closest study to ours was done using data from Fiji Island (Sharma & Roca, 2012) and the conclusions of that study were non-empirically established.

The remaining portion of this paper is organized as follows: next paragraphs conduct a literature review of the theoretical and empirical frameworks of the relationships. The data and methods, as well as analysis and discussion of regression results, follow in that order. Finally, the conclusions, which tie the results of the research with the research objectives, are presented.

4.2 Literature Review

4.2.1 Review of theoretical literature

The debate on the relationship between financial structure and economic growth has led researchers to delineate four distinct theoretical views to enhance the understanding of financial structure measures and their influence on economic growth and growth volatility. These views include bank-based, market-based, financial service-based and law-and-finance-based. We discuss these views in turns in the next sections.

4.2.1.1. *Bank-based financial structure*

The bank-based version has been very popular in comparison with others in the debate for the choice among the versions of financial structure for countries. The bank-based financial structure is adjudged to be superior to others on account of its financial intermediation capacity most especially at the early stage of economic development where countries' institutions are weak (Gerschenkron, 1962). Banks are reputed to be more successful in monitoring projects and project managers based on their knowledge of the businesses and in so doing reduce post-lending moral hazards, address agency problems and short-termism (Luintel et al., 2016; Stiglitz, 1985). Banks' ability to alleviate asymmetric information and adverse selection through relationship banking and proximity to their customers and projects sites is also emphasized as a positive attribute of banks leading to economic growth (Levine, 2002; Luintel et al., 2008).

In support of the bank-based financial structure, Stiglitz (1985) argues that banks do better than the market in that they do not quickly disclose sensitive information to the public. According to the author, such disclosure acts as a disincentive to investors in their adventure to acquire information which may be used by free riders if the information is disclosed before the investors draw sufficient benefits from them. In this case, banks, in preserving sensitive information, promote economic growth by encouraging investors to invest in information gathering and alleviating information asymmetry.

Other proponents of bank-based financial structure believe that markets (capital markets) in their liquid states (when market liquidity is high) create investors who have no patience to help develop the corporate governance and in exerting corporate control on their companies. These investors, according to the proponents of this view, sell their shares at the slightest indication of any problem and exit the investment rather than contribute to solving the problem (Allen & Gale, 1999; Bhide, 1993). Furthermore, a powerful bank, described as a coordinated coalition of investors, could more effectively force firms to repay their debts than the atomistic shareholders in the capital market (Rajan & Zingales, 1998). Such power of debt recovery could motivate investors to invest in financial assets with the effect that the economy will grow. However, in practice, there are no noticeable records of banks being more effective in debt recovery than the capital markets. Also, capital markets have ways of making derivatives out of debt instruments and trading them to reduce the risk of debt recovery. This financial instrument is not so well developed in the banking industry. Claims that banks are better debt recovery agents do not appear to be empirically founded.

4.2.1.2 Market-based financial structure

In contrast to the bank-based model, the proponents of market-based structure emphasize the ability of the market to exercise corporate control and enhance corporate governance through mergers and takeovers and the possibility of implementing managerial compensation tie to the firm's performance (Levine, 2002). The market-based model is adjudged to be better in facilitating risk management through diversification and portfolio choice (Levine, 1991; Obstfeld, 1993). By being able to reduce risk through diversification of holdings, investors can make more investment that would grow the economy. There is also the economy of scale in information gathering about the projects and the firms, which is accredited to the market-based model of financial development. Such attribute of the market affects transaction cost and information asymmetry and therefore investment (Levine, 2002). In addition, market is extolled for a few other advantages which discussed in the next paragraph.

4.1.2.3 Capital market intermediation and economic growth

Several authors have made both theoretical and empirical cases on why capital market development should have a first-order correlation with economic growth. Levine (1991, 1996 and 1999) demonstrate that a well-functioning capital market addresses liquidity risk, enhances resource mobilization, eases information asymmetries, and reduces information and transaction costs, thereby, facilitating economic growth. Diamond (1984) supports the capital markets' contribution to minimizing the cost of information that resolves the incentive problem between borrowers and lenders. Diamond (1984) also identifies the monitoring of managers and investment projects as the link between capital market development and growth. Pagano (1993), in his contribution, emphasizes the increase of the productivity capital through the markets' ability to collect and evaluate information on the alternative investments and enabling investors to invest in riskier but more productive technology by sharing the attendant risk. Saint-Paul (1992) supports the markets' advantage of portfolio diversification as it affects economic growth. Saint-Paul (1992), however, believes that diversification enables firms to increase their productivity through specialization and manage the risks of the sector demand shocks by sharing it in the market. Other authors that support the contribution of capital markets to economic growth are Allen and Santomero (1998). These authors see the contribution of the market toward growth through their ability to provide platforms for the trading of the financial innovated products that enable investors to prefer holding financial assets to holding other investments. We did not test these theoretical claims and, therefore, can not attest to their validity.

The holders of market-based views also support the market by criticizing the bank-based model. For instance, they argue that big banks stifle innovation by extracting rents as the costs of information from firms; and also protecting big firms from competition especially those in good relationship with the banks (Levine, Loayza, & Beck, 2000; Rajan & Zingales, 1998). The proponents of the market-based model report that big banks, where they are not restricted by regulation, collude with managers of firms against other creditors and impede the efficient working of corporate governance (Charny, 1998). On the contrary, capital markets aggregates diffused information signals in the market and transmitted it to investors who used it for decisions that add to the economy (Boot & Thakor, 1997).

4.2.1.4 Financial service view of the financial structure

The financial service view which is attributed to Levine (1997), Merton and Bodie (1995) downplay the banks or capital market dichotomy. It emphasizes only the functions and services rendered in the financial market as being what is required to bring about economic growth. According to the proponents of this view, market arrangements arise to evaluate investment opportunities, wield corporate controls, simplify risk management and liquidity and mobilize savings. They also believe that public policy should only be to provide an enabling environment for markets, banks and other financial intermediaries to function effectively in facilitating investment and therefore economic growth (Levine, 1997). These are not all. Other commentators consider legal and judiciary systems as the driver of financial development and therefore economic growth. This view is considered next.

4.2.1.5 The theory of law and finance

Legal and judiciary systems and their relationship with financial development and economic growth could be a special case of the financial service view of the financial structure. This view is articulated by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997). In the opinion of these authors, bank-based or market-based are hardly a useful way of identifying a financial system. Rather public policymakers should only be concerned with the creation and maintenance of legal and judiciary systems that could ensure growth-promoting financial services. They also argue that financial services are a set of contracts that could be made to be effective by ensuring that legal rights are sufficiently encoded, and their enforcement are effective (Beck, Demirgüç-Kunt, & Levine, 2002).

La Porta et al. (1997) extended their arguments to the origins of each legal system in a bid to identify the determinants of an effective legal system but come short of what the effective legal system entails. This part – effective legal system- was explained by Ergungor (2008) who views inflexible legal environment, earlier regarded as the most effective in the development of the growth-promoting financial sector, as an inhibition to the development of the market. The author argues that a flexible legal system that gives cognizance to the changing economic environment would decide on contract enforcement based not only on the letters of the law but equity and the exigency of the changing business practice. In so doing, most of the advantages of banks over the market will disappear. According to this argument, banks have advantages over the capital market where laws are inflexible in that bank could use an alternative contracting mechanism such as relationship lending, to further a given lending transaction that could have failed in market dominated financial systems where the legal system is inflexible. In summary, according to Ergungor (2008), banks are better than the market mostly in an inflexible legal environment and the effective legal systems is one that is flexible to accommodate not only the letters of the laws but also equity and the changing practices of business. With the understanding of the effective legal systems, the few advantages of the banking system over capital markets streamlined, according to Ergungor (2008), the superiority and the contributions of the market towards economic growth would be better understood.

It will be interesting to note that Ergungor's argument does not invalidate the effective legal systems argument of La Porta et al. (1997). The theoretical confirmation of this argument is found in the recent literature. It will, therefore, be interesting to test the relationship between the effective legal systems and economic growth in further studies.

4.2.2 Empirical Literature

There has been a reasonable volume of empirical investigations on the relationship between financial structure and economic growth starting from the work of Goldsmith (1969) which was corroborated by Levine (2002) and Demirgüç-Kunt and Maksimovic (2002). These authors consistently maintained that financial structure (measured by a mix of banks and capital markets) of a country does not account for its economic growth but rather the overall financial development. In time, a shift in position began to emerge. In a time series analysis reported by Luintel et al. (2008), evidence of a relationship between financial structure and economic growth was reported. This study was followed by another reported by Demirguc-Kunt et al. (2011) in what appears to be an amendment to their earlier one of 2002. In this publication, Demirguc-Kunt et al. (2011) argue that financial structure of a country is not only relevant, but there is an optimum financial structure (optimum mix of banks and capital markets) which is best for an economy's growth and that a deviation from that optimum could be detrimental, in terms of growth, for the country.

The more recent studies of the relationship between financial structure and economic growth suggest that financial structure accounts for growth only in the economies of advanced countries (Luintel et al., 2016). These authors use an expanded sample size of countries, and improved econometric technique from those used by the earlier researchers, and they report the positive and significant relationship between financial structure and economic growth. Luintel et al. (2016) also report that the relationship between financial structure and economic growth is a non-monotonic contrary to the positions of the earlier reports. They were also quick to add that financial structure has virtually no significance in the middle-and-low-income countries. Similarly, the non-linear relationship between financial structure and economic growth had also been reported by Yeh and Lin (2013) and Gambacorta, Yang, and Tsatsaronis (2014).

4.2.3 Financial structure and growth volatility

How and why the financial structure of the economy moderates or amplifies economic growth volatility (stability) appears to be a recent area of academic inquiry. The earliest work in this area is credited to Easterly, Islam, and Stiglitz (2001) in their 'Shaken and Stirred: explaining growth volatility's paper. In this paper, the authors concluded that financial development variables dampen growth rates volatility particularly if equity increases much more than debts. Conversely, the financial sector also exacerbates the periods of economic downturns especially if the increase in finance results from debt relative to equity. Yeh and Lin (2013) investigated the relationship between financial structure and growth volatility and found a positive and significant relationship between them. These authors found a faster economic growth in countries with bigger capital markets in the financial structure and at the same time higher growth volatility. They also found the level of per capita income as being negatively correlated with growth volatility. Their findings imply that the lower the per capita income, higher growth volatility, and vice versa. This conclusion supports that of Easterly et al. (2001) who conclude that faster economic growth occasioned by financial development dampens growth volatility. In another study on the relationship, Gambacorta et al. (2014) found a capital market to be better than banks in acting as a circuit breaker to the contagious financial crisis in a country.

In sum, a financial development that is heavy in the capital market is found to correlate negatively and significantly with growth volatility. It is also concluded that the impact of financial structure on dampening growth volatility depends on the level of economic growth. Also, the capital market is seen to dominate in the financial system at the later stage of countries' economic development.

4.3. Data and Methodology

This study investigates three questions. First, is there any long-term relationship between a country's market-based financial structure and its economic growth? Second, to what extent does a country's financial structure and the volatility of its growth rate manifest? How do the relationships in first and second questions compare with the relationship between bank-based financial structure and economic growth on one hand and growth rate volatility on the other? Additionally, this study examines whether Nigeria can be described as a country predisposed to a greater influence on its economic growth by capital markets or banks and other financial institutions.

Four equations are specified to answer the questions:

$$gdpgrw_t = c + marfinstruct_t + \varepsilon_t \qquad \text{- - - - - - - - - - - - - -} \ (1)$$

$$gdpvol_t = c + marfinstruct_t + \mu_t \qquad \text{- - - - - - - - - - - - - - -} \ (2)$$

$$gdpgrw_t = c + instfinstruct_t + \epsilon_t \qquad \text{- - - - - - - - - - - - - - - - -} \ (3)$$

$$gdpvol_t = c + instfinstruct_t + \cup_t \qquad \text{- - - - - - - - - - - - - - - - -} \ (4)$$

Where gdpgrw represents annual GDP per capita growth rate of Nigeria, c is the intercept term, marfinstruct represents a measure of financial structure dominated by the capital market over banks and other financial institutions, and ε_t is the error term. Similarly, instfinstruct represents bathe nk-dominated financial structure and gdpvol represents annual GDP per capita growth rate volatility estimated using the exponential weighted moving average (EWMA) method, and μ_t is the corresponding innovation process for the period. In justifying the use of the EWMA in estimating GDP volatility, this study rely on the following prior research: Pritchett (2000); Blanchard and Simon (2001) and Koop and Korobilis (2014). A good number of researchers, for example, Pritchett (2000), believe that a country's output growth or decline follows exponential trend. The sources of these variables and the frequency of measurement are indicated in table 4.1 below.

Table 4. 1 Variables for equation 1 and their sources

Variable	Measuring	Full name	Measured by	Source	Frequency	Remark
gdpgrw	Economic growth	Gross domestic product growth rate	The growth rate of GDP per capita	World Development index (WDI)	Annually	
Marfinstruct	Financial structure	Market financial structure	Market index/institution index	Sahay et al. (2015)	Annually	IMF staff paper
gdpvol	GDP volatility	GDP volatility	Exponential Weighted Moving Average of GDP	GDP from WDI	Annually	
Instfinstruct	Financial structure	Institution Financial structure	Inst. Fin. Index/Market Fin. index	Sahay et al. (2015)	Annually	

4.3.1 Measurement of financial structure

In studying the relationship between financial structure and economic growth and growth volatility, the measurement of the financial structure has been a concern. The measurement of financial structure is a concern because the financial structure of any economy is a non-observable variable and must be estimated. In estimating the value of the financial structure in this study, we follow the steps taken in Levine (2002) and (Sahay, Čihák, N'Diaye, & Barajas, 2015).

Sahay et al. (2015) have indices for financial development which comprises an index for capital market development and index for banks and other financial institutions for each country. These indices are made up of three estimated values of efficiency, depth, and activity for markets and banks. It is, therefore, possible to calculate capital market dominated financial structure by dividing the capital market index by that of the banks and other financial institutions. The reverse for the bank-dominated financial structure is also true. Similarly, it is possible to estimate the financial structure based on efficiency, depth or activities/access and at the same time be market or bank dominated. For example, a market dominated financial structure based on efficiency would be calculated as market efficiency index divided by banks efficiency index and is represented as Mareffstruct in this study. In a similar vein, the market dominated financial structure is represented as Marfinstruct, and bank-dominated financial structure is represented as instfinstruct in this study.

4.3.2 Empirical Methodology

To investigate the relationship between a country's financial structure and economic growth and growth volatility, we use autoregressive distributed lag (ARDL), model. ARDL is employed usually in situations where a series consists of differing orders of integration, i.e., series at levels I(0), others at first difference I(1) with none integrated at the second difference I(2), (Pesaran, Shin, & Smith, 2001). Additionally, the series must be suspected to co-integrate. The nature of our data influences the choice of ARDL. ARDL model is specified thus:

$$\Delta \Upsilon_t = \beta_0 + \sum_{i=1}^{n} \beta i \Delta \Upsilon_{t-1} + \sum_{i=1}^{n} \delta i \Delta X_{t-1} + \varphi_1 \Upsilon_{t-1} + \varphi_2 X_{t-1} + \mu_t \qquad (5)$$

Where $\Delta\Upsilon_t$ represents a change in economic growth rates over time; $\sum_{i=1}^{n} \beta i \Delta \Upsilon_{t-1} + \sum_{i=1}^{n} \delta i \Delta X_{t-1}$ represents the short run dynamics of the model, while $\varphi_1 \Upsilon_{t-1} + \varphi_2 X_{t-1}$ represents the long run portion of the model and μ_t represents the disturbance (white noise) term. βi and **δ**i are short term coefficients, while $\boldsymbol{\varphi}_1$and $\boldsymbol{\varphi}_2$ are ARDL long run coefficients. $\varphi^1 \gamma_{t-1} + \varphi^2 X_{t-1}$; also represents $\boldsymbol{\varphi} Z_{t-1}$ in the error correction model as the error correction term (ECT).

The following process will be necessary to use ARDL: first, breakpoint unit test which is needed to confirm that the series is I(0), I(1) and to avoid those that are I(2) and of a higher order of integration. If the series are integrated at the level, OLS could be used for the regression. If they all are integrated at first difference, VECM could be used, or the series could be differenced, and OLS used. If the series is of a differing order of I(0) and I(1), then ARDL would be appropriate. The optimum lag structure for the regression is obtained from the unrestricted VAR regression and based on AIC. Using the optimum lags, we estimate the ARDL model using OLS. The model is tested for serial independence using the Lagrange Multiplier (LM) and Correlation Q-statistics; and dynamic stability of the model is tested using Cusum, Bounds or Wald tests. Cusum test for the presence of recursive residual is used in this study. Recursive residual is due to structural breaks, and ARDL models are sensitive to them. Finally, the error correction model (ECM) is estimated to ascertain the long run coefficients and the speed of adjustment. The results are then used to measure the short run dynamic effects and the long run equilibrium relationship between the variables.

4.4. Empirical results and analysis

4.4.1. Preliminary analysis

We present in this section the results of our empirical procedures. We start by showing the descriptive statistics of the variables used in this study. The descriptive statistics of our indicators give a good idea of the patterns in the series and the nature of the estimates and diagnoses to be performed. Table 4.2 and 4.3 present the descriptive statistics and cross-correlation analysis of the variables.

Table 4. 2 Descriptive statistics of variables

	Marfin struct	gdpgrw	gdpvol	Mareff struct	Instfin struct	Insteff struct
Mean	0.180	3.716	0.668	0.130	11.894	52.922
Median	0.139	4.280	0.460	0.094	7.178	10.694
Maximum	0.715	33.740	5.397	**0.507**	30.750	174.250
Minimum	0.034	-13.120	0.012	0.0057	1.398	1.971
Std Dev	0.154	7.669	0.914	0.141	10.127	62.267
Skewness	1.443	1.164	4.115	1.091	0.771	0.811
Kurtosis	5.398	8.574	21.744	3.582	1.973	1.927
Jarque-Bera	20.515	53.211	611.155	7.436	5.005	5.516
Probability	0.000035	0.00000	0.00000	0.024	0.082	0.063
Sum	6.305	130.058	23.393	4.558	416.292	1852.296
Sumsq Dev	0.812	1999.754	28.429	0.672	3487.253	131825.8
Observation	35	35	35	35	35	35

From Table 4.2 above, the standard deviations of the variables are higher than their mean values, except for market financial structure and institution (bank) financial structure. The difference between the standard deviation and the mean indicates that the variables are highly volatile. The variables also have high kurtosis except in two cases including institution (bank) financial structure and the institution (bank) efficiency structure. The high kurtosis is further confirmed by the formal measure of normality in the distribution of the series using Jacque-Bera statistics. The high Jacque-Bera statistics in the table supports the rejection of the null hypothesis of the series being normally distributed. The distribution of the variables is positively skewed reinforcing the non-normal distribution of the series.

Table 4.3 presents the correlation coefficients of the GDP growth rate and GDP volatility and the various measures of financial structure. The results show that the measures of financial structure, understandably, correlate with each other. For example, institution efficiency structure (insteffstruct) highly correlates with the institution financial structure (instfinstruct), market efficiency structure (mareffstruct) and market financial structure. The correlations among the variables make it difficult to include them simultaneously in one equation. They were therefore analyzed individually by examining the relationship between economic growth, growth volatility and financial structure.

Table 4. 3 Cross-correlation analysis of variables

	Gdpvol	gdpgrw	insteff struct	instfin struct	Mareff struct	Marfin struct
gdpvol	1.000					
	------					
gdpgrw	0.484	1.000				
	(0.0032)	-------				
insteff	0.0247	-0.488	1.000			
Struct	(0.888)	(0.0029)	-------			
instfin	0.0058	-0.510	0.983	1.000		
Struct	(0.973)	(0.0017)	(0.000)	--------		
Mareff	0.126	0.459	-0.693	-0.738	1.000	
Struct	(0.406)	(0.0055)	(0.000)	(0.000)	-------	
Marfin	0.145	0.473	-0.698	-0.752	0.965	1.000
	(0.469)	(0.0041)	(0.000)	(0.000)	(0.000)	--------

4.4.2 The results of the breakpoint unit root tests

Table 4.4 shows the breakpoint-unit-root test results which were done using Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) test. In the results, GDP per capita growth (gdpgrw) and GDP per capita volatility(gdpvol) were integrated at level while market dominated financial structure (marfinstruct) was only integrated at I(1) making a case for the use of ARDL in investigating the long run relationships between these series according to (Pesaran et al., 2001).

Table 4. 4 Results of breakpoint unit root tests

	ADF	ADF	PP	PP
Variable	constant	Trend & Constant	Constant	Constant & Trend
Gdpgrw 1(0)	-7.0014***	-10.0809***	-5.451***	-10.081***
gdpvol I(0)	-13.5463***	-15.7865***	-13.546***	-15.787***
Marfinstruct I(0)	-4.2069	-1.3157	-4.207	-1.316
Marfinstruct I(1)	-5.9623***	-11.9913***	-5.962***	-11.991***
Instfinstruct I(0)	-6.303***	- 1.444	-6.303***	-2.456
Instfinstruct I(1)	-4.682**	- 9.844***	- 6.529***	- 9.844***

Notes: *** = Prob at 1% level; ** =5% level; * = 10% level

4.4.3 The results of the optimum lag selection for the regression of equation 1

As indicated in table 5 below, lag-two was selected for equation 1 and 2 for the ARDL model analysis.

Table 4. 5 Results of the optimum lag selection for equation 1 and 2

Lag-1	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*	*Lag-2*	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	*-112.11*	*NA*	*92.25*	*7.36*	*7.45*	*7.39*	*0*	*-51.87*	*NA*	*1.89*	*3.47*	*3.56*	*3.51*
1	*-109.43*	*4.84**	*82.79*	*7.25*	*7.39**	*7.29*	*1*	*-48.66*	*5.79**	*1.64*	*3.33*	*3.47*	*3.37*
2	*-107.76*	*2.91*	*79.35**	*7.21**	*7.39*	*7.27**	*2*	*-46.90*	*3.06*	*1.56*	*3.28*	*3.46**	*3.34**
3	*-106.82*	*1.56*	*79.80*	*7.21*	*7.44*	*7.28*	*3*	*-45.76*	*1.92*	*1.55**	*3.27**	*3.51*	*3.35*

Notes: * indicates lag order selected by the criterion; Lag (1) = equation 1; lag (2) = equation 2.

Table 4. 6 Results of the optimum lag selection for equation 3 and 4

Lag 3	logL	LR	FPE	AIC	SC	HQ	Lag4	LogL	LR	FPE	AIC	SC	HQ
0	-112.0	NA	91.90	7.35	7.45	7.38	0	-51.876	NA	1.893	3.475	3.568	3.506
1	-108.5	6.36	78.14	7.19	7.33	7.24	1	-48.667	5.79*	1.642	3.333	3.472	3.378
2	-106.3	3.88 *	72.24 *	7.11*	7.30*	7.17*	2	-46.904	3.069	1.564	3.284	3.469*	3.34*
3	-105.4	1.46	72.94	7.12	7.12	7.20	3	-45.760	1.919	1.55*	3.274*	3.506	3.350

Notes: * indicates lag order selected by criterion; lag 3= eqn 3; lag 4 = eqn 4

Lag two was selected for equation 3 and equation 4.

Table 4. 7 The results of the regression

Model 1		Model 2	
Variable	Coefficient	Variable	Coefficient
D(gdpgrw(-1))	0.6299	D(gdpvol(-1))	0.1481
	(2.1465)		(0.2790)
D(gdpgrw(-2))	0.0872	D(gdpvol(-1))	0.0688
	(0.2684)		(0.1977)
D(marfinstruct(-1))	-7.6209	D(marfinstruct(-1))	0.0048
	(16.5758)		(2.2254)
D(marfinstruct(-2))	-14.6426	D(marfinstruct(-2))	-1.1963
	(16.4199)		(2.2254)
ECM		**ECM**	
ECT (-1)	-0.9631***	ECT (-1)	-0.9740***
	(0.1866)		(0.3389)
LM TEST		**LM TEST**	
F-statistic	0.5745	F-statistic	0.5136
Chi^2	0.4843	Chi^2	0.5046
WALD TEST		**WALD TEST**	
F-test	8.2340	F-test	5.1859
Pesaran CV	3.10 - 3.87	Pesaran CV	3.88 – 4.61

Model 1= Fin. Structure/growth eqn; Model 2 = Fin. Structure/ growth volatility eqn; Values in ( ) = standard errors; *** = significant at 1%

4.4.4 The Results of ECM Regression

We ran an error correction model (ECM) regression to examine both the short and long run dynamics of the series. ECM for co-integrated series is specified thus:

$\Delta Y_t = \beta_0 + \sum_{i=1}^{n} \beta_1 Y_{t-1} + \sum_{i-1}^{n} \delta_1 X_{t-1} + \varphi Z_t + U_t$; Z is the error correction term (ECT) which is also the OLS residuals from the following long run co-integrating regression: $Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t$. It should be noted that the coefficient of the ECT must be negative and significant. The negative coefficient of ECT which is also the speed of adjustment implies that the system is mean reverting. And its significance indicates that the model used in the analysis is stable.

Our result for the economic growth analysis reported in Table 4.6 shows that $\boldsymbol{\varphi}$ is -0.9631, about 96%, with zero probability. This means that the coefficient is highly significant. Our test result indicates that 96% of the past deviation from equilibrium converges back to equilibrium in one year, the frequency of our data. In converting to Half-life decay process, it implies that the whole deviation would be restored in approximately 4 months. (Half-life = 0.1899 year = 69 days). Similarly, in the growth rate volatility analysis, the error correction coefficient equals -0.9740; meaning that about 97% of the deviation would be corrected annually. This result also produces half-life of 0.21 year = 77 days. Assuming a constant speed of mean reversion, the deviation from the equilibrium between market-based financial structure and economic growth volatility could be restored in approximately 154 days. It can be argued from these results that the deviations of the financial structure from economic growth and growth volatility are rather transitory.

4.4.5 Diagnostic Analysis

4.4.5.1 Tests for Serial Correlation

As conditions for confirming the existence of a long-run relationship among the variables using the ARDL model, Pesaran et al. (2001) suggest that there should be no serial correlation among the variables. In this study, the Lagrange Multiplier (LM) was used to test for serial correlation. The result of the test reported in table 6 indicates that the null hypothesis of no serial correlation could not be rejected at 5% probability (F-statistic = 0.5745; Probability Chi^2 = 0.4843). The same test was repeated for equation 2, as reported in Table 4.6 above; the result indicated no serial correlation. Correlogram- Q Statistics supported the LM test. The result also indicates no autocorrelation among the variables.

4.4.5.2 Stability test

A test for the stability of the long run parameters and the short-run dynamics of the model was conducted as recommended in Pesaran and Pesaran (1997) using the Cumulative Sum (CUSUM) test. The test is applied to the residual of ARDL regression. In the test, two sets of asymptotic critical values are provided: one when all regressors are purely I(0) and the other if they are all purely I(1). These two sets of critical values provide a band covering all possible classifications of the regressions into purely I(0), purely I(1) or mutually co-integrated. Test value outside the band indicates that the variables are not co-integrated and the test value within the band is said to be co-integrated, and the coefficients of the model are stable. A similar test was conducted on equation 2, and the result as reported in Table 4.6 and figure 1 and two show that the variables – market-based financial structure and growth rate volatility are co-integrated.

Our report of the stability test shows that the model and the coefficients are stable. The test value stays within the band of critical value for I(0) and I(1) in Figure 1.

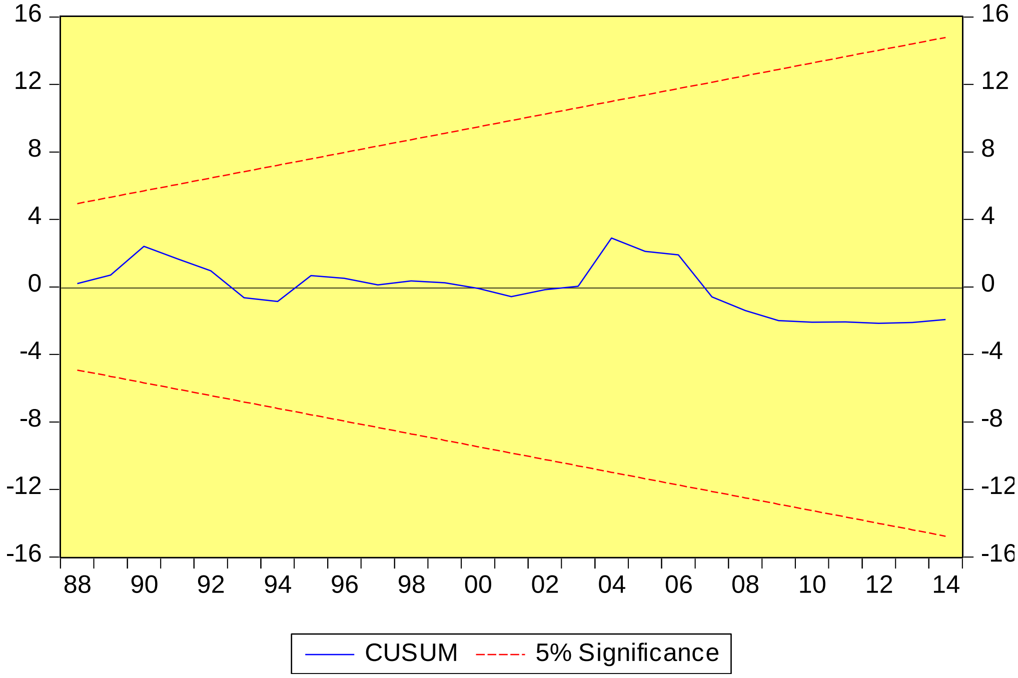

Figure 4. 1 CUSUM Test on growth and financial structure relationship

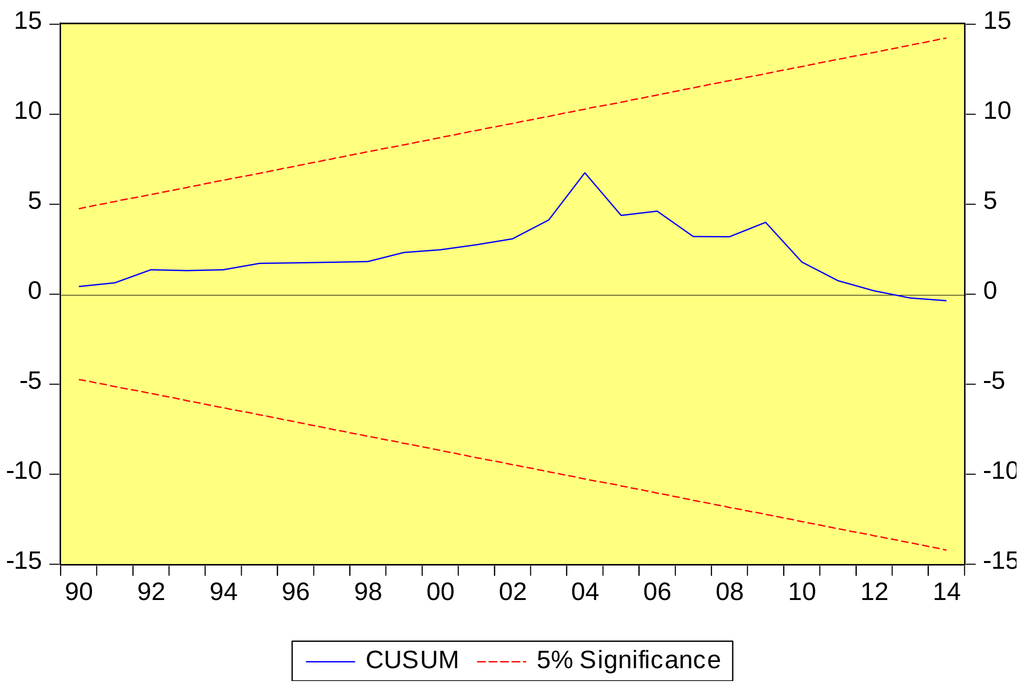

Figure 4. 2 CUSUM test on growth volatility- financial structure relationship

4.4.6 Wald Test for Long Run Relationship

Wald test is used to test the joint significance of the coefficients representing the long run portion of the ARDL model. The computed F-statistic will be compared with a set of asymptotic critical values. If the F-statistic is greater than the critical value, H0 of C (5) =C(6)=0 is rejected to accept the alternative H1 of C(5) not equal to C(6) and not equal to zero. Our results reported in Table 4.6 indicate that the F-statistic of 8.2340 is higher than 3.10 - 3.87 which is the range of Pesaran critical values. The result suggests that there is a long run relationship between the GDP growth rate and market-based financial structure in Nigeria. The explanation of the CUSUM test is given in section 4.4.5.2 above.

4.5 Discussion of the results

This study aimed to investigate the nature of the relationship between market-based financial structure and economic growth and growth rate volatility. The secondary aim was to compare the market-based results with the relationship between bank-based financial structure and economic growth on one hand and growth volatility of the other. Some research had indicated various conclusions including that there was no such relationship (Levine, 2002); that the relationship between the variables depended on the stage of economic development. Boyd and Smith (1998), Rajan and Zingales (1998) hold that bank-based financial systems are more important in promoting economic growth in the early stages of economic development. Yeh and Lin (2013), however, reported evidence that market-based systems are more important in promoting growth in the early stage of economic development. In the same line of the argument, Olofin and Afangideh (2008) using data from Nigeria concluded that a country's financial structure has no independent effect on its output growth. Finally, Luintel et al. (2016) report that a market-based system is relevant - with sizeable economic effects for the high-income but not for the middle-and-low income countries.

Quite contrary to all these research except for that of Yeh and Lin, the results of our study show that market-based financial structure has a positive and statistically significant long-term relationship with economic growth and growth rate volatility. Our study also shows that the financial structure based on capital market measures has a statistically significant relationship with economic growth and growth volatility in Nigeria. Nigeria is a developing and resource-based economy in its early stage of economic development.

Our results reported in Table 4.6 above indicates that market-based financial structure measured by the index of capital market development divided by the index of banks and other financial institutions and denoted as marfinstruct in this study has a long run relationship with economic growth, measured by GDP per capita and denoted by gdpgrw. The relationship between the market-based financial structure and economic growth is supported by the error correction coefficient of -0.9631 at a high significance of 0.000. The result indicates, as stated above that there is a probability of 96% of the mean-reverting speed to restore equilibrium in the space of one year. The probability of the mean-reverting speed appears to be a very strong co-integrating credential between market-based financial structure and economic growth. The rapid pace of mean reverting in this model could be accounted for by the relative growth of capital market compared to banks. The capital market is reputed to be more efficient than banks in the management of risks (Easterly et al. (2001). The capital market is also found to be a better circuit breaker in the event of a contagious financial crisis (Gambacorta et al., 2014) thus accounting for the rapid mean reversion.

In comparing with the bank-based financial structure, the result is heavier in favor of market-based than the bank-based. The error correcting coefficient of the market-based of 96% ranks higher than 77% of the bank-based (see appendix 1). The market-based result is also highly significant compared to the bank-based result that is only significant at 5%. The result for equation indicates the error correcting coefficient of -0.9740 at a probability of 0.0082 which is highly significant at 1%.

These results can be explained in two broad but related ways. First, financial systems development measured regarding market depth, access and efficiency can explain the growth or the lack of it in Nigeria much better than bank-based indices (King & Levine, 1993a). Market depth for the whole financial systems is measured by market capitalization of the capital market and the amount of credit to private enterprises by commercial banks. It means, in the first place, that an increase in market depth could improve the efficiency of investment as reported by Goldsmith (1969) and therefore positively influence economic growth. In the same vein, the increase in financial depth could dampen growth volatility through investment and consumption smoothing (Easterly et al., 2001).

A similar result could be obtained, according to Levine (1997) if access to funding is extended to businesses with growth-enhancing potentials. Such businesses include SMEs, innovative and technology-driven businesses. Additionally, increase in market efficiency, which includes an increase in liquidity (facilitated by the secondary market platforms) has been demonstrated as having a positive and significant relationship with economic growth (Levine & Zervos, 1998). In summary, actions that can deepen the market, improving access to the services of the market and improving market efficiency could positively influence economic growth in Nigeria.

Another explanation suggested by our results is that financial development dominated by capital market appears to have the edge over market dominated by banks judging from our analysis of the Nigerian economy. Using the functional type explanation provided by King and Levine (1993b) and Levine (1997), the capital market is said to manage market risks better than the banks in that capital market provides facilities for portfolio diversification. Capital market also facilitates the adoption of innovation and modern technology in the production process through the availability of market liquidity. This characteristic of the market (liquidity) was reported by Hicks (1969) as the enabler of the Industrial Revolution in England at the time. It is, therefore, possible to say, using the results of our analysis, that Nigeria could experience growth by adopting policies that could boost capital market development without necessarily ignoring the development of banks which is part of the enabling environment for the growth of the capital market.

Also, our results show that market-based financial structure measured as indicated demonstrates a long run relationship with GDP growth volatility. These results support a few prior research conclusions including Yeh and Lin (2013) and Luintel et al. (2016) that market-based financial structure has a long-run relationship with economic growth and reject the view held by Olofin and Afangide (2008) that financial structure has no relationship with economic growth. The results of the second model analyzed in this study also support the research positions of Easterly et al. (2001), Yeh and Lin (2013) to the effect that market-based financial structure significantly correlates with growth volatility.

This result implies that as the market deepens, access provided to growth-enhancing businesses for funding and markets improve in efficiency, economic volatility would be ameliorated. Easterly et al. (2001) explain that financial development dampens growth volatility when access to funding is available to support consumption which is prone to decline when there are any actual or perceived negative economic shocks. The same authors believe that the dampening of growth volatility becomes more sustained when the change in financial development is brought about by the improvement in the capital market rather than banks. However, there is a growing consensus in the literature on this relationship to the effect that the FD/growth volatility relationship is not monotonic but a U-shaped. In the context of Nigeria, what is the point of inflection in this relationship?

A couple of researches argue that this point is not the same for every economy (Arcand, Berkes, & Panizza, 2015; Easterly et al., 2001; Sahay et al., 2015). And what determines this turning point(s)? These are the questions our next paper will attempt to answer.

4.6 Conclusion and policy recommendation

This study set out to examine if market-based (or market-dominated) financial structure has a relationship with economic growth and growth volatility. The second aim was to examine which of the financial structure measures – market-based or bank-based- exhibit a better influence on growth and growth rate stability. Time series data spanning 1980 to 2015 from Nigeria was used. Nigeria was chosen both because it is a developing and resource-driven economy which is prone to GDP fluctuations. Autoregressive Distributive Lag (ARDL) model was selected to analyze the equations designed for this study. ARDL was chosen because the series used in the analysis were of unequal integration order. Besides, no series was of the order higher than 1. Based on the results of the regression analysis reported in table 6, we can conclude that the market-based financial structure has a statistically significant relationship with both economic growth and growth rate volatility. Secondly, the market-based financial structure appears to be better (than bank-based) in promoting long-run economic growth and growth rate stability. The market-based financial structure is more consistent with the data than the bank-based measure.

The conclusions of this study are agreeable with Yeh and Lin (2013), Gambacorta et al. (2014) and Luintel et al. (2016) to the effect that market-based financial structure performs better than the other measures in their influence on economic growth. The conclusions are also consistent with Easterly et al. (2001) and Yeh and Lin (2013) with regards to the better performance of market-based financial structure in absorbing shocks that affect growth rate stability. Finally, the conclusion is a counterexample of Luintel et al. (2016) regarding their claims that the relevance of market-based measure of financial structure in promoting economic growth is not attributable to the middle and low-income countries.

The conclusions of the study help policymakers to distinguish the range of financial reform strategies that can usefully be adapted to influence economic growth and growth rate stability. Other policy implication includes an effort to accelerate the growth of capital market deepening, improvement of access to the services of the market and upgrading the efficiency of the services provided by the market. These strategies have been linked to a positive impact on growth and growth rate stability (Sahay et al., 2015) additionally, providing access for SMEs funding within the market structure should be promoted. SMEs are reputed to have a high potential for economic growth (Kauffmann, 2005). Secondly, the current policy of using second-tier markets for the funding of SMEs should be re-visited as the market has been slow in providing the needed access to funding for SMEs.

Finally, it should be noted that this study is only a preliminary investigation of the relationship between growth, growth volatility and FD in Nigeria. Various prior researches had concluded that the relationship between market-based financial structure and economic growth and growth volatility was only based on the level of economic development and their studies could not be validated when using data from less developed and middle-income countries. To enable us to speak authoritatively about the developing economies we have to investigate a bigger sample than what we have done in this study. Prior research also reported on the relative strength of capital market as compared to banks and other financial institutions with regards to their influence on economic growth and growth volatility, more comparative studies to confirm these claims still need to be done regarding the economies of the LDCs.

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Appendix 1 Results of regression for bank dominated model

Model 1		Model 2	
Variable	Coeff.	Variable	Coeff.
D(gdpgrw)(-1)	0.064	D(gdpvol)(-1)	-0.096
	(0.282)		(0.268)
D(gdpgrw) (-2)	0.050	D(gdpvol)(-2)	-0.033
	(0.189)		(0.184)
D(instfinstruct)(-1)	0.354	D(instfinstruct)(-1)	-0.015
	(0.448)		(0.064)
D(instfinstruct)(-2)	0.712	D(instfinstruct)(-2)	0.046
ECM		***ECM***	
ECT 22(-1)	0.770***	ECT23(-1)	-1.055***
	(0.348)		(0.336)

Note: ( ) = std error; *** = significant at 1%; Model 1= Regression of growth/bank dominated FD; Model 2 = Regression of growth volatility/ bank dominated FD

Chapter Five:

Does spatial proximity to stock exchange enhance access to funding to small and medium enterprises?

Abstract

Adequate funding of small and medium enterprises (SMEs) holds the key to crossing certain socioeconomic hurdles in many countries including Nigeria. These hurdles include poverty reduction, inclusive economic growth, equitable income distribution, and economic diversification among others. In response to such challenges, countries have set up alternative securities market (ASeM) to provide access to equity funding to SMEs. Research argues that stock exchange services are spatially non-neutral; the non-neutrality of these services may result in regional bias in the provision of capital to SMEs. The bias in the equity capital distribution is also expected to reinforce the bias in the regional economic development and rural-urban population drift.

This study examines the relationship between spatial proximity to exchanges and the probability of access to equity funding to SMEs in Nigeria. The study uses the Logistic Regression Model for its analysis. The results indicate that 1 Km decrease in spatial proximity to the exchange in Nigeria decreases the likelihood of being listed on the exchange by 9.76%. The result confirms the spatial non-neutrality hypothesis of the stock exchange services. The study further recommends regionally located and managed stock exchanges as a policy option for easing funding constraints to SMEs.

Keywords: SMEs, Equity funding, Alternative Securities Market (ASeM), Regional Stock Exchange, Spatial Proximity, Logistic Regression Model

5.1 Introduction

Expanding the access to finance holds a promise for the growth and development of the small and medium scale enterprises (SMEs) in Nigeria as it is in other parts of the world. Even though SMEs holds the key to job creation and overall economic growth, as claimed, their growth and sustenance in a developing country such as Nigeria are not keeping pace with the expectation. Aremu and Adeyemi (2011) found that most SMEs in Nigeria fail before their fifth anniversaries. Besides, in countries at the equivalent level of development as Nigeria, SMEs contribute more to GDP than they do in Nigeria. For example, on the average, SMEs contribute 40% to GDP in Asian countries and 50% the o Europe and USA, whereas they contribute only 1% in Nigeria (see Oyelaran-Oyeyinka, 2013). The biggest constraint to the development of SMEs in Nigeria, according to researchers (A. Akinola, 2013; A. O. Akinola & Iordoo, 2013; Kauffmann, 2005) and as it is reported in the nationwide survey of 2010 and 2013 is the lack of access to finance for expansion and sustainable development.

The governments of Nigeria adopted several policies including an expansion of the capital market facilities to solve the problem. Their successes in boosting access to funding to SMEs have been very limited. For example, in 1985, the Federal Government of Nigeria, through the Securities and Exchange Commission and the Nigeria Stock Exchange (NSE), initiated a market-based solution to the problem by creating alternative securities market (ASeM) (CBN, 2013). The ASeM, created to provide access to funding to SMEs operates as a natural expansion to the NSE but with less stringent listing requirements regarding the costs of listing, financial reporting and the frequencies of reporting. Casual observation suggests that this policy, like the others, does not appear to be working. Out of the documented 73, 000 (approximately) SMEs (2015 figure), ASeM have only been able to list 11 firms since 1985. Despite the remarkable indication of the failure of this policy to solve access constraint to funding to the SMEs, there is a noticeable shortage of research to examine why and to point at what works. At the same time, however, there is mounting evidence suggesting that firms closer to stock exchanges disproportionately enjoy more access to funding than those far away from the exchanges (see Fafchamps and Schündeln (2013).

The first aim of this research is to test the market proximity hypothesis for Nigeria. Testing the proximity hypothesis is studied with particular reference to the SMEs and the second-tier securities market in Nigeria. The study seeks to engage various relevant concepts with bearing on information, risk, costs and opportunity cost of capital to understand the behavior of the funding constraints bedeviling SMEs. The second aim of this paper is to examine whether the spatial proximity question holds in the face of the development of technology and communication in the contemporary world? This question among others queries the extent to which technology and communication alleviate the information and other frictions in the financial markets

The remainder of the study will be organized in this order: The next section reviews the literature on spatial proximity and access to funding. Section 3 plays host to the data and methods of analysis to be used and section 4 displays the results of the analysis. Section 5 discusses the results of the analysis and concludes the study.

5.2. Literature review

5.2.1. Financial intermediation

In this study, we would like to trace financial intermediation to the work of Joan Robinson (1953). In her report, she argues that when a strong impulse to invest is frustrated by the lack of finance, devices are invented; habits and institutions are developed to release it. The invention of devices and development of habits and institutions in the last sentence appear to be speaking to intermediation which Allen and Santomero (2001) describe as the creation of markets, designing of products, incentives and the setting up of rules to motivate market agents with surplus savings and the needy agents to meet and exchange. In the circumstance of this study, given a market-based environment, where there is a strong impulse to invest, it is only the presence of intermediaries that are needed, as explained above, for the SMEs to have access to funding. In this case, the intermediaries would design financial products, markets, and positively influence the rules of operations in the market to ensure that parties are motivated to exchange. These intermediaries are the banks, capital markets, and other financial organizations. Markets (ASeMs), according to Levine (1997), ease information frictions, reduce information and other transaction costs and perform other functions of intermediation to ensure that securities issuers get funded. If the market (SSM) has been established, and SMEs are not funded, then further investigation should be done to create an insight into other hindrances which is in part the purpose of this study.

5.2.2. Information asymmetry: what is it and what part does it play?

In a lender-borrower relationship, the borrower is usually able to have more information about the transaction than the lender. The situation is worse where the provision and the quality of such information are not regulated, or the borrower cannot provide the necessary information as could be the case with most SMEs. Both parties need to know about the risk profile of the project to which the funds will be applied, the organization and the managers who will be managing the projects. A feasibility study of the project or information in the prospectus about the project is used in the capital markets in most cases. The problem may not all be solved here because the borrower is in a position and could use the fund for another project once it is given. Information asymmetry could also exist where the profile of the borrower is not known, and the lender has no way of estimating the rate of credit default especially where credit rating agency is not available. The situation is intensified where one party, for instance, the lender has no control to stop the other party (the borrower) from cheating in the underlying transaction. The information asymmetry, especially in a lender-borrower context, is a situation where one party is able to and has more information than the other, and the party with more information could benefit from the information at the expense of the other.

The consequences of information asymmetry are adverse selection, moral hazard and monitoring costs (Hirshleifer, Huang, & Teoh, 2016). Adverse selection speaks to a situation where one party has no benefit of information to discriminate between two projects with different credit risk in her credit allocation; in other words, where the investors make their choice blindly. Moral hazard, in this case, will be a situation where the informed party (the borrower) uses her information advantage to invest in a riskier project after taking possession of the fund to the disadvantage to the lender. This situation put the investor at a disadvantage if the project fails and the credit remains unrecovered. When this is suspected, the lender could hire an auditor or a professional to monitor the borrower to restrain her from taking advantage of her information, and in the process, the lender incurs costs. This cost is referred to as the monitoring cost (Cassar, Ittner, & Cavalluzzo, 2015). All this could affect SMEs' access to funding because when information asymmetry exists, and the value is high, the lender may decide not to participate in the transaction, and credit flow will be hindered.

5.2.3 The concept of transaction costs

Transaction cost is one of the concepts that hold potential in explaining why SMEs may not access funding through ASeM. The context of this analysis is that the 73,000 SMEs are located all over Nigeria, and ASeM is in Lagos the commercial capital of Nigeria. Table 1 shows some SMEs, locational distribution and their driving distance in KM to ASeM in Lagos. In what follows, we examine the connection or the missing link between ASeM's location and SMEs' access to funding?

Where there are no stock exchanges or financial institutions, the individuals with excess savings desiring to invest will first identify where to invest. The target of the investment must be evaluated for viability. The investor will also conduct due diligence on the managers of the project for management capabilities and moral character to judge their credibility with regards to keeping their words against repayment of the credit and interest. The investor may also have to audit or cause to be audited the report made by the project managers for assurance that the revenue report is true especially when the loss was reported. These explain the transaction costs which could potentially frustrate the investment and access to funding by SMEs. Levine (2005) argues that where the financial system is developed, these costs for the investors are minimized by the involvement of the stock exchange permitting savers to hold financial assets and firms in accessing funding. How then do we explain the case of ASeM in Nigeria, set up 1985 and has been able only to list 11 companies out of the approximately 73,000 in the country? The number of listing describes the number who could access funding for growth and development. The poor access to funding by SMEs using the transaction costs argument could be explained in two ways: it is either that the cost is so high that investment in the SMEs financial assets is unviable or ASeM has no capacity to mitigate the costs and encourage investment in the SMEs stocks as explained by Levine (2005).

The other side of this argument borders on the fixed and variable expenditure in the going public transactions. They include underwriting, registration and other professional fees. Subsequently, after being admitted, companies still have to pay annually, the stock exchange fees, audit and distribute their financial statements. These expenses have no respect for the size of the companies and therefore tend to weigh relatively more on the small companies where SMEs belong. This scenario, invariably, makes a case for a relationship between enterprise size and the probability of going public. Different proxies are used in the research to measure firms' size. Pagano, Panetta, and Zingales (1998) use the firm's sales volume while Rajan and Zingales (1996) use the firm's total assets. Where these costs cannot be met within the operations of the SMEs, the demand for the stock exchange funding will be frustrated.

5.2.4 Spatial Proximity to exchanges and access to funding

The argument in this section is whether the capital market or indeed financial intermediaries are spatial neutral in providing funding access to SMEs. If the financial market is non-neutral spatially, it will be biased in the flow of capital to firms that are located at the periphery of the country away from the location of the exchanges and in regional development of the areas (Klagge & Martin, 2005). In Table 1 below, the total SMEs in Nigeria, according to the Central Bank of Nigeria survey of 2013 is 72,828. Out of this number, 84% are located in the regions outside Lagos. This number of firms[2], for instance, would suffer credit allocation bias if the exchange that is in Lagos is space non-neutral in the capital allocation. Based on the information asymmetry and transaction costs discussed above, the exchange would rather allocate fund to firms near it than to the ones farther from it. The allocation of finance by proximity to the exchange has economic development implications. The first implication is that capital resources would be misallocated in that a more profitable and efficient firm outside the stock exchange proximity may have no chance of being funded while the one with low profit and inefficient is funded. The second implication is that the regions with no credit or capital allocation will be slow in development giving rise to rural-urban migration (Klagge & Martin, 2005). The resource misallocation and allocation bias arguments could explain a country's poor economic performance.

[2] Firms located outside Lagos – 61,176 or 84% of the total.

Table 5. 1 SMEs by states in Nigeria

STATE	Number of SMEs	Driving distance (km) from Lagos
Abia	1,809	584 km
Adamawa*	Nil	
Akwa-Ibom	1,093	669 km
Anambra	1,737	496 km
Bauchi	2,066	1270 km
Bayelsa	426	542 km
Benue	1,168	795 km
Borno*	Nil	
Cross-River	1,294	752 km
Delta	1,444	452 km
Ebonyi	1,210	685 km
Edo	1,979	323 km
Ekiti	1,029	289 km
Enugu	911	560 km
Gombe	1,108	1598 km
Imo	1,394	544 km
Jigawa	1,097	1202 km
Kaduna	2,882	784 km
Kano	8,286	998 km
Katsina	1,355	1226 km
Kebbi	989	869 km
Kogi	846	529 km
Kwara	226	303 km
Lagos	11,663	0.00km

Nasarawa	1,120	932 km
Niger	1,358	739 km
Ogun	1,794	109 km
Ondo	1,999	246 km
Osun	2,272	243 km
Oyo	7,987	134 km
Plateau	2,180	970 km
Rivers	3,022	604 km
Sokoto	841	970 km
Taraba	960	2131 km
Yobe*		
Zamfara	593	1136 km
Federal Capital Territory	2,690	737 km
Total	72,828	

Source: Central Bank of Nigeria, 2014 (* Adamawa, Yobe and Borno have no data. Possible reason: Boko Haram struggle in the areas during the time of the survey) (Distance sourced from www.travelmath.com, accessed 18/5/17)

5.2.5 The benefit of going public

A couple of researchers[3] argue that the benefits of going public include the liquidity of the company's shares. Such benefits, according to the proponents of the argument, accrues mostly to the sufficiently large companies essentially because the liquidity of a company's share is an increasing function of its trading volume (Pagano et al., 1998). One, therefore, expects a positive relationship between company size and the probability of

[3] (Pagano et al., 1998) and (Rock, 1986)

being listed on the exchange. If size is proved to be relevant, SMEs are naturally disadvantaged.

5.2.6 Other determinants of going public

In a search for proxies for external finance needs, Rajan and Zingales (1996) analyzed and proposed that technology companies and pharmaceuticals are more likely to depend on external funding in the course of their development. They argue that technology companies are characterized by the possession of low fixed assets and high intangible assets. Such companies, therefore, would have a limited chance of securing bank loans because the bank may require collaterals which they may not have. Another attribute of the technology companies, according to Rajan and Zingales, is that they do not make and distribute profits in the first few years of their operations. Paying interest on the loan during these periods would be challenging (Mayer, 1990). On the pharmaceuticals, Rajan and Zingales (1996) argue that since the operations of these companies involve researching on drugs and testing for their veracity, Such may mean a long wait for cash inflows, forcing them to turn to the market for funds to bridge the periods. These arguments appear to support the hypothesis of a positive relationship between the nature of technology[4] and pharmaceutical business on the one hand and going public on the other. This argument suggests that technology and pharmaceutical SMEs are favored to get listed on the securities exchange.

5.2.7 Lending Technologies

The argument that spatial proximity to stock exchange correlates with the chance of being funded by the exchange supports another to the effect that capital markets do not function in a pace-neutral way (Klagge & Martin, 2005). Then, if this argument is true, one expects to see a good percentage of SMEs that are in Lagos[5] being funded by the

[4] Modern and high technology may depend more on external funding than the conventional ones.
[5] SMEs in Lagos are 11,663

ASeM, all other things being equal. The story is not exactly so. To date, ASeM has only 11 listed companies. It appears then that spatial proximity is not likely to be the only variable affecting the chance of being funded. Research also points to factors such as lending technologies and agency problems as affecting SMEs and their chances of being funded by the second tier securities markets (Berger & Udell, 2002). This section examines lending technologies and their impact on the flow of capital to SMEs. Lending technologies are the methods of extending credits, especially to small businesses by financial intermediaries. These methods are classified as transaction-based and relationship lending.

Transaction-based lending covers lending practices using financial statements of organizations, assets-number and credit scoring. It is most suitable where 'hard' rather than 'soft' information is available. The centralized organizational type works better with transaction-based lending because the information upon which to base the lending decisions is verified or could be verified and could be communicated from place to place using the modern communication technologies (Berger & Udell, 2002). Transaction-based lending technologies are ill-suited for SMEs because SMEs are generally opaque with regards to information, with thin asset base and poor credit scores.

Another relevant lending technology for SMEs is relationship lending. It is one of the most powerful methods available to address information problems in small and medium scale enterprises (SMEs) financing. Under this technology, financial intermediaries acquire information about the projects, the managers, the organizations over time through direct contact with the firms, its owners, local communities, suppliers, and customers on various dimensions and use the information to decide on the availability and terms of credit to the SMEs. It should be noted here that our focus is on the vast majority of the SMEs with very high growth potential, often in knowledge-intensive, and high technology industries who have no access to bank funding because they have no collateral, credit rating or history. These firms are ill-suited for debt financing but equity (Carpenter & Petersen, 2002). Berger and Udell (2002) argue that banks have been quite successful in using relationship lending to extend funding to many SMEs. We argue that this technology, as shall be seen later in this article, could also be used in the equity market situations to provide access to equity funding to SMEs. Literature observes that relationship lending requires a suitable organization other than the conventional, but centralized ones because of the peculiarities of the lending method.

Relationship lending uses soft data, such as information about ones' character, demeanor, the credibility of the owners of firms and the dominant culture of the firms' neighborhood. This information cannot be quantified, easily verified, and communicated through the conventional transmission mechanism (Berger & Udell, 2002). It may therefore not be suitable for a centralized organization with the headquarter-regional office types. Could this explain why ASeM and other alternative markets created to provide access to funding for SMEs do not appear to be very successful? Can this also explain why the improvement in communication technology does not appear to change the success story of the ASeM? Can a case be made here for local, regional or alternative exchanges to be located in the regions and run using relationship lending principles? Some of these questions will be examined in this study and the others in future studies.

5.2.8. Agency theory in the SMEs' funding gap

Agency theory attempts to solve, among others, two relationship frictions. First is where the principal and the agent have different but conflicting goals or where it is difficult and expensive for the principal to verify what the agent is doing. The second is where the principal and the agent have different and conflicting risk dispositions which show up in their difficulties to agree on actions which affect their common interest (Eisenhardt, 1989).

In this study, agency problems are noticed in two principal spots. One is where equity investor is interested in investing in SMEs amid their information opacity. The goals, risk appetite, and aspirations of the original entrepreneur are not transmitted through any conventional reporting instruments to inform and enable the equity investors to make decisions. As it is traditional for investors to be risk-averse[6], where the investor is not sure, she will stop to put her money. The access to funding for SMEs would suffer in such a context.

The second spot where agency theory appears in this study is with regards to the relationship lending. Research reports that it is operationally expedient for the loans officer to be the one responsible for the collection of the soft information regarding the projects, the managers, the owners and the business communities (Berger & Udell, 2002). This information, as we have noted in this study, is difficult to observe, verify or transmit to other decision makers within the organization. In such a context, the authority to decide on the loan may be delegated to the loans officers. Such a management situation may exacerbate agency friction between the loans officer and the bank or the lending organization because there are opportunities and incentives for the loans officer to pursue different goals from those of the organization (Udell, 2008). Where there are challenges in resolving such agency problem, relationship lending technology may not be chosen and if there is no other technology suitable for lending to the SMEs, access to funding to the SMEs will be affected.

In summary, the discussion so far aimed to explain that though spatial proximity may affect the SMEs' access to funding, the information asymmetries, agency costs, transaction costs, the size of the firm, the nature of the technology used, and the lending technology choice may be mediating and moderating factors.

[6] Investors are traditionally risk averse in different degrees.

5.2.9. *Overview of SMEs financing in Nigeria*

Financing SMEs in Nigeria has received a mix of the private and public organizations' attention. The private sector-led effort could be said to be driven by the Central Bank who in 1979/1980 financial year ordered commercial banks to set aside 10% of their loans portfolio for SMEs. The commercial banks barely complied with this directive on account of the riskiness and non-competitiveness of SME loans and even accepted to pay the penalties for the non-compliance (CBN, 2014). In 1990, 10% was increased to 20%, and the directive was made mandatory. The average of the commercial bank loans to SMEs as a percentage of total credit between 2000 and 2005 was 6.02%, and between 2006 and 2011 it was 0.41% (CBN, 2014). The 6.02% increase and then after that, the sharp drop in the ratio could only be explained by the authority of the CBN's directives in the first instance and the weakness of this method when compared with the force of economic rationality. In this case, the uneconomic nature of SME's credit (Luper, 2012) quickly overruled, bringing the ratio to 0.41% in 2011 from 6.02% in 2005.

Another notable effort by the private sector is the Bankers Committee's Scheme of 1999. Under the scheme, commercial banks are to set aside 10% of their profit after tax (PAT) for equity participation in SMEs. Also, the scheme will provide financial, advisory, technical and managerial support to the SMEs (CBN, 2017). Data on the performance of this Scheme (SMEEIS) is not readily reported.

Apart from the private sector-driven effort to finance SMEs, there is an array of the public-sector schemes in the literature attempting to address this funding gap. The list of such schemes includes but not limited to the Nigerian Industrial Development Bank (NDIB) established in 1962 and merged with the Bank of Industry (BOI) and Family Economic Advancement Programme (FEAP) to become Bank of Industry in 2001. In the 1975-1980 Development Plan, a Small-Scale Industries Credit Scheme (SSICS) was created to provide technical and financial support to the SMEs. The scheme failed for lack of workforce to supervise and monitor projects funded by it (CBN, 2014). Another institution established for a specific purpose is the Nigerian Bank of Commerce and Industry (NBCI) in 1973. This bank, created in the wake of the 1973 indigenization policy of 1972 was to provide long-term investment financing and equity to SMEs. It also operated as equity shares underwriters and undertook project identification and feasibility studies. The bank was funded through government subvention and penalties paid by commercial banks for not complying with the CBN directives on SME funding. The bank suffered operational challenges and became ineffective and was liquidated as discussed in this study in 2001 (CBN, 2014).

Other public sector-related schemes include the World Bank SME 1 Loans scheme of 1984, World Bank SME 11 Loans scheme commenced operations in 1990, and these loans were taken by the Federal Government to support SMEs after the adoption of the Structural Adjustment Programme (SAP). Others include the National Economic Reconstruction Fund (NERFUND), Refinancing and Rediscounting Facility (RRF). RRF was designed to support banks that would finance SMEs because most banks chose to finance trading that was economically viable regarding profit and liquidity. The number of schemes appears to be unending. There was N200 Billion SME Credits Guarantee Scheme (SMECGS), N200 Billion Manufacturing Restructuring/Refinancing Facility, N200 Billion Commercial Agricultural Credit Scheme and the Nigerian Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) of 2011 introduced to address the risk and capacity constraint in agriculture (CBN, 2015). The creation of most of these schemes did not appear to be supported by empirical research, and their achievements were not also evaluated empirically. The limited success of these schemes and the generally recognized efficacy of the market-driven policy interventions which incorporate private ownership (de Silanes, La Porta, Shleifer, & Vishny, 1998) and a solution for agency problems (Berger & Udell, 2002) are in part the motivation for the current study.

5.3. Data and Methods

5.3.1 Variables and Data

This study investigates the relationship between the spatial proximity of a firm (SME) to the stock exchange and the probability of it being listed on the stock exchange. The dependent variable is the probability of listing. This variable is a dummy with 1 representing the probability of being listed and 0 otherwise. Our sample is made up of 200 firms of which 60% are listed while 40% are not listed. We acknowledge the purposeful sampling method used in this study and the limited validity the results will potent. The listed companies are obtained from the website of the Nigerian Stock Exchange (www.nse.gov.ng) while the unlisted ones are obtained from the website of the Manufacturing Association of Nigeria (MAN). The independent variables are the driving distance in Kilometers from the exchange and the nature of the technology used by the firms and age of the firms in years. The intra-city distances were obtained from www.distancecalculator.globalfeed.com, and the intercity distances were obtained from www.travelmath.com. The nature of the technology of the firms and their ages were obtained from the websites of the companies. The data for distance and age are continuous while the one for the nature of technology is a dummy where 1 represents high tech and pharmaceutical and 0 represents the conventional and non-pharmaceuticals.

5.3.2 Methodology

This study used a Logistic Regression model specified as $f(z) = \frac{1}{1+e^{-z}}$ where

$Z = a_o + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \varepsilon$; Z, the dependent variable, is a dummy of 1 if firm is listed and 0 when firm is unlisted, X_1 represents the driving distance in Km from the Stock Exchange and is a continuous data; X_2 is a proxy for the nature of technology/pharmaceuticals. X_2 is a dummy of 1 for high tech or pharmaceutical, and 0 for the conventional technology. X_3 is a continuous variable for the age of the firms, a_o is an intercept and ε is the error term.

In specifying the model, the variables were individually rigorously evaluated using delta-beta-hat approach. Some variables, for example, retail, were deleted because they were adjudged to have added nothing to the efficiency of the model. The model as specified reduces the odds ratio of the variable of interest- spatial proximity- by 4.1% (delta-beta-hat-percent = .481827-.462847/.481827*100 = 4.1%) (.481827= odds ratio when there is only one variable - distance in the model and .462847 = odds ratio when technology and age are added) making the model in terms of its variables an efficient one.

The model is estimated using the Maximum Likelihood Estimator (MLE). MLE is reputed to be a sufficient, consistent and efficient estimator for models with a maximum and minimum range of variables (Myung, 2003). It accounts for the potential heteroskedasticity and corrects standard errors for the non-dependent cross observations on the same spatial proximity (Kleinbaum & Klein, 2002).

5.4 Results of the analysis

This section presents the results of our analysis starting with the summary of the regression results.

Table 5. 2 Summary of regression results

Factor	coefficient	Standard error	p-value	Odds ratio	Marginal effect	Area under curve	LR Chi-square	Classifi-cation
cons	1.219228	1.014195	0.171	3.384573	-	82.29%	30.52	83.44%
Log Dist	-.7703579	.2377211	0.001	0.4628474	-.0797142			
Log age	.8121524	.4729544	0.000	2.252752	.084039			
Tech.	.0332695	.7392056	.964	0.9672778	.0004426			

5.4.1 Interpreting the results

The coefficient of -.7703579 for logged distance also gives odds ratio of 0.4628. By using the odds ratio, it could be explained that 1km decrease in spatial proximity to the stock exchange would increase the relative odds of being listed on the exchange by 0.4628 times. The odds ratio is widely used as a measure of association as it approximates how much more likely or unlikely it is for the outcome to be present or absent, in this case, is listed or not listed on the exchange (Hosmer Jr, Lemeshow, & Sturdivant, 2013). This result agrees with those of Klagge and Martin (2005) and Allard, Tolman, and Rosen (2003) on a similar study.

5.5 Model Diagnostic

In evaluating the effectiveness of the Logistic Regression Model as a model estimator, Log likelihood, Likelihood ratio Chi-square, classification and the area under the receiver operating characteristic curve (ROC) which is also known as the Lorenzo curve was used. The log-likelihood of the model is -56.2713 as against the benchmark of -50.00%. This benchmark is used in Harrell (2015). The likelihood ratio Chi-square of 30.52 is also reported. This figure is considered high for Logistic regression model according to Mittlbock and Schemper (2002). Another fitting criterion used in this analysis is the area under the ROC which is equivalent to another criterion – classification. This criterion specifies the degree of likelihood correctly classified by the estimator. It measures the discriminating power regarding classifying outcomes into listed or not listed. Harrell (2015) specifies a benchmark range of 0.7 and 0.8 as acceptable discrimination and 0.8 and 0.9 as excellent discrimination in logistic regression. The classification (or goodness of fit) in this analysis is 83.44% making Logistic Regression excellent estimator in the analysis.

5.6 Discussion of the result

There are the demand and supply frictions that explain the result of our analysis where the reduction in the spatial proximity of firms to the exchange increases the likelihood of not being listed on the exchange. Not being listed is equivalent to not potentially having access to equity funding through the exchange[7]. On the demand and supply frictions, agency costs for the investors, transaction costs for SMEs compounded by the information, legal, Judicial and bankruptcy environments have the potentials to explain the results of this study (Udell, 2008). The possibilities of easing these frictions using financial reporting, mandatory disclosure, corporate governance, and audit assurance[8] are frustrated by the size and the capacity constraints of the SMEs. Beyond spatial proximity, several other factors are important in the decision to go public. These factors could constrain SMEs' access to equity funding. These can be seen in the case of Lagos, the site of the nation's premier stock exchange – the NSE; out of 11,663 SMEs located in Lagos, only a handful (11 in number) is listed on the ASeM. What are the other important factors in the decision to go public and what is known about them about firms being listed on the stock exchange?

Research, (Pagano et al., 1998) identifies several of these factors as potential determinants of listing decisions including the size[9], using new and high technology and research intensity. Some other factors are also seen as reducing the urge to go public. They include loss of confidentiality, loss of ownership and control, IPO underpricing and the fixed transaction costs of listing[10]. In this study we assume that companies in the sample have

[7] The other channels of equity funding – Venture Capital and Business Angels depend to a large extend on the credential of being listed on the exchange for their exit strategies (Zingales, 1995).

[8] These facilities provide a way out of these frictions in the main boards of the exchanges to a reasonable extent.

[9] Size is measured by sales revenue or total assets.

[10] These factors are not examined in this study.

needs for external funding, are willing to get listed and understand the processes and the consequences of being listed on the stock exchange.

5.7 Conclusion and Recommendation

In this study, we set out to examine the relationship between the firms' spatial proximity to the stock exchange and the probability of being listed or not being listed on the exchange. The result of our analysis reveals that the relationship appears to exist. Our analysis shows that 1 Kilometer increase in distance away from the location of the stock exchange[11] increases the odds of being listed by .4674 times. If this finding is true, it means that a firm needs to be around Lagos, the site of the stock exchange to have a chance of being listed and be funded by the market. The implication of this goes beyond the firms; there would be a regional economic development bias, and the larger implication of rural-urban population drift would be a reality and the national economic performance.

To understand the complexity of this development, one needs to look at the political map of Nigeria, and the number of SMEs scattered around it. Out of 72,828 SMEs in Nigeria, only 11,663 (5.11%) are in Lagos; 61,165 others are located around the regions of the country, and their proximity to stock exchange ranges from 109km for Ibadan to 2131 km for Taraba in the North Eastern region respectively. We took a casual observation to confirm our suspicion. Our observation shows that no company in many states of Nigeria including Taraba, Bornu, Adamawa, Cross River, Zamfara, Yobe, etc. is listed on the Nigeria Stock Exchange. Additionally, 99.4 % of those listed are in Lagos and the states neighboring Lagos such as Ogun, Ibadan and Edo states. It is reasonable to note that spatial proximity alone cannot explain why companies in far-away regions from Lagos are not listed in the Exchange in Lagos, but from our literature review, spatial proximity is a noticeable part of the story.

[11] Or 1 km reduction in proximity to the exchange -- - - - - -

The suspicion in the relationship between spatial proximity to the exchange and access to funding is heightened a moment it is understood that the observation is not limited to Nigeria. Klagge and Martin (2005) report that in the UK, out of the 1970 companies listed on the London Stock Exchange in 2003, 1156 of those companies are located in London and South East England (neighbor to London). Together these companies[12] account for a total market capitalization of 80.1% of £1325.5Bn while the 19.9% is shared among other regions including Scotland, Midlands, Eastern/ North East /Yorks-Humber, South West and Wales. We will not be very surprised if the economic development in these regions reflects these spatial distributions of the market capitalization. What then is the policy implication of our findings?

The policy implication of our findings is that the ASeM (the Alternative Securities Market) does not appear to offer a practical solution in providing access to funding to SMEs. Our practical observation supports the empirical findings. ASeM was established in Nigeria since 1985; it has only 11 listed small-scale enterprises out of approximately 73,000 SMEs according to the Central Bank Survey of 2013. Secondly, the existing theories of market development and financial market intermediation do not appear to support their concepts and performance. Furthermore, the concept and operations of ASeM do not seem to align with the dominant operational nature of the SMEs.

Regarding the nature of SMEs, literature sees SMEs[13] as small businesses, owned and run by one person (Most of them), with sub-standard management and accounting skills, located widely in the regions of the country away from the metropolitan cities, and opaque with regards to information. To make sense of the non-alignment of the ASeM principles and the SMEs' profile, we have to review the ASeM's listing requirements for

[12] Companies in London and South East

[13] World Bank has no standard definition for SME, what exist are country specific definition based on sales revenue and number of employees.

SMEs (www.nse.gov.ng). They include two-year comprehensive business plan, two years of audited financials not older than nine months, and the continuous submission of quarterly, semi-annually and annual audited financial reports prepared using IFRS standards. Most of these requirements involve more pecuniary commitment than most SMEs can bear. Other requirements with financial implications include a listing fee of N200, 000 flat, application fee of N100,000 flat, cost of underwriting[14], and the hidden IPO underpricing.

There is, therefore, a clear need for an alternative to the ASeM. Such alternative must consider not only the profile of the SMEs but the factors that determine market development. These factors according to Chami, Fullenkamp, and Sharma (2010) must consider the threats and incentives to all the stakeholders in ensuring a continuous and effective supply and demand of the SMEs financial assets and the development of that niche of the capital market.

An alternative to the current ASeM must be one that is designed to take into consideration all cost sensitive issues vis a vis the ability of the SMEs, the threats and incentives to parties in the market, the bigger picture which is the development of the national financial market, the regional and national economic development. Such a market should be regionally located, depends less on financial statements but more on relationship lending technology and also, be well regulated. Credit allocation that is done using relationship lending technology is not a novel idea. The Capital Trade Point in the Nigerian Securities Law of 1999 was designed to fulfill a similar purpose. Unfortunately, that law has not been implemented. Similarly, the concept of Regional Stock Exchange, once very active in the UK and Germany, closed in 1970, is currently being discussed for

[14] This is expected to be high because the company (SMEs) would probably be unknown

possible reimplementation for the sole purpose of easing frictions in the access to funding to SMEs (Hommel & Schneider, 2003; Klagge & Martin, 2005).

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Chapter six

Summary, Conclusions and Policy Recommendations

6.1 Introduction

In this chapter, we summarize, conclude, make policy recommendations and suggest possible research as a concluding part of the research. It should be noted that this study examined the relationship between financial development and economic growth. Several questions have been asked and answered. These questions are treated in each of the six chapters of this report. The chapters are arranged as follows: the next section summarizes the questions and answers treated in chapter 2, 3, 4 and 5. The section following this will cover the conclusions reached in chapter 2, 3, 4, and 5. After that, details of policy recommendations and suggestions for further research will be summarized.

6.2 The Summaries

Chapter 2 of this report deals with the non-linear relationship between financial development (FD), economic growth(EG) and growth volatility GV), with evidence from Nigeria. The objective of the chapter was to understand the nature of the relationship between FD, EG, and GV in a resource-dependent economy such as Nigeria. Economic fundamentals are expected to fluctuate regularly following the expected fluctuations in the price of oil which is the mainstay of the Nigerian economy. Research on the resource-dependent economies documents that these economies live with poor macroeconomic management ability and as such, we expected volatility in inflation, high unemployment, poor economic regulation, and weak institutions. We aim to document the nature of the FD/EG/GV relationships in the context of such economy. We also aim to identify the channels of the multi-equilibrium effect in the relationship in the context of this economy. The arguments of the extant research were generally non-conclusive. In Nigeria, there is a paucity of research in the area. Where research exists, the conclusions are inconsistent. We are motivated in this study by these inconsistencies.

To achieve these objectives, we used time series data from Nigeria covering 1970 to 2015. The period was well chosen to cover incidences related to instabilities. For example, the oil price jump of 1972/73 during the closure of the Suez Canal, the military coup of 1975, the election of 1979, the coup of 1983 and 1985, the election cancellation of 1993 and the subsequent political tumult, the global financial crisis of 2008/9 and many more. Our model estimator comprises the dynamic threshold estimator and Semi-parametric partially linear model. Our result shows a U-shape relationship between FD and EG. It also shows a U-shape relationship between Financial development and growth volatility.

In chapter 3, we research on the nature of the finance-growth relationship in the oil-producing economies. We aimed to confirm the conclusion of the first paper we reported in chapter 2, examine the nature of this relationship in the panel of the oil-producing economies and to compare the relationship with that of the non-oil producing countries. We also seek to test the influence of institutions on growth in the two contexts. Before our research, literature review indicated that not much was done in researching these relationships in the context of oil-producing areas. We had a desire to show that oil-producing economies present quite a unique economic context, with different responses to macroeconomic events and different economic outcomes when compared with the non-oil economies. In studying the relationship in the oil-producing and the non-oil producing countries, we created two contexts in each of the sets of countries: we divided the samples into countries with negative indices for institutions and countries with positive indices for institutions. We aimed to provide additional modalities of comparison between the two sets of countries. Using the dynamic panel GMM and panel threshold regressors, we document quite insightful results. The non-oil producing countries outperformed the oil-producing in both contexts of the positive and negative indices for institutions and the overall samples.

In chapter 4, we investigated whether the financial structure of a country affects its economic growth and growth volatility. We used Nigerian data from 1980 – 2015. Our interest in this investigation was to ascertain if a structure of financial development (bank-based vs. market-based) has a different effect on growth compared to the other. Before our study, extant literature had made various conclusions ranging from no relationship, a relationship exists only in the advanced economies, and the relationship exists only when bank and market are combined at a given percentage. These inconsistencies motivated us in the conclusions of the extant research. Quite contrary to most research on this topic, we used the newly developed financial development indices compiled by the staff of IMF. The series was shorter in years but more comprehensive in constructing the variables our interest. To analyze this data, we used ARDL to establish the long-term relationships between the variables. Our results indicate that the measure of financial development has a long-term relationship with economic growth. There was also a long-term relationship between FD and growth volatility.

In chapter 5, we examined if Second-tier securities exchange could provide access to funding to the small and medium scale enterprises(SMEs). We used data from the Nigerian Stock Exchange to test what is now commonly called spatial proximity bias hypothesis, and we used the result of that test to make an argument about the second-tier securities exchange in Nigeria called ASeM. The background of that research had been the growing concern of researchers that SMEs are not contributing to the growth of Nigerian economy because they have no access to funding. The problem of poor funding to SMEs has a long history in Nigeria. Several attempts have been made by the government to solve this problem but to no avail. The failed attempt gave way to the creation of the second-tier capital market -ASeM. Extant research document that stock exchanges are space-proximity bias in their services. If this assertion is correct, it means ASeM stands no chance of solving SMEs' funding problem because SMEs are scattered all over the country far away from the location of the exchange. We used logistic regression to test this model, and our result indicates that getting listed on the exchange is negatively correlated with absolute driving distance from the exchange. We computed the odds ratio and found that 1-kilometer increase in distance from the exchange, increase the odds of getting listed on the exchange by 0.4678%.

6.3 Conclusion and policy recommendations

Recall that in chapter 2, we were interested in determining the nature of the relationship between financial development and economic growth on the one hand, and financial development and growth volatility on the other. The results of our analysis indicate that FD returns multiple equilibria in its relationship with economic growth and with growth volatility. We tested the functions at the thresholds using Lind and Mehlum (2010) test for U and inverted U-shapes. The tests confirmed that the relationship between FD and economic growth is a U-shape. Finance – growth volatility relationship is also a U-shape. These results, in the case of finance/growth, agree with that of Adeniyi et al. (2015). And in the case of Finance/ growth volatility, the result agrees with those of Easterly et al. (2001) and Sahay et al. (2015). It should be noted that our result in the case of FD and EG is contrary to most popular results in the finance/growth literature. This peculiarity can be explained by assuming that financial development has a threshold by which it starts to influence economic growth. Below the threshold, the effect of FD on growth is negative, and it is positive only after the threshold.

The implication of this finding is enormous. Financial development does not affect economic growth from scratch. It will only do so after crossing a certain threshold. Before the threshold, FD constitutes a drag on growth. Countries with the level of activities below their Finance/growth threshold could find Financial development as undesirable venture because FD is a drag on growth at those stages. The delayed response of the FD to positive growth could explain why Sharma and Roca (2012) documented their argument against the development of the capital market in the Fiji Islands. Policy initiatives for each country should start by identifying the threshold in the FD/EG relationship. Next should be to accelerate FD to go above the threshold to experience the growth effect of the FD.

Furthermore, the U-shaped FD/GV also has its implications. For example, increase in financial sector development has the effect of tempering growth volatility up to the point of the threshold. After that, a further increase in FD would only have the effect of amplifying the volatility. An advantageous policy initiative would be to deepen the shape of the U-figure of the relationship. Easterly et al. (2001) suggest that such policy could be initiated by developing capital market to grow faster than the banks in the financial structure of a country. Their reason for this advice is that equity financing (capital market product), according to the authors, ameliorates economic volatility better than bank credit financing.

In chapter 3, we follow up on the study in chapter 2, asking almost the same question in the context of the oil-producing countries. We compared the finance-growth relationship in both the oil-producing and the non-oil producing countries. Our interest was to see if variables behave differently in the two sets of contexts. We separated the sample into two: one consists of countries with weak institutions (negative indices) and the other consisting of countries with strong institutions (positive indices). We examined the nature of the finance-growth relationship in the two main samples and the two sub-samples. Our results indicate an inverted U-shaped function in all the contexts for the finance-growth relationship. The thresholds in the non-oil producing countries were higher than those in the oil-producing countries. The result is interpreted to mean that FD has a stronger influence on growth in the non-oil producing countries than in the oil-producing ones. The differences in the results gave us room to suspect that oil-producing countries present a unique economic setting quite different from those of the non-oil producing countries. Our conclusions are quite revealing for the growth literature and policymakers. This paper appears to be the first time research has documented such findings.

This result presents an interesting implication. Oil-producing countries should be recognized as a particular context and research investigating macroeconomic behaviors should take account of it. Policy making and implementation should also consider this. It implies that the oil-producing countries react differently to shocks that affect their macroeconomics and produce different outcomes.

In chapter 4, we investigate whether a country's financial structure (banks vs. capital market) has any effect on its growth rate using data from Nigeria. We used the indices of financial development compiled by IMF to measure FD and its structures. We regress this against economic growth proxied by its per capita growth rate between 1980 and 2015. We used auto-regressive distributed lag estimator to analyze our data. Our results indicate that both financial structures have a long-run relationship with economic growth but financial structure dominated by capital market indices showed better statistics than the one dominated by banks and other financial institutions. Based on our results, we suggest that Nigeria could improve its economic performance by improving its socioeconomic institutions, the rule of law, regulations, macroeconomic management, and financial sector infrastructure to help develop its financial market generally and in particular, capital market.

In chapter 5, we examined whether the stock exchange is spatial proximity bias in its services. Various literature alludes to this hypothesis. Our interest in this analysis is to argue that if stock exchange is spatial proximity bias, then second-tier securities exchanges of Nigeria (ASeM) will be poor a provider of funding to the small and medium scale enterprises in Nigeria. Our interest with ASeM in this study is because it represents an expansion in market facilities to bring about financial sector development. We used logistic regression to investigate the relationship between getting listed on the exchange and the absolute driving distance from the exchange. From our analysis, we conclude that the Nigerian Stock Exchange is spatial proximity bias in its services. On the heel of this result, we further conclude that ASeM would be unsuitable as a policy for funding SMEs. Its unsuitability is because SMEs are scattered all over the country and away from the exchange. In the place of ASeM, we recommend the setting up of the state, provincial or regional stock exchanges. Our recommended exchange has three advantages: first, it draws financial services closer to the SMEs and reduces the costs of listing; second, it could use relationship lending technology which is proven to be useful in lending monies by banks to the small businesses. Financial statement-based lending has been confirmed to be unsuitable for SMEs because of their weak accounting skills; and finally, it will use decentralized management structure to facilitate decision making based on the local and unstructured information made available by the SMEs.

6.4 Areas of further research

To expand research opportunities in the areas we have researched, we include in this section some suggestions on topics we feel are relevant for further research. They cover but not limited to examining the relationship between financial efficiency, financial access, and economic growth. These are the subset of financial development. Literature informs us about the financial deepening which is known to be driving financial development in almost every economy. The purpose of this suggested research area is to measure the impact of financial efficiency and access to growth without the financial deepening. This research could be followed up with the comparison of the relationship between financial efficiency, financial access and economic growth in the oil-producing and the non-oil producing economies. Such comparison is interesting because the oil-producing countries are increasingly becoming a peculiar context different from the non-oil producing ones. Another interesting research could be to examine the relationship between financial development and economic growth using the indices of institutions as moderating or mediating variables rather than as control variables. The reason for this is that institutions do not appear to affect growth directly. They did not appear to be statistically significant in the growth models we analyzed.

It will be interesting to investigate the relationship between countries' financial structure and economic growth and including control variables for growth in the model. Our research used FD and EG as co-integrating variables. We found a long-run relationship between the variables. Furthermore, a gap still exists to examine the causality between the variables. Finally, research should investigate reasons for the slow pace of growth in the second-tier stock exchanges in Africa. Growth in second-tier stock exchanges would provide market-related funding to SMEs.

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