UNIVERSITY OF GHANA

BANK MARKET POWER, FINANCIAL INNOVATION AND ECONOMIC GROWTH IN AFRICA

BY

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DECLARATION

I, ANTHONY ADU-ASARE IDUN, hereby declare that this thesis is the result of my own work. The thesis has neither in whole nor in part been submitted to this University or any other institution for the award of any degree. All ideas other than my own have been attributed to the originators in accordance with academic norms. I accept full responsibility for any lapses in this work.

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DEDICATION

To my parents, the late Mr. John Hendersen Idun and Mrs. Felicia Idun

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ABSTRACT

This thesis has four empirical papers. The first paper examines the determinants of bank market power in Africa. The second paper contains analyses of how financial development and financial innovation lead to economic growth convergence between African countries and the world's technological leader. The second paper also analyzes whether financial innovation lead to economic growth in six sub-regions in Africa. The third paper examines whether bank market with power promote financial innovation that in turn leads economic growth in Africa. The last examines the nexus between bank market power and economic growth using country-level data. The paper also explores how institutional quality factors influence the mechanisms through which banks with market power influence economic growth. Finally, the last paper analyzes how the level of bank market power interact with sub-regional integration to induce economic growth across six sub-regions in Africa. The period of the study spans from 2002 to 2015 and the study includes 44 African countries. The study employs the first difference GMM model to achieve the above objectives. However, in order to analyze finance-growth convergence, the study employs the robust least squares estimation procedure on an averaged cross-sectional data. The results show that bank concentration, bank efficiency, and foreign ownership have negative influence on the level of bank market power. On the other hand, the level of bank stability induces bank market power positively. Moreover, the interaction between: bank concentration and efficiency; bank concentration and access to credits; bank stability and access to credit and foreign bank ownership and access to credits have strong positive effects on the level of bank market power. The

results also show that financial development lead to economic growth convergence provided other policy measures are present. Similarly, the study found that the level of financial innovation does not lead to economic growth for the overall sample and the sample below the median level of financial innovation. Finally, the study reports that bank with market power employ screening processes that induce economic growth in Africa. However, the adoption of ATMs by the banks does not induce economic growth which indicates that in the absence of ATMs banks with market power can still channel funds into productive sectors to induce growth. The study therefore provides information on how the banking system development can induce financial innovation toward economic growth in Africa. The results also show that the level of bank market power in Africa induces economic growth. In addition, institutional quality improvement induces positive economic growth and improves the degree at which bank market power affect economic growth. The influence of institutional quality on economic growth however, vary depending on specific institutional factors even when we differentiated the effect of the level of bank market power. In West Africa, banks with market power induce economic growth but the less competitive nature in the banking environment of the other sub-regions does not induce economic growth.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The gap in per capita income between Africa and the developed nations continue to increase. Africa also continues to lag in terms of infrastructure development despite the fact that the continent is blessed with natural resources. Researchers and policy makers suggest that industrialization and infrastructural development are the way forward for African development. The evidence also shows that African development cannot continue to be the responsibility of central governments alone. There should be a collaboration between the private and public sectors to ensure sustained economic growth. Development also requires a responsive financial system that is effective in channeling productive resources into growth-oriented sectors. This thesis seeks to provide information about how the development in the banking sector contributes to economic growth in Africa. The nations in Africa reorganized into the Africa Union (AU) and this thesis provides a timely information about how the structure, the credit allocation activities, innovativeness and other features of the banking system in Africa contribute to economic growth since the inception of the AU in 2002. There are eight chapters in this thesis.

This chapter introduces the thesis. The chapter presents the background of the various sections of the thesis. The chapter also contains the problems statement which in turn contains the discussions on the overall motivation of the study and specific issues that make up the papers in the study unique. Even though I specify the objectives and the hypothesis for this study in this chapter, chapter 2 contains an elaborate discussion on how I develop the hypothesis from the literature and empirical

evidence. Other aspects of the chapter include the statement of the significance of the study, scope and limitation of the study and the organization of the study.

In Chapter 2, I discuss all the theoretical foundations on the specific objectives in the thesis. I realize that the neoclassical model of economic growth (Solow, 1956) has strong predictions about the factors that can cause economic growth in both the short – and the long run. In the short run, the model suggests that increases in savings (investment) and population growth determine the growth prospects of nations. In the model, to the extent that nations have more investments, they will continue to growth faster and the population growth will decrease the income per capita in the short run. In the long run, only technological progress is the source of growth, according to the neoclassical perspective. The main inputs in the Solow's Growth Model are capital and labour. Labour grows approximately at the same rate as the growth in population. The capital-labour ratio leads to more output as a nation adds more capital but after a certain point an addition to capital stock yields less returns in terms of productivity growth. This phenomenon is known as diminishing marginal productivity of capital stock.

In effect, because of diminishing marginal productivity with respect to capital stock, when a nation increases her savings and investment, the result can be a lesser proportionate increase in economic growth as that nation approaches her steady-state. The steady-state is the stage where increment in inputs leads to constant growth. At that state, the model suggests that, a country can shift her level of output further upward only through technological progress (technical change). According to the neoclassical model, technological progress is however exogenously determined.

Furthermore, the Solow's model offers certain policy implications. One of such predictions worth noting is the issue of economic growth convergence. In terms

of convergence, the model explains that poor countries will catch up with the per capita income level of rich countries. This may happen because at their steady-state, rich countries can add nothing to productive growth as they accumulate more capital. Because of inability of rich countries to growth further, poorer countries will grow with increases in capital stock until they catch up with the growth path of rich country. This aspect of convergence is based on Gerschenkron's (1952) idea of "advantages of relative backwardness" which stipulates that the more underdeveloped a country is, the more that country can rely on existing technologies to grow faster than the developed world. This type of growth convergence is what some economists have termed absolute or unconditional convergence (Abel, Bernanke & Smith, 1999; Mankiw, 2004; Samuelson & Nordhaus, 2005; Korotayev, Zinkina, Bogevolnov, & Malkov, 2011). Because of the possibility of convergence, Abel et al. (1999) commented that investors would gain more if they channel resources into developing countries with some appreciable level of technological endowment. Korotayev et al. (2011) also found that convergence is possible for a group of developed countries after the year 1998.

However, empirical supports for the absolute convergence in Africa is weak. In Figure 1 (see page 45), we see that the gap in income between Sub-Saharan Africa and the United States has been widening. There are therefore little chances that Africa can converge to the per capita income level of the advanced countries without taking into consideration other policy factors which are fundamental to growth.

According Mankiw, Romer and Weil (1992), the evidence tends to suggest that absolute convergence is not possible and that convergence is possible only within a country only after that country has reached her steady-state level of income. According to some economists, the steady-state growth cannot last for a long time

because of possible increasing returns that private economic agents can initiate through their actions that can make developed countries continue to grow faster than developing countries (Romer, 1986). In addition, Lucas (1988) and Romer (1990) are of the view that knowledge and human capital, which are endogenously determined, can accelerate the speed with which countries achieve growth convergence. The mounting of evidence suggests that convergence depend on other factors such as knowledge (Cohen, 1996), trade openness (Sachs et al., 1995) and the level of financial development (Aghion, Howitt & Meyer-Foulkes, 2005).

Finally, most studies identify finance as a determinant of economic growth by emphasizing a stronger contribution of finance to economic growth of nations (E.g. King & Levine, 1993; Levine, 1997; Aghion, Howitt & Meyer-Foulkes, 2005; Laeven, Levine & Michalopoulos, 2015). In this thesis, I follow the Schumpeterian theoretical proposition in Aghion et al. (2005) and test the hypothesis that countries with some appreciable level of financial development can converge to the growth path of the world's technological leader faster. I also test a related hypothesis in Laeven et al. (2015) that countries that innovate toward the technological frontier can converge faster to the growth path of the technological leader. These hypotheses are applicable to African economies because in modern times, globalization has made it possible for African countries to assimilate financial technologies of other nations to induce the growth of their economies.

This thesis contributes to the finance-growth literature by investigating the link between bank market power, financial innovations and economic growth in Africa. The study tells the story from the African region because prior studies neglect salient qualities that separate the African region from other region of the world, in terms of financial and economic development. In the thesis, we also find how

institutional factors affect economic growth given the level of bank market power. By incorporating institutions into the finance-growth nexus, the thesis also contributes to the law-finance hypothesis that stipulates that environment with strong institutional qualities develop more financially and are likely to convert financial development into economic growth (La Porta et al. 1997, 1998; Acemoglu & Johnson, 2001, 2012).

However, the aftermath of the 2007-2009 global financial crisis motivates some economists to question the role of finance in economic growth. For instance, Rousseau and Wachtel (2011) empirically shows that the contribution of finance in economic growth is dwindling. Similarly, Johnson and Kwak (2012) admonishes economies to be selective in the kind of innovations they embrace since not all financial innovations are beneficial. This is because, financial innovation that works in one regime may fail to work in another regime. Furthermore, the finance-law literature posits that there is a strong link between finance and institutions and that the relationship is strong because of improvements in the legal quality, rule of law, accountability, control of corruption, public sector effectiveness and quality regulation toward economic growth. Financial development also improves access to credits in common law regimes than in civil law regimes (La Porta et al., 1997, 1998). However, prior to this study, there was sparse evidence on the finance-institutions hypothesis in Africa. In chapter two, I intersperse discussions on the various theories with discussions on the comparison of the empirical literature on the various issues.

Chapter three contains the discussion on the econometric models employed in this study. In that chapter, I also compare the chosen models with other models and justify the chosen models in relation to the objectives of the study and the characteristics of the dataset. The conclusion in that chapter is that, due to outliers in the cross-section dataset, the robust least square techniques should be more efficient

in predicting the long run convergence between the growth rate of African countries and the USA given the level of financial development or financial innovation. For the panel dataset, the smaller cross-section feature suggests that the Arellano and Bond's (1991) dynamic generalized method of moment (GMM) procedure can provide more efficient results.

Chapter four contains the first empirical paper. In that chapter, I examine the factors that influence the level of bank market power for a sample of 44 African countries over the period 2002-2015. I employ the generalized methods of moment (GMM) procedure by Arellano and Bond (1991) to achieve the above objective. The results show that bank concentration facilitates access to credit towards the promotion of bank market power in Africa. In addition, the level of economic freedom has a positive effect on bank market power. Similarly, the level of bank efficiency and the level of bank concentration are substitutes in promoting bank market power. In the same token, the level of bank stability and access to credits are complementary in inducing bank market power. Moreover, stock market development and the level of access to finance are complement in inducing bank market power.

Chapter five contains the second empirical paper. The paper examines whether the level of both financial development and financial innovation cause economic growth convergence between 44 African countries and the world's technological frontier, USA. The paper also determines the effect of financial innovations on economic growth in Africa. The paper applies the first difference Generalized-Methods-of-Moment (GMM) econometric procedure in order to achieve the above objectives. To determine convergence, the paper however, applies an averaged-data cross-sectional specification that is estimated by a robust least square estimation pocedure. The results confirm the hypothesis that appreciable amount of financial

development drives African countries towards the growth path of the world's technological leader but only when other policy measures are supportive. However, the study also found that whereas the level of financial development induces economic growth, the level of financial innovation is detrimental to the economic growth prospects in Africa. To probe into the negative relationship between financial innovation and economic growth, I divide the sample into two: the sample above the median level of financial innovation and sample below the median level of financial innovation. The result shows that financial innovation has no relation with economic growth for sample above the median level of financial innovation. However, for the sample below the median level of financial innovation, financial innovation has strong negative effect on economic growth. The results suggest that, the negative relationship between financial innovation and economic growth for the overall sample is due to low level of financial innovation in some part of Africa.

Chapter six contains the third empirical paper. In the final paper, I seek to find out whether the level of bank market power induces financial innovations to promote economic growth in Africa. This investigation is based on the models that stipulate that there is a close relationship between the level of competition and innovation (Aghion, Harris, Howitt, & Vickers, 2001; Aghion, Bloom, Blundell, Griffith & Howitt, 2005; Acemoglu & Akcigit, 2012). Again, the paper adopts the dynamic GMM procedure in order to realize the above objective. The results show that bank market power and financial innovation are complement in inducing economic growth when the study used the presence of credit bureaus/registries as measures for financial innovation. The paper also shows that banks in Africa do not employ ATMs in the intermediation channels that distribute credit into productive sectors. The study did

not find any interaction effect when it uses the growth in credit as a measure of financial innovation in the third paper.

Chapter seven contains the last empirical paper. The objective of the paper is to investigate the nexus between bank market power and economic growth. The paper also explores how institutional factors influence the mechanisms through which bank market power influences growth. In the same paper, I investigate how bank market power in six sub-regions influence economic growth. The results show that bank market power has strong positive effect on economic growth in Africa. In addition, institutional improvement leads to positive economic growth and improves the path toward which bank market power affects economic growth. Furthermore, in ECOWAS, the level of bank market power has positive effect on economic growth. However, in other regions, bank market power has either negative or no effect on economic growth.

Finally, in chapter eight, I summarize the key findings in the thesis based on the objectives and the hypothesis outlined in this chapter. The chapter also contains the conclusion and the recommendations that ensued from the study. Finally, I also discuss some suggestion for further studies under Chapter eight.

1.2 Statement of the Problem

Africa continues to house majority of the world's poorest people. In chapter two, we find that the gap in per capita between the USA and Sub-Saharan Africa (SSA) widened from 15.90 times in 1960 to about 32 times in 2016. Similarly, the gap in per capita income between High Income Countries (HIC) and SSA also widened from about 11 times 1960 to about 25 times in 2016. Even the income gap between East Asian and Pacific (EAP) and SSA is about 5 times in 2016 (World Development Indicators [WDI], 2017). The gap in income between Africa and USA increased from

15.90 times in 1960 to about 21.6 times in 2016. This means that despite the fact that technological progress has evolved, the productivity of the greater majority of the people has worsened in recent times compared to those in other regions. Because of the facts above, researchers and policy makers have always called for pro-growth policies that concentrate on specific sectors of economies.

Africa is endowed with many natural resources but it appears that has not translated into development. It is believed that greater portions of the world's natural resources is deposited in Africa. Africa has gold, diamond, manganese, cocoa, cotton, timber etc. Despite this state, the continent still has not witnessed enormous level of development as she should. Political economists attribute the poor state of some African countries to over-dependence on the continent's extractive sectors for development (Acemoglu & Robinson, 2012). Over the decades, researchers suggest that Africa can develop faster if she embarks on industrialization process that can convert her natural resources into finished product for exports. The essence of industrialization is to add more value to exports in order to generate more foreign revenues.

The industrialization process requires more investments in infrastruture. Unfortunately, despite the fact that infrastructural development account for about 50 percent of economic growth in Africa, the continent is still characterized by massive gap in the quantity and quality of infrastructure. An African Development Bank Group (2018) report indicates that as at the end of 2012, housing was a scarce commodity in the continent, 65 percent of the population lack access to electricity, transportation systems need much more improvements, internet and broadband coverage was 18.6 percent and 16 percent of the population respectively. The report also indicated that only about 59 percent of the poorest of the population in Africa

have access to improved water (ADB, 2018). The outlook of the infrastructure level in Africa is expected to improve. A 2017 World Bank Report highlights that access to portable water density was about 77 percent in Sub-Saharan Africa (World Bank, 2017). The report also stated that the reduction of the infrastructural deficits can increase the growth of GDP per capita by 2.6 percent. This figure is about the current average growth rate for Africa so the implication is that increase in the level of infrastructure can double the standard of living of the people of Africa.

However, infrastructural development requires commensurable funding sources especially for start ups in the high-tech industries that can initiate innovation in the digital space. Funding from public sources include taxation and public debts. Since the financial sector partly influences the size of the public debts, we can analyze the public sources mainly by looking at the potential of the government to increase taxation for infrastructural funding. Tax revenue has declined over the last decade. In 2007, tax revenue as a share of GDP was 27.61 percent. Tax revenue rose to a peak of 29.20 of GDP in 2010. In 2016, tax revenue to GDP was only about 16.91 percent of GDP. The trend indicates that on the average, tax revenue has declined and it shows a constraint on amount of money that can be used to fund infrastructural development. The reduction in tax revenue is a major constraint on the continent's public sector revenue capacity for infrastructural funding.

If the governments in Africa do not fall on tax revenue, they can rely on the issues of bonds and that has implications on the external debts situations. The external debt situation of the continent shows a decrease in external debt stock from 126.22 percent of GDP in 2002 to 36.94 percent of GDP in 2015. Similarly, public debts servicing as a percentage of gross national Income (GNI) declined from 2.45 percent in 2002 to 1.09 percent in 2015. These are signals that governments in Africa are, on

the average, looking inward to mobilize financial resources for developmental projects. Inwardly, when all other avenues for project funding are exhausted, the government would fall on the financial systems. Therefore, the financial systems are major partners for economic development in any country. However, governments participation in the domestic bond market implies that less money would be available for the private sector which can crowd-out investment in the private sector.

Apart from public sector revenue sources, the financial sector augments the effort of the public sectors to promote development. It appears that, the amount of credit from financial institutions that goes to the private sector has exceeded tax revenue in recent times. In 2016, the average credit to the private sector stood at around 25 percent of GDP. In the same year, the average tax revenue is around 16.99 percent of GDP. This means that the financial sector has a greater potential to directly finance infrastructural development towards economic growth in Africa. However, when we compare credit from banks to the private data to that of other region of the world, the figure for Africa is lagging. In 2015, the domestic credit to the private for Africa was about 28.75 percent whilst that of High Income Countries (HIC), East Asia and Pacific (EAP) and Latin America and Caribbean (LAC) were 87.52 percent, 58.97 percent and 46.00 percent of GDP respectively. This means that financial depth which ensure access to credit in Africa is lower. Inadequate access to credits can hamper economic growth (King et al., 1993a; Rouseau et al., 2011).

We can also analyze the responsiveness of the banking system to economic growth by looking at the features of the banking system. The available data in 2015 indicates that the banking system in Africa is not as competitive as the system in other regions. Financial inclusion in terms of ATM density is also the lowest across regions. The banking system in Africa is also relatively less stable. Credit restrictions are also

higher in Africa than the rest of the world. Borrowers are required to commit assets for loan collateral to the tune of about 296.20 percent of the amount of loan contracted. For HICs, creditors only require 83.90 percent of the loan amount. Barth, Caprio and Levine (2013) also report that banks in Africa are allowed to take up some risky activities such as investment in derivatives and stocks. All the above can have implications on financial intermediation towards economic growth.

However, within the past two decades, studies that concentrated on the link between the level of competiveness and economic growth based their analysis either at the firm or industry levels (E.g. Cetorelli & Gambera, 2001; Bonaccorsi di Patti & Dell'Ariccia, 2004; Liu, Mirzaei & Vandoros, 2014; Fernandez de Guevara & Maudos, 2011; Love & Martinez Peria, 2015). Similarly, in Africa, Amidu (2014) studied on the factors that affect access to finance but did not link those factors to economic growth. Country-level studies can provide direct information for policy direction concerning financial systems' development. Now, thanks to the Global Financial Development Database (GFDD) (2017), country-level data are available for analysis. In this study, I applied a dynamic generalized method of moment procedure to investigate whether the level of bank market power and financial innovation induce economic growth in Africa, given the level of institutional quality and other growth policy factors. The following are the specific motivation and features of each of the four papers.

1.2.1 The Effect of Bank Market Power on Economic Growth in Africa: Do Institutions Matter and Regional Integration Matter?

Banks are prime medium through which a sizeable amount of financial intermediation activities takes place in Africa. Through their ability to screen out bad borrowers and provide credit to viable entrepreneurs, banks reduce adverse selection

and morale hazard thereby ensuring that each party to the intermediation process does not suffer from bad decision due to inadequate information. The empirical evidence predominantly suggests that competitive banking systems promote bank efficiency (Cetorelli & Strahan, 2006) which ensure that credits are channeled to productive areas. Bank competition also promotes bank stability (Boyd & De Nicolo, 2005). The idea that a competitive banking system induces economic growth has influenced financial market policy directions for decades on the continent. For instance, the structural adjustments programs and other economic reforms since the late 1980s were all meant to improve competition in the various markets on the continent.

However, in regimes characterized by high levels of efficiency losses, banks with market power promote economic growth through efficient and effective distribution of credit to small firms that have growth prospects in the future (Petersen & Rajan, 1994, 1995). Banks with market power can also have detrimental effect on the stability of smaller banks (Kim, Park & song, 2016). Thus, the level of bank competitiveness affects the intermediation process, productivity of firms, volatility of macroeconomic variables and economic growth.

There are various views on the effect of bank market power on economic growth. For example, Roy (1997) and Guzman (2000) in their theory posit that a competitive banking system stimulates economic growth. In the same token, there are other arguments that suggest that an oligopolistic bank market structure enhances economic growth (Cetorelli & Gambera, 2001; Cetorelli, 2001). Similarly, Pagano (1993) posits that even though intermediation leakages are inevitable, such losses are higher in systems that experience greater levels of market power, suggesting the behavior of banks with market power can be injurious to growth. In a similar study, banks with market power initially impact positively on industrial growth and after a

certain point, the impact of bank market becomes negative, the relationship depicting an inverted U-shaped and indicating that there is an optimal level of bank market power beyond which the level of bank market power becomes injurious to economic growth (Fernandez de Guevara & Maudos, 2011). In addition, Petersen and Rajan (1995) posits that large banks can allocate credit to viable ventures better than smaller banks and thus make a case for market power in stimulating growth. We find from the extant literature that all levels of bank market power have implications on economic growth through credit ration and capital accumulation. However, the inconclusiveness, with respect to the direction of causality, from the existing studies suggests that only contextual investigations can determine the specific features of a banking systems that can predict the direction of economic growth in various regimes.

This paper draws its theoretical inspiration from Petersen and Rajan (1995), the so-called relationship-banking hypothesis, which proposes that banks with market power have the acumen to spot and create favourable relationship with viable small businesses to ensure that growth-oriented projects are financed. The authors posit that a monopolistic banking system promotes economic growth because of the system's effectiveness in rationing credit in favour of economically viable enterprises. According to the hypothesis, banks with market power can leverage their scale economy to finance relatively unknown but good entrepreneurs. Banks with market power have the resources to invest in information in order to monitor borrowers and select the ones that are likely to succeed. In the short run, these entrepreneurs may appear less attractive but because of their growth potential, the banks can finance their operation. Later, when these enterprises are profitable, large banks can leverage their scale economy and charge premium rates to extract some of the profit. By financing small businesses, banks with market power aid firms to create value, generate

employment and be innovative. All these can have positive implications on economic growth. Thus, for banks with market power to stimulate economic growth, they should look for and support viable entrepreneurial activities. Despite the fact that this theory applies to imperfect markets, no country-level investigations have been carried out directly to test the theory in systems characterized by high degree of bank market power.

The other aspect of the paper looks at how the level of institutional quality moderates the relationship between the level of bank market power and economic growth in Africa. Institution is one of the drivers of growth. Countries with high institutional quality have greater protection of property rights, freedom to do business, political stability, high levels of law enforcement and higher public support systems. Such countries attract more investors and are able to capitalize on their institutional endowment to promote growth. Institutional impediment such as weaker law enforcement; political risks; corruptions, weak protection of creditors' right can create market frictions and have detrimental effects on the development of the banking system of most African countries (Andrianaivo & Yartey, 2010). Acemoglu, Johnson and Robinson (2001) and Acemoglu and Robinson (2012) suggest that the low level of institutional quality in Africa is due to the extractive nature of her institution that concentrates on extraction of natural resources for development. The predominant view is that, countries with high institutional quality can grow faster than countries with low institutional quality. The expectation is that, the soundness and performance of the banking system can improve in evironments with strong institutions. However, in Africa which is characterized by weaker institutional quality, imperfect bank-based markets can allocate resources more effectively towards growth (Stiglitz & Weiss, 1981; Petersen et al., 1994; 1995). To the best of my knowledge, no empirical

investigation has been conducted on the role of institutions in the bank market power and economic growth transmission. The current study addresses the gap in a dynamic panel framework.

On the other hand, the relationship banking hypothesis (Petersen & Rajan, 1995) stipulates that bank with market power can rely on their information advantage to sustain favourable relationships with their clients so that they can perpetuate the larger market share position. The suggestion is that, bank with market power can do effective and efficient intermediation even in the wake of weaker institutions (Fernandez, Gozalez & Suarez, 2010). A contribution of this study is to examine whether bank market power is a substitute for weaker institutional systems in inducing economic growth in Africa. To do this, I interracted the proxy for bank market power and the proxies for both economic and political institutions. A negative co-efficient is interpreted as a substitute relation whilst a positive coefficient is interpreted as a complement relation.

Furthermore, for Africa to achieve greater economic transformation, sub-regional integration is key. Regional integration offers amalgamation of markets thereby providing busisnesses and financial markets wider coverage across countries within a regional block. Even though, many of the ends of regional integrations such as free trade, common currency and economic political integration have not been achieved, policy makers believe that regional integration can be a panacea for sustainable economic development. Some writers believe that regional integration has not realized its aims because of its linear nature of integration in Africa. Hartzenberg (2011, p. 1) summerized his views on regional integration in Africa as follow:

> *Regional integration is seen as a rational response to the difficulties faced by a continent with many small national markets and landlocked countries. As a result, African governments have concluded a very large number of regional integration arrangements, several of which have significant membership*

> *overlap. While characterized by ambitious targets, they have a dismally poor implementation record. Part of the problem may lie in the paradigm of linear market integration, marked by stepwise integration of goods, labour and capital markets, and eventually monetary and fiscal integration. This tends to focus on border measures such as the import tariff. However, supply-side constraints may be more important. A deeper integration agenda that includes services, investment, competition policy and other behind-the-border issues can address the national-level supply-side constraints far more effectively than an agenda which focuses almost exclusively on border measures.*

The insert above suggests that Africa must concentrate on factors that can speed up the realization of integration goals. In this study, I analyze how the level of the financial innovation and bank market power in Africa combine with regional integration to induce economic growth. The banking system tend to gain from regional integration because it can offer the banks the opportunity to expand their operational frontier. In the same token, the banking system can contribute to regional integration agenda by developing products that can provide the financial base for infrastructural development. In addition, as regional integration opens up the markets for human resources, good and services, bank with market power can provide funds to induce transactions that enhance productivity within the continent.

According to Levine (2001) financial openness can ensure the efficient allocation of capital, higher investment and growth in the domestic markets. Schularick and Steger (2010) commented that the empirical literature contains details to the effect that countries with closer level of financial openness are more likely to grow faster. However, the effect of regional integration on the ability of banks with market power to channel resources into productivity growth has not receive much empirical treatment in markets with higher efficiency loss. The aim of regional integration in the real and financial sectors in Africa is to promote economies of scale in production and financial markets in order to promote trade, induce growth and reduce poverty (African Development Bank Group [AfDB], 2010). Even though the

banking system dominates the financial systems in Africa, studies on integration has concentrated on stock market integration with virtually sparse investigation on the link between credit market integration and economic growth. In this study, I analyze how the level of bank market power in six sub-regions (COMESA, ECOWAS, ECCAS, EAC, Arab Meghrab and SADC) in Africa contribute to economic growth in those regions.

1.2.2 Financial Innovations and Economic Growth in Africa

Since King et al. (1993) reopened discussions on the financed-growth nexus, numerous studies confirm positive relationship between financial development and economic growth (See also, Levine, 1997; Aghion et al. 2005; Aboagye & Idun, 2012; Idun & Aboagye, 2014; Leaven, Levine & Michalopoulos, 2015; Bara et al., 2016). In economies with low level of financial development, the banking system is best positioned to engage in effective intermediation toward productivity growth.

Financial innovation may have negative effect on economic growth if new financial products and services do not directly affect financial intermediation that channels funds into productive sectors (Johnson & Kwak, 2012). In addition, empirical evidence by Rousseau and Wachtel (2011) indicates that the robust positive significant relationship between financial variables and economic growth is not as strong as it used to be, for example, as reported in King et al. (1993). Thus, the finance-growth nexus has different conclusions and therefore demands further investigations.

The study makes a contribution to some theories on the sources of economic growth. In the Solow's growth theory, economic growth is a function of two factors, capital and labour which depend on technical change which is exogenous. The Schumpeterian growth views however emphasize the role of innovation in causing

improvement in productivity growth. Under this view, the financial sector is viewed as responsible for capital accumulation/total factor productivity, reducing risks and transaction costs, easing transaction, enforcing effective corporate governance and avoiding information assymetry (King et al., 1993a, 1993b; Levine, 1997; Levine, 2005). The financial sector also serves as the absorptive capacity that channels technological transfer into productivity to the extent that countries that fail to develop their financial market would not catch up with the per capita income level of a technological frontier (Aghion et al., 2005; Laeven et al., 2015).

In this thesis I investigate the proposition that countries with some appreciable level of financial development can converge to the per capita income level of the world's technological frontier for 44 African countries. This is the first time a test is being conducted on the finance-growth convergence since Aghion, Howitt and Meyer-Foulkes published their proposition in 2005. In this study, I employ a cross-setional specification in order to analyze the long-run convergence position of the countries given their level of financial development. In a related proposition, Leaven et al. (2015) emphasize that financial agents also engage in innovations that assist them to develop screening technologies that evaluate the viability of innovations by firms. They stress that the world's technological leader often initiate financial innovations that assist her to reach her steady-state growth path faster. Because of this, countries which want to pursue the standard of living level of the technological leader must as well engage in financial innovation that relies on technological transfer from the leader.

At the micro level, firms go through processes in order to source and use funds for their new projects. At the beginning of each year, the officers of organizations come up with various levels of plans: strategic plans; tactical plans and operational

plans. The strategic plans are normally formulated by managers at the top-level of their organization and they aim at chartting the long-term focus of the organisation such as introduction of new products (projects) and investment in capital expenditure. At the tactical level, plans aim at breaking the stratagic plans into various sectional plans for implementation. Operational plans relates to plans that are used to implement the day-to-day and short-term activities of the firm. After they put in place all these plans, managers of the organization must find resources for the implementation of all the plans. A budget is the financial plan that assign financial resources to the various aspects of the strategic, tactical and operational plans.

In the budget, the source of funds can be classified into: (1) internal or external (debts) or a combination of the two. Internal capital are those generated within the firm which may include additional equity or retained earnings. External capital are often generated through the issue of debt instruments that pay periodic interest and at maturity, both interests and the principal amount are settled. Examples of external finance include credits from financial institutions. In most cases, firms do not pay any interest on retained eranings (profits that is not distributed to shareholders as dividend). Therefore, it makes economic sense for firms to use equity sources to finance their projects. When these sources are exhausted, firm may resort to the credit market for funding.

The foregoing analysis implies that the private sector resorts to the credit market for project funding. In Africa, the credit market is dominated by the banking system. According to the Schumpeterian views (King et al., 1993a; Aghion, et al., 2005; Laeven et al., 2015) financiers will only allocate more credit to firms if the firms have innovative products. This means that, the value of any innovation include the amount needed to finance the projects plus the wages for innovators plus the

interest that is paid on the loan granted by the banks. Laeven et al. (2015) provided an extension to this relation by emphasizing that the financiers themselves would engage in innovations that assist them to do effective screening in order to identify firms with good project. Therefore, at any point in time, if more money are going into firms' operation, the implication is that the firms are implementing something new that is viable and therefore require more funding. They emphasize that at the country-level, we can therefore measure the innovativeness of firms by using the improvement in the amount of credits that go to the private sector.

In as much as the above theoretical position appear interesting, empirical investigations are limited. In Africa, specific innovations may include the electronic cards, mobile money transfer, internet banking, and mobile banking. There are some problems associated with defining financial innovations these ways. The first relate with the number of people who actually use these means to transact banking business. For example, for the period 2002 to 2015 (for the 44 countries), the average ATM density is around 12 ATMs per 100, 0000 people. This means at a time, about 8,333 (100,000/12) people have access to just an ATM in Africa. Similarly, electricity and internet infrastructure which provide the platform for the usage of these products are not in constant supply in some parts of the continent. Moreover, financial and internet illiteracy may deter most people from using these services. In effect, these services may be improvement in service delivery but may not be directly related to financial intermediation that aims at channelling funds into productivity (Johnson et al., 2012). Nevertheless, in this study I also use ATM penetrations as an alternative measure for specific financial innovations in the banking system.

This study defines financial innovation by the growth in credits to the private sector as a share of GDP. Since this study is analyzed at the country-level and the fact

that we assume the financial agents would be diligent in credit allocation (by following due processes), we can equate the total amount of innovations in a system in a particular year to the growth in credit in order to fund these innovation. This definition assumes that all firms depend on external finance to implement their new projects. The definition is also anchored in theories on the finance-growth nexus (King et al., 1993; Aghion et al., 2005; Laeven et al., 2015).

Furthermore, Aghion et al. (2005), develop a theoretical model that predicts that a significant level of financial development determines the rate of convergence to the economic growth rate of the world technological leader. They emphasize that countries which have higher levels of financial markets development can grow faster than countries with lesser levels of financial development. In other words, developing countries can reduce the rate at which they converge to the growth path of rich countries if they fail to develop their financial markets in a way that allows more credit to be channeled to entrepreneurs.

In the same token, Laeven et al. (2015), by extending the model by Aghion et al. (2005), rather posits that the growth of the financial systems rather harnesses technological innovations to boost the rate with which economies converge to the growth path of the technological frontier. Countries with less financial innovations converge slowly to the growth path of the world's technological frontier, unless they develop capacity to leverage cost effective financial innovations transfers into productivity.

No empirical investigations had been conducted to test the above two theoretical propositions apart from the ones conducted by the authors who proposed theories on the finance-growth convergence. Aghion et al. (2005) and Laeven et al.

(2015) include only 11 African countries in their studies. We know that a theory only has value when it has empirical evidence backing or fine-tuning it.

The empirical investigations on the 44 African continent is important because even though the continent is economically underprivileged, Africa is projected to grow at higher rate in the near future. The World Bank (2017) predicts that Africa will grow on the average at 3.6 percent for the period 2019-2020. This figure is greater than the world average of 2.9 percent for the same period. In this study, we find empirical estimates on how financial development lead to growth rate convergence between African economies and the world's technological leader. We also establish how the level of financial innovation affect the rate of economic growth for 44 African countries in a first difference generalized method of moment (GMM) framework proposed by Arrelano and Bond (1991).

The theoretical Schumpeterian perspectives hold that innovations promote viable entrepreneurial activities that promote economic growth and development. However, recent world events have shown that financial innovations can have adverse contagion effect on economic growth and development. Johnson et al. (2012) makes us understand that it is not the innovations per se that influence real life occurrences but, what we do with financial innovations. It implies that financial innovations that worked for one regime or jurisdiction may not work for another jurisdiction. Yet, we find in the empirical studies that sought to investigate the nexus between financial innovations and economic growth that real differences within the financial structures were not accounted for. I also examine the moderating effect of sub-regional integration on the relationship between financial innovation and economic growth in Africa. Sub-regional treaties can provide wider intermediation coverage and that can

position the financial institutions to support trade, industrialization and infrastructural developments in the various sub-regions in Africa.

1.2.3 Determinants of Bank Market Power of Africa: Does Economic Freedom Matter?

The competitiveness of the banking system is important for several reasons. First, bank competition has direct bearing on bank stability (Boyd & De Nicola, 2005; 2009). A stable banking system protects smaller banks to survive external shocks and therefore ensures their ability to assist less attractive entrepreneurs. In a stable banking system, bank failure is limited. However, a competitive banking system can result in rivalry behaviour among banks that can exact downward pressure on interest rates, which can in turn make it difficult for smaller banks to meet their operating costs. Secondly, a competitive banking system has important implications on bank efficiency (Cetorelli & Strahan, 2006). An efficient bank operates under lower operating costs that can translate into either lower lending rates (a benefit to the banking clients) or higher margins (a benefit to the banks) or greater availability of credits (a benefit to firms) or combinations of the above. Finally, the level of competitiveness in the banking system has implications on financial innovations that aid technological innovation towards fostering prolonged economic growth.

In addition, the banking system's competitiveness affects access to credit by the productive sectors of national economies. In this regard, three strands of arguments have been highlighted in the extant literature. The first group of authors posit that availability of credit is enhanced in a less competitive banking environment (Petersen & Rajan, 1995; Shaffer, 1998; Cetorelli & Gambera, 2001). They emphasize that, banks with market power create relationships that manifest in the availability of credits to small businesses. In essence, a less competitive banking

system promotes capital accumulation by channelling economic resources to support entrepreneurial activities. Other authors trace the banking system's contribution to capital accumulation to a more competitive banking environment (Guzman, 2000; Cetorelli et al. 2006). They emphasise that, in an efficient market that promotes free entries and exits of banks, credits are channelled to productive sectors more cheaply.

Some literature also argues that banking environments under the control of only few banks are more likely to promote credit availability and capital accumulation in an uncertain financial market (Cetorelli, 2001; Cetorelli & Peretto, 2012). Bank markets concentrations among few banks promotes contestable behaviour that have downward effects on interest rates thereby assisting productive firms to access finance more cheaply. However, bank market contestability can also induce collusive behaviour among banks with market power that have similar competitive orientation (Claessens & Laeven, 2004). In Africa, bank with market power are profitable but not necessarily efficient (Amidu & Wolfe, 2013). This may mean that they derive their profit from rising interest rates and thus constrain access to finance. But what determines the level market power in the banking system in Africa? Do institutional quality levels have implications on bank market power in Africa?

In this study, I argue in favour of reverse causality situation to the extent that the level of bank concentration, stability, efficiency and foreign bank penetration can induce bank market given the level of financial market development in Africa. This assertion is based on the relationship banking hypothesis that suggests that credits relationships can results in larger market shares for incumbent banks. The paper also explores how the quality of economic institutions affect the level of bank market power in the African continent. This aspect of the paper is based on the assertion that improvement in economic institutions can promote the soundness of the banking

system and reduce intermediation leakages (Pagano, 1993). The paper has similar demeanour as that of Claessens et al. (2004). The authors analyse the effect of bank concentration, foreign ownership, macroeconomic environment, other forms of intermediations and regulation quality on the level of bank competition. Unlike Claessens et al. (2004), the current study contend that the level of financial development can have second order effect on the magnitude by which bank efficiency, stability, concentration, and foreign bank penetration perpetuate the conducts and performance of banks with market power. In addition, the impact of the size of government, the legal structure and security of property rights, access to sound money, freedom to trade internationally, and regulation of credit, labour and business – the composite indices of economic freedom – on bank market power in regimes characterized by market imperfections have been analysed in this thesis. By including these economic freedom indices, the study ascertained how institutions affect the level of market power.

In systems of strong institutions that support business freedom, protection of property, stable political environment, and rule of law, businesses will expand investment and the banking system can grow. In addition, a freer environment protects new entrants from incumbents' manipulations thereby ensuring survival of small banks and the soundness of the financial systems. I expect economic freedom to reduce the level of bank market power and induce bank efficiency, financial innovations and access to finance by industrious firms. This is because if the policies and institutions of a country enhance economic freedom, expect the banking system to be more competitive (Acemoglu, 2005).

It follows that, in a freer country, foreigners are allowed to set up banks, banks come up with new products due to lesser restrictions, governments do not compete

with businesses for loanable funds, there is rule of law that ensures protection of property rights, little international trade restrictions and access to sound money, among others. The above should have positive bearings on the level of competitiveness in the banking system.

However, in the absence of strong institutions that promote economic freedom through regulations that foster information disclosure that in turn limits the competitive advantage of large banks, banks with market power provide avenues for efficient and effective credit rationing through relationship banking (Petersen et al. 1995). In weaker institutional systems, banks with market power are more capable to spot and create relationship with only viable entrepreneurs that reduces information asymmetry and ensures that credits go to only firms that have innovative application for funds toward increase in productivity.

A sound banking system is essential for effective capital accumulation and economic growth. The existing literature suggests that the level of bank competitiveness is important for access to finance, bank stability, bank efficiency and economic growth (Cetorelli & Gambera, 2001; Allen & Gale, 2004; Bonccorsi di Patti & Dell'Ariccia, 2004). However, apart from the fact that majority of the studies drew their sample from the developed nations, the researchers also conducted most of their studies at the firm or industry level. A countr-level study can produce findings that have implications on policy-making and regulations that can improve the soundness of the financial system. Country-level studies also provide wider spectrum for the generalization of the findings. In this study, I report information on bank-based systems that affect the welfare of majority of the people in Africa.

In addition, the evidence stipulates that the earlier researchers conducted their investigations by looking at how the degree of bank market power influence bank

efficiency and bank stability. Leon (2015) suggests that the rate at which bank market power affect the level of bank concentration toward efficiency can be also due to reverse causality. In the same token, the relationship-banking hypothesis suggest that banks with market power need to allocate funds efficiently as an integral part of the relationship building process. They must also ensure that the firms continue to prosper. In other words, bank efficiency, stability and concentration can enhance the feedback mechanism that ensure that banks with market power sustain the credit relation that perpetuate their large market share situation after they provide series of subsidies to small firms. Therefore, because of the feedback mechanism in the relationship building process, bank efficiency, bank concentration, bank stability, and foreign bank ownership can influence bank market power through efficient allocation of credits. All these depend on the level financial development in a regime. Existing studies have not tested the feedback loop in the relationship-banking hypothesis given the level of financial development. In this study I interact each of the proxies for bank efficiency, bank stability, bank concentration and foreign bank participation with the level of access to finance and analyze how such relationship can affect the level bank market power in Africa.

1.2.4 Bank Market Power, Financial Innovations and Economic Growth in Africa

The endogenous growth literature suggest that innovation is major a contributor to economic growth (Schumpeter, 1912: Romer, 1990; Mankiw, Romer, & Weil, 1992). Recently, Laeven et al. (2015), showed that countries with some appreciable level of financial innovation are more capable to converge faster towards the growth rate of the world's technological frontier. Other strands of the literature hold that the extent of market power can have both direct and indirect effect on economic growth through access to credit by the productive sectors of most

economies (Petersen & Rajan, 1995; Cetorelli et al., 2012). In this paper, I examine whether banks with market power can induce financial innovation that in turn can lead to economic growth.

This aspect of the thesis is situated within the Schumpeterian perspectives that predict the convolution of the levels of competition and innovation toward productivity (Schumpeter, 1912; Aghion, Harris, Howitt, & Vickers, 2001; Aghion, Bloom, Griffith, & Howitt, 2005; Acemoglu & Akcigit, 2012). In the financial sector, there is higher degree of diffusion of new financial products due to lower degree of intellectual properties protection. In the absence of intellectual properties protection, bank with market power can create credit institutions that enhance their market share and increase their rent from innovations financing. In effect, bank with market power can innovate to enhance the intermediation process and also support enterprising firms by financing their new projects. By inducing innovation, bank with market power can redistribute productive resources to induce economic growth. To the best of my knowledge, this is the first time an empirical investigation has been carried out on the above in developing countries.

In addition, as has been established in the other papers in this thesis, both bank market power and financial innovations have strong relationship with the level of economic growth in African. Contrary to other studies that report strong positive relationship with economic growth (Laeven et al., 2015; Bara et al., 2016), the second paper in this thesis found strong negative relationship between financial innovation and economic growth especially when all the three afforementioned studies applied similar measures for both variables. In the same token, the last paper in this essay found that less competitive banking systems are beneficial to economic growth. However, inherent in the relationship-banking hypothesis is the assertion that bank

with market power can effectively monitor and spot viable small start ups and support their innovative activities. Since innovation promote economic growth, banks with market power can induce economic growth by funding small firms that innovate. I tested this aspect of the relationship-banking hypothesis at the country-level for a sample of 44 countries for the period 2002 to 2015.

1.3 Objectives of the Study

The general objective of the study was to evaluate the relationship between bank market power, financial innovations and economic growth in Africa given the level of institutional quality of the continent. The specific objectives are the following:

- Examine the effect of the level of bank market power on economic growth in Africa;
- Examine the effect of the quality of institution of economic growth in Africa;
- Examine the role of institions in the bank market power and economic growth transmission in Africa;
- Examine the role of regional integration in the bank market power and economic growth tramsmission in Africa;
- Analyze whether countries in Africa with appreciable level of financial development can catch up with the growth rate of the United States of America;
- Analyze whether countries in Africa with appreciable level of financial innovations can catch up with the growth rate of the United States of America;
- Assess some determinants of bank market power in Africa; and
- Establish whether bank with market power promotes financial innovations to induce economic growth in Africa.

1.4 Hypotheses

H_1: *Countries in Africa with some levels of financial development can converge faster to the growth path of the world's technological leader.*

H_2: *Countries in Africa with some levels of financial innovation can converge faster to the growth path of the world's technological leader.*

H_3: Bank *market power encourages banks to allocate credit to productive firms and this in turn can enhance capital accumulation and economic growth.*

H_4: *Institutions induces economic growth by facilitating the role of bank with market power in channeling capital accumulation into growth in Africa.*

H_5: Sub-regional integration in Africa can induce bank with market power to allocate resources *to induce higher economic growth.*

H_6**:** *Bank stability, concentration, ownership structure, efficiency induce access to credit that in turn promote bank market power.*

H_7**:** *Development in the other financial markets induces greater competition in the banking system in Africa.*

H_8: *Banks with market power can promote financial innovation in order to induce higher economic growth in Africa.*

1.5 Significance of the Study

This thesis contributes in several ways. On finance-led growth convergence, the study shows that developing countries can fastrack the rate of economic growth convergence through financial development. Proponents of economic freedom including the Heritage Foundation, the Freedom House and the Fraser Institutes would find the finding in this study that economic freedom of African countries has strong relationship with the level of banking system's competiveness interesting when they are advising nations on how to promote economic freedom. Similarly, the essay

presents detailed information of how bank regulators in Africa can capitalize on the banking market situation and enact regulations that require large banks to support small businesses in Africa. Small businesses promote innovations that translate into economic growth. Furthermore, the study provides information on how institutions can moderate finance to promote economic growth. The information on the level of institutional quality's impact on the intermediation process towards growth will guide the legislature to formulate financial laws that facilitate financial development for stronger growth. Law enforcement agencies in Africa will find the need to ensure quicker adjudication of cases, rule of law, control of corruption and quality of law when they are confronted with cases involving financial intermediation.

1.6 Scope and Limitation of the Study

This study covered all the countries within the African continent provided that usable data was available for the estimates. The thesis, in all estimations, uses the official language origin as instruments. The official language of most African countries also determine the legal origin of the countries and the nature of the financial system. For example, most North African countries have Arabic as their predominant official language. The region also has Islamic banking system and a legal system known as the *Sharia*. The study shows that there is a strong relationship between the official languages, the legal system and the financial system of African countries. Therefore, by using the official languages as instruments, the essay is simultaneously dealing with the heterogeneity issues associated with differences in the financial systems in African countries. The period of the study (2002-2015) was selected to coincide with the period at which the Africa Union was established. By studying within the period, we can ascertain the contribution of the banking sector to the sustainable growth agenda of the AU that would also decide on how we can

restructure the banking systems to have pro-growth orientation. I could not cover all the 54 African countries because of data unavailability for some countries. Nevertheless, I covered majority 44 countries. By including majority of African countries, we have the assurance that we can use the results and implications in this study to formulate financial market policies that will channel more resources into economic growth in Africa.

1.7 Chapter Disposition

The essay is organized into eight chapters. Chapter one has the introdution, the overview of the entire study, which include the stylized information on main variables, the justification of the study, problem statements on each and every paper, the objectives of the study, the hypotheses and the scope and limitations of the study. Chapter two contains the review of related literature. I interspered the theoretical reviews with a discussion on how the empirical literature relates with the various arguments. The chapter also contains a review of the banking system in Africa and discussions on the conceptual definitions of the main variables in the study. In Chapter three, I discused the econometrics models I used to perform the various estimations. Chapter four contains the first paper "The Effect of Bank Market Power and Economic Growth in Africa: Do Institutions and Regional Integration Matter?". Chapter five contains the second paper: "Financial Innovation and Economic Growth in Africa". Chapter six contains the third paper: "Determinants of Bank Market Power in Africa: Does Economic Freedom Matter?". Chapter seven contains the final paper: "Bank Market Power, Financial Innovations and Economic growth in Africa". Finally, Chapter eight presents the summary of the key findings, conclusions, recommendations and suggestions for further studies.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Economic Growth Theories

The need to identify the factors that induce economic growth and per capita income differences among nations has led to various propositions from different economic perspectives. In this section, I review some of the main theories that form foundations for the empirical investigations on sources of economic growth. I intersperse the theoretical discussions with discussions on the relevant empirical literature. Concerning this thesis, I derived the main underlying theories from the Schumpeterian Growth Perspectives, the Relationship-Banking hypothesis, Institution-Growth Perspective. For growth convergence, it is important that we also review the two main groups of theories: Exogenous (Neoclassical Growth Theory) and Endogenous (New Growth Theory).

2.1.1 Exogenous Growth Theory

Solow (1956) developed a growth model that has become the basic framework for the development of economic thinking in modern times. The model depends on certain assumptions. First, the model assumes a closed economic situation without government expenditure so that we can appropriate new outputs into new investments (replace worn out capital) or more consumption. Outputs depend on consumption and investment only in the sense that the amount of output that society does not invest, she will consume. This assumption also implies that consumption at any point in time is the difference between output and investment.

The second assumption relates to population growth and the labour force participation rate. The Solow's model suggests that at any point in time the rate of population growth is a direct proportion of the rate of growth in the labour force. If the population grows by 2%, the labor force will also grow by 2%. The third assumption is that the output of the economy depends on the capital to labour ratio at the beginning of each period.

According to Abel, Bernanke and Smith (1999), Solow (1956) answered three main questions: (1) "What is the relationship between a nation's long-run standard of living and fundamental factors such as its savings rate, its population growth rate, and its rate of technical progress? (2) How does the nation's rate of economic growth evolve over time? Will economic growth stabilize, accelerate, or stop? (3) Do economic forces exist that will ultimately allow poorer countries catch up with the richest countries in terms of living standards?" (p. 191).

To answer the above questions, economists express the production function in per unit terms so that we can have output per person and capital stock per person. The first assumption implies that, both capital stock per person and output per person

would decrease when the population or labor force increases and the rate of depreciation of capital stock exceeds new capital stock.

Solow also analyzed the role of capital stock on output when there is no technological progress in the short run. This allows for the analysis of the change in output per person as result of an evolution of capital stock per capita. In the model, an initial increase in capital stock per person produces more output per person. However, when we add more to capital stock in the production function, the total productivity of capital increases less than proportionately – this phenomenon reflects the diminishing marginal productivity of capital stock per person. Abel et al. (1999) explained that, at a point when the capital-labor ratio reaches its peak, an addition to the capital-labor ratio has a relatively lesser impact on per capita output. This tend to suggest that, at a certain point countries would not experience positive marginal growth when there is an addition to capital stock.

Solow also posits that in the absence of technological progress (growth in productivity) economies will attain a steady-state (a situation where output, investment and consumption do not change over time) as more capital is accumulated. At the steady-state, capital stock grows at the same rate of the growth in population and also the capital stock that is not used to acquire new capital is used to replace worn-out capital. Therefore, we can define the steady-state consumption by the difference between output and net investment plus depreciation. Eventually, consumption reduces as an economy devotes more resources to investment (Abel et al., 1999). When a change in capital stock is zero, society would use all output to replace or expand capital and that leaves nothing for consumption.

The Solow's model has fundamental implication on savings and growth convergence. It predicts that countries can increase the steady-state living standard or

consumption by increasing the savings rate now. However, because of diminishing returns with respect to capital stock, the rate of return on savings will be a decreasing function of capital stock. Because the amount of capital-labor ratio does not change at the steady-state, at any point in time the steady-state society's savings are the same as its investments. An economy can converge faster to its steady-state output when the initial capital-labor ratio is low but converges slowly to its steady-state growth when the ratio is high. Eventually, the Solow's model predicts that output per person will cease to improve as soon as the economy reaches its steady state unless there is a technological improvement, increasing saving rate and falling population growth rate. These have become the three main determinants of economic growth under the neoclassical growth model. Nevertheless, how do these factors influence economic growth?

An increase in the saving rate induces more investment in capital and less consumption. Reduction in consumption implies more resources from output are available for production of capital goods (Mankiw, 2004). Workers in the economy will have more capital to work with and that initially increases output per worker. However, as the saving rate increases capital stock to the extent that workers already have enough capital, each addition to capital stock (because of an increase in investment) produces a lesser addition to output when the economy reaches its steady-state. Mankiw emphasized that "in the long run, the higher savings rate leads to a higher level of productivity and income, but not a higher growth in these variables" (p. 546).

Mankiw, Romer, and Weil (1992) analyzed the effect of savings rate in the Solow's growth model as follows: Based on a two-input economy, there are capital (K) and labor (L), which receive their marginal rewards. Therefore

$$Y = f(K, L) \tag{2.1}$$

Under a Cobb-Douglas production, output (Y) at a time (t) we can represent the output function:

$$Y(t) = \left(K_t{}^{\alpha} A_t L_t{}^{1-\alpha}\right) \qquad 0 < \alpha < 1 \tag{2.2}$$

Where A is the level of technology and all other factors as defined before. Furthermore, L and A are assumed to grow exponentially by the rates n and g respectively. Therefore,

$$L_t = L_0 e^{nt} \tag{2.3}$$

$$A_t = A_0 e^{gt} \tag{2.4}$$

In effect, the growth rate of the number of effective labor, $L_t A_t$, is $n+g$, where n is the growth in population g is the growth in technology and t is time. In the standard Solow's model, an economy saves a fraction, s, of its income (Y) all times. Therefore, given k which is the capital stock per unit effective of labor ($k = K/AL$) and y which is the level of output per unit of effective labor ($y = Y/AL$). At the steady-state when income that is not invested would be used to replace capital stock (δ), the change in capital stock ($\dot{k}$) is given by:

$$\dot{k} = sy_t - (n + g + \delta)k_t \tag{2.5}$$

Mankiw et al. (1992) stressed that, at the steady-state, $\dot{k}$ is zero. Eventually, setting equation (2.5) equals to 0 and making k (the steady-state capital to labor ratio) the subject, equation (2.5) becomes:

$$k^* = [s/n + g + \delta]^{1/(1-\alpha)} \tag{2.6}$$

Equation (2.6) means that the steady-state capital-labor ratio has a direct relationship with the rate of savings (s) but indirect relationships with the rate of population growth (n). Equation (2.5) also implies that the steady-state output increases with the growth rate of effective labor ($n + g$).

Furthermore, Solow's model posits that population growth would have adverse effect on productivity because increase in population reduces the time to the steady-state by shifting the steady level of investment upwards. As Abel et al. (1999) explained:

> *An increase in the population growth rate means (more) workers are entering the labor force more rapidly than before. These new workers must be equipped with capital…maintaining the same steady-state capital-labor ratio, the amount of investment per current members of the workforce must rise… this increase in population growth rate causes the steady-state investment line to pivot up and to the left…"* (p. 200-201).

Population growth reduces the steady-state capital-labor ratio, output per worker and consumption per person. This implies that population growth reduces welfare by reducing the standard of living.

Finally, the Solow's model predicts that, the only way society can improve its output, in the long-run, is through improvement in the productivity of her capital-labor ratio – technological progress. Doing so will also improve the long run saving rate since investment in the capital has a positive relationship with the savings rate. Increases in technological progress have integrative effects because it makes capital-labor ratio, savings, output and consumption larger, thereby pushing the steady-state of an economy upwards. Eventually, standard of living will increase in the long-run as a result of technological progress. The achievement of growth through technical progress is the cornerstone of growth theories. Disagreement in growth theories relates to whether technical change can be determined through other policy measures.

A long-standing issue that has attracted the attention of economists over the years is whether the disparities in income between rich countries and poor countries will continue or cease to exit. To put more formally, is it possible for living standards across countries to converge so that people in the United States will be as better off as those in Africa, for instance? Another prediction in the neoclassical model is that,

convergence of standard of living in the long-run is possible for all economies in the absence of technical change. In its strictest form, the Solow's model suggests that the rate of return on savings is a decreasing function of capital stock to the extent that all per capita dynamics will eventually converge. We can situate neoclassical convergence in Abel et al. (1999) classification of convergence. The authors classified convergence into *unconditional* and *conditional* convergence.

According to the authors, unconditional convergence implies that low-income countries will eventually catch up to high-income countries to the effect that in the long-run, standard of living will standardize across all countries. Korotayev and Zinkina (2014), by drawing on Gerschenkron's relative backwardness hypothesis[1], explained that unconditional convergence may be possible because poorer countries can rely on the skills, technology, and resources in richer countries to grow so cheaply. Another reason why convergence is possible is that of diminishing returns associated with capital. Because the initial level of capital stock in poor countries is low, any addition to capital stock induces higher of level output in low-income countries. This may not be the case in rich countries. Rich countries already posses large levels of capital stock, so addition to capital stock does not induce high growth per capita outcomes. If this assertion is true, then the gap in standard of living between Africa and the world's richest country, United State of America should vanish.

However, the empirical data does not appear to support unconditional convergence. In 1960, the average person in the USA was 15.90 times richer than the average person in Africa. However, in 2016 the gap in standard of living widened to the extent that average person in USA was 32 times richer than the average person in

[1] The hypothesis states that "the relative backwardness of a country can contribute to its development if supported by adequate endowments of usable resources" (Gerschenkron, 1952, p.6).

Africa. The growth in income in USA may be due by internal factors which do not connote diminishing marginal productivity at all times.

One other prediction from absolute convergence is that resources can be channeled to developing nation from developed nations because developing countries can achieve greater level of marginal productivity with application of such resources to a greater extent than their developed counterpart (Samuelson & Nordhaus, 2005; Sachs et al., 1995). Therefore, rich countries can, for instance, transfer financial technology into poorer countries to uplift standards of living.

However, inherent in this technological-transfer-proposition is the assertion that poorer countries must have the internal capacity to leverage technology from the frontier countries. This may not be feasible in practice for countries which have not invested in education (Romer, 1990), trade (Sachs et al., 1995) and institutional quality (Acemoglu & Robinson, 2012). These countries lack the capacity to utilize technological transfer into growth. The further away a country lies from the technological leader, the more complex utilization of technological transfer for laggards (Aghion & Howitt, 2009). Therefore, the empirical evidence suggests that certain conditions (such as optimal levels of human capital, institutional quality, trade openness, foreign direct investment and financial development) both rich countries and poor countries can reach the same level per capita income. The evidence tends to support conditional convergence.

Abel et al. (1999) also emphasized that *conditional convergence* occurs because countries differ in their economic fundamental such as the saving rate, population rate and access to technology. In this case, convergence is possible in "clubs". For example, if two countries, A and B, have the same savings rates, A being poor and B being rich, then it is possible for A to catch up to the living standard

level of B in the long run (because of diminishing return to capital). However, assuming there exists a third rich country C, which has a higher saving rate than both A and B, then convergence is impossible between A and C in the long run. This means that researchers must be interested in investigating certain factors that make convergence possible among nations and regions.

Thus, the neoclassical model offers very formidable precepts for the appreciation of the factors that induce economic growth. It posits that in the short run, countries can achieve higher economic growth by increasing their savings rate and at the same time containing population growth rate. In the long run, countries can only increase the standard of living through technological progress. The model also suggests that technological progress is exogenous – it cannot be explained within the model, purely nonexcludable and nonrival – a public good that is available freely. Romer (1990) however emphasized that because education is a rivalry good the creation of new products (innovation) are as a result individual ingenuity. Such ingenuity cannot be made available to all individuals or by extensions all societies. Because of this, individuals who will utilize their education can create new products that can enhance technological progress (design) which can be replicable. More technological progress implies more growth and more growth also create more education that can improve technical change. Therefore, Romer (1990) suggests that technical change is endogenous – it can increase when education increases to the effect that new technology produces a variety of products that induce productivity growth. In effect, there exist increasing function of inputs on outputs because of technical change unlike as in the neoclassical models that suggest diminishing effect on outputs as inputs increases.

The Solow's perspective on growth convergence has not harnessed much empirical support in the literature. Barro (1991), by analyzing the correlation between the GDP per capita of 98 countries in 1960 and that of 1985, did not find a significant correlation between the average income of the countries for the period and the initial per capita income in 1960. Aghion and Durlauf (2009) also commented that the neoclassical model has not been able to explain why South American countries that had average higher growth rate over the Asian countries in the early 1960s are lagging behind the Asians in terms of growth. They stressed that the savings rate alone cannot explain why South Korea's per capita income is greater than that of Ghana even though at independence in 1957, the two nations' per capita incomes were at par. They suggest that South Korea is growing faster than Ghana because the former took advantage of research and development to improve productive technology but the latter relied on extraction of her natural resources for development.

Furthermore, the data has not been able to lend support to the neoclassical's income convergence over the past half a century between Africa and the rest of the world. Figures 1 and 2 (in pages 45 and 46 respectively) illustrate the level of per capita divergence between Africa and other regions of the world. In all Figures, the vertical distance between the horizontal line and the curve depicts the number of times a region's per capita income is greater than that of Africa or Sub-Saharan Africa.

Figure 1 compares the per capita income gap between Sub-Saharan Africa (SSA) on one hand and East Asia and Pacific, High-Income Countries and the United States of America, on the other hand. The green dotted curve depicts the level of income divergence between SSA and USA. It shows that per capita income divergence increased from 1960 to 2016. For instance, in 1960 the per capita income

in the USA was 15.90 times higher than that of SSA; it increased to the peak at 38.5 times in 2000 and the in 2016 the gap it reduced marginally to 32 times. In absolute terms, the gap in income is widening but relatively the gap reduced from the year 2000. SSA is catching up to the growth path of USA in recent one and half decades. Figure 1 also shows that the USA has the highest level of per capita income among developed nations. High-Income Countries' (HIC) per capita income lies below that of USA from 1960 to 2016. The vertical distance between the red dotted line and the horizontal axis depicts the level of per capita income divergence between SSA and HIC. The gap in income was 11 times in 1960 but rose to 25.8 times in 2016. The highest gap was 30.6 times in 2000. From 2000, the gap has been reducing in relative terms. This means that after 2000, SSA started catching up with USA and HIC. Conversely, East Asia and Pacific (EAP) has had a higher per capita income than that of SSA. The per capita income gap between SSA and EAP was 1.2 times in 1960 but in 2016, the gap was 5.9 times.

Figure 1 implies that rich countries reached the peak of their per capita income (in relation to SSA) in 2000. EAP and SSA countries are catching up to the income level of rich countries from 2003. However, countries in EAP are catching up faster than countries in the SSA. Aghion et al. (2009) and Romer (1990) suggest that the EAP countries have faster growth rates in recent years because of their internal capabilities that SSA countries have not developed. The Asian countries have invested enormously in technology through education and research and development than countries in SSA. This might have accounted for their rapid growth rates.

Figure 2 also compares the average income level of countries in Africa with that of the USA, HIC and, EAP. By putting all African countries together, we find that that gap in income has decreased. In 1960, a person in the USA was 15.9 times

richer in terms of per capita income. The gap increased in 2016, fifty-six years later, to 21.6 times. Obviously, we see that putting Africa together, the average income looks better in relation to the income level of USA but there is still no sign of absolute convergence. The USA's steady-state output level shifted from 2000 to around 2003 when we compared her per capita income to that of Africa. We also see from Figure 2 that there was a reduction in the gap from 1994 to 2008. However, beyond 2008, the gap is widening which indicates that convergence is not going to come by chance, as the neoclassical model tends to predict. Convergence is conditional on factors such as human capital, trade, infrastructure, institutions and the level of financial development.

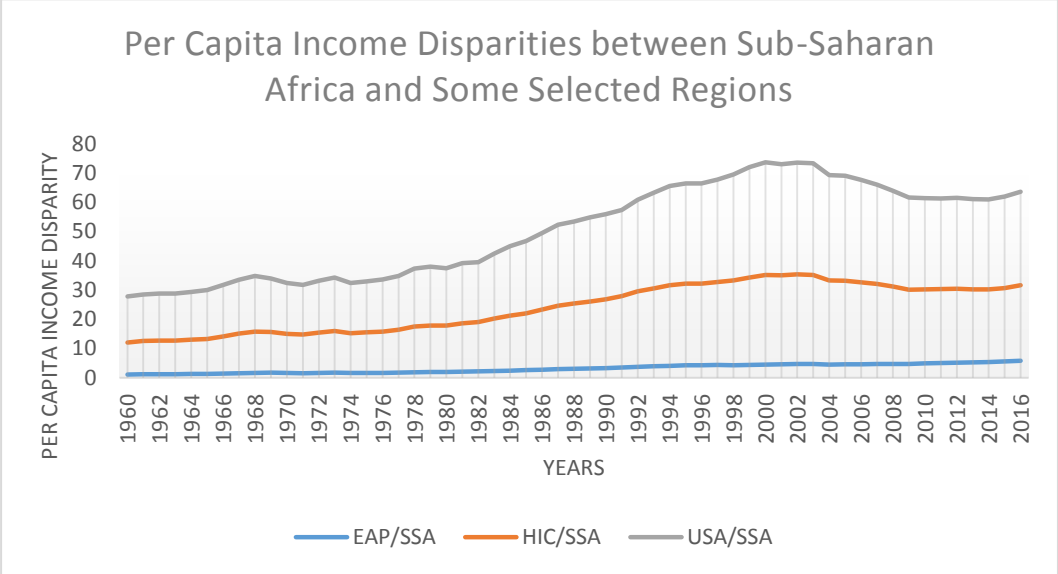


Figure 1: Differences in the Level of Per Capita income between Sub Saharan Africa (SSA) and High-Income Countries (HIC), East Asia and Pacific (EAP) and the United States of America (USA). Source: Drawn from data from World Development Indicators (2017)

Similarly, the gap in per capita income between Africa and HIC has increased over the past 55 years to 2016. In 1960, the average person in HIC had an income level 11 times higher than the income of the average person in Africa. In 2016, the average income of a person in HIC was 17.4 times higher than the income of the average person in Africa. This, however, shows a fall from a peak of 20.7 times in

1995. When we compared that average income of SSA to the income of the richer countries, the peak period for the income gap was 2000 but putting Africa together, the peak comes a bit earlier in 1995. This indicates the contribution of the North African countries to the growth of Africa since the difference between SSA and Africa is North Africa.

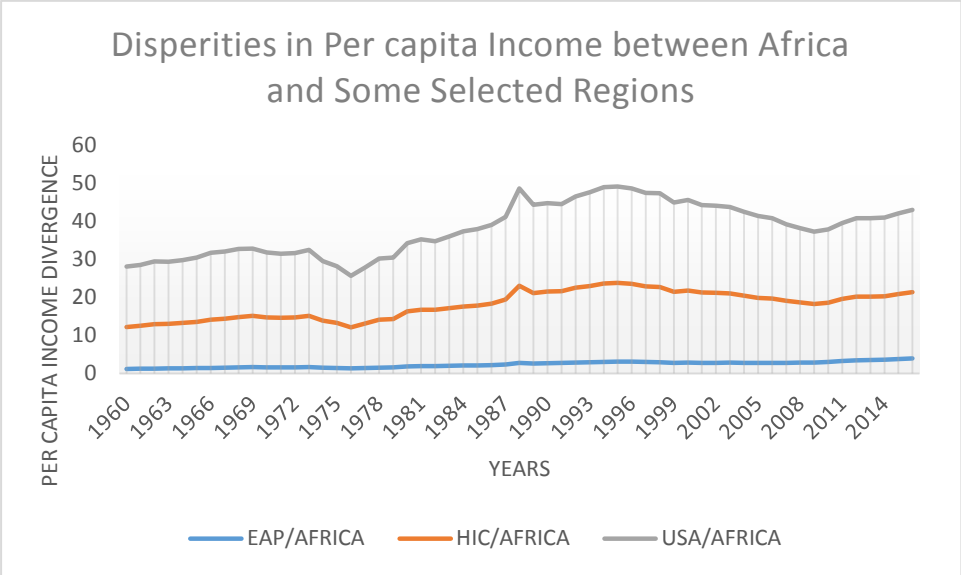


Figure 2: Differences in the Level of Per Capita income between Africa (AFRICA) and High-Income Countries (HIC), East Asia and Pacific (EAP) and the United States of America (USA). Source: Drawn from data from World Development Indicators (2017)

The above indicates that convergence among regions cannot be automatic. It requires conscious efforts by countries across regions to invest in growth drivers. These growth drivers include research and development, education, trade, foreign direct investment, institutional quality and financial development. These factors can improve technological productivity.

This study concentrates on how finance (bank market power, financial development and financial innovation) can lead to economic growth or growth convergence for African countries. The study also analyzes how institutions can

interact with finance to induce growth. The following are discussions on how the endogenous growth models (new growth theories) explain the factors that affect economic growth. Unlike the exogenous growth theories, the endogenous growth theories posit that technological progress is determined by knowledge (Lucas, 1988), education and product variety (Romer, 1990), financial development (Aghion, Howitt & Meyer-Forkes, 2005), financial innovations (Laeven, Levine & Michalopoulos, 2015).

2.1.2 The new growth theories

The new growth theories are also known as endogenous growth models. According to Gylfason (1999), the new growth theories "throws all windows wide open" in the sense that the theories allow multiple factors to cause growth in productivity unlike the neoclassical models which suggest that long-run economic growth is caused by only technological progress. The new growth theories suggest that economic growth is endogenous which means we can explain why it occurs. Most contributors base their arguments that fundamental growth factors possess positive externalities that can induce growth. Countries that can absorb growth fundamentals can have the abilities to apply technologies for innovations that depends on the level of existing technological knowhow (Cohen & Lavinthal, 1990). Countries that wants to catch up with a growth leader must develop internal capabilities close to the growth leader. This idea tends to differ from the Gerschenkron's perspective of relative advantage to backwardness. If that idea holds, then the further away a country's level of economic growth from the growth leader, the faster the rate at which that country can catches up with the leader.

The endogenous growth theory posits that because of positive knowledge spell-over, developed countries can continue to grow faster and there is no possibility

of per capita income convergence between developed and developing nations, unless developing countries develop internal capabilities to apply growth drivers. Proponents hold that, if the accumulation of knowledge overshadows the decreasing returns associated with increases in capital stock, then the economy will grow proportionally with the rate of investment in the long-run (Lucas, 1988; Romer, 1990). Aghion et al. (2009) classified the new growth proponents into the the innovation-based growth models and the Schumpeterian growth models.

The AK models dominated economic discourses around the late 1980s and the 1990s. Even now their expositions are very much useful and explain much of the cross country variations in per capita income more comprehensively than the neoclassical perspectiv. The central theme in their exposition is that besides technological progress, other factors can cause economic growth. In the extreme case, Lucas (1988) emphasized that knowledge spillover is instrumental in inducing technological progress to cause economic growth. The author emphasized that countries which are growing more rapidly are those which are able to generate and use knowlegde that enhance productivity to promote economic growth. While knowlegde can be instrumental in inducing growth, Lucas' view tend to attribute capital accumulation to knowledge accumulation only.

Similarly, Romer (1990) emphasized the role of innovations in enhancing technological progress towards economic growth. The author emphasize that innovation creates more capital that can improve the capital-labour ratio which in turn induce technological progress or growth. The idea is that, if workers have enhanced and efficient way of doing what they must do, their productivity would increase. In terms of growth convergence, the theory stipulates that countries which leverage innovations to improve capital accumulation can grow more rapidly than countries

which do not. Therefore, innovation becomes an absorptive capacity that propels countries towards long term increases in living standard. In the same token, Mankiw, Romer and Weil (1992) emphasized the role of human capital in enhancing economic growth.

Thus, the endogenous growth model by Romer (1990) predicts that innovation as a results of research and development cause economic growth through product variety. Innovation in this case include any new products but not necessarily products that improve existing way of doing things (Aghion et al., 2009). The Schumpeterian growth theories however suggest that innovation results in improvement and destructction of existing order that produces positive externalities on productivity growth.

2.3 Finance and Economic Growth

The idea that finance leads to economic growth can be traced to the work of Schumpeter (1912) who propagated that financiers contribute to growth by financing viable projects and innovations. Schumpeter emphasizes that innovation creates improvement in doing things that pushes the circular flow (the static condition that reestablishes its state notwithstanding temporal disruptions) upwards. Innovation (a dynamic process that must occur in order to cause positive change in the course of the economy) includes the creation of new markets, new products, new institution or new methods of organization, new production techniques and new sources of raw materials. In his exposition, the destruction of the circular flow through innovation must occur before economic growth can happen. This is obviously contrary to the neoclassical position that the steady state is undisruptive, even if it is disruptive, the factor that can cause such disruption are temporal. Schumpeter described the role of innovation in economic development as follows:

> *To produce means to combine materials and forces within our reach. To produce other things or the same things by a different method, means to combine these materials and forces differently. In so far as the "new combination" may in time grow out of the old by continuous adjustment in small steps, there is certainly change, possibly growth, but neither a new phenomenon nor development in our sense. In so far as is not the case, and the new combinations appear discontinuously, then the phenomenon characterizing development emerges. For reasons of expository convenience, henceforth, we shall only mean the latter case when we speak of new combinations of productive means. Development in our sense is then defined by the carrying out of new combinations.*
> *This concept covers the following five cases: (1) the introduction of a new good – that is one with which consumers are not yet familiar – or of a new quality of a good; (2) the introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially; (3) the opening of a new market, that is a market into which the particular branch of manufacture of the country has not previously entered, whether or not this market has existed before; (4) the conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created; (5) the carrying out of the new organization of any industry, like the creation of monopoly position (for example through trustification) of the breaking up of a monopoly position* (Schumpeter, (1934)[1912], p. 66).

Thus, we can analyze how innovation that lead to economic progress. Schumpeter suggested that, innovations come out of the activities of entrepreneurs who come up with new markets, new products, new organizations and new combination of production techniques that promote growth. Since innovation are initiated by entrepreneurs they must be allowed to explore new ways of doing things even when their activities disrupt and push aside existing market and social order and by so doing society will grow. Innovation is therefore a catalyst for economic growth and development.

In the innovation-growth transmission, the role of financial institutions, as agencies that finance the activities of entrepreneurs, is to spot and support entrepreneurs with viable innovation and supply the needed funds to actualize the innovations. Financial institutions in their quest to avoid morale hazard and adverse

selection have screening processes that identify and grant funds to entrepreneurs who have productive investments. This suggests that financiers will not extend more credit into private enterprises if these enterprises fail to engineer new and positive-net-present-value projects. In regimes with low levels of innovativeness, the Schumpeterian view suggests that financial institutions may not support growth in productivities because there can be restrictions on incremental access to credit. By supporting productive investment by firms, financial institutions can promote growth of businesses, assist in creating employment and improve the growth of the economy.

According to King and Levine (1993a, 1993b) financial intermediaries influence productivity growth (and in a dominant way) by monitoring and selecting entrepreneurs with viable projects. By supporting these entrepreneurs financially, financial intermediaries facilitate access to finance, capital accumulation and therefore, economic growth. They emphasized that financial intermediaries influence productivity growth by evaluating prospective entrepreneurs and funding the most promising ones. Financial intermediaries also develop cost-effective ways by researching about customers, evaluating entrepreneurs and monitoring activities. Financial intermediaries mobilize funds from savers and sort them according to the needs of borrowers more effectively and efficiently to the extent that they are able to reduce the transaction costs. By reducing transaction costs, financiers offer another channel to improve productivity inducing intermediation efficiency. King et al. stress that, attempts to distort the flow of fund from the financial sector to viable businesses would reduce economic growth.

Theoretically, King and Levine (1993a) also suggests that amount of innovation in the private sector generates commensurable amount of credit from the financial sectors if the financial institutions have ascertained the viability of firms'

projects. This implies that, the amount of credits that flow into private sector through the financial institutions provides a criterion measurement for financial innovations with the assumption that we can use these funds to improve the productivity of firms. In the footnote of their seminal paper, the authors defined technological innovation broadly and it encompasses invention of new products, enhancement of existing products, costly adoption of technology from other countries and the production of existing goods using new production or business method (King et al., 1993a). Since entrepreneurs engage in innovation in the context of the Schumpeterian views, they are individuals and businesses that engage in invention, add value to existing products, transfer technology from a technological leader, and produce existing goods and services using new production methods or processes.

However, for finance to support innovations by entrepreneurs, there must be certain conditions. First, economies must establish specialized institutions or systems to evaluate borrower and avoid information asymmetry. These systems or institutions can evaluate investment projects, screen out bad projects and provide information that assist financiers to support only viable projects. In Africa, majority of the Francophone countries have public credit registries (PCRs) that the Central Bank controls in order to provide information about the credit-worthiness of borrowers. Other jurisdictions are embracing the private-sector-controlled private credit bureaus (PCBs) which provide a wider scope of borrower information. These systems may provide protection to creditors and savers against moral hazards and adverse selection (Djankov et al, 2007).

Secondly, the quantity of innovation must be large enough to warrant mobilization of funds from small savers. If the process or product innovation were infinitesimal, the cost of savings mobilization will exceed the benefits of productivity

growth associated with innovations. Thirdly, since innovation involves uncertainties, financiers must provide the mechanisms for individuals and firms to diversify their risk. This is essential in order to provide security that innovation that financial agents can finance can be successful or if not successful, another institution can bear the costs of innovations in order to protect savers. Deposit Insurance schemes for instance provide security to savers that at least they would not lose large portions of their savings if the financial intermediaries fail. This requires that all savings should pass through financial institutions. However, in Africa, all savings do not pass through the financial system as much as in other regions. The high rate of intermediation leakages can affect the ability of finance to support economic growth (Pagano, 1993).

The final implication is that individual must be encouraged to be innovative rather than producing existing products using existing production methods. In Africa, the rate of innovation is lower. The Global Innovation Index (2016) (Cornell University, INSEAD & WIPO, 2016) showed that African countries ranked lower among 128 countries surveyed across the world. The best innovative African country ranked 53rd while the average ranking for all countries in Africa was 109th out 128th. The limited amount of innovation implies limited access to finance which in turn can have detrimental effect on economic growth.

Thus, if the above are put in place, then the amount of credits that go to the private sector would be only to support technological innovation that supports productivity growth. The implication is that, the growth in credit to the private sector can lead to economic growth. However, inherent in the theory by King et al. (1993a) is that, firms and individuals only rely on external finance from financial institutions for their projects. In practice, firms prefer to use internal finance (from equity) because it is cheaper to do so. It is only when internal avenues are exhausted that firm

would resort to external finance from the financial institutions. In addition, management of firms would rationally go for external finance only it the internal rate of return associated with its new projects is greater than the cost of capital associated with external borrowings. The implication is that firms can finance their innovations through internal sources of finance or through the other capital markets rather than the banking systems. In this study, the concentration is on how the growth in credit from the banking sector can induce economic growth of African countries. This is because the banking sector appears more developed and dominates intermediation activities on the continent.

2.2.1 Financial Development and Economic Growth Convergence Theory

Aghion, Howitt and Mayer-Foulkes (2005) provide another Schumpeterian theory on how financial development/innovation supports economic growth convergence. The theory emphasize the role of appreciable level of financial development in facilitating per capita income convergence among countries that belong to similar clubs of convergence and the world's technological leader, the United States of America. The authors suggests that *club convergence* implies countries have similar internal resources or absortive capacities that assist them to leverage financial development transfers into productivity. In addition, the finance-growth convergence is based on the assertion that technology is the main factor that underline growth convergence or divergence even though institutions[2] and geography can also be causative factors.

Gerschenkron (1952) emphasize that countries which are poor now would eventually attain the same level of per capita income as rich countries because poor

[2] We will discuss how institutions affect economic growth shortly in this chapter. Subsequently, we will incorporate economic and political institutions in the empirical models to ascertain its direct and indirect effects (through finance) on economic growth in Africa.

countries can cheaply employ technologies available and growth faster to the per capita income level of rich countries. This view, known as "advantage of backwardness", is based on the fact that there is decreasing marginal productivity associated with employment of technology. In the context of technological transfer, the Gerschenkron's view implies that that technological laggards[3] can easily implement new technologies that have been developed by the technological leader if the laggards lie further away from the leader. This assertion is the foundation for the neoclassical theorists' view of *absolute convergence* – the idea that all poor countries will eventually catch up to the level of standard of living of rich countries because of diminishing marginal productivity of inputs (Solow, 1956).

On the contrary, Aghion et al. (2005) posits that financial restrictions inhibit poor countries from capitalizing on technological transfer and that foster the lack of growth convergence between poor countries and the technological leader. They hypothesized that "countries above some critical threshold of financial development will all converge to the same long-run growth rate, and all other countries will have strictly lower long-run growth rates" (p. 175). This study tested the above proposition by first estimating the interaction effect of financial development/innovations and per capita income divergence (between countries in Africa and the world's technological leader, USA) on economic growth in Africa. The study then applied Aghion et al.'s threshold criterion to estimate the possibility of a country in Africa to converge to the growth path of USA given that country's average level of financial development and financial innovation.

The above proposition is based on three pillars. First, the receiving countries might have developed internal capability to absorb and adapt technological transfer to

[3] These can be individuals, businesses and nations who (that) do not initiate innovation but wait on the technological leader for adoption.

the local economic conditions. This requires that countries must invest in human capital, infrastructure, financial development, institutional quality among others in order to use technologies developed elsewhere locally. In this study, my interest is to analyze whether investment in finance can help push African countries to the growth path of the world's technological leader.

The second pillar of the theory is that, it must be costly for the technological laggards not to engage in innovations locally. They emphasize that:

"…the size of investment required in order to keep innovating at the same pace as before rises in proportion. This assumption recognizes the force of increasing complexity, which makes technologies increasingly difficult to master and adapt to local circumstances" (Aghion et al., 2005, p. 175-176). This implies that technology is not a public good (goods that everyone can use freely) but a private one (that does not come for free). The technological laggard would be better off if she keeps up with the level of technology by the frontier. In the model, even though previous level of technology eventually becomes common and costless, laggard cannot sustain the costs of engaging in the use of previous technology in the long run.

The previous assumption is in line with Romer's (1990) view that drivers of technology (such as education and research and development) are rivalry and excludable. They are rivalry because once they are produced, the cost to another nation using it is non-zero. It is excludable because a country can be prevented from benefiting from technology if her internal systems do not support the use of that technology (Rosen, Gayer, & Civan, 2014). Just as Romer (1990) emphasized the possibility of technological tranfer to cuase productivity growth through product variety, Aghion et al. (2005) acknowledges that the adaption of technological spillover involves internal investments that capilize on technological advancement.

They specifically argue that financial development can leverage technological spillover into an economy to improve growth. Contrary to the above assumption, the neoclassical view in Solow (1956) assume that technological progress is a public good – it exists freely – and because of diminishing return to marginal productivity, developing countries will eventually catch up to the level of standard of living in developed nations.

The final pillar of Aghion et al.'s theory is that innovators would not disclose all material information about successful innovation because of agency problem. Agency problem reflects the desire of officers of firms to promote their own interest at the expense of maximizing the wealth of shareholders. Such a desire would limit the net present value of innovative projects. The implication is that because profit on investment would decrease, financial institutions would reduce the amount of credits they advance to support innovations in the sense that financiers would align amount of credit to profit levels of firms. This would limit an innovator's access to credits to some multiples of her wage income at equilibrium to the extent that if innovators do not do full disclosure of profits, financiers would not provide all funds to implement projects by firms.

There would be no need for firms to withhold information from financial agents. Doing so would affect the amount of income (wages) that firms can generate from innovative activities. According to Aghion et al. (2005), "since wages are limited by domestic productivity … a technological laggard can face a disadvantage of backwardness that counteracts Gerschenkron's "advantages of backwardness" … The lower the level of financial development in the country the greater will be this disadvantage" (p. 76). Thus, the proportionality of the wage rate to the domestic

productivity determines the level of technology investment in a credit-constrained country (Laeven, Levine, & Michalopoulos, 2015).

Inherent in the Schumpeterian theory is the argument that the technological frontier would continue to innovate as long as new innovations produces superior value to the innovator and financiers. As the technological leader innovates, she is rewarded by a temporal rent at least to the point that the innovation is still superior to the previous level of innovations. The leader gets funds from the financial institutions to finance the technological innovation. As a result, a portion of the rent from innovations is paid to the financial institution. In other words, only successful innovators can get access to finance because they alone can genertate enough income to pay the cost of finance and the principal.

Inherent in the Aghion et al.'s theory is that technological innovation in period 2 makes obsolete technological innovation in period 1 to the extent that innovation in period 1 becomes common or household technological innovation. This way, followers become accustomed to existing processes to the extent that the leader gets absolutely nothing from the technological innovations she initiated. For the leader to increase her income from technological innovations, she must continue to initiate superior technological innovation that the financiers are ready to finance.

Pillar two of the Aghion et al.'s theory implies that the follower must engage in some form of investments locally that include developing the financial systems that can facilitate the absorption of the new technological innovation locally. If the laggard fails to invest, she will be further away (in terms of technological advancement) from the leader and that can affect growth adversely. Therefore, successful innovation produces it own source of financing and both the innovator and the financier benefits until a new and improved innovation displaces the gains of the old one.

H_1: *Countries in Africa with some levels of financial development will converge faster to the growth path of the world's technological leader.*

A closely related theory on finance-growth convergence is the one recently introduced by Laeven et al. (2015). Their model is similar to that of Aghion et al. (2005) in many aspects except that Laeven et al.'s theory concentrated on the fact that the financiers themselves will invest and engage in costly, risky but viable technological innovations that assist in screening technological entrepreneurs before they allocate funds.

Two groups of innovators were identified: technological entrepreneurs/innovators and financial innovators. Technological entrepreneurs/innovators are those who invest in risky, but potentially viable process of improving technology. They initiate new product, processes, organisation, markets and sources of raw materials. They include but not limited to those who brought railway systems to Africa the first time, built infrastructure to extract the mineral deposits in various countries in the continent and more recently entrepreneurs who brought telecommunination infrastructure. According to the authors, such technological innovations require their own special kind of financing.

On the other hand, financial entrepreneurs are those who develop risky but pontentially viable screening processes that identify technological entreprenuers who have the best chance of successfully implementing technological innovations. Examples of such innovations include development of specialized investment banks to finance special infrastructure; development of new accounting systems to facilitate

screening and monitoring distant investors[4] and recently, the development of venture capital firms that screen new information technology firms.

The main tenet in the financial innovation-economic growth theory is that, as technological innovators invest in risky but lucrative process of improving technology (Aghion & Howitt, 2009) financial entreprenuers must continuously invest in screening technologies that correctly monitor and identify potential technological entrepreneur in order to fund only sucessful projects. This is essential because technological innovators internalize innovation profits by innovating endlessly to the extent that their activities promote economic growth.

In the model, successful innovation generate profits as long as the innovation has not become a household innovation – this happens when technological innovations generated by the frontier has become common to the extent that the laggard pays nothing to adopt the innovation locally. Just as new technological innovation makes an exiting innovation obsolete, new financial innovation makes existing screening process obsolete to the extent that if financiers fail to implement new and improve screening processes, they risk the possibility of moral hazard and adverse selection. Leaven et al. (2015) highlighted two implication (1)Technological and financial innovations are strongly and positively correlated and (2) Economic growth will eventually stagnate unless financiers innovate (in order to develop efficient screening of technological innovators).

The model emphasizes that technological entrepreneurs would continue to innovate because successive innovation are superior to existing technologies and also provide better payoffs. Any successful innovation at a point in time generates profits for the technological entreprenuer. Because financiers supplied credible screening

[4] Leaven et al. (2015) cited Chandler (1965, 1977); Baskin and Miranti (1997) and Neal (1990) as sources of this information.

information that culminated in the implementation of the new technology, the technological entreprenuer would pay a portion of the profit to the financial innovator. This payment is used by the financial innovator to pay for new screening technologies that can screen, monitor and identify risky but potentially lucrative projects for finance. This virtious cycle will continue as long as both technological and financial entrepreneurs continue to improve technology. Thus, technological innovation and financial inovation must always move in tandem because of creative destruction. If this does not happen or if financiers do not innovate in their screening process, they are likely to select only technological entreprenuers who can be identified by the old screening technology. Such entreprenuers are laggards in the natural sense and therefore lie further away from the leader. Financing laggards can inhibit productivity by firms, industries and nations.

Based on the second pillar in Aghion et al. (2005), Leaven et al. (2015), agree that it would be more expensive for the technological laggards not to innovate because as the technological leader advances, existing screening processes becomes less effective at identifying viable entreprenuers. However, Leaven et al. (2015) deviates from Aghion et al. in the sense that their theory views financial agents as profit-oriented entities that invest in risky but lucrative screening processes in order to finance technological innovations. This suggests that successful financial innovations actualize successful technological innovation. Aghion et al. tend to suggest that technological innovation precede financial innovation or financial development. Both theories suggest that economic growth will stagnate if economies do not develop their financial markets to the extent of allocating more credits to support viable technological progress. Both theories also argue that appropriate policies, institutions

and regulations are needed to propel lucrative financial and technological innovations that induce economic growth.

The theories are applicable to African nations in the sense that despite the vast deficit in infrastructural development, infrastructure contributes to more than half of the recent improvement in economic growth, according a report by African Development Bank Group (2018). The report also stresses that Africa still needs secure energy, efficient transport, reliable communication systems, resilient sanitation and affordable housing. These vast infrastructure deficits are constraining growth on the continent. Against this background, the continent is becoming more urbanized which require infrastructural development in housing, reliable electricity and effective transport systems. Infrastructural development would also create jobs to alleviate the huge youth unemployment. These are the areas the financial agents can initiate innovative screening processes to spot and support technological innovators to the extent that Africa can grow towards the growth path of Aghion et al.'s (2005) and Laeven et al.'s (2015) technological frontier, the United States of America.

Thus, Aghion et al. (2005) are of the view that since technological innovations promote growth and at the same time requires its own source and level of finance, regimes that have some appreciable level of financial development can leverage on technological spillover and grow faster to the growth path of the tecnological leader. Financial development is defined here as the amount of credits that flow from the banking sector to the private sector at a point in time, in this study annually, as ratio of gross domestic product (GDP). In the same token, Laeven et al. defined financial innovation in two ways. First, financial innovation is the growth in the amount of credits provided to the private sector by financial institutions or agents. This definition was operationalized by the annual growth in private sector credits to GDP.

The second definition of financial innovation is the speed with which a country introduces either public credits registry or private credit bureaus in its financial system. The definitions of financial development and financial innovations are anchored in the Schumpeterian theories (discussed above) that innovations generate their own sources and level of finance.

The definition by Laeven et al. implies that any financial agent can engage in financial innovation. The definition is particularly applicable for systemic studies such as the current one in the sense that if we assume that all new projects require finance, then the improvement in access to credit should be the same as the amount of new innovations in the system. This requires a broader definition of innovations as given initially by Schumpeter (1912). We discussed the Schumpeter's definition previously.

However, informationally opaque regimes such as in most African countries information telecommunication infrastructure are crucial for financial innovation. This view is exemplified in most of the new financial products in vogue on the continent. The mobile money, mobile banking, internet banking, electronic cards among others are all powered by telecommunicatuon infrastructure. In this study, the contribution of private credit bureaus (public credit registry) was analyzed based on how such systems convolute with telecommuination infrastructure (mobile phone subscription in 100 people) to influence access to finance towards economic growth. In addition, the study also applied growth in credits as a ratio of GDP as a proxy for financial innovation. For financial development, we applied the Aghion et al. (2005) prefered measure, credit to the private sector as a share of GDP.

H_2: *Countries in Africa with some levels of financial innovation can converge faster to the growth path of the world's technological leader.*

2.2.2 Related Empirical Studies

The second paper in chapter five tested the hypotheses for 44 African countries owing to the fact that the theory has not been extensively exploited in the empirical literature. The theory is particularly applicable to countries in Africa because majority of low income countries are in Africa and therefore it would be interesting to find out if these countries can catch up with the growth path of the technological leader if they develop their financial markets. The study relies on the hypothesis above and also estimated convergence rates of the countries to ascertain which African country can catch up with the growth path of the world's technological leader, the United States of America. The US has been a hub for technological advancement for decades if not centuries. For example, the automated teller machine (ATM) which most African financial system have embraced was first introduced in the US in 1969. The US is also the country which has consistently recorded the highest level of per capita income over the decades (see Figures 1 and 2). Appropriately, this study used the USA as the world's tecnological leader.

The empirical literature provide support for the convolution of financial and technological innovations in inducing economic growth. In a within-country-regional-study, Valverde, Del Paso and Fernandez (2007) found that products and service delivery in the Spanish banking system contributed significantly to the growth of regions in Spain. The authors found that ATM and electroninc cards penetration all had strong and positive impact on economic growth using a dynamic GMM specification. However, since most countries in Africa do not generate GDP growth data at the within-country-regional level, the strategies in Valverde et al. (2007) cannot be applicable.

Similarly, Hasan and Tucci (2010), reported for 58 countries that countries with high-tech industries or firms with higher quality patents also have higher growth. This discovery fits into the general perspective in the Schumpeterian models that knowledge spurs technological advancement that results in innovations and productivity growth. A similar result is found Andrianaivo and Kpodar (2011). The authors reported that in Africa, ICT infrastruture, which they defined by mobile phone development, has strong and positive impact on economic growth. The relationship between ICT and growth is strong because ICT infrastructure improves financial inclusion. Andrianaivo et al. (2011) however did not investigate how the banks uses ICT infrastructure to develop intermediation oriented products to induce economic growth on the continent.

In addition, Hsu, Tian and Xu (2014) found for 32 emerging and developed nations using fixed effects strategy that high tech industries innovate more in countries where the equity market is more developed. However, in those countries, the development of the credit markets appear to discourage technological innovations by high-tech industries. The results in their study may not be the case in Africa because the continent's financial system is driven predominantly by development in the banking systems and therefore we expect the bank-based financial institutions to have greater influence on credit distribution into productivity growth. Similarly, Lechman and Marszk (2015) found that the development of ICT technologies in Brazil, Japan, Mexico, South Korea and the United States aided the penetration of exchange traded funds (a financial innovation) in those countries. The market for exchange traded funds is however at its infancy only in some selected regimes in Africa. Furthermore, Galindo and Mendez (2014) found for 13 developed nations that there exists interrelationship among entrepreneurship, economic growth and

innovation. This result is in line with the Schumpeter's view that at equilibrium, entrepreneurs engineer innovation that induce higher growth. However, Johnson and Kwak (2012) caution that ICT infrastructure may not induce growth because it may not have direct effect on financial intermediation.

Similarly, Chavula (2013) estimated the impact of mobile, fixed telephone lines and the use of internet on per capita income in a study that included 49 African countries. All variables were averaged from 1990 to 2007 producing a cross section of 49 data point. The results showed that the use of mobile telephony contributes significantly to the growth of low income, lower middle income and upper middle income countries in Africa. However, internet and telephone lines usages only contribute to the growth of upper middle income countries. The results provide evidence that actual usage of ICT infrastructure can determine the impact of ICT on growth. In Africa, mobile telephones are widespread even in the remotest village whereas internet and telephone lines usages are restricted to the elites in the continent. This might have explained why the use of internet and telephone lines did not have any significant contribution to economic growth in low and lower-middle income countries. The current study extends the literature by analysing how financial innovations and technological innovations combine to influence economic growth.

In Africa, ICT infrastructure facilitates the development of electronic financial products but there is litle evidence from the above studies that convolution of ICT infrastructure and new financial products influences economic growth. Information technology is responsible for most important technological innovations in the banking systems in the past three decades. The telecommunication industry dominates the infrastructural sectors of most economies. In the banking and other financial sectors, new products are powered by ICT. The ATMs, the internet banking, the mobile

monies, mobile banking, credit cards, debit cards etc. are all ICT enabled tools for financial transactions. Because of this, some studies have investigated the effect of ICT on economic growth. In this study, I examine how ICT infrastructure facilitates the use of technological innovations in banks to induce economic growth.

There are a couple of studies that suggest that equity market development can have a more beneficial impact on firm-level innovation than credit market development (E.g. Xiao & Zhao, 2012; Hsu et al., 2014). Equity markets provide a quicker means of finance than the credit market which involves rigorous screening in the credit transmission process. The tight screening process may put potential borrowers off hence their resolve to use equity financing to support new projects. Therefore, if a credit market financier can come up with effective and efficient screening procceses, it will facilitate the allocation of credit to firms. The second reason why a firm may prefer equity finance is the cost involved in aquiring bank finance. For instance, in Africa and other jurisdictions where interest rates are relatively high, firms may decide to raise funds internally. This is especially the case when the cost of credit finance supercedes the return on capital employed associated with the new projects. However, in Africa, the equity market is less pervasive and developed and thus limiting holistic investigation into the market's contribution to growth of majority of the countries. In Africa, Amidu (2014) reported that excess liquidity, bank concentration, bank density, bad loans, and bank regulatory capital are the factors that restrict access to credits. However, bank efficiency, bank size, bank growth, bank stability, bank activity restriction are the factors that induce banks' decision to lend in Africa. The author did not however investigate growth-effect of the contributions of the above variables.

Conversely, some studies suggest that financial innovation can be destructive to economic growth. Ulgen (2014) emphasized that financial liberalization and deregulation of the financial markets can influence banks to move away from their core intermediation activities leading to reckless behaviour that can disrupt the soundness of the economy. Similarly, Johnson and Kwak (2012) tend to suggest that financial innovation has a different demeanor from product and process innovation and admonishes stakeholders to keep financial innovation in check. Their admonishing is based on the fact that many technological innovations (such as the ones that facilitate accessing your financial statement and paying your bills online) deviate from the core mandates of the financial institutions which is financial intermediation – mobilizing funds from surplus economic agents to deficit economic agents who may have a productive use for the funds. When such financial innovation do not directly assist in financial intermediation, it would be difficult for the financial sector to allocate funds to support innovations by firms. The authors suggest that financial innovation would have positive impact on financial intermediation if it facilitates productive use of savings that has never happened before.

Secondly, we can experience the positive impact of financial innovation if it enables more access to credits by the productive sector. With this, it does not matter how innovative a bank for instance can be. If banks find it convenient to allocate funds to consumers and state institutions because they find these agents less risky, the effect would be that, less money would be available to support private sector innovation. This can discourage innovations by the private sector and the impact on economic productivity can be negative. In effect, any financial innovation that does not promote effective and efficient intermediation can be destructive to economic growth. In the same token, Ansong and Marfo-Yiadom (2011) found that the financial

innovations, in the form of electronic cards and the ratio of M2 to M1, are injurius to financial savings in Ghana since they encourage withdrawals by consumers more than savings. This can negatively affect investment in Ghana and subsequently economic growth. Similarly, Bara, Mugano and Le Roux (2016) used cointegration approaches and autoregressive distributive lags (ARDL) approcahes to investigate the effect of financial innovations on economic growth in SADC region. The authors did not find any evidence that the growth in credit influence economic growth.

The current study on the nexus between financial innovation and economic growth has the demeanor of the study by Laeven et al. (2015) which investigated the convolution of financial and technological innovation to induce convergence of per capita income of develeped and developing countries. However, in several respects the current study is different from Laeven et al. (2015) in terms of strategy. First, the current study incorporates more current data observation from 2002 to 2015. In Laeven et al. (2015), the dataset spans from 1965 to 1995. Secondly, to explain the contemporaneous role of financial innovation in inducing per capita income convergence, the current study creates 14-year averaged of the variables on both sides of the model (except the initial level of income divergence). In Laeven et al. (2015), 5-year averages were estimated. In addition, whereas this study includes 44 African countries, Laeven et al. (2015) includes only 11 selected African countries. Since most poorer countries are in Africa, a study that purport to investige the speed of convergence among poorer and richer countries can provide a better picture on income convergence by including more African countries. The African continent has chartered higher growth trend and this is expected to improve per capita income convergence to that of high income countries. This study examines the role of the banking systems' development in achieving higher per capita income convergence.

2.3 Bank Market Power and Economic Growth

2.3.1 The Relationship Banking Hypotheses

Banks derive their market share from the credit creation activities. The amount of quality credits the banks can create depends on several factors but paramount among these factors is the rate of interest that the banks can charge and the amount of risks they can assume. These factors also depend on the nature of the structure of the banking system. For simplicity, we assume that in an economy, the structure of the banking system can be either less competitive or more competitive. In less competitive markets, there are concentrated or large banks that leverage their size to generate market share in terms of assets or profitability or cost reduction or all. This however does not imply that such banks cannot be punished by their actions to the effect that banks with market power can create inefficiency.

One formal theory that explain how a less competitive banking structure can influence economic growth is the propositions in Relationship-Banking Hypothesis proposed by Petersen and Rajan (1995). The theory posits that bank with market power can acquire monitoring technologies that allow them to spot and create favorable banking relationships with seemingly unattractive firms until they (the firms) become profitable to the extent that they can pay the rent required by the banks. In the credit transmission process, small firms that depend on external finance to implement projects can approach banks with market power for funding. The banks initially may not charge higher lending rates knowing so well that the firms are not profitable enough to pay the necessary rates. Thus, the banks provide lending rates subsidy now to the unattractive firms, invest in information monitoring technology to entrench relationships with the firms until such a time they (the firms) are ready (profitable) to pay the maximum rents. By possessing information advantage over less

concentrated banks, banks with market power invigorate their market share position in the industry. Large market share enables banks with market power to cream-off industrial profits from smaller banks that did not participate in the relationship building process. Thus, relationship-banking makes more credit available to firms and in future, enable large banks to enjoy larger share of the banking industry's profitability thereby creating a win-win situation for the growth of the firms and the banks simultaneously in the long-run.

The relationship-banking hypothesis thrives on the assertion that banks have material information about firms to the effect that they believe that the now-relatively-unknown-firms will be successful. The firms may not have any incentive to hide material information in their proposals for funding because doing so will constrain the amount of credits they can obtain from the banks. If the firms hide strategic information about the prospects of their proposals, the banks will punish them by not supplying all the needed funds. If a firm does not obtain the funds, it may not implement its viable projects. If projects do not get finance, the firm will become less profitable until it fades out of the industry.

The theory also assumes that bank with market power would continue to enjoy large market share. If banks fail to maintain market share, they stand the risk of not being able to participate in the rents when the young firms become profitable. Thus, in the monitoring process, information complements large market shares to ensure future extraction of rent by large banks.

How then does bank market power promote economic growth? At the aggregated level, bank with market power improves access to credit to viable firms to the effect that capital accumulation would improve. Improvement in capital accumulation can lead to economic growth. Firms that depend on external finance can

obtain funds from banks with market power, expand output and create employment. In the end, productivity would grow. If firms were constrained because of the banking system's inability to provide needed finance, it would affect productivity adversely. Thus, bank market power promotes investments in the economy and more investments can lead to economic growth. In addition, by financing smaller firms to implement their new projects and produce new products, banks with market power promote innovations that in turn promote strong positive effects on economic growth.

The relationship-banking hypothesis has support from the literature. By specializing in relationship lending, bank with market power can leverage their information advantage and reduce intermediation inefficiency that increase profits (Nguyen, Skully, & Perera, 2012). Relationship serves as entry barrier for existing banks and thus gives the incumbent competitive advantage over potential entrants (Sengupta, 2007). Because of access to information about borrower, banks with market power do not have to engage in extensive screening processes. The result is a decrease in screening costs and that can improve the efficiency of the banks. Therefore, relationship banking can make incumbent banks more efficient and profitable.

Sengupta (2007) posits that, relationship banking undermines competition from foreign banks and restricts their ability to charge higher rates. This is especially the case in environment with poor legal protection that prevent the new entrant from relying on screening to counter the incumbent's information advantage. Under this situation, foreign banks may find it difficult to extend credits to small firms and that can have negative implications on industrial and economic growth. However, in an informationally opaque environment like the African banking system, new entrants can benefit from the incumbent's information advantage by mimicking the

incumbent's strategy (Diallo, 2015). Similarly, Fernandez, Gonzalez, and Suarez (2013) found that for normal period (period without systemic crises) bank market power has strong positive effect on economic growth suggesting that in crisis period banks with market power may not reduce the harmful effects of the crisis.

On the risk-taking behavior of banks, Dell'Arricia (2000) suggests that banks with market power can ameliorate risk-taking behavior of banks than more competitive banks through effective screening. Competition increases the risk-taking behavior of banks through indiscriminate credits allocations. The author suggests that banks in more competitive banking systems find credit screening unfruitful because such activity drives customers away to their competitors. If competition is keen, customers may want to do business with banks that reduce the credit screening process as opposed to banks that employ rigorous and extensive screening. In their effort not to lose customers because of competition, banks may grant credits indiscriminately without proper screening. This may result in moral hazard because firms who get credits may not apply the funds on productive activities. The practice can also lead to adverse selection because lack of proper credit scoring screening implies that credit may move to borrower who are likely to default repayment rather than borrower who actually need the funds for productive activities. All these may have negative impact on economic growth because credit may not move into productive sectors. Therefore, bank market power reduces the risk-taking behavior of banks and induce economic growth through efficient allocation of credits.

Contrary to the relationship-banking hypothesis, Pagano (1993) modelled that banks with market power, to the extent that they can charge higher lending rates and pay lower deposit rates, can promote credit constraints and discourage savings. The net effects are: (1) because of high lending rates, firms may not obtain enough funds

to support their viable projects and (2) to the extent that deposit rates are lower, there would be no incentive for people to save. These can have negative effect on capital accumulation and therefore economic growth. On the other hand, the author suggests that loan rates in more competitive environments are likely to be lower and that firms can access enough external credits and invest to promote economic growth. Pagano therefore, suggests that bank with market power may not support economic growth because of their ability to restrict credit availability, induce intermediation leakages and charge higher loan rates.

Similarly, Guzman (2000) posits that if two countries have identical economic circumstances except that their bank market structures differ – one being more competitive and the other being less competitive – the more competitive banking environment can enhance capital accumulation. The authors emphasized that excessive credit rationing and monitoring are the reasons for credit restriction in monopolistic banking environment. Guzman also agrees with Pagano that loan rates are higher in monopolistic banking system that influence the system's negative effects on economic activities.

Furthermore, Cetorelli and Peretto (2012) showed that the link between less competitive banking environment and capital accumulation is ambiguous. They stressed that where idiosyncratic risk[5] of entrepreneurs is high (mild), capital accumulation is higher (lower) under less (more) competitive banking system. They suggest that, in a less competitive banking environment, banks with market power provide services to smaller firms that help them to succeed in the face by diversifiable risk. However, in more competitive banking environment, banks react to loss of interest spread between the loan rate and deposits by rather increasing the quantity of

[5] Risks that are peculiar to a particular bank rather than risks that affects all banking systems.

credits. This increases capital accumulation but does not provide the guarantee that smaller firms would succeed. At the intermediate level of idiosyncratic risk, the author prescribes that an oligopolistic banking environment (a banking environment that is controlled by only a fraction of large banks) would allocate credit efficiently. Cetorelli and Peretto, therefore suggest that only empirical investigations conducted across different environments can enable us to assess the effect of bank market structure on economic growth.

Empirically, Cetorelli and Gambera (2001) found that concentrated banking environment enhance the growth of industries that rely on external finance to support investments. Similarly, Bonaccorsi di Patti and Dell'Ariccia (2004) found in Italy that a more concentrated banking system provide venture capital assistance to new industries with unknown credit credentials. In the same token, Liu, Mirzaei and Vandoros (2014) did not find enough evidence in the United States that the effect of concentration on economic growth may be higher for higher level of competition. They further found that, for a given the level of financial dependence, an increase in bank concentration led to 0.133% increase in real growth.

In addition, Mitchener and Wheelock (2013) found in the U.S that bank concentration has strong positive effect on output growth even though the growth effect of competition was weak for firms that depend on external finance. In a similar study, bank market power initially had positive influence on industrial growth and after a certain point, the impact of bank market power becomes negative, the relationship depicting an inverted U-shaped (Fernandez de Guevara & Maudos, 2011). In the same token, Love and Martinez Peria (2015) found that more competitive banking restricts access to finance by firms. If firms cannot easily access

finance to support their viable projects, it would reduce their output and hence the output of the whole economy.

Furthermore, by investigating the relationship between banking market structure and economic growth, Fernandez de Guevara and Maudos (2007) provided evidence that supports Petersen et al.'s (1995) proposition that banks with some market power have incentives to establish long lasting relationships with borrowers to overcome informational problems. The banks also facilitate access to credit, thereby reducing financial constraints. In their study, they used dataset on manufacturing industry-level growth rates and banking market concentration for U. S. States for the period 1899 to 1929. The authors found that, bank market concentrations have positive effect on the growth of the manufacturing sector in the early years of the twentieth century. In addition, they found that increases in branch banking and more banks per capita improve growth of industries that rely on banks for external finance. They stressed that, bank entry regulations have independent effects on the growth of the manufacturing industries.

The following empirical studies found strong positive evidence that more competitive banking systems can induce banks to reduce their lending rates and other operational charges and hence induce access to finance and lead to the growth of firms and economies (Beck, Demirguc-Kunt, & Maksimovic, 2004; Liu, Mirzaei, & Vandoros, 2014). Similarly, Fernandez de Guevara and Maudos (2011) by using the Lerner Index and the Panzar-Rosse H-Statistic, found that a more concentrated banking system does not induce economic growth because the system constrains credit availability. Additionally, Leon (2015) using the Boone Indicator, Lerner Index and the H-statistic found that bank competition facilitates access to credit in

developing countries which is contrary to the assertion that bank market power reduces credit constraints.

In addition, Fernandez, Gonzalez and Suarez (2013) found that in times of bank crises, bank market power has downward effect on economic growth. It is only in normal economic situation that market power encourages banks to support industries that depend on external finance. The above implies that the relationship between bank market power and economic growth is subject to empirical investigations since different results are obtained from different context across time. Most of these studies were conducted at the bank level. Results from such studies have limited level of generalization. Since banking system's policies and regulations are implemented at the country and international levels, country-level studies can provide direct information for policy formulation and implementation.

The literature provides the transmission mechanism through which bank market power can affect economic growth. In the existing theoretical literature, we find that bank market power influence economic growth through its effect on access to finance (toward capital accumulation), bank stability/fragility, and bank efficiency. Within the scope of this study, we discuss only the path through which the level of bank market power effect capital accumulation toward economic growth.

On how bank market power influence economic growth through access to credit, proponents are of the view that large banks possess monitoring mechanisms that allow them to spot and grant credits to relatively poor-performing firms which have viable projects. The firms do not have to pay the rent associated with credit immediately – they only do so when they become profitable.

Proponents also posit that only large banks with market power can develop such relationship with largely unknown smaller firms (Petersen et al., 1995). By

facilitating access to finance, banks with market power promote the growth of smaller firms and the economy. The implication is that, large banks with market power invest in information scoring and monitoring technologies that can allow banks in locating and assisting smaller firms to implement their positive net present value projects. Another implication is that, policies that are meant to induce bank competition such as deregulation and financial liberalization are unnecessary in less competitive banking environments because they stifle access to credit by smaller-innovating firms. By facilitating access to credit, banks with market power support technological innovation that is an engine of economic growth (Schumpeter, 1912).

Other studies have produced results that favor strong growth-effect of bank market power. Berger, Hasan and Klapper (2004) employed data from both the developed and developing countries and found that greater market shares and efficiency ranks of small, private, domestically owned banks are associated with greater economic performance, and that the marginal benefits of higher shares are greater when these banks are more efficient. It follows that, a competitive banking system induces efficiency in financial intermediation, which can be more encouraging on economic development, should the necessary regulatory mechanisms put in place.

H_3: Bank *market power encourages banks to allocate credit to productive firms and this in turn can enhance capital accumulation and economic growth.*

2.4 Bank Market Power, Institutions and Economic Growth

"Institutions encompass the set of political and legal arrangements that provide the environment in which economic activity takes place" (Jennings, 2013, p. 252). Apart from physical capital, human capital and technology as the proximate causes of cross-country differences in per capita income growth, institutions have become a dominant determinant of economic growth. According to Acemoglu, Johnson and

Robinson (2001) much of the differences in development across colonies can be attributed to the kind of institutions promoted by their European Colonial masters. In Africa and elsewhere, the Europeans instituted Extraction Institutions[6] that created centralized regimes to facilitate the extraction of resource. The authors emphasized that, they (the Europeans) were not interested in settling in Africa hence they needed an oppressive systems to put the people under constant fear in order to extract resources away to where they wanted to settle. In other places where the Europeans found convenient to settle (like Australia, Canada, New Zealand and the United States of America) they put in place institutions that uphold protection of property rights to the elites. These have accounted for the differences in institutional quality among the two groups of colonies. By extension, we can say that differences in institutions among the two colonies have partly accounted for the differences in their economic develoment. It appears that even after independence, African leaders continued to pursue systems left by their colonial masters in the sense that most African countries still rely on the extraction of natural resources for development.

According to Acemoglu and Robinson (2012) countries that have achieved enormous successes in growth (like Botwana and South Korea) are those that promoted inclusive economic and political institutions. They stated that inclusive economic institutions "must feature secure private property, an unbiased system of law, and a provission of public services that provide a level playing field in which people can exchange and contract; it also must permit the entry of new businesses and allow people to choose their carreers" (Acemoglu & Robinson, 2012, p). These institutions include ethnic tolerance, avoidance of divide and rule, protection of property riaghts, political stability, rule of law, provision of public services etc.)

[6] These were frameworks or systems promoted to extract resources from the colonies into Europe. This institution is associated with minimal free commerce and political and economic decisions are taken by the elite.

encouraged peace, democracy and stability in countries with high institutional quality. Other nations like Democratic Republic of Congo relied extensively on her extractive institutions (Haselip, 2014). Acemoglu and Robinson (2012) emphatically emphasize that political institutions matter most when explaining the cross country differences in economic growth than economic policies, culture and geography (as have been trumpeted in the extant literature as determinants of economic growth). However, not all economists agree that insitutions can promote growth better. Sachs (2003) emphasized that ecology and geography are more important for growth. Nunn and Puga (2012) also emphasized that geography influences institutions which in turns explain the differences in standard of living across nations.

We also examined how level of institutional quality within Africa can serve as a substitute for the ability of a less competitive banking system to distribute external finance and promote economic growth. Actually, we set out to ascertain whether the level of bank market power in Africa can serve as replacement of weak institutions in Africa in order to channel available credit to productive sectors. This is essential owing to the fact that there exists a consensus that quality institutions stimulate economic growth (Acemoglu & Robinson, 2012; Siddiqui & Ahmed, 2013; Boubakri, El Ghoul & Saffar, 2015). Institutional quality replaces bad governance with good governance, curbs corruption, promote political stabibilty, promote rule of law and ensure quality regulations would enable indivudauls and businesses to flourish in their endeavour that can improve the prosperity of society. These measures promote investor protection and ensure effective legal system (La Porta, Lopez-de-Silanes & Shleifer, 1997, 1998). However, in North Africa, the removal of supposedly bad governance in Egypt, Tunisia and Libya has not necessarily led to economic prosperity in those countries. The findings from this study is expected to enable

African countries to streamline regulations, political systems, governance and role of law to be in line with a banking structure that can induce economic growth and sustainable development.

The relationship banking hypothesis (Petersen et al., 1995) also suggests that in weak institutional environment, banks with market power can create relationship that facilitate access to credit by industries that depend heavily on external finance. Banks with market power would have information to invigorate relationship with customers notwithstanding the level of institutional quality in the system. Similarly, the law finance hypothesis suggest that bank development can induce access to credit when a country's financial system is characterized by strong legal and institutional system (La Porta, Lopez-de-Silanes & Shleifer, 1997, 1998). The authors suggest the differences in the legal system influence access to credit with a common law system facilitating greater access to finance than the civil law system. This is because the common law system gives shareholders and creditors greater protection than the civil law system.

The finance-growth literature also suggests that in environment where financial development is imperfect, information asymmetry encourages banks and other financial institutions to insist on collateral and deposit insurance thereby constraining access to credit to industries that depend on external finance (King & Levine, 1993). Similarly, environments characterized by efficient and strong legal systems are associated with greater access to external finance (Demirguc-Kunt & Maksimovic, 1998). Mahoney (2001) also found that common law countries that offer stronger protection of property and contracts rights are in better positions to grow faster. Levine (1998) provides a complimentary finding that protection of creditors

rights and swift enforcement of contracts promote a well-functioning banking system and this induces high growth.

Deregulation also has strong relation with economic growth, according to the existing literature. The literature suggest that, environment that promote less restrictions of the financial system can induce economic growth. There are those that suggest that geographical distribution of banks induces economic growth and thereby implying that bank branching restrictions can inhibit economic growth (Jayaratne & Strahan, 1996; Clarke, 2004). Therefore:

H_4: *Institutions induces economic growth by facilitating the role of bank market power in channeling capital accumulation into growth in Africa.*

2.5 Regional Integration, Finance and Economic Growth in Africa

The premise of regional integration is that countries, by forming political and economic groups, countries can mobilize human and economic resources toward developmental trajectory. For the past 60 years, regional integration has been on the agenda for most countries in Africa. African countries began this agendum with the establishment of the Organization of African Unity (OAU) in 1963. African leaders were unable to achieve most of the objective of the OAU then because the objectives were very ambitious. Secondary, political commitment from member countries' head of state has been abysmal.

The countries reorganized the OAU into the African Union (AU) in July 2002. Among others, the objectives of the AU include the promotion of sustainable economic, social and cultural development. Within this developmental objective, the AU aims at creating a free trade area, custom unions, a single market, a central bank and a common currency. By achieving these objectives, the AU aims at establishing Economic and Monetary Union with a single currency by 2023. The AU desires to

use sub-regional bodies under her to fast track her single currency agenda. The sub-regions include African Economic Community (AEC), Community of Sahel-Saharan States (CEN-SAD), Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC), and Economic Community of Central African States (ECCAS). The rest include Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD), Southern African Development Community (SADC) and Arab Maghreb Union (AMU).

The objectives of the various sub-region and groupings are derived from the objectives of the AU. The sub-regional groupings are supposed to pursue economic and monetary unions so as to expedite the realization of economic and monetary union for the continent in 2023. Now, even though the AU has recorded some successes in the areas of trade and movement of goods, services and people, a lot still has to be done to realize the Economic and Monetary Union status at the stipulated date, 2023. The banking and other financial system can be strategically restructured and positioned to be responsive to the financial needs of businesses to facilitate trade and movement of resources to support sustainable economic development.

One area that is essential for the promotion of the economic and monetary objectives of the AU is financial integration. Researchers have conducted many studies on financial integration in Africa, but majority of the studies concentrated on the integration of the equity capital markets (e.g. Agyei-Ampomah, 2011; Lagoarde-Segot & Lucey, 2007) even though the financial system in Africa is dominated by the banking system. In addition, the emergence of cross-border banking in Africa implies bank market integration. We also do not know whether the level of the banking system's competitiveness induces economic growth within the sub-regions in Africa. Information on this would help the African Union and policy makers to ascertain how

the banking system is contributing to the realization of sustainable economic development across sub-region in the continent.

According to the World Bank (2007), financial systems in Africa have not been able to induce economic growth and poverty reduction because of their limited scale of operation in many countries. Regional integration offers the financial sectors in the regions wider market and facilitates cross-border banking (African Development Bank Group [AfDB], 2010). The AfDB report stress that African countries can enhance growth and poverty reduction if they maintain price stability, improve trading among themselves and maintain currency stability. This requires a very sound and responsive banking and other financial systems. This means that the development in the banking system is essential for the realization of African integration and regional integration that is also essential for financial development across Africa.

H_5: *The interaction between the level of Bank Market Power and regional integration in Africa would induce higher economic growth.*

2.6 Determinants of Bank Market Power

The literature provides enormous evidence that the nature of bank market structure (in a continuum of a more competitive banking system to a less competitive banking system) influences access to credit, bank stability (fragility), bank efficiency and foreigh bank entry. However, this is one side of the story. It is posible that the nature of bank stability, the way through which firm secure finance from the bank, the level of efficiency of the banking system, and the ease of entry by foreign banks would influence the nature of bank market structure. The innovations in this thesis include an investigation on the factors that impact the level of bank market power in Africa. In particular, the study tests the feedback loop in the relationship-banking

hypothesis that stipulates that bank with market power needs to engineer enough market share in order to partake in rent when the clients become profitable. This feedback loop requires the banks to channel funds to entrepreneurs that also include the survival and sustainability funding. Such funding is meant to ensure growth of firms in the banking-relationship for continuous business. However, the level of market share engineered by banks depends on the stability, efficiency, concentration, new foreign banks, the level of economic institutions and the level of financial development (Claessens et al., 2004; Mirzaei et al., 2014). To the best of my knowledge, this is the first paper to test how access to finance perpetuates larger market share given the factors above. In this subsection, I review the available literature and show the transmission mechanisms through which these factors can affect the level of bank market power.

2.6.1 Bank Market Power and Bank Stability

Allen and Gale (2004) supports the view that a more concentrated banking systems induce bank stability. In their model, they illustrate the contagion effect of bank crisis in a more competitive banking system, the authors showed that under perfect competition, competitive banks are price takers and cannot afford to support troubling bank(s). Because of that a bank which experiences fragility or instability eventually fails and that negatively affects the soundness of the whole banking system. The authors pointed out that, such contagion effect of bank failure is not common in less competitive banking systems. They stress that bank with market power obtain informational rent from their relationship with borrowers which reduces screening activities, screenig costs and risk-taking strategies. They emphasized that, because of the smaller numbers of banks in an imperfect banking system the central banks can monitor and supervise the activities of banks so well thereby reducing their

risky strategies and promoting systemic bank stability. Thus, less competitive banking systems are less likely to fail because of their informational advantage.

In times of liquidity crises, banks can support each other and ameliorate the harmful effect of a troubling bank on the banking system. On this, Saez and Shi (2004) argued that banks in a less competitive banking environment can create relationships with existing banks and provide support to banks that are currently facing liquidity problems and thus ensure the stability of the whole banking system. Such cooperations are less likely to occur in a competitive banking environment because banks are price takers in those environments.

Alternatively, Boyd and De Nicolo (2005) emphasized that, in both the loan and deposits markets, bank with market power can increase the loan rates or reduce the deposit rates. By increasing the loan rates, banks with market power do not only restrict access to finance but also make it difficult for firms which eventually access credits to repay the loans. The inability of the firms to repay the loans would lead to increasing non-perfoming loans that can in turn impair the soundness of the banking system. In addition, by reducing deposit rates, banks with market power discourage mobilization of funds which can reduce the credit creation ability of banks and impede financial intermediation. The authors suggest that because entreprenuers find it difficult to repay loans under less competitive banking environment, banks with market power increases entreprenuerial moral hazard which in turn raises bank's default risk (Soedarmon, Machrouh & Tarazi, 2011).

Empirical evidence on the link bewteen bank market power and bank stability is limited. Support for bank market power-bank stability view came from Beck, De Jonghe and Schepens (2013). In a cross-country study made up of 79 countries globally, the authors found that bank market power promotes bank stability

especially in systems where regulation is intensive. Specifically, their results show that a one standard deviation reduction in bank market power reduces bank Z-score (their measure for bank stability) by 17%. This situation was severe when the authors created an imaginary crisis situation. They found that in crises period, a one standard deviation in bank market power reduces bank stability by 37%. Large banks rely on their economies of scale and diversify their activities which in turn reduces their idiosycratic risks (Boyd & Prescott, 1986; Nguyen et al., 2012).

Fu, Lin, and Molyneux (2014) also found that increases in bank market power are associated with greater bank fragility thereby offering support to the competition-bank stability hypothesis enshrined in Boyd et al. (2004). Soedarmono, Machrouh, and Tarazi (2011) also found that in Asia, bank market power leads to financial instabilities because less cmpetitive banks engage in higher risk taking behavor. They emphasized that, higher economic growth can reduce the risk taking behaviour of banks with market power and therefore reduce bank instability.

It is clear from the above that no matter the sign of causation, bank market power influence bank stability. My literature search found that, the link between bank stability and bank market power has not been explored even though a stable banking environment can also sustain the favourable position (profits, capital ratio and chatter value) of existing bank market structure. Also by investigating how these factors affect bank market power, we would ascertain how to regulate the banking system on bank stability in order to promote economic growth since bank market power has implications on economic growth.

In this study, we analyzed how bank stability (bank Z-score) influence the level bank market power in Africa. The results in this study will influence regulations on bank market power – whether authorities should tighten regulations to promote

stability or otherwise in the face of high bank market power. The findings will also engineer development of theories on the relationship between bank stability and bank market power especially after empirical studies are replicated across regions and results proven consistent.

2.6.2 Bank Concentration and Bank Market Power

The traditional structure-conduct-performance view on bank market structure holds that bank market power is higher in highly concentrated banking environment. The hypothesis hold that, in a concentrated market where only few banks control affairs, the banks are inclined to manipulate loan rates and stay profitable (Mason, 1939; Bain, 1956). This hypothesis implies that bank concentration increases the performance of banks by improving efficiency. The structural-conduct-performance hypothesis holds that bank market power limits access to credits through credit rationing that in turn can lead to lower economic performance (Guzman, 2000). This is probably because banks in highly concentrated market increase the loans rates which can lead to moral hazards behaviour of firms that strongly depend on external finance (Boyd et al., 2005). Recent empirical support for this view was given by Liu, et al. (2014) who found that bank concentration can promote the growth of industries that depend on external finance. Banks with market power can also strengthen their market share by being efficient in their intermediation activities (Leon, 2015).

2.6.3 Foreign Bank Ownership and Bank Market Power

In Africa, Kodong, Natto, and Biekpe (2015) stress that the uncompetitive nature of East African banking system drives banks to open branches across their national boundaries. Diallo (2015) also emphasizes that cross-border banking activities are increasing in the continent. Large banks are opening branches across the continent. Mirzaei et al. (2014) also reports that foreign banks induce competition in the banking

system in a cross-country study. In Africa, foreigners own, on average, more than 50 percent of bank assets. Intuitively, we expect foreign bank participation in banking sector to promote bank competition in Africa.

Finally, developments in other financial markets can influence the level of bank market power. Stock market developments can provide alternative sources of funds to firms, which can bring competition in the credit markets. In the same token, insurance companies in Africa are liaising with the banks in credit allocation by providing insurance on deposits and advances. To ascertain the effect of other financial intermediation channels on bank competition, this study employed two inter-industry factors: share of insurance company's premium in GDP and capital market development (share of market capitalization in GDP), following Claessens et al. (2004) and Mirzeai et al. (2014). The expectation is that the development in the capital and insurance markets should increase the competitiveness of the banking industry.

2.7 Bank Market Power, Financial Innovation and Economic Growth

Acemoglu, Gancia and Zilibotti (2012) showed (in a model) how output standardization process automatically establishes low technology firms in the financial markets to be in a position to partake in the diffusion of financial innovations. The authors emphasized that innovators enjoy temporal rent when they introduce their new products. However, as the production technology required to produce the new product becomes more standardized, more firms will enter the product market which in turn may lead to more competition. Market interactions introduce a standardization process that allows low technology producers to employ (relatively) unskilled hands to produce the new products. This produces two conflicting outcomes. Competition erodes profit levels of innovators over time

through free entry (Van Horne, 1985). In other words, product market competition enhances diffusion of innovative products and if conditions are normal, the consumer should pay less for the (superior quality) of new products.

Most ICT-oriented products follow this view. The cost of such products is high initially because the innovators control production. However, when the technology becomes common, production increases and prices fall. Unless product standardization brings efficiency to the extent that society can increase productivity, there must be intellectual protection for innovators.

The other side of the continuum is the possibility of standardization to redistribute innovative rents from innovators to adopters. The model pointed out that, this serves as a disincentive for further innovations. Therefore, an optimal level of innovations standardization can induce a positive effect of competition on innovations and therefore facilitates diffusion of innovative products. Strong institutions are therefore required to regulate the standardization process and provide rent incentives to innovators.

In effect, Acemoglu et al. (2012), posit that product standardization has positive influences on competition. The authors also suggest that, intellectual property rights that seeks to protect entrepreneurs who innovate from depletion of rents can be injurious to economic growth in the absence of process standardization which encourages more innovations. In effect, standardization facilitate new product diffusion which makes the outputs of both technologically endowed firms (which employ skilled labor) and relatively technologically deficient firms (which employ unskilled labor) to be similar in the end. In the absence of intellectual property protection, large firms can create incumbency advantage through information

generating systems such as research and development in order to sustain higher market share (Petersen et al., 1995).

The theory above is particularly related to innovations in the financial sector. In the financial sector, new financial products diffuse easily in the financial market because they are usually syntheses of existing technological innovations and that ownership of new financial products are not clearly defined. For instance, mobile banking combines internet service with the proliferation of mobile phone to provide banking services. Since there is little intellectual protection on new financial products, financial market participants imitate new financial products in order to strengthen their competitive position.

Financial innovation is responsible for many of the development financial products such as mobile money transfer, services in the remittances industry, and new financial services such as SMS banking, internet banking, and mobile banking among others. Financial products enumerated above are in turn promoting financial inclusion Bara et al. (2016). The proliferation of new financial products is expected to lead to more competition especially when there are lesser activities restrictions in the banking sector. For example, in Ghana (and many parts of Africa where mobile money transfer services exist), the banks are leapfrogging competition from mobile money transfer by linking the mobile money platform to customers personal account.

In some banks, customers can transfer money from their mobile money accounts to their bank account and vice-versa. With this service, customers need not have a bank branch within their vicinity. All they have to do is to locate a mobile money vendor around their vicinity, deposit any amount into the mobile account and within few minute, they re-transfer the money into their bank account by the help of their mobile phone. Through integration of mobile money transfer services, customer

can withdraw money from the comfort of their homes, pay their bills anywhere anytime, and earn interest on their mobile money deposits. It appears that, in no distance future, financial innovation can determine the scope, the structure and credit allocation activities of the banking system.

Besides, innovations in the financial sector (especially in Africa) has limited level of innovativeness. This is because, most of the financial innovations (electronic cards, internet banking, mobile banking, mobile money etc.) are transfers from other part of the world. For example, the electronic cards that existed in the USA since the 1960s are now new financial products in some part of Africa however with much more improvement. We derive other forms of innovations from products from other industries. For instance, the synthesis of ICT product and financial service delivery has resulted in internet banking, SMS banking, mobile banking etc. Finally, intellectual protection of new financial products is very low which does not provide protection for rent and therefore discourages further innovations. This can increase competition when higher degree of imitation encourages more innovations. Therefore, it is important for us to know the extent to which financial innovation interrelates with the level of competitiveness of the banking system to induce economic growth.

Theories suggest that innovation and competition convolute to improve access to finance, which in turn can promote economic growth. Allen and Gale (2004) posits that bank competition increases the risk-taking behaviour (innovation) of banks to the extent that they engage in activities (such as trading in derivatives) that are injurious to effective financial intermediation. The 2008 financial crisis happened because of excessive risk-taking activities of large financial agents in the developed world at the blind side of regulation. Bank competition are responsible for the likelihood of

investment risks in some jurisdictions (Gonzalez, 2016), increase credit restrictions (Alvarez & Bertin, 2016) and bank fragility (Diallo, 2015).

The relationship-banking hypothesis also posits that large banks facilitate access to finance by small and innovative firms, which may not have collaterals for funds (Petersen et al. 1995). This suggest that bank with market power can improve economic growth by improving access to credit in an opaque economy. Competitive banks may lack the information to evaluate the prospects of small firm. Their inability to create relationships with smaller firm may stifle innovations and productivity growth.

In addition, according to Schumpeter (1912), small firms are responsible for technological innovations. A competitive banking system does not have the patience to effectively screen-out bad borrowers. The implication is that bank competition can result in indiscriminate credit allocation, which can exclude small firms from getting access to finance (Dell'Arricia, 2000). If competitive banking systems cannot channel funds effectively to small firms, lack of access to credit may mean that projects would not get financed which in turn can restrict growth.

Furthermore, we can appreciate the link between financial innovations and bank competition by understanding the relationship between product market competition and innovation, since financial innovation is closely related to technological innovation. As discussed earlier, (technological) innovation means new products, new organizations (institutions) and new processes (Tufano, 2003; Frame & White, 2004). Innovations and inventions are closely related even though the time lag between the two necessitate that inventions precede innovations. Inventions are clearly the ideas that actualize innovations and innovations are inventions that have been commercialized (Afuah, 1998).

In the other theoretical literature, competition in the product market is detrimental to innovation especially in a keenly contested industry (Aghion, Harris, Howitt, & Vickers, 2001; Aghion, Bloom, Blundell, Griffith, & Howitt, 2005; Acemoglu & Akcigit, 2012). The basic information in these theoretical exposition is that in product markets, competition initially increases innovations among firms in a neck-to-neck competition. In a competitive environment, firms can obtain distinctive competencies through products and process innovations and innovating firms would increase post-innovation rents. For laggards, innovation would reduce their post-innovation rents unless they develop internal capabilities to catch up with innovators. This implies that, further innovation in a competitive industry depend on the speed with which laggards catch up with leaders of innovations.

However, lack of intellectual property protection reduces the rents of innovation due to imitations by laggards (Acemoglu et al., 2012). The authors suggest that, in the absence of intellectual property protection, firms can enjoy profits from innovations when they can engineer some form of monopoly power for a sufficient period. In effect, market power provides protection to innovators but competition erodes rents thereby encouraging further innovation under full competition. In the intermediate period, the authors suggest that firms would split profits from innovation equally. However, in the financial sector, the literature above may suggest that, under intense competition, no bank can profit from innovation for a very long time since there is little restrictions on financial product imitation.

According to Aghion et al. (2005), intensive competition is overcome by innovations that provide incumbents some profits over the competition. The laggards must also keep up with the level of innovation until they catche up with the incumbent before either the incombent extend innovation or the laggards outweigh the

incumbent. Inherent in the Schumpetrian models is the assertion that a imitation is important for growth because it serves as incentive for competition-driven innovation. However, beyond a certain limit, imitation can discourage innovation due to its negative effects on rents. For firms that operate with the same level of technology, they can only survive if they innovate in a competititive industry (Aghion et al., 2005). Intellectual properties ensure rent protection for incumbents (Acemoglu et al., 2012). The inference is that, in the absence of intellectual property protection, firms would reduce their research and development activities in a keenly competitive environment unless they have monopoly power. Therefore, market power encourages innovations that can lead to economic growth.

In addition, some views suggest that finacial agents derive their rents by recognizing technological innovators and funding their innovation (King et al., 1993; Aghion et al., 2005) and by innovating in screening processes that would give them the advantage of being the first to recognize and sponsor technological innovation (Laeven et al., 2015).

At the empirical level, Aghion et al. (2005) regressed patents on the Lerner Index and found invented U-shaped relationship between competition and innovations an a panel specification. This illustate the non-linear causality between competition and innovations in the product market. The implication is that competition increases innovation initially and at certain points in time, there is a diminishing effect of competition on innovations. The explanation is that competition increase the rents of innovation so incumbent firms derive more incentive to innovate. But after a certain period, intense competition adds no further benefits to innovation. However, through creative destruction that pushes the equilibrium level of competition upwards, a new level of competition-innovation transmission can occur that can lead to growth.

Cornaggia, Mao, Tian and Wolfe (2015) suggests that financial supports to small private firms from comepetitive bank discourages takeover intent of large public firms. They also found that bank competition reduces innovation by public firms when there is deregulation. Form their study, we can infer that private firms are able to wad-off predatory firms because bank competition allocates more funds for the them to implement their new projects. The implementation of projects improves the value of the firm to the extent that large firms find it more expensive to acquire smaller firms.

H_8: *The level of bank market power induce financial innovation and the interaction effect lead to economic growth in Africa*

2.8 Conceptual Review

2.8.1 Financial Innovation

It is important for us to define innovation and relate the term to financial innovations. The term innovation has many connotations. Innovation is sometimes refers to as technological innovation. Schumpeter (1912) define innovation as new products (such as the mobile money transfer that emerged in East Africa around the period of the 2008 financial crisis), new sources of raw materials (such as the search for renewable energy as a cost efficient substitute to existing energy systems), new markets (such as the development of the mutual funds and bond markets in some parts of Africa), new production processes (such as the use of ICT to enhance services delivery across the bankinhg systems in Africa.; and development of new forms of organisations. This definition encapsurates all aspects of activities that connote the initiation, development and diffusion of new products, markets and processes (Hirsch-Kreinsen, 2011). Sometimes the term innovation is used interchangeably with invention but in practical terms, invention precedes innovations. According to Afuah

(1998), innovation are inventions which have been commercialized. This definition implies that innovation adds value to inventions.

2.7.1.1 Measurement of Financial Innovations

Researchers have not concluded on a generally acceptable proxy for financial innovations. Lack of generally accepted measurement of financial innovations impedes empirical investigations on the concepts (Frame & White, 2004). Most studies mitigate this measurement difficulty by employing patent indicators. Ang (2014) defined financial innovations by the amount of patented activities. Acharya and Xu (2016) measured innovation activities by collecting firm-year patent counts and patent citations data from the National Bureau of Economic Research (NBER) Patent Citation database. The authors used R&D spending to measure innovation input and patent-based metrics to measure innovation output. Similarly, Beck, Chen and Song (2016), measured financial innovations by research and development expenditure by banks. And, Xin, Zhang, and Zheng (2017), defined innovations by the invention patent (the actual patent realized in inventions), new products sales (the mean of new products sales to a firm's total sales) and industry level R&D expenses (the mean of R&D expenses to a firm's total sales).

The problem with patent measurement is that it is very difficult to trace the direct results of the patents in financial innovation. Also, most banks (in Africa) do not report R&D expenditure figures in their financial statement (Beck et al.,2016).

Due to the above highlighted difficulties regarding the use patent data to measure financial innovations and other considerations such as the emergence of new financial instruments and processes that affect credit distribution by banks, other studies employed the following measures: Kim, Koo and Park (2013) measured financial innovations by interest rate derivatives, venture capital and private

equity (VC/PE), and securitization. These three variables are consistent with Tufano's (Tufano, 2003) definition of financial innovation in that interest rate derivatives are a form new financial product; capital and private equity (VC/PE), depicts a new financial institution and securitization depicts a new financial processes.

In a study to investigate the influence of financial innovations on bank/financial stability of European banks, González, Gil, Cunill and Lindahl (2016) measured financial innovations by the use of securitization and credit derivatives. They defined securitization by the outstanding balance of securitized assets as a ratio of gross loans. They also defined credit derivatives by the total net position of credit derivatives as a ratio of credit portfolio, net position of credit derivatives in the trading portfolio to credit portfolio, net position of credit derivatives in the hedging portfolio to credit portfolio and Gross position of credit derivatives to credit portfolio. Similarly, Norden, Buston and Wagner (2014) measured financial innovations by gross and net positions in credit derivatives in a study that sought to determine the relationship between financial innovations and bank behavior. Data on these proxies are unavailable within the African context at the country-level.

Recently, by following the Schumpeterian view of how financial innovations affect economic growth, some studies have employed credit scoring measures. Li, Niskanen, Kolehmainen and Niskanen (2016) developed credit scoring models for SMEs to define financial innovation. In this measurement, financial innovation is infered from the reduction in the credit risks indicators of banks. Similarly, Laeven et al. (2015) used the speed with which a country's banking system adopts private credit bureaus (PCB) and public credit registry (PCR) as alternative measures of financial innovations. Both PCB and PCR provide information on the the credit worthiness of borrowers thereby ensuring the protection of creditors by minimizing moral harzards

and adverse selection. The premise is that the presence of PCBs and PCRs in an economy allows banks to share informations about credit worthiness of borrowers that would aid them to channel funds to productive areas of the economy. By employing technology in evaluating borrowers, Laeven et al. (2015) suggests that PCBs and PCRs are able to merge technological innovations and financial innovations toward improved productivity. The authors also suggested that improved screening process of borrowers should culminate in the availability of more credit to the private sector (financial development). They therefore measured financial innovations alternatively as the growth in financial development (growth rate of credit to the private sector over gross domestic product (GDP)).

By following Laeven et al. (2015) and a host of other studies (e.g. Aboagye & Idun, 2012; Idun & Aboagye, 2014; & Bara et al., 2016), this study employed the growth in banking sector credit to private sector standardized by GDP, to measure financial innovations. This measurement is theoretically supported by the Schumpeterian view that financial institutions provide credits that corresponds to the amount required to support technological innovations by the private sector. This study also used automated teller machines (ATM) penetration rates/coverage or the amount of electronic products transactions in an economy as a specific measure of financial innovations. Alternatively, in order to measure a specific financial innovation, we used the speed with which a country in African adopted PCBs and PCRs as measures of financial innovations by following Laeven et al. (2015).

2.7.2 Bank Market Power

Market power refers to the ability of a firm either to vary quantity of production or price but not both at a point in time (Keeley, 1990). Banks with market power also possess strong bargaining power that assist them to change deposit or

lending rates in favor of their strategic options without loss of profit or customers. Banks and other creditors can also be powerful when they have all material information about borrowers (Djankov et al., 2007). Researchers commonly measure bank market power by the Lerner Index (the difference between price and marginal cost as a ratio of price). If the Lerner Index is close to zero, it is an indication of a near perfectly competitive banking system (less market power) and if index is large, it implies the banking system is nearer to a monopoly (more market power).

Normally, when few banks control the pricing behavior and product offering of a banking system, we say bank market power is high. Bank market power also implies that banks operate in less competitive banking environment (Cetorelli & Paretto, 2012). A banking system can exhibit high market power behavior if it is characterized by: high lending rates in relation to deposit rates, insistence on collateral before credits are allocated to borrowers, high financial charges, and relationship building (Petersen et al., 1995). A firm has market power if it perceives that it can change prices and price taker firms have less market power (Hahn, 1984). According to the literature, the level of bank market power in Africa is higher than any other regions (Clerides et al., 2015; Mirzael, et al., 2014; Amidu et al., 2013).

The structure of a banking induces economic growth. In a less competitive system, bank with market power can restrict access to credit to firm that source finance externally by charging higher lending rates. They may also constrain savings by giving borrowers lower deposit rates (Pagano, 1993). These two channels can restrict an economy's ability to generate enough investment. By constraining capital accumulation, banks with market power can reduce economic growth. Banks may also decide to make credits available to firms that needs credit for expansion at

exorbitant rates. High interest rates may encourage high default rates that can lead to bank failure.

On the other hand, banks that operate in less competitive banking environment can use their bargaining power and develop efficient and effective monitoring systems that spot and channel credits to small firms. The firms can apply the funds into innovations that results in the production of new products, new markets, new sources of inputs, new techniques and technologies, among others (Petersen et al., 1995). In a competitive environment, banks in their course to win more customer may grant credits without proper scrutiny. In an informationally opaque environment, indiscriminate credit allocation can increase morale hazards and adverse selection and the effect can be an escalation of systemic bank failure (Dell'Ariccia, 2000). This is because a more competitive environment increases the risk-taking behavior of banks that can affect the soundness of the banking system negatively. A banking system that is not sound may fail to allocate funds productively thereby impairing capital accumulation and economic growth.

As mentioned earlier, the banking system in Africa is characterized by high market power. The Lerner Index, which defines the relative divergence between price and marginal cost, has averaged around 30 percent over the past decade to 2013. For example, for a sample of 44 African countries, the Lerner Index were 30.5% in 2004. This figure increased marginally to 31.19 in 2013 that shows rising bargaining power of banks in Africa. Bempong and Sy (2015) provided that in 2014, the Lerner Index for Africa was 30 percent of which North Africa, 35 percent; East Africa, 34 percent; West Africa 16 percent and Southern Africa 33 percent. The less competitive nature of the banking system is driven by developments in North Africa. Bempong and Sy (2016) attributed this to higher foreign entry restrictions in the area. The figures show

that the banking system in West Africa is more competitive than the system in other sub-regions and appears to drive the competitiveness of the banking environment in Africa. This can be attributed to the deregulation processes that have allowed banks from the continent, to penetrate the sub-region. Other regions in the world also appears more competitive than Africa. In their report, Bempong et al. also showed that the Lerner Index associated with the banking systems in Latin America and Caribbean, High Income Countries and Low-Income countries were 27 percent, 20 percent and 22 percent respectively.

The trend of the Lerner Index does not appear to corroborate with the trend in bank concentration that depicts higher bank market power (Cleassens et al. 2004). Within the 2002-2015, estimations from the Global Financial Development Database (2017) indicate that the 3-banks concentration ratio (which is the proportion of the three largest banks' assets in the total assets aggregated for the 44 African countries) fell from 79.6 percent in 2004 to 72.71 in 2013. The average level of bank concentration fell further to 70.85 percent in 2015. Similarly, lending-deposit spread on the average fell from 11.5 percent to 8.25 percent within the period.

Despite the above, access to credit is relatively restricted on the African continent compared to other regions in the world. Domestic credit to the private sector (DCPS) as a ratio of GDP, an indicator of financial depth, was 29.23 percent in 2015 for the sampled countries. For the whole Africa, DCPS stood at 36.3 percent of GDP in 2014. The figure for West Africa and North Africa was lower than the regional average at 21.0 percent and 24.4 percent respectively, an indication of lower degree of financial penetration and restriction to access to finance. On the hand, the level of financial penetration in East Africa and Southern Africa were above the regional

average – DCPS in East Africa was 48.1 in 2014 whilst that of Southern Africa was 43.1 (Bempong et al., 2015).

The DCPS data show improvement in access to credit from a ratio of 18 percent in 2006, Africa is still lagging developed nations in terms of financial depth. Bempong et al. (2015), in their report emphasized that, the DCPS in High Income Countries was 134.3 percent of GDP whilst that of Latin America and Caribbean was 45.5 percent of GDP. In the report, the authors presented that, the average level of financial depth compared favorably with that of low-income countries stood at 26.8 percent of GDP including Africa and 28.5 excluding Africa. The above shows that the amount money from the domestic banking sector to the private sector has direct effect on economic growth.

In addition, foreign bank ownership has increased significantly in recent year. Available data from the Global Financial Development Database [GFDD] (2017) indicates that the median foreign banks' assets to total assets between 2002 and 2015 has been over 53% which means foreign banks own more assets in a banking system than local banks. Interestingly, this development in foreign ownership in Africa is attributed to cross-border banking within the continent. As at 2013, Ecobank had operations in 32 African countries; United Bank for Africa, 19 countries; Standard Bank, 18 countries and Bank of Africa, 18 countries. In addition, Attijariwafa Bank had operations in 12 countries; Banque Centrale Populaire, 12 countries; Access Bank, 9 countries and Guaranty Trust Bank, 9. The penetration of Pan –African banks into other African countries has been effective in lowering the market share of local and European banks that dominated financial intermediation in Africa prior to independence of most countries (Beck, Fuchs, Singer & Witte, 2014).

Despite these developments, the level of bank market power is still rising (See Figure 3, page 107). To the best of my knowledge, no study has been carried out to investigate how the level of bank market power in Africa translate into economic growth despite the above developments. The relationship-banking hypothesis posits that bank market power is instrumental to the growth of economies.

We can also observe the high bank market power situation through the trend in the Boone Indicator. The Boone indicator is also a measure of bank market power. It is the coefficient of the relationship between profitability/market share and marginal cost. A high negative coefficient means a bank is able to increase profitability at a lower marginal cost and vice versa. The coefficient of the Boone indicator is normally negative which indicates that inefficient banks would not survive in a highly competitive banking environment. Therefore, the higher the degree of the Boone indicator, the higher the degree of competition. The average Boone Indicator for 44 African countries has followed a rising trend in absolute terms (meaning the absolute negative values are decreasing), which indicate higher degree of bank market power. For example, in 2002, 2003 and 2004, the average Boone indicator were -0.090, -0.106 and -0.077 respectively, which indicates that the level of bank market power rose marginally in 2004. In 2005, the average Boone Indicator was -0.090 and the figure rose to -0.086 in 2006 indicating loss of bank competition.

During the period of the global financial crisis, the Boone Indicator showed increase in bank competition (which implies a reduction in bank market power) at -0.087, -0.094 and -0.143 in 2007, 2008 and 2009 respectively. This indicates that, during the crisis period, bank competition in Africa increased. However, in 2010, the level of bank market increase to -0.070. Except in 2011 when the Boone Indicator was

-0.113, the measure of bank market power has been below -0.050 from 2012 to 2015. Overall, the bank market power in Africa has intensified over the past 14 years.

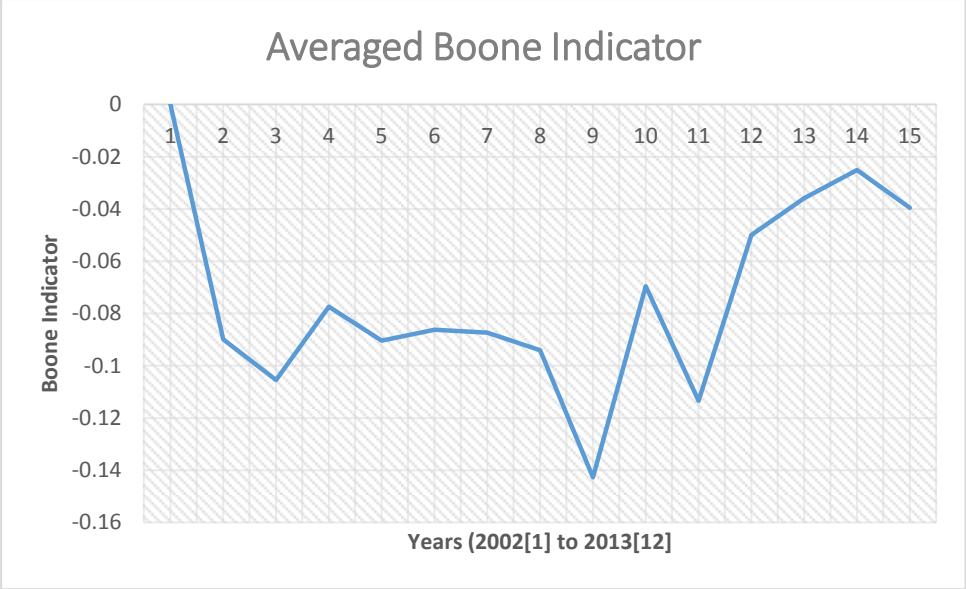
Thus, we can infer both bank market power and bank competition from the trends in both the Lerner Index and the Boone Indicator. However, the Boone Indicator incorporates the level of efficiency of the banking system in its estimates that makes it a better measurement of bank market power than the Lerner Index (Stiglitz, 1989; Boone, 2008). I used the Boone Indicator to measure the level of bank market power in this study.

From the foregoing, we conclude that there is less competitive behavior in the African banking system, which means that surviving banks in Africa enjoys the advantages of market power. According to Hicks (1935), banks can hide behind their market power and perpetuate managerial inefficiencies – a phenomenon he termed the "Quiet Life Hypothesis". The implication is that, the fact that banks with market power are profitable does not means they are being efficient in terms credit rationing. The above details partly motivated me to investigate whether the level of bank market power in Africa would be beneficial to economic growth.

In this study, I used Boone Indicator to measure the level bank market power. For evaluation purposes, we expect both the Lerner Index and the Boone Indicator to produce at least similar qualitative results in term of the coefficients of the econometric estimates. However, readers need to be mindful of the fact that the two proxies provide opposite signs but similar interpretation for the degree of bank market power in terms of magnitude. High negative values of the Boone Indicator connote higher degree of bank competition and lower degree of bank market power. In the same token, higher positive values of the Lerner Index are an indication of higher

bank market power whilst lower positive values or values close to zero is an indication of higher degree of bank competition.

However, for the two indicators to qualitatively measure the same level of bank market power, the sign of the co-efficient of the estimate should depict the same direction. This assertion is vividly depicted in Figure 3, where the primary trend of both the Boone Indicator and the Lerner Index are towards the same positive direction. This means that one must always verify the trend in the level of bank market power before one can make a conclusion on whether the banking system is competitive or less competitive. The banking system in Africa is relatively less competitive across the period of this study. However, Table 1 indicates that in 2015, the banking in Africa was more competitive than that of the rest of the world.



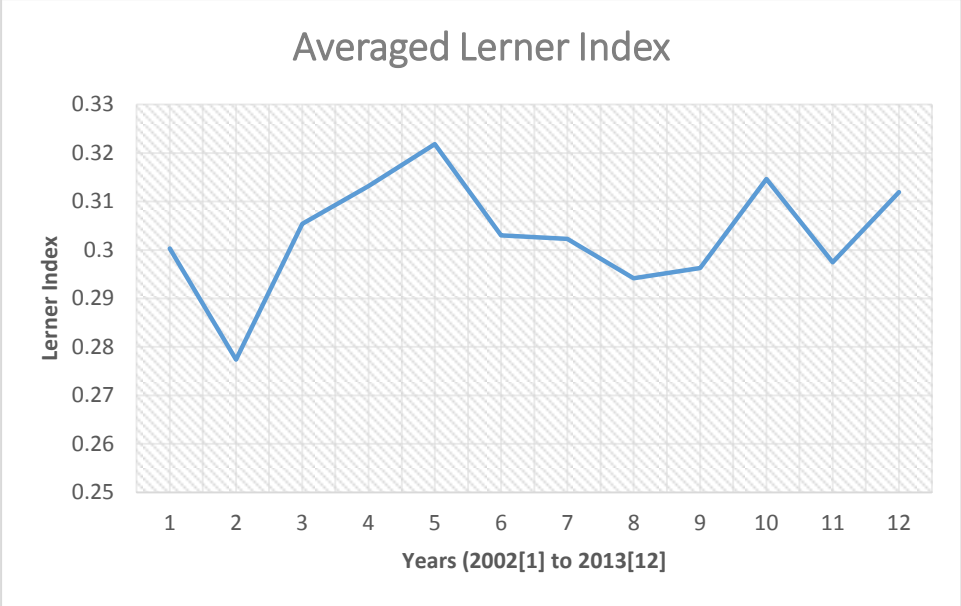


Figure 3 The Trend of the Average Boone Indicator and the Average Lerner Index for 44 African Countries (2002-2015). Source: Estimated from Global Financial Development Database (2017)

2.8. The Banking System in Africa

2.8.1 Bank Competition in Africa

The banking system in Africa has evolved in recent times. The banking system appears more competitive as the banking environments in other regions of the world. Available data from the Global Financial Development Data Base (GFDD) (2017)

indicate that the Boone Indicator, which is a measure of banking system competitiveness, is lesser than the figure reported for other regions in 2015. This development has been attributed to the cross-border banking that is sweeping through the continent (Leon, 2015) and the developments of new financial products in the sub-Saharan region (Bempong et al., 2015). Table 1 shows that the banking system in Africa is as competitive as that of Latin America and Caribbean and lower middle-income countries.

However, on average, the banking system in Africa is as competitive as that of high-income countries, low-income countries, East Asia and Pacific, Middle-income countries and Middle East and North Africa. Within the continent, Bempong et al. (2015) showed that the competitiveness of the banking system is driven by the level of bank competition in West Africa. They stressed that bank competition in West Africa is higher because of deregulation, development of new banking product and proliferation of Pan-African Banks across countries in the sub-region. It is much easier for new banks to enter West Africa than North Africa.

Similarly, their report showed that it is easier for West African banks to develop new products than their North African banks because the banking system in North Africa is more restrictive. They also stressed that the free entry of banks into the West African sub-region has been possible because of deregulation of the banking system. In Figure 3, the primary trend line shows that within the sample period (2002 to 2015), the average Boone Indicator has been rising. However, in recent times the level of bank competition has been increasing. This is depicted by the downward trend of the Boone Indicator graph from 2014.

Table 1: Boone Indicators across Regions

Regions	2015

Africa	-0.032
East Asia & Pacific (developing only)	-0.015
High income	-0.01
Latin America & Caribbean (developing only)	-0.03
Low income	-0.015
Lower middle income	-0.03
Middle East & North Africa (developing only)	-0.025
Middle income	-0.02
Sub-Saharan Africa (developing only)	-0.01

Source: GFFD (2018)

2.8.2 Automatic Teller Machines (ATMs) Penetration in Africa

Over the years, Africa has made tremendous strikes to improve financial inclusion on the continents. Even though much needs to be done, Figure 4 shows that ATMs per 100,000 of population, an indicator of access to finance, technological innovation and financial inclusion, has been increasing over the 14-year period under consideration. This means that more people in Africa are having access to financial services and the level of financial inclusiveness is increasing. This can have positive effect on savings, as majority of the people would now save with the financial institutions instead of keeping their money in the homes. The possible high rates of savings would also increase intermediations that can keep the banking system vibrant. However, Table 2 indicate that the level of ATMs penetration in Africa is only higher than that of Lower Income countries. High-income countries still command higher level of financial inclusion followed by Latin America and Caribbean. Other regions in the table recorded levels of inclusion above that of Africa, which indicates that there is still much to be done in terms of improving financial inclusion in Africa.

Table 2: ATMS per 100,000 of Population

Regions	2015
Africa	16.19
East Asia and Pacific	28.3
High income	70.8
Latin America and Caribbean	40.58
Low income	4.395
Lower middle income	21.19
Middle East and North Africa	22.4

Middle income	32.49
Sub-Saharan Africa (developing only)	7.525

Source: GFFD (2018)

2.8.3 Bank Stability in Africa

A stable banking system is essential for efficient bank intermediation. Available data depict that the banking system has relatively been resilient to systemic crisis. The GFDD (2017) show that between 2002 and 2015, only Nigeria recorded systemic crises[7] in 2009, 2010 and 2011. This is a great improvement compared to the number of bank crises recorded between 1990 and 2011. Within that period, the GFDD (2017) counted 100 bank crises in Africa. North Africa recorded 6 crises over the period while 45 bank crisis period were recorded in West Africa alone. East Africa recorded 10 crisis periods; Southern Africa, 16; and Central Africa, 23 bank crisis periods. The data shows that West Africa has had greatest share of Bank crises from 1990 to 2011. The region has however made tremendous recovery by recording only 3 crises from 2002 to 2011. The rest of the regions did not record any bank crisis over the period (2002-2011).

Table 3 also shows that bank stability (measured by the Z-Score: the sum of average return on assets and average equity to total assets divided by the standard deviation of return on asset) across regions of the world in 2015. For evaluation purposes, the higher the Z-score, the higher the level of bank stability. Therefore, Africa lags behind Middle East and North Africa (22.2), High Income countries (12.4), Latin America and Caribbean (12.07) and Lower Middle-income countries (11.83). On the other hand, the level of bank stability in Africa compares favorably to the level in East Asia and Pacific countries (6.7), Low Income countries (7.84), and

[7] This is a dummy measurement that record 1 when there is a bank crisis in a country within a year and 0 when there none.

Middle-Income countries (11.00). The trend line in Figure 4 shows bank stability in Africa rose during the period of the global financial crisis until 2011. The continent was resilient to the crisis in terms of bank stability because of the less developed nature of the banking system and lower level of integration of the African banking system to the global banking system. In addition, most African banks still operate under Basel 1 Regulation Framework while banks elsewhere are operating under Basel II and II. These might have accounted for the relative stability of banks in Africa (Bempong et al., 2015). The figure also shows that the average Z-score has been falling since 2011 and that portrays a fall in the level of bank stability in recent times.

Table 3: Bank Stability (Z-Score) across Regions

Regions	2015
Africa	11.33
East Asia and Pacific	6.17
High income	12.4
Latin America and Caribbean	12.07
Low income	7.84
Lower middle income	11.83
Middle East and North Africa	22.2
Middle income	11
Sub-Saharan Africa	8.44

Source: GFFD (2018)

2.8.4 The Level of Financial Development

Domestic credit to the private sector as a ratio of GDP is a major proxy used to determine the depth of financial development in the extant literature. The GFDD

(2017) provide an all-embracing definition for domestic credit to the private sector as "financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment. For some countries these claims include credit to public enterprises".

Firms, which depend on external finance use resources provided by the financial sector to implement innovations, expand capacity and sustain operation. The amount of credit that goes to the private sector is also a direct reflection of how savings are channeled into capital accumulation. If more credits go to the private sector through financial intermediation, investment would be high and that can have positive effect on economic growth (King & Levine, 1993). More credit to the private sector is also an indication that businesses are doing well and therefore the banks find it expedient to support the growth of businesses. High level of financial deepening can result in competition in the loan markets when banks actively seek businesses and grant them loans. In their endeavor to win more businesses the banks can create new products that meet the needs of certain niches in the business environment. The relationship banking hypothesis (Petersen & Rajan, 1995), on the other hand, suggests that bank with market power can spot and monitor promising firms and create relationship that improves access to credit and sustains both the bank and the firms.

Table 4 shows that in 2015, the level of financial development in Africa lagged behind that of all major regions in the world except Low Income countries. The table shows that the level of financial development in Africa is driven by the growth in credit in North African since the sub-Saharan Africa's average at 20.30% is lower than the North African average at 28.75%. At that level Africa's level of financial development is just about half of that of East Asia and Pacific (58.97%); at

level above half of the level in Latin America and Caribbean (46%) and close to one-fourth of the level of financial development in High Income countries (87.52). This is problematic since restrictions on access to finance can have negative effect on economic growth in Africa. Bempong et al., (2015) offers the factors that affect financial deepening by stating that:

> *Deepening the financial sector in the long run partly depends on financial institution's ability to track repayment history that requires credit registry and information sharing among financial intermediaries. Difficulties in establishing borrowers' ability and willingness to repay, and lack of legal support for creditor rights limit banks' lending schemes, which contributes to shallow financial development.5 In weak legal and institutional environment, financial institutions run the risk of lending to agents with little to no prospects of repayment* (p. 3).

The authors suggest that public and private registries (or any information sharing systems among banks) as well as strong institutions are essential for greater financial deepening.

Figure 4 however shows that the average amount of credit to the private as a share of average income has been rising from 2002 for the 44 African countries included in this thesis. There is much more room for improvement in financial deepening to ensure efficient intermediation that can lead to economic growth.

Table 4: Domestic Credit to the Private Sector

Country Name	2015
Africa	28.75
East Asia & Pacific	58.97
High income	87.52
Latin America & Caribbean	46.00
Low income	14.875
Lower middle income	35.78

Middle East & North Africa	30.47
Middle income	39.9
Sub-Saharan Africa	20.295

Source: GFFD (2018)

The amount of credit that goes to the private sector can also depend on loan restrictions that the banks impose on borrowers. These restrictions include the value of collateral needed for a loan as share of total loan advanced. Table 5 shows that collateral requirement stood at 292.5% of total average loan in 2015. Banks in Africa and Low Income countries require higher values of collateral before credits are advanced. We did not have figures for High Income countries in 2015 from GFDD (2017) but the 2014, figure shows that High Income countries require lower value of collateral before they advance loans. This partly explains why financial deepening in Africa is lower than the level in High Income countries.

Table 5: Value of collateral needed for a loan (% of the loan amount)

Country Name	2015
Africa	296.2
East Asia & Pacific (developing only)	223.5
High income	83.9*
Low income	296.2
Lower middle income	223.5
Middle income	219.75
Sub-Saharan Africa (developing only)	296.2

Source: GFFD (2018)

2.8.5 Development in Other Financial Markets

The financial system in most economies are classified into the banking sector, the insurance market sector and the stock market sector. The development in the stock market and the insurance sector affect the development in the banking sector. Barth, Caprio and Levine (2013) show that banks in Africa are allowed, to some extent, to engage in insurance and stock market activities. This form of deregulation can result in competition in the banking sector through new markets and products development. Therefore, in this thesis, we sought to analyze how the development in the other financial markets can affect the level of bank market power in chapter 6.

Table 6 compares the level of insurance market penetration, measured by the share of insurance premium of average income[8], of major regions in the world. It shows that the level of insurance penetration compares favorably to the level in Latin America and Caribbean, Lower Middle Income and Low-Income countries. However, the level of insurance market penetration in Africa is lower than the level in High Income countries and East Asia and Pacific countries.

Table 6: Share of Insurance Premium over GDP

Regions	2015
Africa	0.95
East Asia and Pacific	1.66
High income	2.88
Latin America and Caribbean	0.37
Low income	0.59
Lower middle income	0.36

[8] We use this measure because on the average the higher the level of income, the higher would be the propensity for the citizens to take up insurance coverage on their life and property.

Middle East & North Africa (developing only)	0.23
Middle income	0.37
Sub-Saharan Africa (developing only)	0.77

Source: GFFD (2018)

Stock market development in Africa have implications on bank market power and economic growth. If the stock market were highly developed and efficient, firms would find it cheaper to access equity funds from the stock market instead of seeking external finance from the banks. This would result in competition in the banking sector, as banks would have to provide incentives in the forms of lower lending rates, new products, and efficient service delivery in order to attract more customers. The above however, depends on whether firms depend on internal finance or external finance to implement projects. Firms, which depend on internal finance, use equity funds to support their new projects and may find the stock market a fertile avenue for finance. However, if firms depend on external finance to support their projects, then they would resort to the banking system for funds. In Africa, there are only 18 organized stock exchanges. This is inadequate and can affect access to equity finance and economic growth negatively.

Table 7 shows that the level of stock market development, measured by the stock market capitalization to GDP, in Sub-Saharan Africa and North Africa[9] are at 50.02% and 31.02% respectively. In sub-Saharan Africa the level of Stock market development is deeper than the level in Middle Income (35.01%), Latin America and Caribbean (33.53%), Lower Middle Income (35.10%) and Middle East and North Africa (35.05%). However, the level of stock market development in Africa is

[9] Excluding Egypt

shallower than the level in East Asia and Pacific (74.33%) and High Income (70%) countries.

Table 7: Stock Market Capitalization to GDP

Country Name	2015
East Asia and Pacific	74.33
High income	70
Latin America and Caribbean	33.53
Lower middle income	35.10
Middle East & North Africa	35.08
Middle income	35.01
Sub-Saharan Africa	50.02
North Africa	31.02

Source: GFFD (2018)

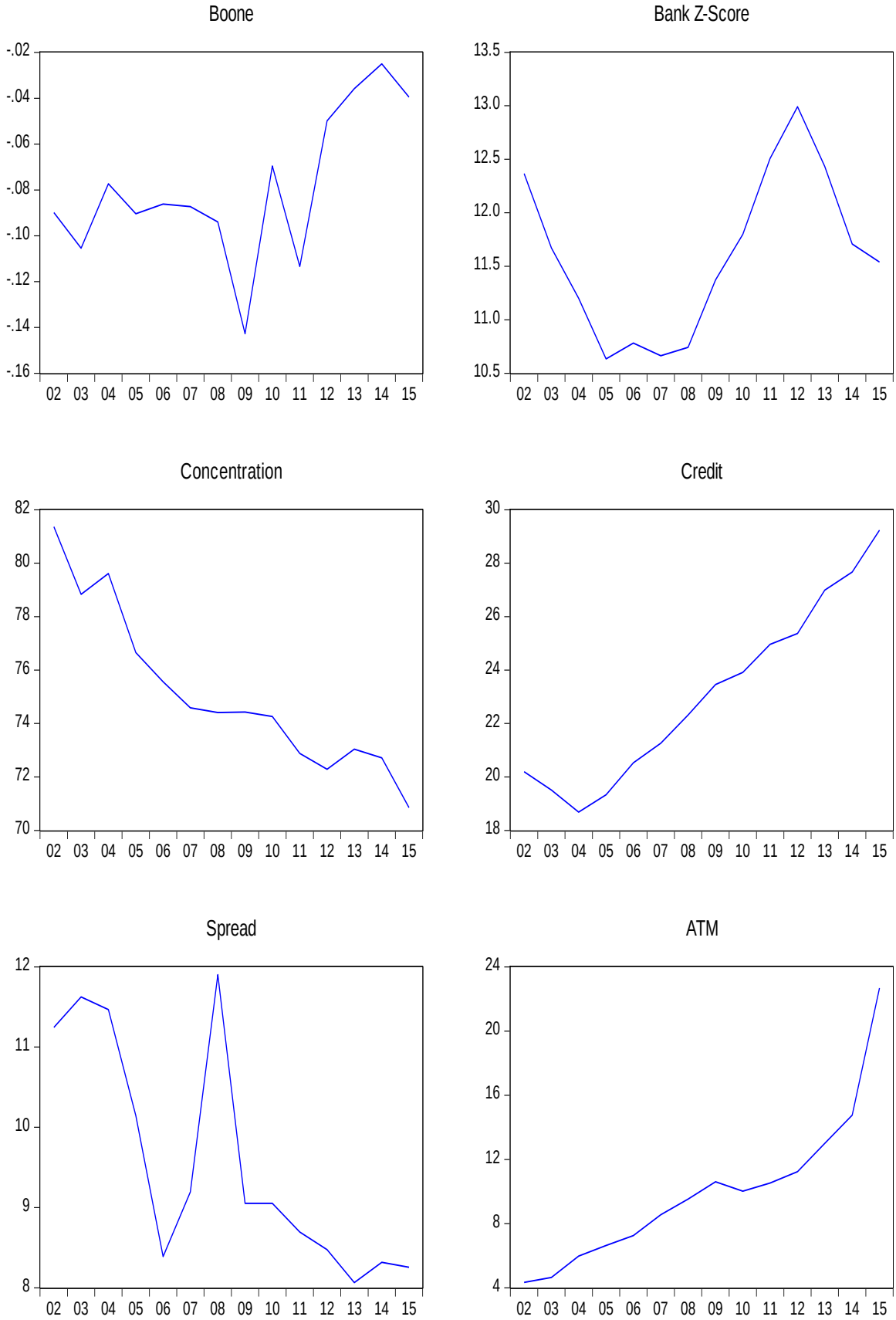


Figure 4: Average Trend of Relevant Variables for 44 African Countries over the Period 2002 to 2015. Source: Drawn from GFDD (2017) Data

2.8.8 Regulation of the Banking System

The regulation of the banking system is needed for three main reason. First, the regulation of the banking system protects depositors from excessive risk-taking behavior of bank entrepreneur (Rose & Hudgins, 2008). Bank regulations are meant to reduce moral hazards (the tendency of banks to engage in activities that can injure the position of depositors and lead to loss of deposits). Banks for instance, can trade in derivatives instruments or stocks, which in turn can increase the risk of depositors. Since these items are not recorded on the banks' statement of financial position, it would be very difficult for depositors to track banks, which engage in such risky activities. In that case, the Central Bank can come up with regulations to restrict banks' participation in risky activities.

Secondly, regulations are also needed to promote the soundness of the banking system (Burton, Nesiba & Lombra, 2003). Such regulations are instituted to reduce bank failure – the collapse of a bank because it is unable to meet obligations to pay depositors and other creditors at a period. The collapse of a bank has multiple implications. The employees of the bank loose their job and become temporarily unemployed. In 2017, when UT Bank and Capital Bank in Ghana was liquidated, about 600 workers became redundant because the GCB Bank which absolved the two banks could not retain all employees. This has social adverse implications on the affected workers and their dependence. In the absence of deposite insurance, depositors face the risk of loosing all or part of their deposits and this can lead to bank panic or bank run (a situation where depositors in other surviving banks decide to withdraw their deposits because of insecurity). Bank run can result in the collapse of other banks. Finally, the collape of the banking system can impede the smooth

running of businessess and the economy because of possible limitations on access to credits.

Burton et al. (2003) emphasized that bank regulations are promoted to ensure bank competition and efficiency. Competitions promote the ability of the system to allocate credit to productive sectors and thereby improving access to finance by firms that depend on external finance for their projects. However, competition can also promote excessive risk taking behaviour of banks that can lead to bank failure and prevent smooth running of the economy. Therefore, regulations are needed to balance the trade-off between ensuring the soundness/stability of the banking system and promoting competition without encouraging moral hazards among banks.

Mishkin and Eakins (2009) provides the various forms of regulations in the banking systems of most countries. The first form of regulations is the use of deposit insurance. Deposit insurance assures depositors that they would not loose a certain threshold of their deposits in case a bank fails. For instance, in the case of the United States, the government through the Federal Deposit Insurance Corporation (FDIC) pay depositors $100,000 of their initial deposit when their bank is in trouble.

A glance through the list of membership of the International Association of Deposit Insurers (IADI) on 28th April 2018, shows that 17 countries in Africa have registered with the organization to provide one form of deposit insurance or other in their banking systems. These countries include Algeria, Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Kenya, Libya and Mali. The rest are Morocco, Niger, Nigeria, Senegal, Sudan, Tanzania, Togo, Uganda and Zimbabwe. The purpose of deposit insurance is to provide assurance to depositors that their monies are safe thereby instilling confidence in the banking system and encouraging savings.

However, deposit insurers can be associated with moral hazards. Because the banks know that they would not have to be responsible for depositors money when they fail, banks would undertake risky investment with deposits. If they are successful with their risk taking behavoiur, the pay-off would be great, but if they are not successful, the deposit insurance institution would have to be responsible for customers' deposits. Deposit insurance can also encourage adverse selection because it will provide room for entreprenuers who are crooks to set up banks with the hope of milking from customers' deposits without having to be held accountable (Mishkin et al., 2009). In that case, regulations are needed to augment the activities of deposit insurers to ensure that the banking system is devoid of moral hazard and adverse selection.

Another form of regulation in the banking system is restrictions on assets holdings. These restrictions are in the forms of a bank's ability to hold ownership rights in financial and non-financial firms and to engage in trading of high-risk assets such as derivatives, real estate and insurance (Bempong et al., 2015). Normally, banks in Africa are allowed to own government securities such as treasury bills and bonds but are restricted to own high- risk assets.

Barth, Caprio and Levine (2013) measured the extent of assets and activities restriction on a scale 1 to 4, where higher values indicate greater restriction and lower values indicate lesser retrictions. If a country scores 4 on the level of restriction of an activity, it means the activity is highly prohibited. On the other hand, if a country scores 1 on an activity, it indicates the activity is allowed. Bempong et al. (2015) extracted data from Barth et al. and concluded that the overall activity restriction in sub-Saharan Africa and North Africa are 2.29 and 2.0 respectively, an indication of some form of asset restrictions in Africa. They also stressed that there are less

restrictions on insurance activities in sub-Saharan Africa than the rest of the world apart from Latin America and Caribbean. This means that African banking system is becoming more liberalized. In this study, in Chapter Six, we analyzed how the interaction between the development in the insurance market and access to credit serve as either substitutes or complements in promoting bank market power in Africa.

Bank capital requirement has been a tool for regulators to ensure that the banks provide enough capital requirement as a buffer against customers' deposit when there is a systemic shock. The bank capital requirement is normally expressed as the bank capital as ratio of (risk weighted) total assets. Globally, banks regulatory capital requirements are enshrined in the Basel I, II and III. The Basel I requires banks to maintain a minimum capital of not less than 8% of total assets. This threshold is meant to allow banks to withstand negative shocks without impairing the smooth running of the economy. All banking systems in Africa, with exception of those in South Africa and Mauritius, implement the Basel I accord.

Basel II requires banks to maintain 8% capital adequacy ratio. In addition, bank under Basel II are expected to conduct their own internal risk assessment to ensure proper self-monitoring and transparency. Basel III has been introduced in the aftermath of the global financial crisis. Under Basel III, banks are expected to maintain capital adequacy ratio of not less than 10.5% by 2019. The Core Tier 1 capital ratio has also been moved from 4.5% to 6.0% under Basel III. The Basel III is therefore aimed at strenthening micro-regulations under Basell II and at the same time introduce Macro-regulations to avert financial crises (Bempong et al., 2015)

As reiterated earlier, most African bankings systems operate under Basel I unlike the systems in developed nations. Notwithstanding this development, Table 8 shows that on the average, banks in Africa are adequately capitalized as much as their

counterparts in other parts of the world. Banks in Africa have higher average bank regulatory capital to risk-weighted assets is only lower than that of East Asia and Pacific and Low Income countries by less than 1%.

Table 8: Bank regulatory capital to risk-weighted assets (%)

Country Name	2015
Africa	17.92
East Asia & Pacific	18.71
High income	17.07
Latin America & Caribbean	15.97
Low income	18.86
Lower middle income	16.18
Middle East & North Africa	14.165
Middle income	16.18
Sub-Saharan Africa	17.96
Upper middle income	16.19

Source: GFDD (2017)

2.9 Conclusion

Both the theoretical and the empirical literature highlights the contribution of the banking sector to economic growth. However, research gaps exist in specific areas. The finance-convergence theory has not been extensively tested in the empirical literature. The feedback relationship between bank market power and banking system characteristics (bank efficiency, bank stability, bank concentration and bank ownership structure) has received not much attention in the literature even though a theoretical foundation exists within the relationship-banking hypothesis.

The study also derived a research niche from the fact researchers have not conducted investigation into how the banking system facilitates the course of regional integration in Africa to support economic growth in Africa. We also do not have evidence on how the level of financial innovations affect economic growth in Africa, except the one conducted at the country level and SADC. These studies did not estimate the extent to which African countries can converge to a technological frontier. A gap also exists on the interaction effect of the level of bank market power and financial innovation in inducing economic growth. This study bridges all the above gaps.

CHAPTER THREE

REVIEW OF ECONOMETRICS MODELS

3.1 Introduction

In the production function, economic growth (Y) is expressed as a function of some capital (K), labor (L).

$$Y = fA(K, L) \qquad (3.1)$$

The aim of every economy is to make both sides of equation (3.1) larger and larger all the time. In the neoclassical framework, only technical progress can induce economic growth in the long-run. In the new growth models, several factors can induce economic growth including, finance. The general specification above will have a subscript, i, or t or both depending on whether a cross sectional or a time series or a panel method respectively are employed in a particular study. Since this study employs cross sectional and panel designs, the following discussions relate to how those specifications assisted the researcher to test the hypotheses generated in the previous chapter.

3.2 Cross Section Design

Researchers use the cross-section design in growth studies to determine the long run relationship between a regressor (E.g. human capital, trade, finance and foreign direct investment) on economic growth. Mankiw et al. (1992) employed cross-section design to investigate the effect of human capital on economic growth.

Similarly, King and Levine (1993b), Aghion et al. (2005) and Laeven et al. (2015) all employed cross-section methods to investigate the effect of average level of financial development (or financial innovations) on long run economic growth.

Cross-section design uses a cross-section data structure. Researchers collect cross-section data on two or more cases at a point in time (Greene, 2003, Gujarati, 2013). Example of such data include the population census data collected every decade by the Ghana Statistical Service. However, a cross-section data can also emerge as results of estimating the average of data collected for various period for each cross –section. For example, in this study, I formed a cross-section of the variables by finding a fourteen-year average (from 2002 to 2015) of all the variables included in the estimation. Cross-section estimation equation can take following form:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_n X_{n,i} + \varepsilon_i \quad (3.2)$$

where,

- Y is the dependent variable,
- $X_{1i}, X_{2i} \ldots X_{n,i}$ are the independent variables or regeressors that can be a single variable or multiple of variables;
- $\beta_0, \beta_1, \beta_2 \ldots \beta_n$ are the regression parameters;
- i is the cross-section cases or observations which can be individuals, firms or countries. In this study the cross-section includes countries.

The error term ε_i is assumed to be normally distributed with zero mean and constant variance. We can estimate Equation (3.2) by ordinary least square (OLS), generalized methods of moment (GMM), robust least squares, among other econometrics estimations. The least square approach model the relationship between a dependent variable and one or more independent variable using linear predictor function to

estimate unknown parameters (Susanti, Pratiwi, Sulistijowati, & Liana, 2014). The most efficient OLS estimate is the one that minimizes the variance of the error term:

$$\min K = \min \sum_{i=1}^{n} \varepsilon_i^2 \quad (3.3)$$

where K is the total number of observations with respect to the error term. If we take a partial derivative with respect to any of the parameters $\beta_k, k = 0,1, \dots, n$ and setting the results to zero we derive the estimated normal equation:

$$\hat{Y}_i = \hat{\beta}_0 + \hat{\beta}_1 X_{1i} + \hat{\beta}_2 X_{2i} + \cdots + \hat{\beta}_n X_{ip} \quad (3.4)$$

and

$$\varepsilon_i = Y_i - \hat{Y}_i$$

where, the parameters with the hats are estimates of equation (3.3).

In equation (3.4), outliers can affect the efficiency, and consistency of the estimates. According to Susanti et al. (2014), large points from the error threshold line indicate erroneous data or a poorly fitting regression. If we identify outliers in the aftermath of a descriptive estimation on the residuals, the ordinary least square estimation may be problematic. In that case, one can resort to the robust regression estimations.

Robust Least Square estimations produces efficient results when there are outliers in the observation or when the errors are not normally distributed (Huber, 1973; Rousseeuw & Yohai, 1984; Yohai, 1987). Robust least squares models detect outliers and provide results that are resistant or less sensitive to outliers (Susanti et al., 2014). There are three main methods for estimating robust least squares: the maximum likelihood approach (M Estimation) by Huber (1973), S-estimation by Rousseeuw and Yohai (1984) and MM-estimation by Yohai (1987). The M-estimation approach is used to deal with abnormal values in the in the dependent

variable. We adopt the S-estimation approach to deal with abnormal values in the regressors. Finally, the MM-estimation approach combines both M-estimation and S-estimation procedures to deal with abnormal values in both the dependent – and independent variables. In this study, I adopted the MM estimation approach.

3.3 Panel Data Design

We use panel designs when the data structure contains both cross-sectional and time series dimensions. Panel data allows for more estimations at individual, firm, industry and country levels especially for larger observations when data on each case can be collected repeatedly across time.

Wooldridge (2009) provides the basic structure of the fixed effect approach to panel data analysis. The fixed effect model is a linear regression model in which the intercept terms change over the cross-sectional units. The fixed effect estimations use a transformation to eliminate the unobserved effects prior to an estimation. In equation (3.5), t is the time dimension and the unobserved effect is represented by α_i and it is fixed over time. All other parameters are as defined previous.

$$Y_{t,i} = \beta_1 X_{1i,t} + \beta_2 X_{2i,t} + \cdots + \beta_n X_{n,i,t} + \eta_{i,t}\,, t = 1,2,\ldots,T \qquad (3.5)$$

where,

$$\eta = \alpha_i + \gamma_t + \epsilon_{it}$$

In order to remove the unobserved time effect α_i and the time effect γ_t, we average equation (3.5) overtime for each i.

$$\bar{Y}_i = \beta_1 \bar{X}_{1i} + \beta_2 \bar{X}_{2i} + \cdots + \beta_n \bar{X}_{,in} + \alpha_i + \bar{\varepsilon}_{,i} \qquad (3.6)$$

where, $\bar{Y}_i = \sum_{t=1}^{T} \frac{Y_{i,t}}{T}$, $\bar{X}_i = \sum_{t=1}^{T} \frac{X_{i,t}}{T}$, and so on. Even after finding the averages, we realize that the unobserved effect α_i persists in both equations (3.5) and (3.6). We can eliminate the unobserved effect by subtracting equation 3.6 from 3.5.

$$Y_{t,i} - \bar{Y}_i = \beta_0 + \beta_1\left(X_{i,t} - \bar{X}_i\right) + \beta_2(X_{i,t} - \bar{X}_i) + \cdots + \beta_n(X_{t,in} - \bar{X}_{n,i}) + (\alpha_i - \alpha_i) + (\varepsilon_{t,i} - \bar{\varepsilon}_i)$$

$$\ddot{Y}_{t,i} = \beta_1\ddot{X}_{1i,t} + \beta_2\ddot{X}_{2i,t} + \cdots + \beta_n\ddot{X}_{t,in} + \ddot{\varepsilon}_{t,i}, t = 1,2, \ldots T \quad (3.7)$$

Where $\ddot{Y}_{t,i} = Y_{it} - \bar{Y}_i$ a time-demeaned data on Y and similar definition is applied to all variables $\ddot{X}_{1i,t}, \ddot{X}_{2i,t}, \ldots \ddot{X}_{t,in}$ and the idiosyncratic term, $\ddot{\varepsilon}_{t,i}$. We see from equation 3.7 that the unobserved effect has been eliminated. This implies that equation 3.7 can be estimated by ordinary least squares. Once the unobserved effect does not exist, all endogeneity issues or measurement errors have been cancelled (Verbeek, 2004). The transformation in equation 3.7 is called *within transformation* and the resulting pooled OLS estimator that is based on the variables in equation 3.6 is called the *fixed effect estimator* or *within estimator* (Wooldridge, 2009).

When we include intercept and apply OLS estimator on the cross-sectional specification such as equation 3.5, we derive the *between estimator*. The between estimator will not produce consistent and efficient estimates when the unobserved effect is correlated with any of the independent variables $(X_{1i}, X_{1i}, \ldots, X_{ni})$.

Another approach for estimating the fixed effect is to divide the unobserved effect α_i into individual cross-sectional intercepts that should be estimated along with $\boldsymbol{\beta}$, which is a vector of the parameter $(\beta_1, \beta_2 \ldots \beta_n)$. This can be implemented by assigning dummy variables for each cross-sectional observation and estimate them alongside the independent variables. By this, we would be able to ascertain how each cross-sectional intercept affect the dependent variable. This approach is known as *dummy variable regression* (DVR) (Wooldrigde, 2009) or *least square dummy variable fixed effect (LSDV)* (Verbeek, 2004).

The problem with the LSDV approach is that, it results in so many independent variables especially when the number of cross-section observation, N, is

large. Wooldridge pointed out that the DVR/LSDV procedure essentially yields similar results for the coefficients $\boldsymbol{\beta}$, the standard errors, p-values etc. same as the results produced by the time-demeaned data. The R-squared and the F-statistics that measure the explanatory power of the independent variables are likely to be greater for DVR estimations than the time demeaned estimations since the DVR approach contains more explanatory variables.

The R-square for the DVR estimation is likely to be close to 1 especially when more cross-sectional dummies are significant in explaining the dependent variables. Wooldridge (2009) advises that, researchers should not get too excited about large R-squares since they emerged just by including more dummy variable as explanatory variables. For example, for this study that includes 44 African countries, the DVR estimation requires that we include 44 dummies for each country. This is not only laborious but there is no need having more dummy variables especially when the results would be qualitatively the same as the one produced by the time-demeaned estimation. However, if the estimated constant for each cross-sectional observation is of interest, one must adopt the DVR procedure. When the $\boldsymbol{\beta s}$ are of interest, as in most studies, researchers should use the time-demeaned approach.

The demeaned-data method appears very simple but it requires that the explanatory variable should be strictly exogenous i.e. the explanatory variables are not permitted to depend on the present, past and future values of the error term. It implies that fixed effect estimation excludes the addition of lagged dependent variable as part of the explanatory variables to the extent that any dependent variable which depends upon the past values of the dependent variable would also violate the condition of strict exogeneity (Verbeek, 2004). Fixed effect estimations are more

efficient when the error term is serially uncorrelated. This requires a formal test of serial correlation to verify the efficiency of the estimations.

Random Effect Models

The fixed effect estimation depends on the assumption that the unobserved effect α_i is correlated with any of the explanatory variables in equation (3.5). When the unobserved effect does not correlate with the explanatory variables, the fixed effect estimation may be biased. Random effect models are used when the unobserved effect α_i does not correlate with any of the explanatory variables. The fact that the unobserved effect is independent of each of the explanatory variables is a distinguishing factor when choosing between random effect and fixed effect estimations (Wooldridge, 2009). Formally we need to test that:

$$COV(X_{itj}, \alpha_i) = 0, \quad t = 1,2, \dots, T; j = 1,2, \dots k \tag{3.8}$$

Where $COV(X_{itj}, \alpha_i)$ is the covariance between the explanatory variables and the unobserved effect**.** Both fixed effect and random effect are estimated from equation 3.5 provided equation 3.8 holds.

Panel data structures usually have missing values. A panel data that has missing observations are known as *unbalanced panel*. A panel data structure without missing observations in its cross-sections are known as *balanced panel.* When a panel data is unbalanced we need to ascertain the reason why we have such data structure. According to Wooldridge (2009) if the reasons for the unbalanced nature of the data are uncorrelated with the error term, then an unbalanced data structure are not problematic. The author also stressed that if nonrandom sample is employed fixed effect estimations are unbiased in the sense that they did not allow attrition (the reason

why a cross-sectional observation is excluded) to be correlated with the unobserved effect. This view is collaborated by Aboagye, Akoena, Antwi-Asare and Gockel (2008). The authors suggests that if the cross-sectional sample are not randomly selected there is no justification for a researcher to use random effect estimation. Similarly, the user guide that accompanied EVIEWS Version 9 (IHS Global Inc., 2015) suggests that when the panel data is unbalanced, the empirical estimates produced results in favour of the fixed effect estimation at the expense of random effect. The above suggests that esitimates by fixed effects are robust when the panel data structure is unbalanced.

Wooldridge (2009) also suggests that when the evidence is in favour of random effect, then there is no need to pool the data in a panel form because a single cross-section can produce consistent results. However, cross –section estimates do not allow for the exploitation of the time series dimension of the data. In practice researchers estimate both random effect and fixed effect and use Hausman test to choose between the two approaches under the null hypothesis that the unobserved term is uncorrelated with the explanatory variables. If the null hypothesis is rejected, the implication is that the fixed effect estimates are more consistent and the reverse calls for the use of the random effect estimates.

Generally, we perform the Hausman's test only when we want to make decisions on the random effect estimation since the fixed effect estimates are consistent whether the null hypothesis is rejected or not. However, as I stated earlier, the use of the fixed effect estimates depends on a strict assumption that the explanatory variables are exogenous. This can be problematic in as much as theoretical and empirical literature produce evidence of endogeneity between dependent and independent variables. The static models (fixed effect and random

effect models) excludes the possibility that the lags of the dependent variable can influence the dependent variable. In that case dynamic models can be used to do the estimations.

Dynamic Panel Models

The dynamic panel models include all cross-section and time-variant models that have the lagged dependent variable, $Y_{i,t-1}$ as one of its regressors (Greene, 2003; Wooldridge, 2009). We can add the lagged dependent variable to equation 3.4 and produce a dynamic model as follows:

$$Y_{t,i} = Y_{i,t-1} + \beta_1 X_{1i,t} + \beta_2 X_{2i,i} + \cdots + \beta_n X_{t,in} + \eta_{i,t}\,, t = 1,2,\dots,T \qquad (3.9)$$

According to Greene (2003, p. 307), "adding dynamics to a model in this fashion is a major change in the interpretation of the equation. Without the lagged dependent variable, the "independent variables" represent the full set of information that produce observed outcome $Y_{i,t}$. With the lagged variable, we now have in the equation, the entire history of the right hand side variables, so that any measured influence is conditioned on this history; in this case, any impact of X_{it} represents the effect of new information". Equation 3.9 is a fixed effect ordinary regression with a lagged dependent variable.

Arellano and Bond (1991) developed a dynamic model that uses a generalized method of moment (GMM) estimator. The GMM dynamic approach eliminates the unobserved (heterogeneity) effect in both the fixed effect and random effect estimation by taking the first differences of both dependent and independent variables.

$$Y_{i,t} - Y_{i,t-1} = \theta(Y_{i,t-1} - Y_{i,t-2}) + \boldsymbol{\beta}(V_{i,t} - V_{i,t-1}) + (\varepsilon_{t,i} - \varepsilon_{i,t-1}) \qquad (3.10)$$

Subject to $E[(Y_{i,t-p}(\varepsilon_{i,t} - \varepsilon_{i,t-1}) = 0,\ p \geq 2; t = 3, \dots T$ and;

$$E[(V_{i,t-p})(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0, \qquad p \geq 2; t = 3, \dots T$$

Where $\boldsymbol{V} = (X_1, \ldots \boldsymbol{X_n})$ and θ is the parameter for the differenced-lagged dependent variable. If this condition is not meet, one can use another variable that is highly correlated with the dependent variable but uncorrelated with the error term as an instrument. In most cases, the lags of the variables are used as instruments. The use of the lagged independent variable as instruments is conditioned on the fact that there exists no serial correlation in the error term and that the lagged independent variables are weakly exogenous (i.e. they are uncorrelated with future error term) (Rioja & Valev, 2004). The implication is that correlation between the independent variable and a cross-section-specific error term may be acceptable but the correlation between the differenced independent variables and the error term is unacceptable.

In order to verify whether the conditions for serial correlation and validity of the instruments are not violated, we perform Arellano and Bond AR(2) and Sargan test respectively. The AR(2) test verifies that the error term is not second-order serially correlated whilst the Sargan test verifies the hypothesis that the instruments are uncorrelated with the error term. If these conditions are satisfied, we can estimate equation 3.10 by the GMM estimator.

There are other dynamic models. Table 9 compares some of the panel regression approaches.

Table 9: Comparison of Some Panel Estimation Models

Models	Assumption	Shortcoming(s)
Pooled OLS (1)	1. (a) It imposes a common intercept and slope coefficients for all cross-sections and thus disregards individual heterogeneity and therefore highly restrictive	
Fixed Effect (2)	2. (a) Assume that the estimator has common slopes and variance but country-specific intercepts (b) Both the cross-sectional and time effects can be observed through the introduction of dummy variables	(a) Problems due to loss of degree of freedom (b)Parameters produced by fixed effect estimates are bias when regressors are endogenous and correlated with the error terms
Random Effect (3)	3. Assume that the individual country effect does not correlate with the error term.	The model is time invariant: the error is uncorrelated with the past, present and future i.e. strict exogeneity
	The static models do not distinguish between the short- and long-run relationships.	
Dynamic GMM (4)	4. Assume that N is large than T. e.g. large number of countries. It is efficient when the number	(a) When N is small and T is large, the GMM estimates can produce spurious results.

		of countries exceeds the number of years	(b) GMM captures on the short-run dynamics hence the stationarity of the variables tends to be ignored.
Mean Group (5)	5.	(a) Estimates separate regressions for each country and calculates the co-efficient as unweighted means of the estimated coefficient. (b) Does not impose any restrictions. It allows the coefficients to vary and heterogeneous in the short- and long-run	(a) Requires sufficiently large cross-sectional and time-series dimension of the data. (b) For small N, the MG estimator is sensitive to outliers and small model permutations. The model is subject to simultaneous- equation bias due to the endogeneity between the error term and the lagged dependent variable in the case of small sample size.
Dynamic fixed Effect (6)	6. (a) Restricts the slope coefficients and error variances to be equal across countries in the long run (b) Restricts the speed of adjustment coefficient to be equal (c) Assumes cross-country specific intercept		

*****N is the number of cross-section and T is the total number of observation

Source: Author (2017)

The number of cross-sections included in this thesis is 44 and the number of years is 14. This means that the cross-sections exceed the time series dimension of the data. In order to ensure efficient results, I employed the dynamic GMM estimator proposed by Arellano and Bond (1991) for all estimations except for the convergence analysis in Chapter Six. I employed the cross-sectional robust least square estimation method to analyze the possibility of finance-induced growth convergence in Africa. The robust least square estimation can deal with outliers in both the dependent and

independent variables in the cross-section estimation. Its static nature would also assist in analyzing the long-run relationship in the averaged-variables.

CHAPTER FOUR

DETERMINANTS OF BANK MARKET POWER IN AFRICA: DOES ECONOMIC FREEDOM MATTER?

4.1 Abstract

In this chapter I analyse the various factors that determine the level of bank market power in Africa. I analyse how the level of bank concentration, bank efficiency, bank stability, foreign bank ownership and other financial sectors influence the degree of bank market power (given the level of financial development) in a dynamic generalized method of moment (GMM) analytical framework. The results show that bank concentration, bank efficiency, and foreign ownership have negative influence on the level of bank market power. On the other hand, the level of bank stability induces bank market power. Moreover, the study finds that the influences of the above variables on the level of bank market power depends on the degree of systemic access to credit. In addition, the study finds that higher levels of institutional quality are associated with higher degree of bank market power in Africa. The evidence from this paper has wide range implications on need to encourage higher banking system contestability and inclusive institutions that support sound financial intermediation in Africa.

4.2 Introduction

The competitiveness of the banking system is important for several reasons. First, bank competition has direct bearing on bank stability (Boyd & De Nicola, 2005; 2009). A stable banking system protects smaller banks to survive external shocks and therefore ensures their ability to assist less attractive entrepreneurs and small firms. In a stable banking system, bank failure is limited. However, a competitive banking system can encourage rivalry behaviour among banks, which can exact downward pressure on interest rates. When interest rates are low, the resulting loss of margin may threaten the survival of banks with lower market share (Allen & Gale, 2004).

Secondly, a competitive banking system has important implications on bank efficiency (Cetorelli & Strahan, 2006). An efficient bank operates under lower operating costs that can translate into either lower lending rates (a benefit to the banking clients) or higher margins (a benefit to the banks) or greater availability of credits (a benefit to the real sectors) or combinations of the above. Finally, the level of competitiveness in the banking system has implications for financial innovations by providing funds to support positive net present value projects by small firms in an institutional banking relationship (that aid technological innovation towards fostering prolong economic growth) (Petersen & Rajan, 1994).

In addition, banks with market power affect access to credit by the productive sectors of national economies. In this regard, three strands of arguments have been highlighted in the extant literature. The first group of authors posit that a less competitive banking environment facilitates access to credit by young but promising firms (Petersen et al., 1995; Shaffer, 1999; Dell'Ariccia, 2002; Cetorelli & Gambera, 2001). They emphasize that banks with market power create relationships that manifest in the availability of credits to small businesses. In essence, less competitive banking system promotes capital accumulation by channelling economic resources to support entrepreneurial activities. Other authors trace the banking system's contribution to capital accumulation to a more competitive banking environment (Guzman, 2000; Ceterorelli et al. 2006). They emphasise that, in an efficient market that promotes free entries and exits of banks, credits can be channelled to productive sectors more cheaply.

Yet, other strand of the literature argues that if only fewer number of banks control activities of the market (oligopoly competition), they are more likely to promote credit availability and capital accumulation in an inefficient and uncertain

financial market (Cetorelli, 2001; Cetorelli & Peretto, 2012). However, concentration among few banks can cause contestable behaviour that can have downward effects on interest rates thereby assisting productive firms to access finance more cheaply. Similarly, bank market contestability can also result in collusive behaviour among banks with market power that have similar competitive orientation. Such banking conduct can have upward pressure on interest rates and affect access to finance detrimentally (Claessens et al, 2004). Nevertheless, there is a feedback process inherent in the above propositions that bank efficiency, stability, concentration and ownership structure can affect the level of bank market power. This feedback has not received much investigations even though the process can provide information on how to regulate the banking system to promote bank market power or otherwise.

Furthermore, the extant studies suggest that the level of bank market power in Africa is high (Clerides et al., 2015; Amidu & Wolfe, 2013). This paper also explores a major gap inherent in the relationship-banking hypothesis proposed by Petersen et al. (1995). The main argument in that hypothesis is that bank with market power have the capabilities to invest in information that assist them to spot and create perpetual relationship with potentially viable firms. The banks with market power provide subsidies to young firms now and partake in future rent when the firms survive and become profitable. For banks to extract more rents in future they must continue to enjoy higher market shares. However, higher bank market share implies that the young firms must grow in effectiveness and efficiency. The banks, in order not to lose future rents may decide to support the firms to survive.

This means that the banks must do more than credit allocation. They should provide training services, financial advisory services, management consultancies and support in research and development. These services may aim at improving

sustainability of the young firms. If the banks do not have the acumen to provide these services, they can grant the firm more credits in order for them to outsource the services from firm with more expertise. Therefore, the amount that banks with market power allocate to young firms include *sustainability funds.* By sustainability fund, I mean the advances from banks meant to improve the effectiveness and efficiency of young firm to ensure their growth and survival. When the young firms grow and survive, the banks with market power can partake in future profit when they have assumed higher market share through for example, increase in their customer or loan base.

From the last paragraph, we can deduce that the efficiency, concentration, stability and ownership structure of the banking system alone may not sustain the relationship. The amount of credits that flow to the young firms for project implementation and sustainability activities serve as conduits for firm survival and continuation of the banking relationship. For sustainability funding, I used the total credits to the private sector as a share of GDP as a proxy. This is because firms that depend on external finance can also use some of the funds obtained from the banks to engage in research and development, staff development, management consultancy services, investment in ICT infrastructure, among other. These activities can promote effectiveness and efficiency of young firms for growth and survival. If the firms survive, bank with market power can extract more rents from these firms within the relationship network to perpetuate their monopoly position. Therefore, in the empirical analysis, I interact measures for bank efficiency, concentration, stability, foreign ownership and economic freedom each with the amount of credit to the private sector to ascertain whether these factors facilitate credit allocations to perpetuate the market power position of banks in Africa.

In this study, I also analysed other spectrums of factors that affect bank market power in Africa. More specifically, the paper explored how the average level of economic freedom affect the level of bank market power in the African continent. The idea of economic freedom is based on the premise that societal norms, values and government intervention should provide individuals the right and responsibility to obtain and use economic resources. It does not necessarily imply absence of government intervention but it requires that government intervention should not empower only the elite minority but should channel resources to encourage the productivity of the greatest masses (Miller & Kim, 2018). In the banking sector, the level of economic freedom, through effective regulation, can influence bank with market power to allocate credits to individual entrepreneurs instead of the rent-seeking-strongest in society.

By including these economic freedom indices, the study ascertains how economic institutions affect the level of bank market power. According to the relationship-banking hypothesis, banks with market power can ration credits effectively in the wake of weaker institutions. In that sense, bank market power and economic institutional quality are substitutes. If the policies and institutions of a country enhance economic freedom, we expect the banking system to be more competitive (Acemoglu et al., 2005). However, in the absence of strong institutions that promote economic freedom, banks with market power can provide avenues for efficient and effective credit ration through relationship banking (Petersen et al. 1995). In weaker institutional systems, banks with market power are more capable to spot and create relationship with only viable entrepreneurs that reduces information asymmetry and ensure that credits go to only firms that have innovative application for such funds to promote productivity. In the wake of the above, we found that prior

to this paper, to the best of the researcher's knowledge, no empirical investigations had been conducted to ascertain the effect of economic freedom of countries on the level of bank market power in Africa since the inception of the AU.

Furthermore, the competition-fragility hypothesis states that bank market power is beneficial for financial stability. This happens because large banks enjoy economy of scale that allows banks to channel credits more efficiently and effectively (Allen & Gale, 2004). The view suggests that banking system competition is detrimental to financial stability because in that system, smaller banks find it difficult to grow and survive due to low margins. This can have negative effect on access to finance by smaller firms that depend on external finance to implement their innovative projects. Conversely, other strands of the literature argue that bank market power is detrimental to financial stability, because it empowers bank to extract higher spread. Higher lending rate increases the risk of firms, which in turn increases moral hazards. Eventually, firms are not able to repay the loans together with their interest and that can affect the soundness of the banking system adversely (Boyd et al., 2005; Schaeck & Cihak, 2014).

I concentrated on the banking sector in Africa because the level of financial development in Africa is relatively weaker (Africa has a less developed financial market compared to Europe, North America and Asia). Africa also has lower levels of institutional quality and degree of economic freedom. Gwartney, Lawson, Hall and Murphy (2016) reported that, more than half of the 48 countries in Africa (about 32 countries) were classified under the least economically freer countries whilst 8 countries in Africa were grouped under the third quartile range of economically freer countries. In the groupings, only 6 countries in Africa emerged within the second

quartile of economically freest countries whilst no African country was classified under the top category of economically freer countries.

Similarly, the Heritage Foundation (2018) classified majority of African countries as "Mostly Unfree". Both organizations rank the level of economic institutions in Africa as weaker. It follows that, predominantly, the degree of economic institution in Africa is considered below average. Since most countries in Africa are within the lowest range of economic freedom, the study expects that to exacerbate inefficiencies in the banking system thereby promoting greater bank market power. In a closely related cross-country study on the determinants of bank competition, Claessens et al. (2004) only included three African countries (Kenya, Nigeria and South Africa). Apart from the fact that enormous time has elapsed since their study, this study includes 44 African countries, based on availability of data and a lot has happened since Claessens et al. conducted their study. The current study is also situated within the period from the inception of the AU in 2002 to 2015.

The discussion on the banking system in Africa in chapter two shows that some level of intermarket activity is permitted in some banking systems in Africa. This means that the system permits banks to engage in some level of off-balance sheet activities provided such activities would not affect the soundness of the banking system. The banks can partake in some equity market activities. They can also laisse with the insurance market to ensure effective credit allocation. In the last aspect of the analysis, I analyse how the equity market and insurance market developments affect the level of bank market power in Africa.

Bank market power is measured by the Boone Indicator. To reduce the level of endogeneity from the similarities in our proxies and also ensure the consistency of the

results, I employ the generalized method of moment (GMM) approach prescribed by Arrelano and Bond (1991).

The rest of the paper is structured as follows: the next section discusses the methodological issues including, the data and the sources of the various data that measured the dependent and the independent variables. Also, in section 2, I describe the model specification that reflect an extension of the one in Claessen et al. (2004). Section 3 presents the discussions of the results. Finally, section 4 concludes the paper.

4.3 Method

I obtained country-level data on bank market power, bank efficiency, bank stability, market structure, inter-industry factors, financial depth, inflation, remittances share of GDP and GDP per capita from the World Bank (GFDD, 2017). In the same token, I obtained the economic freedom data and its sub-categories (Size of government; legal environment and property rights; sound money; freedom to trade internationally and regulation) from the Heritage Foundation. These variables relate to the period between the year 2002 and the year 2015 inclusively.

The 3-bank concentration ratio is the assets of the three largest banks in a country as a share of total commercial banking assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax, discontinued operations and other assets. The World Bank calculates the concentration ratio from underlying bank-by-bank unconsolidated data derived from Bankscope. Foreign banks among total banks (%) is the rate of the number of foreign-owned banks to the number of the total banks

in an economy. A bank is defined as a foreign bank if foreigners own 50 percent or more of its shares.

This study also establishes the link through which bank efficiency and bank stability can affect the level of bank market power. In the extant literature, we mostly find the link rather from bank competition to these two variables. In this study, I operationalize bank efficiency by bank net interest margin. I used this measure because it is directly related to efficiency of financial intermediation within a country. Bank net interest margin (%) is the accounting value of a bank's net interest revenue as a share of its average interest-bearing (total earning) assets. This figure has been aggregated at the country-level for all African countries. The annual figure is an average of the net interest margin for all banks in a year. The expectation is that a high competitive banking system will experience a narrower bank spread as competition restricts banks from charging higher lending rates but may force banks to pay more on deposits. Similar argument is true for the ability of banks to widen net interest margin in a less competitive banking system.

Bank stability is defined by the bank Z-score. This indicator measures the probability of default of a country's commercial banking system. Z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns. It is calculated as return on assets plus return on equity divided by the standard deviation of return on assets.

Next, to ascertain the effect of other financial intermediation channels on bank competition, this study employed two inter-industry factors: share of insurance company’s premium in GDP and capital market development (share of market capitalization in GDP), following Claessens et al. (2004) and Mirzeal et al. (2014). Insurance companies in Africa can provide complementary services such as insurance

on advances that can improve financial intermediation. Similarly, the stock market can provide alternative source of finance for the banks to embark on expansion thereby increasing their size. I measure the level of stock market development by the share of market capitalization in GDP which is the total value of all listed shares in a stock market as a percentage of GDP.

In all estimations, this paper employs series of control variables. These include GDP per capita, inflation and remittance inflows to GDP (%): GDP per capita is the natural log of per capita GDP as reported by the World Bank (WDI, 2017). Inflation is the changes in consumer price index over the period. In addition, workers' remittances and compensation of employees comprise current transfers by migrant workers and wages and salaries earned by non-resident workers. The banks serve as agents for remittances services and it is expected that inflow of remittances can encourage more competition in the banking system.

4.3.1 Model Specification

In order to establish the determinants of bank competition in Africa at the national level, we specify a model that include all the variables defined above. The dynamic GMM representation is derived as follows:

$$BI_{i,t} = \alpha_t + \sum_{j=1}^{p} \beta_j BI_{i,t-j} + \sum_{j=1}^{p} \beta_j X_{i,t-j} + f_i + \varepsilon_{it} \qquad (4.1)$$

BI is Bank market power measured by the Boone Indicator; f_i is country specific effect; p is the appropriate lag length; i represents the countries and t is the time series dimension of the data. In order to do away with the individual effect, we transformed the model into the first differences as follows:

$$\Delta B_{i,t} = \sum_{j=1}^{p} \beta_j \Delta B_{i,t-j} + \sum_{j=1}^{p} \beta_j \Delta X_{i,t-j} + \sum_{j=1}^{p} \beta_j \Delta C_{i,t-j}\, \Delta\varepsilon_{i,t}\,, j = 1, \dots, p \qquad (4.2)$$

where $\Delta B_{i,t} = B_{i,t} - B_{i,t-1}$ and this definition applies to all explanatory variables as well. Similarly, $\Delta\varepsilon_{i,t} = \varepsilon_{i,t} - \varepsilon_{i,t-1}$. With the above equation (4.2) we have retained only time effect but have eliminated the cross sectional effect. Other variables are defined as follow:

B= Bank market power measured by the Boone Indicator;

X= The determinants of bank market power

C= The control variables

By introduction an interaction term for all interactions estimate, equation is transformed as follows:

$$\Delta BI_{i,t} = \sum_{j=1}^{p} \beta I_j \Delta B_{i,t-j} + \sum_{j=1}^{p} \beta_j \Delta X_{i,t-j} + \sum_{j=1}^{p} \beta_j \Delta C_{i,t-j} + \sum_{j=1}^{p} \beta_j \Delta FD * X_{i,t-j} + \Delta\varepsilon_{i,t} \quad (4.3)$$

The determinants include Net Interest Margin to Total assets, bank stability, financial development (access to finance), composite index of economic, stock market development and the level of insurance penetration. Moreover, the control variables include: log of GDP per capita, government expenditure, inflation, remittance inflow (REM) and trade openness (TRADE). Table 10 presents the variables' description.

Table 10: Variables, their Measurement and Data Sources

Measurements	Variables	Data Sources
Boone indicator (BI)	Bank market power	Is the coefficient of the relationship between market share and marginal costs of firms aggregated at the country-level. Calculated from underlying bank-by-bank data from Bankscope. Source: World Bank (2017)
3-Bank concentration (%) (BC)		Calculated from underlying bank-by-bank unconsolidated data from Bankscope.
Foreign banks among total	Foreign Banks	Is the share of foreign bank ownership in total assets. World Bank (2017).

banks (%) (FOREIGN)		
Domestic credit	Financial Development.	Is the share of domestic credits to private sector by bank of GDP. World Bank (2017).
Insurance Premium (LIP)	Insurance Penetration	Is the ratio of total insurance premium in a year to GDP. Data taken from a variety of sources such as AXCO and national sources.
Bank net interest margin (NIM)	Bank Efficiency	Is the difference between interest income and interest expenses as a ratio of total assets. Raw data are from Bankscope.
Bank Z-score (ZS)	Bank Stability	Is the sum of the banks' return on assets and return on equity as ratio of the standard deviation of Return on assets Calculated from underlying bank-by-bank unconsolidated data from Bankscope.
Remittance (REM)	Workers' remittances	World Bank (2015).
Economic Freedom Index (EFREE)	Economic Freedom	Heritage Foundation

Source: Author (2017)

4.4 Results and Discussions

Table 11 depicts the characteristics of the variables. By concentrating on the main variables, we realized that, on the average, as reported by the Boone indicator, bank market power is high in Africa. This result is similar to the ones in Clerides et al. (2015) and Amidu et al. (2013). The implication is that, this paper should relate the influence of the independent variables on bank market power, the inverse of bank competition. The above result is reinforced by the high concentration ratios. On the average, closed to 80 percent of the total assets in the banking system are controlled by only 3 banks. These depicts the African banking system as highly concentrated. Similarly, the average difference between lending rate and borrowing rates (bank spread) in Africa is 6.36 percent.

Intuitively, we expect that in economically freer economies, there should be improved competitiveness in all sectors, including the banking sector. Such an economy is characterized by new ideas and innovation as well as better protection of private property rights, freedom to trade and exchange, supportive government interventions, effective monetary policy and responsive regulations that promote sanity in the banking system. The economic freedom (EFREE) indicators used in this study comprise the overall economic freedom index. The average figure for all the 44 countries over the period is 55.24. The economic freedom level was as high as 77.00 in some country and as low as 31.50 in other countries. Overall, the Heritage Foundation interprets the average figure as "Mostly Unfree". This implies that the level of economic freedom in Africa is relatively weaker.

The level of bank stability (ZS) is very volatile with standard deviation of 26.04. Bank stability is higher, the higher the Z-score. The average value is 11.60 but stability is as high as 63.87 in some countries. Similarly, foreign banks' ownership

(FOREIGN) is higher in Africa. More than 50 percent assets of the banks belong to foreigners. Furthermore, insurance market development (LIP) is at 1.62 percent of GDP on the average. Similarly, stock market development is as high as 255.62 percent of GDP in some countries and as low as 0.01 percent in other countries.

Table 11: Summary Statistics for Determinants of Bank Market Power

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
BI	-0.07	-0.04	1.13	-3.20	0.24	529
BC	74.99	76.62	125.80	23.32	18.35	501
NIM	6.36	5.80	17.26	0.57	3.26	561
ZS	11.60	9.64	63.87	0.00	8.89	578
FD	23.19	14.16	160.13	0.00	26.04	586
FOREIGN	50.53	53.00	100.00	0.00	32.48	285
INF	6.94	5.57	44.39	-35.84	6.63	610
GEX	14.89	14.29	38.41	2.74	5.56	579
REM	4.51	1.88	50.10	0.00	7.12	553
TRADE	74.73	67.97	311.36	19.10	36.18	592
LGDP	7.07	6.89	10.16	1.31	1.16	597
EFREE	55.24	55.60	77.00	31.50	6.75	579
LIP	1.62	0.16	36.70	0.00	5.18	498
FDI	5.27	3.18	89.48	-4.02	7.88	613
SKT	41.42	22.30	255.62	0.01	57.64	160

Source: WDI (2017) and GFDD (2017)

Table 12 shows the correlation matrix among the variables. There is positive but weak correlation between bank market power and bank concentration. The magnitude of the relationship is too small since the theoretical expectation is that in a concentrated market, market power is strong. There is negative correlation between bank efficiency and bank market power, which means that when bank efficiency increases, the level of market power decreases. Stated differently, this results shows that banks in Africa leverage on their market power to charge higher margins. Similarly, there is negative correlation between the level of bank stability and bank market power. When bank stability increases, the level of bank market power decreases. This implies that bank stability increases bank competition in Africa. Finally, foreign bank ownership in Africa correlate positively with the level of bank

market power in Africa. However, the correlation estimates are without the control variables. Table 13 present the dynamic GMM estimates for the determinants of bank market power in Africa.

Table 12: Correlation Matrix

	BI	BC	NIM	ZS	FD	FOREIGN	INF	GEX	REM	TRADE	LGDP	EFREE	LIP	FDI	SKT
BI	1														
BC	0.10	1													
NIM	-0.04	0.22	1												
ZS	-0.05	-0.12	-0.47	1											
FD	0.05	0.08	-0.68	0.30	1										
FOREIGN	0.24	0.00	0.40	-0.54	-0.35	1									
INF	-0.09	0.01	0.42	-0.45	-0.45	0.10	1								
GEX	0.18	0.33	-0.33	0.12	0.44	0.05	-0.39	1							
REM	-0.42	-0.32	-0.18	0.55	-0.16	-0.49	-0.11	-0.30	1						
TRADE	0.11	-0.01	-0.40	0.12	0.30	0.18	-0.31	0.46	-0.25	1					
LGDP	-0.03	-0.02	-0.78	0.23	0.72	-0.11	-0.46	0.48	-0.12	0.65	1				
EFREE	0.17	-0.04	-0.29	-0.08	0.38	0.52	-0.22	0.31	-0.46	0.55	0.59	1			
LIP	0.07	0.37	-0.40	-0.07	0.83	-0.10	-0.25	0.54	-0.45	0.19	0.62	0.41	1		
FDI	0.01	0.00	0.08	-0.31	-0.20	0.35	0.01	0.06	-0.06	0.24	0.02	0.03	-0.08	1	
SKT	0.02	0.19	-0.47	0.18	0.86	-0.33	-0.22	0.26	-0.14	-0.07	0.48	0.22	0.81	-0.25	1

Source: WDI (2017) and GFDD (2017)

4.4.1 Empirical Results for Determinants of Bank Market Power

Table 13 has 8 columns. For the significant coefficients, the lags of bank market power is negatively related to the level of bank market power. This is an indication that the level of bank market power given the other factors is falling as the previous level of market power does not promote the current level. In the following paragraph, I take each determinant and discuss its effect on bank market power. Next, I discuss the various interaction relationships, which will be followed by a discussion on the control variables.

4.3.1.1 Bank concentration and bank market power

In Columns 01 and 03, the level of bank concentration is negatively related to the level of bank market power. According to the SCP hypothesis, a more concentrated banking system is detrimental to bank competition (Mason, 1939; Bain, 1956; Petersen et al. 1995). The evidence however proved otherwise. We found in our GMM estimation that, bank concentration is negatively related to bank market power in Africa. A one standard deviation increase in the level of concentration decreases bank market power by 0.020 standard deviations in Africa. The magnitude of the coefficient however decreased when FD was introduced into the estimation in Column 03. This implies that bank concentration promotes bank competition in Africa. Bikker et al. (2009) provides an explanation that bank concentration can also be a product of keen banking system's competition that encourage banks to form syndicates and charge similar prices which is beyond their marginal costs. Claessens and Laeven (2004) suggest that bank concentration leads to higher bank contestability which can reduce market shares of bank with market power.

4.3.1.2 Foreign bank ownership and bank market power

Foreign bank participation in the banking sector does not promotes bank market power but bank competition in Africa. This is intuitively expected as the entry of foreign

bank would increase the number of banks and improve bank competition. More foreign banks participation may also increase the size of existing banks rather than increasing the number of banks if the entrance of the foreign banks is a result of mergers and acquisition. Leon (2016), offers another avenue where the entry of foreign banks can limit competitive behaviour of banks. According to the author, new banks cannot have any effect on competition in a market that is uncompetitive and non-saturated, in which only a fraction of the customers are served by existing banks. In addition, foreign banks cannot exert any pressure on competition when they have similar competitive strategies with incumbent firms. In this case, foreign banks adopt similar markets strategies with existing banks in their perceptual map. If existing banks are charging high rates, foreign banks enter, offer similar services and charge high rates. Foreign banks may also enter through acquisition that limits the contestability of the market. The evidence supports this revelation. In Africa, banks, which participate in cross-border banking, are largely large Pan-African banks that are powerful enough to perpetuate their market power conducts even in their host nations.

4.3.1.3 Bank efficiency and bank market power

Traditionally, the Structural-Conduct-Performance Hypothesis posits that bank market power is associated with higher bank concentration that translate into higher interest rates (higher margin) and lower supply of funds (Mason, 1939; Bain, 1956). According to Leon (2015), the direct nexus between bank concentration and bank efficiency can be explained by reverse causation. In essence, bank market power can be because of efficient bank management that results in lower cost, larger market shares and higher margins (Demsetz, 1973; Peltzman, 1977). We tested how the interaction between bank concentration and bank efficiency can promote bank market and reported the results in Table 25.

There is a negative relationship between bank net interest margin and bank market power and this was significant at the 1 percent significance level. The implication is that bank efficiency promotes banking system competition in Africa. This stands contrary to the SCP hypothesis but in favour of the 'efficiency structure 'hypothesis that states that bank market power emerges from the ability of the banks to increase market share as a result of managerial efficiency.

4.3.1.4 Bank stability and bank market power

In Column 02, we find the estimates of the relationship between bank stability and bank market power. Two opposing view determines the direction of this investigation. The competition – fragility view holds that banks with market power protect their market position by engaging in conducts that generally lead to the stability of the entire banking system (Markus, 1984; Keely, 1990). Bank with market power will prefer a stable system that sustains their higher margin situation than a relatively fragile system.

On the other hand, competition-stability hypothesis posits that more competitive banking systems discourage banks in charging abnormal lending rates thereby providing incentives for firms to access funds, use the funds on viable project and earn returns that exceed the loan obligations. Competitive banking systems would enable firms to honour their credit obligations, which in turn reduces non-performing credits (Boyd & De Nicolo, 2005, 2009). Competition would result in lower interest rates and the resulting lower interest rates and lower possibility for default from competitive conducts would lead to higher bank stability.

In this study, we tested the above hypotheses using bank Z-score as a measure for bank stability. We found that, bank stability does (does not) promote bank market (bank competition) when the Boone Indicator was used as a measure of bank market power. A 1

standard deviation increase in bank stability will result in 0.010 increase in bank market power. This result confirms the market power-stability/competition-fragility hypothesis in Africa.

4.3.1.5 Other financial systems' development and bank market power

The development in other financial industries have spillover effect on the development in the banking system (Andrianaivo & Yartey, 2010). By following Claessens et al. (2004) and Mirzeal et al. (2014), this paper determined the effect of stock market development (measured by stock market capitalization to GDP) and insurance market development (measured by share of insurance companies' assets to GDP) on bank competition. The result shows that stock market development is not significant in explaining the level of bank market power even though the coefficient indicates there is a positive relationship between the variables. The implication is that stock market developments promote bank market power in the banking sector in Africa but the relationship is weak. This is can be partly attributed to less developed nature of the stock markets in Africa. Out of the 54 countries, only 18 countries have formal stock exchanges. Banking activities would not reflect in their stock market performance and hence the performance of the stock market because majority of the banks are not listed. This result is similar to the one in Mirzaei et al. (2014) that reported that stock market development has no effect on bank competition

4.3.1.6 Economic freedom and bank market power

One of the innovations in this paper is an assessment of the effect of economic freedom on the level of bank market power in Africa. The expectation is that, the level of economic freedom should promote the competitiveness of the banking system. In both Claessens et al. (2004) and Mirzael et al. (2014), the effect of property rights on bank competition was analysed. This paper goes steps further by holistically analysing the effect of

the broad index of economic freedom on bank market power. Table 17 provides the GMM results on the influence of economic freedom on bank market power. The overall level of economic freedom promotes bank market power in Africa. There exists enough evidence that the level of economic freedom is detrimental to bank competition. A one standard deviation increase in the level of economic freedom increases the level of bank market power by 0.018. This result is contrary to the classical economists' long-held view that economic freedom leads to competition.

The study also investigated how the level of financial development in African countries can affect the level of bank market power. We find that credit to private sector is negatively related to bank market power. In other words, more credit to the private sector increases the competitive behaviour of banks. This does not support the assertion in the relationship-banking hypothesis that access to credit by firms would increase market share of banks with market power. This suggests that access to credits induce bank market power indirectly. Subsequently, I analyse the interaction effects of the level of access to finance and banking systems characteristics on the level of bank market power in Africa.

4.4.2 Interaction relationships

In Column 01, Table 13, the interaction between bank concentration and bank efficiency promote bank market power. The coefficient of the interaction term is 0.130. This confirms the assertion that concentrated banking system increases bank efficiency and that in turn keep the market share of bank with market power larger (Petersen et al., 1995). The implication is that large banks in Africa promote market power by being efficient in financial intermediation. This result is contrary to the quiet-life-hypothesis by Hicks (1935) which suggests that large banks with market power are unlikely to be efficient due to slack management.

In Column 03, the interaction term between bank concentration and the level of financial development promote bank market power. The coefficient of the interaction relationship is 0.001. This confirms the feedback loop in the relationship-banking hypothesis that the relationship between large banks and firms that dependent on external finance will increase the market share of the banks in order for them to partake in future rents. It also shows that banks in Africa must support firms toward their growth. By so doing, the banks will continue to grow.

In Column 04, the aim is to analyse whether the level of bank stability leads to more access to credit which in turn promote bank market power. The coefficient of the interaction relationship is positive at 0.052, which indicates that the level of bank stability lead to more access to credits and that in turn sustains the market power position of banks in Africa. This is contrary to the bank competition-bank stability view, which stipulates that competitive banking systems promote stability through access to finance.

In Column 05, the interaction between foreign ownership and access to finance lead to bank market power. The coefficient of the interaction term is 0.013. This means foreign banks in Africa create relationships that improve access to credits and sustain their market share.

Control Variables

The log of GDP per capita has a positive influence on bank market power. This is in line with argument that economic development drives the level of financial development (Robinson, 1952; Lucas, 1988). When the GDP of a nation is high, people will have more income and high propensity to save. High savings will boost financial intermediation and therefore, the performance of the firms.

Government expenditure has negative influence on the level of bank market power. This means that government expenditure has injurious effect on the activities of banks with market power. If government borrows from the financial system and uses the money on recurrent expenditure, the accelerating effect on growth is lower than when government expenditure is on capital expenditure. Governments may not pay back loans on time and that can also reduce the intermediation capacity of the banks. These might have accounted for the negative effect since bank market power relates directly with economic growth.

Similarly, inflation has negative effect on the level of bank market power in most of the estimates. When inflation reduces that purchasing power of both individuals and businesses, savings become low and the banking sector would not generate enough deposits to create more credits. Banks obtain income on their loan assets, therefore, if the loan level is low, interest income would also be lower and that adversely affects the performance of the banks. However, when I added the proxy for access to credits into the model, the effect of inflation had positive effect on bank market power. This means inflation affects the level of bank market through the amount of money that goes to the private sector.

Furthermore, the amount of remittances inflow for a period has negative effect on bank market power. This implies that remittance reduces the less competitive nature of the banking system. It also implies that remittances may not have any direct effect on the intermediation activities of the banks even though the banks serve as agents for remittance inflow into Africa.

Finally, trade openness has a negative effect on the level of bank market power in Africa. Trade opens up the economies for competition from other economies. The banking sector can also face competition from other external banks when they operate in countries

that have open financial systems. Such financial services competition can reduce the less competitive nature of the banking system.

4.4 Conclusion

In this chapter, I analysed the various factors that determine the level of bank market power in Africa. From chapter two, we find that the banking system in Africa is less competitive. In addition, from the chapter four, we realize that the level of bank market influence economic growth economic growth in Africa. Since bank market power is important to economic growth, it is imperative that we determine the factors that influence bank market power so that we can control those factors in order to promote economic growth. Therefore, based on theoretical foundations, we analysed how the level of bank concentration, bank efficiency, bank stability, foreign bank ownership and other financial sectors influence the degree of bank market power.

The results show that bank concentration, bank efficiency, and foreign ownership have negative influence on the level of bank market power. On the other hand, the level of bank stability induces bank market power positively. Moreover, the interaction between: bank concentration and efficiency; bank concentration and access to credits; bank stability and access to credits and foreign bank ownership and access to credits have strong positive effects on the level of bank market power.

Table 13: Determinants of Bank Market Power in Africa

Eq Name:	01	02	03	04	05	06	07	08
BI(-1)	-0.033	-0.015	-0.007	0.044	-0.281	-0.023	-0.055	0.009
	(0.004)***	(0.008)	(0.004)	(0.007)***	(0.007)***	(0.007)***	(0.009)***	(0.008)
BC	-0.020		-0.002					
	(0.001)***		(0.000)***					
NIM	-0.213	-0.000						
	(0.005)***	(0.003)						
BC*NIM	0.002							
	(0.000)***							
LGDP	0.761	0.840	1.643	1.025	0.105	1.603	1.316	1.383
	(0.029)***	(0.015)***	(0.036)***	(0.037)***	(0.151)	(0.032)***	(0.056)***	(0.047)***
GEX	-0.035	-0.035	0.002	-0.012	-0.005	-0.010	-0.009	-0.001
	(0.003)***	(0.001)***	(0.003)	(0.004)***	(0.002)**	(0.003)***	(0.012)	(0.002)
INF	-0.003	-0.006	0.002	-0.000	-0.007	0.002	-0.009	0.000
	(0.001)***	(0.001)***	(0.001)**	(0.001)	(0.001)***	(0.000)**	(0.002)***	(0.000)
REM	-0.066	-0.042	-0.036	-0.054	-0.094	-0.068	-0.060	-0.041
	(0.002)***	(0.002)***	(0.002)***	(0.002)***	(0.004)***	(0.001)***	(0.002)***	(0.001)***
TRADE	-0.003	-0.006	-0.005	-0.006	0.001	-0.003	-0.010	-0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.001)***	(0.000)***
ZS		0.010		0.064				
		(0.003)***		(0.005)***				

Table 13 Contd.

ZS*NIM		-0.000 (0.000)						
BC*FD			0.000 (0.000)***					
FD			-0.037 (0.002)***	-0.004 (0.003)	-0.023 (0.001)***	-0.020 (0.001)***	-0.026 (0.005)***	-0.026 (0.007)***
ZS*FD				-0.001 (0.000)***				
FOREIGN					-0.002 (0.001)***			
FOREIGN*FD					0.000 (0.000)***			
LIP						0.077 (0.046)		
SKT							0.003 (0.002)	
EFREE								0.018 (0.002)***
Observations:	371	389	366	384	212	332	120	372
AR(2):	0.999	0.711	0.999	0.999	0.885	0.998	0.987	0.401
Sargan Test:	0.389	0.646	0.487	0.335	0.602	0.375	0.336	0.612

Number of Countries Included	37	37	36	38	29	35	15	35

CHAPTER FIVE

FINANCIAL INNOVATIONS AND ECONOMIC GROWTH IN AFRICA

5.1 Abstract

In this chapter, I analyze the long run effect of both financial development and financial innovation on economic growth for 44 African countries. I employed a cross-sectional approach on averaged observations from 2002 to 2015. The aim was to determine whether both financial development and financial innovation induce economic growth convergence between countries in the sample and the Aghion et al.'s (2005) technological frontier. I interact the level of the two variables each with initial income and interpreted the significant negative coefficient of the interaction effect as evidence of convergence. I also relied on the interaction parameters for each country and estimated the possibilities for the countries to converge using a convergence benchmark. The results show that financial development lead to economic growth convergence provided other policy measures are present. For the individual countries, the table in Appendix A shows that 16 out of the 44 countries are likely to converge to the growth path of the USA if they develop their financial markets. However, financial innovation makes African countries grow apart from the growth path of USA. The second portion of the paper examined whether financial innovation has any impact on the growth prospect of the countries. I applied the dynamic GMM approach for this objective. The analyses were performed on the overall sample, sample above the average level of financial innovation and sample below the average level of financial innovation. In addition, I ascertained whether financial innovation across six sub-regions in Africa induces economic growth in the respective regions. For the whole sample and the sample below the average level of financial innovation, financial innovation is detrimental to economic growth. For the sample above the average, financial innovation has no effect on economic growth. This indicates that the negative growth-effect in the overall sample is driven by low level of financial innovations from the samples below the average level. On the other hand, whereas financial innovation in COMESA and ECCAS induces economic growth in those regions, that of ECOWAS and ARABMAG is detrimental to economic growth. The evidence makes a strong case for measures to promote productivity-oriented financial intermediation in Africa.

5.2 Introduction

The contribution of finance to economic growth has been extensively studied (See, King & Levine, 1993; Levine, 1997; Aghion et al. 2005; Leaven, Levine & Michalopoulos, 2015). Most of these studies reported positive relationship between finance and economic growth. For example, the seminal work by King and Levine (1993)

suggests that financial intermediaries are avenues through which financial agents provide financial resources to implement viable entrepreneurial projects toward improvement in gross domestic product per capita. Financial intermediation and financial institutions also ensure low transaction cost, improved investments and reduced information asymmetry by linking surplus and deposit units efficiently. However, empirical evidence by Rousseau and Wachtel (2011) indicates that the robust positive significant relationship between financial variables and economic growth is dwindling (when the authors applied similar approach adopted in King et al (1993a)).

The theories on the sources of economic growth also suggest that technological endowment promote productivity growth of countries (Solow, 1956; Lucas, 1988; Romer, 1990). In terms of growth convergence, studies posit that product variety and innovation (Romer, 1990), education and knowledge (Lucas, 1988), human capital (Mankiw et al., 1992), trade openness (Sachs et al. 1995), political institutions (Acemoglu et al., 2012), among others drive countries closer to their steady-state growth path or the growth path of a technological frontier. Since the policy measures above contribute to technological progress and productivity growth, economic growth convergence can be contingent on these fundamental like human capital accumulation, institutions, trade openness and financial variables. However, we have not yet exploited, in the area of finance-growth nexus, how finance interact with the initial level of per capita income to move countries closer to the growth path of a technological frontier. In this study, by following the theoretical foundation by Aghion, Howitt and Meyer-Foulkes (2005) and Laeven, Levine and Michalopoulos (2015), I contend that countries in Africa with some appreciable level of financial development and financial innovation can

converge faster to the per capita income level of the world's technological leader, United State of America.

In 2005, Aghion, Howitt and Meyer-Folkes developed a Schumpeterian theory that stipulate that countries that develop their financial markets to assimilate technological transfer from the world technological frontier can foster growth toward their steady-state and also converge to the living standard level of the technological frontier. They also emphasize that, countries that eventually converge to the growth path of the technological frontier would have positive but vanishing effect, all other things in place, on the steady-state level of standard of living or income per head. This phenomenon occurs because complications develop locally for countries that fail to promote financial development to the extent that it is costly for countries not to pursue the footstep of the technological leader. The model suggests that financial development follows technological innovations because innovation materialize when funds are available for its implementation.

Therefore, to the extent that technological innovators require funds to implement innovations, countries must develop their financial markets in order to embrace technological innovations locally. Since technological innovation induces economic growth through creative destruction, the theory stipulates that the technological leader will always grow above the laggards until the leader reaches her steady-state growth path where growth becomes asymptotic or until another innovation pushes growth beyond steady-state. For the laggards, the more they develop their financial systems the more they build capacity to embrace technological innovation toward the growth path of the

technological frontier. The basic tenet of the theory is that appreciable level of financial development pushes countries to the growth path of the technological frontier.

In the first part of this paper, I implement a cross-sectional analytical framework that is directly related to the theoretical position in Aghion et al. (2005). I first construct averages of the variables that entered the cross-country specification from 2002 to 2015 for 44 African countries. According to King and Levine (1993b) averaged country level variables will assist in determining the long run contemporaneous relationship among the variables in a model. The mean-variables in this paper include policy factors: human capital, cellular phone subscription, trade openness, government expenditure and inflation. I proxy initial income divergence by finding the averaged divergence between the logged per capita income of African countries and that of the world's technological leader, United states of America. The regressors includes the interaction of the initial income and the average level of financial development (measured by the averaged domestic credit to private sector as ratio of GDP). I interpret the negative and significant coefficient of the interaction terms as possibility of economic growth convergence that is fueled by the level of financial development locally. Furthermore, I replicate the above procedure for the proposition that financial innovation serves as a catalyst for economic growth convergence between African countries and the United States.

Innovations cause economic growth, according to the Schumpeter (1912), through creative destruction. In this transmission, the role of finance is to identify entrepreneurs who have viable innovations and support them financially. This implies a direct relationship between financial innovations and technological innovations (the development of new product, new processes of service delivery, new markets, new

sources of raw materials and new forms of organization). Alternatively, financiers themselves can engage in costly and risky innovations that allow them to develop mechanisms to appraise borrowers and give credit to only credible technological entrepreneurs. By supporting technological innovations through effective screening processes, financial innovation combines with technological innovations to promote economic growth (Laeven et al., 2015). This study tests the proposition that financial innovation combines with technological innovations to promote growth convergence between technological leaders and technological laggards. The study also tested the hypothesis that countries with appreciable amount of financial innovation can converge faster to the growth path of the world's technological leader.

The second aspect of the paper examined the influence of financial innovation on economic growth. To achieve this objective, I conducted various analyses. First, for the overall sample, I regressed the proxies for financial innovation on economic growth given other policy factors. The result shows that financial innovation has indirect impact on economic growth. Since the result is counter-intuitive (in the sense that we expect financial innovations to have positive impact on economic growth), I conducted further analysis to determine what is causing the negative impact. Therefore, I divided the sample into two: the sample below the average level of financial innovation and the sample above the average level of financial innovation. Given the same policy variables, the study did not find any meaningful evidence that financial innovation induces economic growth for the sample above the mean level of financial innovation. However, for the sample below the average level, the study found a strong negative impact of financial innovations on economic growth. This implies that, the negative effect of

financial innovation on economic growth is induced by low innovations by countries below the average level of financial innovation. This confirms that hypothesis that countries with (without) appreciable levels of financial innovation can (cannot) grow faster.

The third segment of the paper emphasized the role of sub-regional integration in influencing financial innovation toward economic growth. Even though, sub-regional integration has existed for decades in Africa, the contribution of finance to regional integration in the various sub-regions for economic development has not been adequate (World Bank, 2007; AfDB, 2010). Sub-regional integration also provides the financial institutions wider intermediation market, which can improve the market share and efficiency of the banks. The expectation is that sub-regional integration can channel funds into productive sectors of regional economies. However, prior studies have not analyzed the impact of regional integration in Africa on financial innovation toward improvement in economic growth. In this study, I developed dummies for six sub-regions and interacted the dummies with the level of financial innovations. The results show that financial innovation enhances economic growth in COMESA and ECCAS but discourages economic growth in ECOWAS and ARABMAG. The study did not find enough evidence that financial innovation influence economic growth in EAC and SADC.

The Schumpeterian perspectives hold that innovations promote viable entrepreneurial activities that promote economic growth and development. However, recent world events have showed that financial innovations can have adverse contagion effect on economic growth and development. Johnson and Kwak (2012) makes us

understand that it is not innovations per se that influence real life occurrences but, what we do with financial innovation. If financial innovation promotes effective financial intermediation, it would induce economic growth. If financial innovation has no direct impact on effective intermediation, it can hamper economic growth. It implies that financial innovations that worked for one regime or jurisdiction may not work for another jurisdiction.

We concentrated the study within the African continent for several reasons. The financial system in Africa is evolving in recent decades than before, especially, under the financial control regime. Researchers attribute this development to the financial market liberalization programme, which has had implications on the development of new financial products, processes and institutions. We find various levels of penetration of electronic cash dispensing automated teller machines (ATMs), point of sales electronic payment systems, personal computer banking, internet banking, mobile banking, and electronic cards among others in most banking systems on the continent. In the capital markets, we also find automated electronic trading activities and the utilization of Eurobonds, corporate bond and municipal bond markets that have boosted capital flows among businesses and state entities. These have become possible because of the proliferation of telecommunication industries and technological innovation by startups – internet communication technology (ICT) enabled products that facilitate the development, spread and use of new financial products, processes and institutions.

However, in most recent times, the new financial product that is doing the trick for a boost in financial inclusion on the continent is the mobile money transfer system (M-PESA, mobile money transfers etc. as it variously called in various countries on the

continent). Mobile money transfer contributes about one-third to financial inclusion in Africa. Nevertheless, mobile money emerged also from technological innovations. Besides technological innovations, Frame and White (2004), posits that financial innovations can also emerge from the level of market power, the size of the firm, the presence of property rights that protects innovators, markets demand conditions, taxes and other factors that include macroeconomic volatility and its attendant regulation, research and development (R&D), among others.

In this study, I rely on various measurements of financial innovations and analyze how financial innovation can influence the speed of convergence in per capita income between Africa and the world's technological leader, United States of America. The essence of the various measurement is to provide a richer validity for the measurement of financial innovations that are related to the financial markets intermediation in Africa and thereby reducing the controversies surrounding the measurement of financial innovations. I also agree with Frame and White (2004) that we can best measure financial innovation by the change in the level of development of the financial system rather than the level of new financial system. Therefore, following Laeven et al. (2015), I measured the level of financial innovation by the change in financial development operationalized by change in the ratio of private credit to gross domestic product (GDP). This measure has a theoretical foundation in the Schumpeterian view that suggests that new products, new markets, new organizations, new sources of raw materials and new techniques of production are financed through growth in the amount of credits to the private sector. This is especially the case for firms in the economy that depend heavily on funds from the financial institutions in order to implement new projects. This measurement is also

appropriate for studies at the country-level because it indicates the systemic contribution of the financial sector to the growth in productivity (technological innovation) by the private sector.

The rest of the study is organized as follows: Section two presents the econometric procedures employed in this study. Section three provides discussions on the data. Section four presents the results and their discussions. Section five concludes and provides recommendations.

5.3 Model Specification

5.3.1 Cross-sectional Specification

This paper tests the Schumperian view by Aghion et al. (2005) that countries with some appreciable level of financial development will converge faster to the growth rate of the world's technological leader. To achieve this we used the United States as the technological leader following Aghion et al. (2005) and Laeven et al. (2015). The US also has the highest per capita income beyond the global average. Consequently, we estimated the following cross sectional equation using the robust least square method. As I explained in Chapter Three, the robust least square method allows us an efficient estimation method when there are outliers in both the dependent and the independent variables.

$$u_i - u_1 = a_0 + \beta_1 FD_i + \beta_2(c_i - w) + \beta_3 FD_i(c_i - w) + \beta_4 C_i + \varepsilon_i \qquad (5.1)$$

where,

- $u_i - u_1$ is average growth rate of per capita income of a country in Africa relative to U.S. growth over the period 2002 to 2015;

- FD is financial development measured as the the share of credit to the private sector to GDP;
- $c_i - w$ is the log of per capita income relative to the log of per capita income of U.S.;
- C is a vector of control varibales, (including, schooling, trade, government expenditure and inflation); and
- ε is an error term.

According to Aghion et al. (2015), β_1 should not be significantly different from zero and β_3 should be negative and significant which portray that the level of financial development stimulates the rate at which economies converge to the world's technological leader. Also, if $\beta_1 + \beta_3 FD_i \neq 0$, we represent (5.1) as

$$u_i - u_1 = \theta_i(\hat{c}_i - \hat{w}_1)$$

where $\hat{c}_i$ is the steady state income value of a country in Africa and θ_i is the country-specific convergence coefficient, $\theta_i = \beta_1 + \beta_3 FD_i$. The convergence coefficient should be negative which implies that a country in Africa can catch up with the growth rate of the technological leader, USA, if the growth rate of that country's per capita income depends negatively on the initial value θ_i or $\beta_1 + \beta_3 FD_i < 0$. The implication is that financial development will increase convergence if $\beta_3 < 0$. By letting the right-hand side of equation (5.1) equal to zero, we can estimate the level of convergence (due to the level of financial development) for each country as follows:

$$\hat{c}_i = -\frac{\alpha_0 + \beta_1 FD_i + \beta_4 C_i + \varepsilon_i}{\beta_1 + \beta_3 FD_i} \tag{5.2}$$

By differentiating the effect of financial development (FD) with respect to $\hat{c}_i$, we can derive the long run effect of financial development relative to income as:

$$\frac{\partial \hat{c}_i}{\partial FD_i} = \frac{\beta_1 + \beta_3 \hat{c}_i}{-(\beta_1 + \beta_3 FD_i)} \quad (5.3)$$

Equation (5.3) implies that if all countries are laggards relative to the USA in steady state, then: $\hat{c}_i \leq 0$. According to Aghion et al. (2005), "if $\beta_3 < 0$, financial development will have a positive long run effect on per-capita GDP of each (laggard) country that converges if and only if $\beta_1 \geq 0$. For then the numerator of equation (5.3) will be positive. Moreover, this effect will eventually vanish (when FD reaches the leader's level) if and only if the direct effect is equal to zero: $\beta_1 = 0$" (Aghion et al., 2005, p. 192).

In Laeven et al. (2015), the authors emphasized in their model the importance of financial innovation in accelerating the rate at which economies converge to the technological frontier. Therefore, we introduce our measure for financial innovation (growth in credits) and estimate the following cross-sectional specification (equation 5.4) by including financial innovation and the interaction of financial innovations and the log of relative per capita income.

$$u_i - u_1 = a_0 + \beta_1 FD_i + \beta_2 (c_i - w) + \beta_3 FD_i (c_i - w) + \beta_4 C_i + \beta_5 FI_i + \beta_6 FI_i (c_i - w) + \varepsilon_i \quad (5.4)$$

where, FI is financial innovations over the period 2002 – 2015. According to Laeven et al. (2015), equation (5.4) predicts that β_6 should be less than zero, meaning the speed of convergence relate directly to financial innovations. Again, the prediction of equation (5.4) is that β_2 should be insignificant, an indication of diminishing steady state growth effect. The premise is that "the technological leader already possesses a financial system that innovates at the growth maximizing rate, so that faster innovation would not increase the probability of picking capable entrepreneurs" (Laeven et al., 2015). For convergence

to occur between African countries and the United States, the world's technological leader:

$\beta_1 \; and \; \beta_5 < 0$ and must be significant. Similarly, $\beta_3 \; and \; \beta_6 < 0$ and significant.

5.3.2 GMM Estimations

It is an objective in this study to determine the relationship between the level of financial innovations and economic growth in Africa using the generalized – method –of moment estimator developed by Arellano and Bond (1991) for the period 2002-2015. The GMM estimator would also aid us to determine the impact of other growth determinants on the convergence of countries to the growth path of the world's technological frontier and at the same time assist in (1) dealing with simultaneity and omitted variable bias and (2) exploiting the time series dynamics of the data.

$$G_{i,t} = \alpha_t + \sum_{j=1}^{p} \beta_j G_{i,t-j} + \sum_{j=1}^{p} \beta_j FD_{i,t-j} + \sum_{j=1}^{p} \beta_j C_{i,t-j} + \sum_{j=1}^{p} \beta_j FI_{i,t-j} + f_i + \varepsilon_{i,t} \qquad (5.5)$$

where:

f_i is country specific effect; p is the appropriate lag length; i represents the countries and t is the time series dimension of the data.

$$A\ set\ of\ control\ variables\ (C) = \begin{cases} Human\ Capital \\ Trade\ Openness \\ Governemnt\ Expenditure \\ Inflation \\ Mobile\ Telecommunication\ Infrastructure \\ Institutions \end{cases}$$

$$Financial\ Development\ (D) = \{Credit\ to\ Private\ Sector\ to\ GDP$$

$$Financial\ Innovations\ (d) = \begin{cases} Growth\ in\ private\ sector\ credit \\ ATM\ per\ 100{,}000\ population \\ Private\ Credit\ Bureau \\ Public\ Credit\ Bureau \end{cases}$$

In order to do away with the individual effect, we transformed the model into the first differences as follows:

$$\Delta G_{i,t} = \sum_{j=1}^{p} \beta_j \Delta G_{i,t-j} + \sum_{j=1}^{p} \beta_j \Delta FD_{i,t-j} + \sum_{j=1}^{p} \beta_j \Delta C_{i,t-j} + \sum_{j=1}^{p} \beta_j \Delta FI_{i,t-j} + Interactions + \Delta\varepsilon_{i,t} \quad (5.6)$$

With the above equation (5.6) we have retained only time effect but have eliminated the cross-sectional effect. I also estimated Sargan test to ensure that the instruments do not correlate with the error term.

5.4 Data and Sources of Data

I have decribed the sources of most the variables in this estimation in the previous chapter. We obtained information on coutries in Africa with PCBs or/and PCRs from Triki and Gajigo (2012) and the World Bank. The paper estimated the growth in financial development (financial innovation) by the current level of the share of credit to the private sector minus the previous level of credt to private sector. This estimation was used to measure innovations in the financial system, following King et al. (1993), Laeven et al. (2015), Idun and Aboagye (2014) and Bara et al. (2016). The measure is appropriate because it indicates the financial agents' contribution to technological innovation through financial intermediation.

The paper also measured financial innovations by the speed at which a country's financial system adopts private credit bureaus (PCBs) or the speed at which a countries financial system adopts public credit registry (PCRs). These were estimated as the fraction of years PCBs or PCRs existed. In addition, we measured financial innovations by the number of ATMs/100,000 of the population. This measurement was necessary

because most of the financial innovations in vogue in the financial systems in Africa are in electronic forms and ATMs appear widespread. In most countries in the continent, ATMs are used to pay bills, withdraw money, deposit money, transact businesses across the globe and many more. This measurement also connotes the extent of diffusion and coverage of electronic financial innovations in the financial systems of Africa.

The paper also included (as one of the control variables) cellular mobile subscription per 100 people of the population to measure the level of telecomunication infrastructure. This is calculated as the number of people who own mobile cellular phones out of every 100 individuals in the population of a country. Table 16 shows that the mean value for cellular phone subscription in Africa over the period is 46 mobile phone for every 100 Africans. In Africa, cellular phones are the main tool for mobile money, mobile banking, internet banking, online trading, business communication and many more. This means that by moderating the effect of cellular subscription, we are also accounting for the role of internet communication technology (ICT) infrastructure in the analysis.

The telecommunication industry is responsible for most of the technological innovations in Africa. Now firms across industries sell their products online or through social media, computer applications are facilitating product designs, new forms financial products are powered by ICT. Mobile cellular infrastructure also indicate the level of advancement in telecommunication. Financial agents use telecommunication infrastructure when evaluating technological innovation for funding. Telecommunication also improves monitoring of borrower in order to avoid information asymetry. In Andrianaivo and Kpodar (2011), we find that ICT infrastructure induce economic growth

in Africa. However, in the financial sector ICT infrastructure can have positive effect on economic growth only if it leads to effective financial intermediation. Therefore, I interacted cellular phone subcription to technological innovations by financial agents (ATM and PCR/PCB), regressed the interaction term against GDP growth per capita and interpreted the result as the interplay between financial innovations and technological infrastructure toward economic growth. This in line with the position that technology and finance coevolute to induce economic growth (Hasa et al., 2010; Galindo et al., 2014; Lechman et al., 2015; Laeven et al., 2015).

Table 14 presents the characteristics of the variables that entered into the regression estimates. The table shows that the averge rate of growth divergence between countries in Africa and the United States is 1.17. This means that, within the period, the growth in per capita income for African countries on the avarege exceeded that of the world's technological leader, US by 1.17 percentage points within the period 2002 to 2015. Growth divergence ranges from as low as negative 3.54 percentage points in some countries to as high as 5.40 percentage points in other countries.

Furthermore, the table shows that the average government expenditure over the period has been higher. The mean of governement expenditure to GDP is 15.14 percent whilst that of financial development is 22.64 percent. In most countries the private sector's contribution to growth is more dealer than that of the public sector. This means that more resources should go to private sector than the public sector. More resources to support government consumption expenditure can have a crowding-out effect on capital accumulation and therefore, economic growth.

Similarly, inflation is as low as negative 6.79 percent in some countries and as high as 17.62 percent in other countries. Inflation can have dual effect on economic growth. Inflation can have positive effect on growth if it expected and encourages productivity and at the same time results in devaluation of a country's currency that in turn improve exports of goods and sevices. On the other hand, inflation can have crowding out effect on capital accumulation towards growth if it results in increase in production costs that limit productivity or if is as a result of imports.

In addition, the average secondary school enrolment is as high as 2.44 in some countries. However, the minimun value of zero should rather be seen as missing value rather than the level of human capital since it is illogical to suggest that human capital is nonexisting in some countries. The mean age of schooling in Africa is about is about 1.61 out of 5 years. This is woefully below that of USA which is about 3.44 for the same period. This means, human capital development in Africa is also low. Since human capital is beneficial to economic growth, African countries still need to improve education. Skilled and knowledgable labour is needed to transform technological transfer into productivity. Countries with high level of human capital are better positioned to transform technology and capital accumulation into economic growth. Inadequate human capital has crowding out effect on economic growth.

Finally, trade openness in Africa has been high and this is expected to lead to economic growth. The mean of total trade in Africa over the period is 75.20% percent. Trade openess generally has positive influence on economic growth (E.g. Sachs et al., 1995). However openness can have a crowding out effect on economic growth if it results in more inports of consumer products at the expense of goods and services that enhance

capital accumulation. Trade openess is expected to have positive effect on economic growth because it can increase the absortive capacity of countries to embrace finance toward economic growth.

Table 14: Descriptive Statistic

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
u_i-u_1	1.17	1.20	5.40	-3.54	1.87	44
C-W	-1.61	-1.67	-0.49	-2.33	0.49	44
HC	1.61	1.62	2.44	0.00	0.59	40
FD	22.86	14.70	141.28	3.62	25.00	44
FI	0.70	0.65	3.21	-2.04	0.80	44
GEX	15.14	14.27	35.66	8.00	5.58	44
INF	7.01	6.79	17.62	1.55	4.35	44
TRADE	75.20	68.28	166.28	33.99	31.72	44
MOB	46.01	39.58	97.66	11.31	24.11	44
GDP	2360.70	1050.15	16028.76	229.64	3269.63	44

Table 16 contains the summary statistics of the variables that were used to estimate the cross sectional model. U-U1 is the divergence between the GDP per capita growth rate of a country in Africa and that of United States of America. C-W is the log of GDP per capita for a country in Africa minus the log of GDP per capita of the United States of America. GDP is the average level of GDP per capita for the 44 African countries used in this study. All figures were obtained from the WDI (2017) and were standardized at the 2010 US dollars constant values. HC is the Barro-Lee's mean age of education. FD is the level of financial development, calculated as the share of bank credit to the private sector of GDP. FI is financial Innovation and it is calculated as the annual change in a country's level of credit to the private sector to GDP. GEX is a measure of the size of the government calculated as the share of government expenditure of GDP. INF is inflation and it is calculated as the annual change in the consumer price index within a country. TRADE is an indicator for trade openness and it is calculated as total exports plus total imports divided by GDP. Finally, MOB is a measure of technological infrastructure, estimated as the number of people out of every 100 people in a country's population who own mobile cellular phone. All the figures are country level averages from 2002 to 2015 except HC which is an average from 2002 to 2014.

Source: Calculated From WDI (2017)

Figures 5 through to 8 are scatter plotes that relate the raw data for financial innovation (financial development) to either per capita GDP growth rate or the log of per capita GDP. In Figure 5, the trend line indicates positive long run relationship between financial innovation and economic growth. For a signal of convergence, the trend line should slope downward. However, some countries such as Ethiopia, Rwanda, Nigeria and Sudan have low levels of financial innovation but high growth rates. Other countries such

as Mauritius and Cape Verde have high levels of financial innovations but diminishing growth rates. These illustrates the vanishing effect of financial innovation alluded to by Aghion et al. (2005). Overall, countries with financial innovation level above the sample grand average (0.07) had commensurable high growth rates with exception of Ghana, Sierra Loene, Sudan, Nigeria and Ethiopia, which have below average level of financial innovation but an average growth rate beyond 4 percent.

In Figure 6, the trend line indicates a weaker positive long run relationship between financial development and economic growth. For countries with the level of financial development above that of Cape Verde (52.10), the level of financial development has diminishing effect on long run economic growth. On the other hand, countries which have financial development levels below the sample average (22.86) and are above the trend line have growth rates beyond 2 percent. This again illustrate the growth-vanishing effect inherent in the convergence theory by Aghion et al. (2005).

In Figure 7, the trend line indicates positive long run relationship between financial innovation and per capita income. However, we see that for some countries such as Ethiopia, their lower level of financial innovation will eventually reduce their per capita income. And for others such as Mauritius, there is a diminishing effect of finanacial innovation on per capita income.

Finally, in Figure 8, the trend line indicates positive lon run relationship between financial innovation and per capita income. However, we see that for some countries such as South Africa, their higher level of financial development will eventually reduce their per capita income.

It must be emphasized that the raw data excludes other growth drivers that we described previously. In the discussions that follows, I include other policy factors that influence economic growth. These include human capital, government expenditure, inflation and telecommunication infrastructure intermitently, to the cross-section model. The model was estimated by the robust least square regression in order to eliminate the effect of outliers in the variables. The results are presented in Table 17.

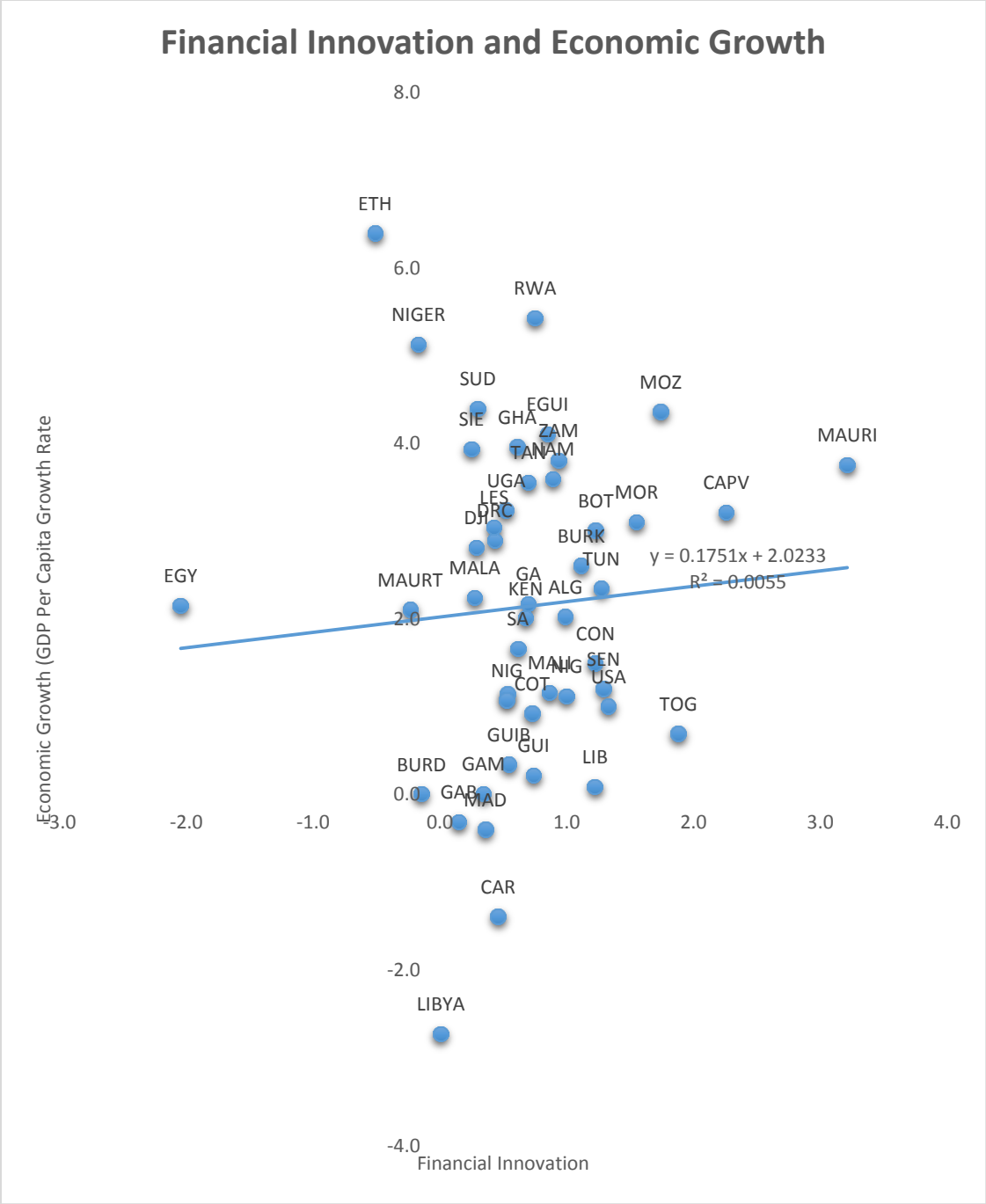


Figure 5: A Scatter Plot Showing the Relationship between Financial Innovation and Economic Growth. Source: Drawn from WDI (2017).

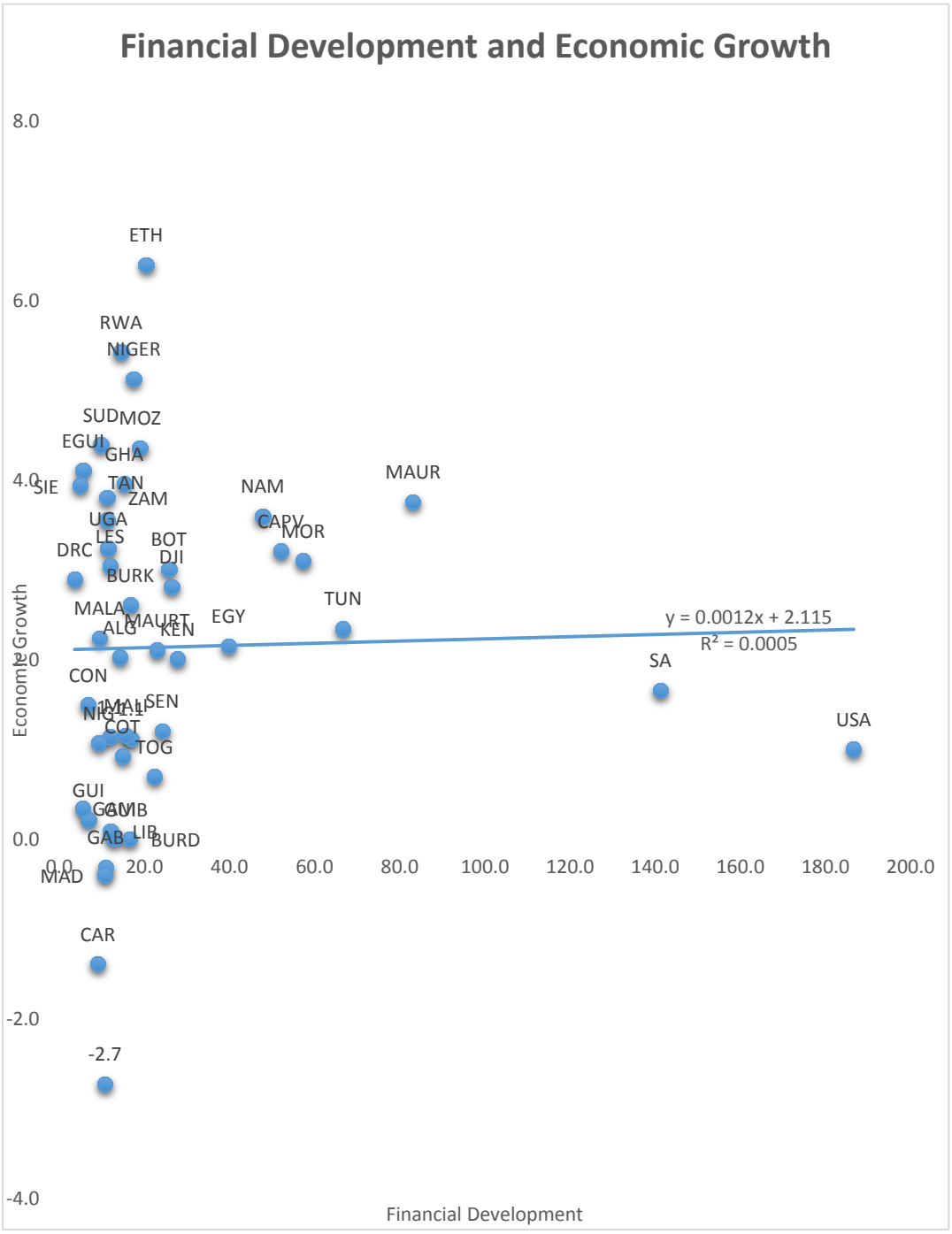


Figure 6: A Scatter Plot Showing the Relationship between Financial Development and Economic Growth. Source: Drawn from WDI (2017).

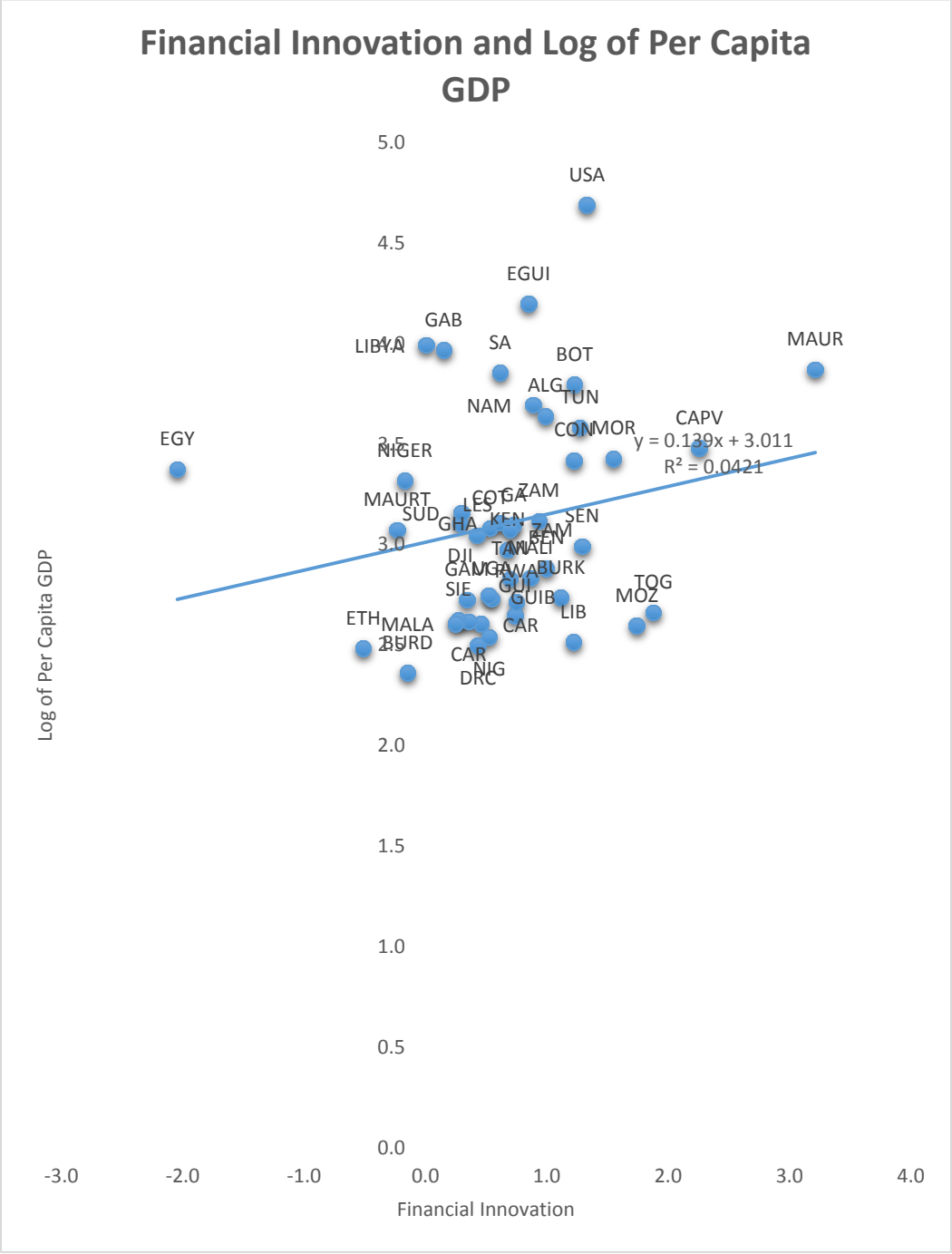


Figure 7: A Scatter Plot Showing the Relationship between Average Financial Innovation and Logged Per Capita Income. Source: Drawn from WDI (2017).

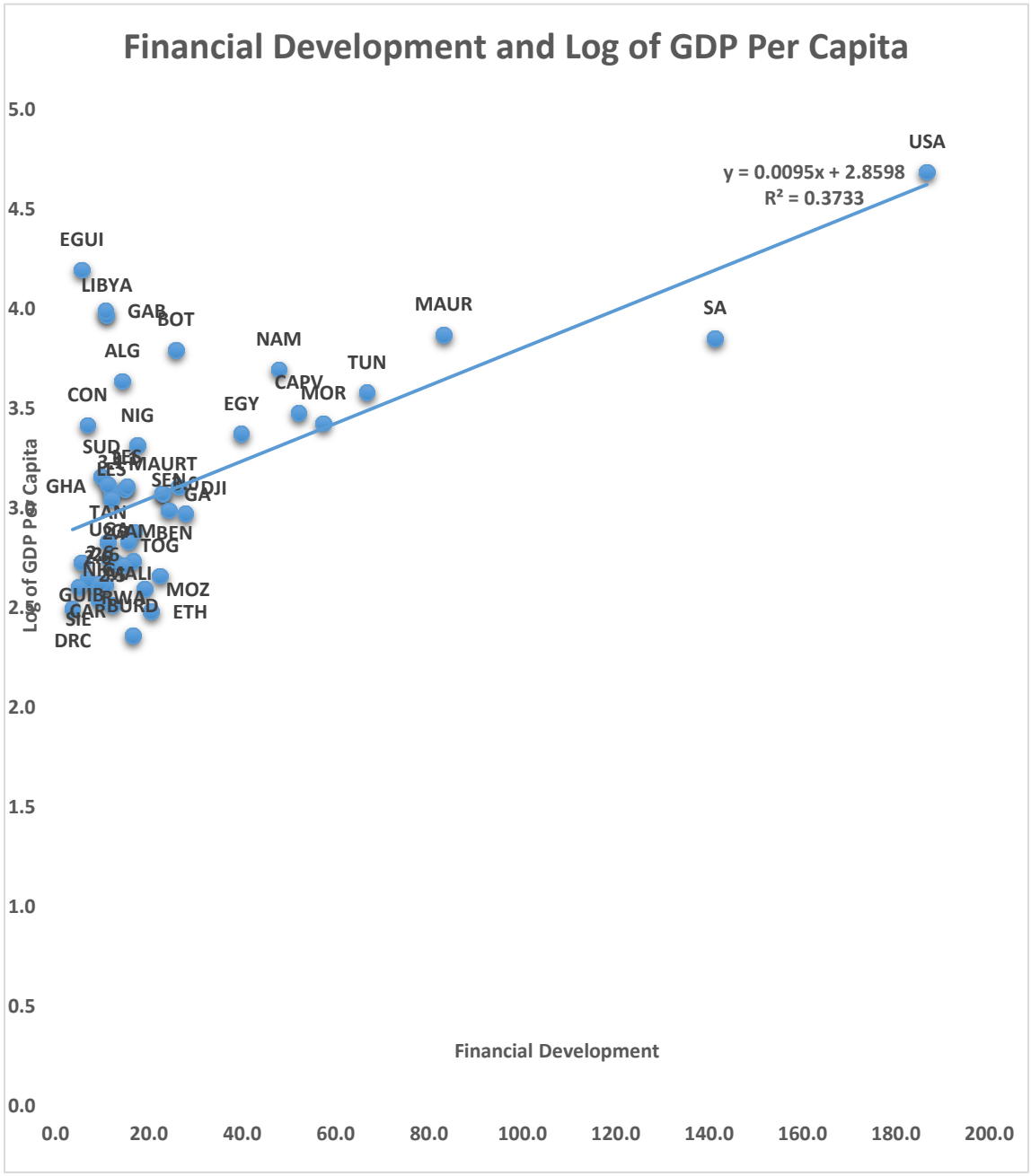


Figure 8: A Scatter Plot Showing the Relationship Between Financial Development and Logged Per Capita GPD Averaged from 2002 to 2015. Source: Drawn from WDI (2017)

5.5. Empirical Results

5.5.1 Cross-sectional Estimation Results

Table 15 contains five estimation columns. In Column 01, I regress financial development (FD), the initial level of per capita income divergence (c_i-w) and the interaction between FD and c_i-w on the divergence between economic growth of an African country and that of USA (u_i-u_1). A negative coefficient of the interaction term is ($\beta_3 < 0$) is an indication of the rate of convergence in economic growth between African countries and the technological leader that is induced by the level of financial development or financial innovation. It must be emphasized that column 01 is without the other determinants of economic growth convergence. The results indicate that without the other factors, financial development does not cause economic growth convergence since the interaction is negative but statistically insignificant.

In Column 02, I included the other policy variables outlined above except Leaven et al.'s (2015) measure of financial innovation. The inclusion of the other variables did not show possibility of financial development led convergence either. In that estimation, we find that inflation has long run positive relationship with economic growth divergence. This relation permeates all the estimations and confirm that assertion that high inflations are inimical to economic growth convergence.

I repeated the estimation procedure in Column 01 for financial innovation in column 03. In that column, there is no evidence that financial innovation causes economic growth convergence if we evaluate at the convergence criterion $\beta_6 < 0$ in equation 5.4. The coefficient of the interaction between financial innovation (FI) and

initial level of income (c_i-w) is positive and insignificant. For convergence, the coefficient should be negative and significant.

In Column 04, I included the other determinants. Interestingly, inclusion of the other determinants produced a positive relationship between financial innovation and economic growth divergence. This mean that African countries and the USA are growing apart given their long run level of financial innovation. Financial innovation promotes economic growth divergence between countries in Africa and the USA. In column 04, the long run level of government expenditure has positive relationship with economic growth divergence whilst trade openness had negative relationship with divergence. This confirms the assertion by Sachs et al. (1995) that trade openness lead to economic growth convergence.

Column 05 incorporates all the variables. We find enough evidence that the average level of financial development leads to economic growth convergence. This is because the coefficient of the interaction term $\beta_3 < 0$ is both negative and significant at 0.05. However, the evidence shows that financial innovation rather leads to economic growth divergence between African countries and the technological frontier. This is because $\beta_6 > 0$ and significant.

We can compare the results in Table 15, especially those in column 05 to those in Aghion, et al. (2005) and Laeven, et al. (2015). Aghion et al. posit that the possibility that a country will converge to the growth path of the world's technological leader increases with the level of financial development. In the empirical section of their paper, financial development was the sole determinants of economic growth convergence, which means the other determinants, were not significant in inducing economic growth convergence

between the countries and the world's technological leader. In this study, the other growth factors are instrumental if Africa should converge to the growth path of the USA. African countries must promote trade openness; reduce inflation and government expenditure in order to induce financial development to cause economic growth convergence.

However, Aghion et al. (2005) included 10 African countries (DR, Congo, Ghana, Liberia, Kenya, Mauritius, Niger, Senegal, Sierra Leone, South Africa, Togo and Zimbabwe) in their analysis but only South Africa was likely to converge to the growth rate of USA using averages from 1965 to 1995. Using their threshold convergence rate - $(\beta_2/\beta_3) = -1.55$ and the country-level convergence parameter ($\theta_i = \beta_1 + \beta_3 FD_i$), I estimated the convergence rates for each country in the sample and Appendix A shows the results. In the table, we find that 16 countries out 44 are likely to converge given the policy factors included in the study. Therefore, in Africa the average level of financial development from 2002 to 2015 for some African countries will lead to economic growth convergence.

There was no enough evidence that financial innovation leads to long run growth convergence in Africa contrary to the results in Laeven et al. (2015). The average level of growth in credits to the private sector is 0.70 percent, which is woefully inadequate for convergence to occur. For the countries to move, faster toward their steady growth path the financial sector should move more credits to productive private sectors of African economies. The results in Table 17 shows the long run relationship. To determine the level relationships, I estimated the GMM model as I described above. The results are shown in the tables below.

Table 15: Results from the Cross-sectional Estimations

Eq Name:	01	02	03	04	05
FD	-0.027	-0.036			-0.071
	(0.046)	(0.043)			(0.021)**
C-W	0.851	2.342	-0.456	0.554	-0.116
	(0.894)	(1.255)	(0.844)	(1.063)	(0.500)
FD*C-W	-0.034	-0.050			-0.075
	(0.047)	(0.045)			(0.021)**
Intercept	2.127	4.977	0.547	1.885	-1.546
	(1.398)	(3.025)	(1.397)	(2.663)	(1.082)
HC		-0.307		-0.179	-0.002
		(0.509)		(0.408)	(0.238)
GEX		0.050		0.092	0.106
		(0.058)		(0.045)**	(0.027)**
INF		0.220		0.228	0.273
		(0.075)**		(0.064)**	(0.036)**
MOB		-0.032		-0.022	
		(0.021)		(0.017)	
TRADE		-0.009		-0.018	-0.022
		(0.010)		(0.009)**	(0.005)***
FI			1.833	1.812	2.941
			(1.166)	(0.848)**	(0.516)***
FI*C-W			1.295	0.925	1.737
			(0.809)	(0.603)	(0.353)***
Observations:	44	40	44	40	40
R-squared:	0.034	0.330	0.071	0.399	0.452
Rw-squared:	0.077	0.569	0.098	0.650	0.910
Wald (FD=FI)					0.000
*(FD*C-W)-(FI*C-W)*					0.000

Table 15 contains the cross-sectional results of the variables. U-U1 is the divergence between the GDP per capita growth rate of a country in Africa and that of United States of America. C-W is the log of GDP per capita for a country

*in Africa minus the log of GDP per capita of the United States of America. GDP is the average level of GDP per capita for the 44 African countries used in this study. All figures were obtained from the WDI (2017) and were standardized at the 2010 US dollars constant values. HC is the Barro-Lee's mean age of education. FD is the level of financial development, calculated as the share of bank credit to the private sector of GDP. FI is financial Innovation and it is calculated as the annual change in a country's level of credit to the private sector/GDP. GEX is a measure of the size of the government calculated as the share of government expenditure of GDP. INF is inflation and it is calculated as the annual change in the consumer price index within a country. TRADE is an indicator for trade openness and it is calculated as total exports plus total imports divided by GDP. Finally, MOB is a measure of technological infrastructure, estimated as the number of people out of every 100 people in a country's population who own mobile cellular phone. All the figures are country level averages from 2002 to 2015 except HC which is an average from 2002 to 2014. **significant at 0.05 and ***significant at 0.01.*

Source: Estimated from WDI (2017)

5.5.1 The Dynamic GMM Results on the Relationship between Financial Innovation and Economic Growth

Table 16 presents the results from the dynamic GMM estimations. Four columns relate to the estimations for the relationship between financial innovations and economic growth. In column 01, financial innovation is measured by the growth in credit to the private sector as a ratio of GDP. In column 02, we interacted the level of ATM penetration with the level of technological innovation (MOB) to measure the extent of coevolution of financial and technological innovations toward economic growth. Similar measurements were used in Columns 03 and 04. In column 03, I interacted PCB with MOB and in Column 04, I interacted PCR with MOB.

In Column 01, for the overall sample, we find that financial development (FD) has strong and positive effect on the level of economic growth. A percentage point increase in the level of financial development will increase economic growth by 0.26. This result is consistent throughout the estimation in the subsequent three columns but there are variations in the magnitude of the coefficients. The positive relationship between financial development and economic growth is consistent with the findings in a myriad of studies in the finance-growth nexus (King et al., 1993a, 1993b; Laeven et al., 2015).

On the other hand, the level of financial innovation has strong negative effect on economic growth in the short run. This does not meet expectation as we expect the growth in credits to have a more positive effect on economic growth. Johnson and Kwak (2012) offers explanations why financial innovation may not influence economic growth. They explain that if financial innovations do not improve effective financial intermediation, funds may not flow into productive sectors thereby hampering productivity. When innovations from financial agents do not directly assist in channeling funds to viable sectors but for improving services delivery, then financial innovations may have indirect effect on economic growth.

Similarly, Ansong et al. (2011) found that most of the financial innovations such as electronic cards, mobile monies transfers etc. encourage withdrawals rather than savings, which can constrain the banks' ability to mobilize and create credits. In addition, financial innovations may not have direct impact on economic growth where the amount of credits that goes to the productive small and medium enterprises is inadequate. In most countries, small and medium enterprises (SMEs) are engines of growth to the extent that they generate employment and innovations. In addition, they provide larger portions of government revenue for capital expenditure by paying taxes. However, one of the major challenges of SMEs especially in Africa is inadequate access to finance. In most cases, they do not possess the assets base to meet the collateral requirements of the financial agents since most banks in Africa requires over 296 percent of the value of loan as collateral. If the SMEs have inadequate access to finance, they cannot implement their innovative projects, expand capacity or employ more people. These can have negative implications on productivity or economic growth.

Furthermore, the Schumpeterian growth models (Aghion et al., 2005; Laeven et al., 2015) suggests that amounts of innovations generate commensurable levels of funding from financial agents. It follows that, financial agents would only increase credits to the private sector if the level of innovations bring improvement as the screening processes of the financial agents detect. In the growth model, financial agents innovate along with technological innovators. If technological innovators fail to keep up to the screening requirements of financial agents/innovators, they would not obtain funds to implement projects. On the other hand, if technological innovators are ahead of financial innovators, the outmoded screening process may fail to spot credible innovations. In these situations, the amount of credits that goes to the private sector for productivity would be limited.

In this analysis, in order to ascertain whether inadequate improvement in finance can be the situation for the indirect effect of financial innovation on economic growth, I decomposed the sample into two: the below-average sample and the above average sample and applied the GMM methods. The results are presented in Tables 17 and 18.

Some of the policy indicators also have significant relationship with economic growth in Africa. Economic institutional quality (EFREE) is negatively related to economic growth in Africa. This is partly because the level of economic institution has been ranked as low for most countries in Africa. Similar, external debt has negative relationship with economic growth in Africa. This may be the case when external debts are not used for developmental purposes or are wasted through corruptions and misappropriation. Similarly, the level of government expenditure has negative relationship with economic growth, which indicates that funds that flow to the public

sector may not be beneficial to economic growth. However, trade openness has positive effect on economic growth. In the previous chapter, I discussed the reasons why trade openness can be beneficial to economic growth.

Furthermore, I introduced telecommunication infrastructure, measured by cellular mobile subscription into the model. This is essential because most of the financial innovations in vogue in Africa are powered by ICT. However, the evidence shows that mobile telecommunication infrastructure is negatively related to economic growth in Africa. It suggests that, the mobile platforms rather facilitate the performance of an activity that induce growth than to induce growth directly. This is practical. People use their mobile phone to communicate, sell, buy, learn etc.; firms use their ICT capacity to design products and deliver services but the use of ICT in itself does guarantee success. ICT infrastructure is a catalyst or a magnifier. If economic agents use ICT infrastructure to engage in productive activities, it will magnify output. If economic agents do not apply ICT infrastructure on productive activities, it will reduce output drastically. Furthermore, ICT may not be a substitute for ineffective corporate governance that results in bad strategic formulation and implementation by firms. In the subsequent columns in Table 18, I analyze whether ICT infrastructure combine with financial innovations to influence economic growth.

In Column 02, I interacted ATM penetration with MOB. The aim is to test the assertion in Laeven et al. (2015) that financial innovation combines with technological innovations to influence economic growth. In addition, Andrianaivo et al. (2011) found that ICT infrastructure (measured by mobile phone development) interacts positively with financial inclusion to influence economic growth. Hasan et al. (2010) found that high-

tech industries or firms with higher quality patent have higher growth. Moreover, Hsu et al. (2014) found for emerging and developed nations that high-tech industries innovate more in countries where the equity market is more developed and in countries where the credit markets dominate, technological innovations are discouraged. From the results in Table 18, the interaction between MOB and ATM is not significant in inducing economic growth, which confirms that assertion in Johnson et al. (2012) that financial innovations in the credit markets may be for service delivery but not necessarily for improvement in financial intermediation. Similarly, Ansong et al. (2011) found that financial innovations in the banking system in Ghana discourages savings. Similar results were obtained for the interaction of MOB and PCB as well as the interaction of MOB and PCR.

Table 16: Financial Innovations and Economic Growth in Africa

Eq Name:	01	02	03	04
GDPG(-1)	-0.012	-0.148	-0.036	-0.012
	(0.018)	(0.028)***	(0.026)	(0.021)
FD	0.271	0.130	0.220	0.217
	(0.020)***	(0.041)***	(0.028)***	(0.021)***
FI	-0.139			
	(0.010)***			
EFREE	-0.370	-0.449	-0.364	-0.347
	(0.044)***	(0.088)***	(0.042)***	(0.041)***
ED	-0.009	-0.017	-0.006	
	(0.002)***	(0.004)***	(0.003)**	
GEX	-0.087	-0.117	-0.123	-0.212
	(0.053)	(0.080)	(0.059)**	(0.042)***
INF	-0.022	-0.004	-0.004	-0.006
	(0.010)**	(0.019)	(0.015)	(0.014)
MOB	-0.079	-0.057	-0.063	-0.048
	(0.005)***	(0.023)**	(0.014)***	(0.025)
TRADE	0.090	0.099	0.086	0.079
	(0.009)***	(0.019)***	(0.011)***	(0.008)***
ATM		-0.092		
		(0.050)		
ATM*MOB		0.001		
		(0.001)		
PCBF			-13.481	
			(9.133)	
PCBF*MOB			0.102	
			(0.103)	
PCR				-13.296
				(5.425)**
PCR*MOB				0.050
				(0.032)
Observations:	405	298	407	409
AR(2):	0.849	0.849	0.871	0.988
Sargan:	0.257	0.690	0.382	0.327
Cross-sections:	39	38	39	39

*Table 16 shows estimates of the relationship between financial innovations and economic growth. All equations were estimated using the first difference dynamic GMM procedure proposed by Arellano and Bond (1991). Instrument used in the estimations include dummies for four official languages spoken in Africa: Arabic, English, French and Portuguese. We assigned "1" if a country has any of the official languages and "0" otherwise. All estimations were carried out using EVIEWS Version 9. FD means financial development, calculated as domestic credit to the private sector as a ratio of gross domestic product (GDP). FI is one of the proxies for financial innovations, calculated as the change in the share of domestic credits of GDP. EFREE is Heritage Foundation's Economic Freedom estimated as an index of 12 indicators. And ED is external debts calculated as the total external debts of a country as ratio of GDP. Other indicators include: GEX, government expenditure measured by the share of general government final consumption expenditure to GDP; INF, inflation measured by annual changes in the consumer price index; MOB is our measure for technological innovation measure as the number of mobile cellular subscription per 100 of the population; and TRADE is the level of trade openness measured as total trade (exports plus imports) as a ratio of GDP. Finally, we also employed other measures of financial innovation. These include: ATM which is the level of automated teller machines (ATMs) diffusion measured by the number of ATMs per 100,000 of the population; PCB is private credit bureau calculated as the speed with which countries introduce private credit bureau in a financial system using the year by which the first country introduce private credit bureau as a benchmark; and PCR is private credit registry measured as the current year as a ratio of the year the year in which a country introduced private credit registry. Information on PCB and PCR were obtained from the World Development Indicators and ***Significant at 1% level and **Significant at 5% level.*

Source: Estimated from Data in WDI (2017)

In the last section of Table 17, we have the diagnostic indicators. The AR(2) is the second order serial correlation test. The high p-values indicate that there are no second order serial correlation in the error term. Similarly, I used the Sargan test to ascertain whether the instruments used in the GMM estimation correlate with the error term. The high P-values again across the estimations indicate that the instruments were efficient. These two indicators show that the dynamic GMM results are efficient and consistent.

5.5.2.1 Sample above the average level of financial innovation

Laeven et al. (2015) posits that countries with appreciable level of financial innovations will grow faster. My previous results also show that financial innovation indirectly induces economic growth in Africa. To verify whether the negative effect was caused by low level of financial innovations, we divided the sample into two: Sample above the average of financial innovation (0.70 percent) and sample below the sample average. Table 19 present the results for sample above the average level of financial innovations. We aim at finding out if African countries which are aggressive about financial innovation would improve economic growth.

From Table 17 even though the coefficient of financial innovation is negative but it is insignificant. This means the results are not statistically credible for any decision on financial innovations. For the results that are significant in Column 03, the previous levels of growth influence current growth negatively which illustrates diminishing effect of productivity in Africa. Government expenditure and trade openness consistently maintain their respective negative and positive effects respectively on economic growth. Table 20 shows the results for countries with financial innovations below the sample average.

Table 17: Countries with Financial Innovations above the Sample Average

Eq Name:	01	02	03	04
GDPG(-1)	-0.091	-0.048	-0.042	-0.170
	(0.097)	(0.148)	(0.095)	(0.117)
FD	-0.182	-0.264	0.077	-0.237
	(0.884)	(0.532)	(0.406)	(0.422)
FI	-0.164			
	(0.556)			
EFREE	0.650	0.060	-0.172	0.686
	(0.644)	(0.771)	(0.562)	(0.413)
GEX	-0.941	-0.965	-0.472	-1.066
	(0.811)	(0.571)	(0.407)	(0.482)**
INF	0.041	-0.232	-0.004	0.095
	(0.300)	(0.261)	(0.149)	(0.177)
MOB	-0.035	-0.041	-0.052	-0.060
	(0.074)	(0.093)	(0.035)	(0.089)
TRADE	0.026	0.135	0.034	-0.021
	(0.051)	(0.051)***	(0.040)	(0.065)
ATM		-0.219		
		(0.435)		
MOB*ATM		0.002		
		(0.005)		
PCBF			-66.518	
			(100.830)	
MOB*PCBF			0.543	
			(0.764)	
PCR				-22.282
				(32.334)

MOB*PCR				0.182 (0.140)
Observations:	213	164	213	213
AR(2):	0.999	0.999	9.943	0.999
Sargan:	0.843	0.711	0.473	0.765
Cross-section:	20	20	20	20

*Table 17 shows estimates of the relationship between financial innovations and economic growth. All equations were estimated using the first difference dynamic GMM procedure proposed by Arellano and Bond (1991). Instrument used in the estimations include dummies for four official languages spoken in Africa: Arabic, English, French and Portuguese. We assigned "1" if a country has any of the official languages and "0" otherwise. All estimations were carried out using EVIEWS Version 9. FD means financial development, calculated as domestic credit to the private sector as a ratio of gross domestic product (GDP). FI is one of the proxies for financial innovations, calculated as the change in the share of domestic credits of GDP. EFREE is Heritage Foundation's Economic Freedom estimated as an index of 12 indicators. And ED is external debts calculated as the total external debts of a country as ratio of GDP. Other indicators include: GEX, government expenditure measured by the share of general government final consumption expenditure to GDP; INF, inflation measured by annual changes in the consumer price index; MOB is our measure for technological innovation measure as the number of mobile cellular subscription per 100 of the population; and TRADE is the level of trade openness measured as total trade (exports plus imports) as a ratio of GDP. Finally, we also employed other measures of financial innovation. These include: ATM which is the level of automated teller machines (ATMs) diffusion measured by the number of ATMs per 100,000 of the population; PCB is private credit bureau calculated as the speed with which countries introduce private credit bureau in a financial system using the year by which the first country introduce private credit bureau as a benchmark; and PCR is private credit registry measured as the current year as a ratio of the year the year in which a country introduced private credit registry. Information on PCB and PCR were obtained from the World Development Indicators and ***Significant at 1% level and **Significant at 5% level.*

Source: Estimated from Data in WDI (2017)

5.5.2.2 Samples below the average level of financial innovation

Table 20 shows that the inverse relationship between financial innovation and economic growth appears to be driven by the financial innovation level of countries which had figures below the sample average. A one standard deviation increase in the level of financial innovations decrease economic growth by 0.22. This means that the adverse relationship portrayed for the full sample in Table 18 was caused by low level of financial innovations. The implication is that there was not enough growth in access to credit that can be used to implement technological innovations or there was limited level of innovations that generated the corresponding level of growth in credit which tend to be injurious to economic growth. This confirms the proposition that countries which fail to

innovate, would not generate the required amount of credits from the financial sector (King et al., 1993a, 1993b; Aghion et al., 2005; Laeven et al., 2015). Other measures of financial innovations did not produce significant results just like results in the previous tables.

The results for the policy measures were qualitatively the same as those in Table 16 except that the sign of government expenditure changed from negative to positive when FI and ATM were included in the model. Economic institutions still reported strong negative effect on economic growth. Similarly, trade openness is positive and strongly related to economic growth. In addition, in Columns 03 and 04, inflation is positively related to economic growth. The results for inflation and trade openness are largely consistent with the results obtained in the previous chapter. I have explained therein the reasons why the results appear these ways.

The probability values (p-values) for Arellano and Bond's second order serial test [AR(2)] are high indicating that there are no serial correlation in the error terms for all estimation. Similarly, the p-values for the Sargan test are high indicating that the instruments are uncorrelated with the error term. These tests show that all the estimation are efficient and consistent and therefore, the results are reliable. In the next section, I investigate how the level of financial innovations influence economic growth in six regions in Africa.

Table 18: Sample below the Average Level of Financial Innovation

Eq Name:	01	02	03	04
GDPG(-1)	-0.052	-0.165	-0.137	-0.102
	(0.027)	(0.046)***	(0.020)***	(0.026)***
FD	0.000	-0.104	-0.085	0.248
	(0.058)	(0.054)	(0.112)	(0.207)
FI	-0.219			
	(0.083)***			
EFREE	-0.533	-0.328	-0.400	-0.762
	(0.153)***	(0.153)**	(0.086)***	(0.173)***
GEX	0.255	0.471	-0.235	-0.441
	(0.067)***	(0.157)***	(0.135)	(0.215)**
INF	-0.002	-0.015	0.071	0.042
	(0.029)	(0.025)	(0.017)***	(0.022)
MOB	-0.036	-0.037	-0.025	-0.133
	(0.024)	(0.035)	(0.039)	(0.131)
TRADE	0.127	0.179	0.076	0.092
	(0.037)***	(0.025)***	(0.013)***	(0.027)***
ATM		0.012		
		(0.336)		
MOB*ATM		-0.004		
		(0.005)		
PCBF			-62.605	
			(193.551)	
MOB*PCBF			0.291	
			(1.892)	
PCR				31.719
				(25.233)
MOB*PCR				-0.011
				(0.339)
Observations:	220	158	223	223
AR(2):	0.664	0.999	0.129	0.827
Sargan:	0.401	0.449	0.258	0.202
Cross-section:	21	20	21	21

Table 18 shows estimates of the relationship between financial innovations and economic growth. All equations were estimated using the first difference dynamic GMM procedure proposed by Arellano and Bond (1991). Instrument used in the estimations include dummies for four official languages spoken in Africa: Arabic, English, French and Portuguese. We assigned "1" if a country has any of the official languages and "0" otherwise. All estimations were carried out using EVIEWS Version 9. FD means financial development, calculated as domestic credit to the private sector as a ratio of gross domestic product (GDP). FI is one of the proxies for financial innovations, calculated as the change in the share of domestic credits of GDP. EFREE is Heritage Foundation's Economic Freedom estimated as an index of 12 indicators. And ED is external debts calculated as the total external debts of a country as ratio of GDP. Other indicators include: GEX, government expenditure measured by the share of general government final consumption expenditure to GDP; INF, inflation measured by annual changes in the consumer price index; MOB is

*our measure for technological innovation measure as the number of mobile cellular subscription per 100 of the population; and TRADE is the level of trade openness measured as total trade (exports plus imports) as a ratio of GDP. Finally, we also employed other measures of financial innovation. These include: ATM which is the level of automated teller machines (ATMs) diffusion measured by the number of ATMs per 100,000 of the population; PCB is private credit bureau calculated as the speed with which countries introduce private credit bureau in a financial system using the year by which the first country introduce private credit bureau as a benchmark; and PCR is private credit registry measured as the current year as a ratio of the year the year in which a country introduced private credit registry. Information on PCB and PCR were obtained from the World Development Indicators and ***Significant at 1% level and **Significant at 5% level.*

Source: Estimated from WDI (2017) and GFDD (2017) Data

5.5.2 Financial Innovation, Sub-Regional Integration and Economic Growth in Africa

As I discussed in Chapter Two, regional integration offer the financial systems wider market for financial intermediation. The integration of the financial systems can also offer firms that depend on external finance wider opportunities for project funding. Furthermore, there is evidence of cross-border banking activities by banks within the continent. In this sub-section, we analyze whether the banking systems across six sub-regions in Africa complement the level of financial innovations to promote economic growth within the sub-regions. The sub-regions are ECOWAS, EAC, ECCAS, COMESA, ARABMAG and SADC. I constructed dummies for each of these sub-regions and interacted the dummies with FI just as I did in the previous chapter for BI (see equation 4.5). In the previous chapter, we find that bank market power in ECOWAS lead to economic growth in that sub-region. Nevertheless, in EAC, ECCAS, and ARABMAG, bank market power does not induce economic growth directly. In the following, I analyze whether the level of financial innovation promote growth in the various sub-regions. I interpreted the interaction relation for financial innovation and the regional dummies by summing up the coefficient of financial innovation and the coefficients of the interaction term. Table 19 presents the empirical results.

The interaction between financial innovation and ECOWAS produced strong negative effect on economic growth in West Africa. The coefficient of the interaction is

negative 0.287. This implies that a percentage point increase in the level of financial innovations in ECOWAS would lead to 0.287 reduction in economic growth. We can compare this result with the results for ECOWAS in the previous chapter. In the previous chapter, based on the analysis of the bank competitiveness information we obtained from analysis in chapter two, we find that the relative competitiveness of the banking system in ECOWAS had positive impact on economic growth. It appears from the results in this sub-section that the competitiveness of the banking system in ECOWAS has not promoted the growth of credits toward economic growth.

The interaction between financial innovation and COMESA induce economic growth in the sub-region. The interaction coefficient is positive (0.019) and significant at 0.01. This means that financial intermediation in the region complement the growth agenda of the sub-region.

The third column shows the effect of financial innovations in SADC on economic growth. Even though the practical impact is negative, the interaction coefficient is not significant. We can therefore not make any meaningful deduction from such interaction. The result is similar to the one in Bara et al. (2016). The authors employed the autoregressive distributive lags (ARDL) and Granger Causality methods to determine the causality between financial innovation (measured by growth in credits) and economic growth in SADC. They did not find any evidence that financial innovation induces economic growth in that sub-region.

Furthermore, the interaction between financial innovation and ECCAS has strong positive effect on economic growth for economies in Central Africa. The

interaction relation is positive at 0.682. This indicates that a percentage point increase in financial innovation in ECCAS will increase economic growth by 0.682.

The interaction term for financial innovation and EAC is not significant. This means there is no enough evidence that financial innovation lead to economic growth in East Africa. In Figure 6, we find that countries such as Ethiopia, Rwanda and Uganda, Djibouti, Kenya and Tanzania have appreciable levels of growth rate despite the fact that they have low levels of financial innovations. Burundi has both lower level of financial innovations and economic growth. However, this relation relates to the long run and the table does not factor in the other policy measures. There is no effect of financial innovation and economic growth in EAC in the short run.

Finally, financial innovation in Arab Maghreb (ARABMAG) sub-region does not promote economic growth. The interaction coefficient is negative 0.373 and it indicates that a percentage increase in the level of financial innovation will decrease economic growth by 0.373 in the sub-region.

The results above show that credit growth have various responses on economic growth in the various sub-regions. In COMESA and ECCAS, financial innovation promotes economic growth whereas in ECOWAS and ARABMAG, financial innovation does not induce economic growth. On the surface, one would be tempted to jump to the conclusion because of the negative effect, financial innovation should not be promoted in these regions. From the earlier discussion on the proposition by Laeven et al. (2015), we realized that financial innovations would not lead to economic growth when the rate of technological innovation is low. In that situation, financial agents would be reluctant to allocate funds to firms that depend on external finance. In the same token, Johnson et al.

(2012) also suggested that in situations where technological innovations in the financial sector have no direct effect on effective financial intermediation, financial innovation can be injurious to economic growth.

Table 19: Financial Innovation, Regional Integration and Economic Growth in Africa

Eq Name:	01	02	03	04	05	06
GDPG(-1)	-0.011	-0.010	-0.012	0.000	0.044	0.025
	(0.016)	(0.014)	(0.019)	(0.013)	(0.048)	(0.033)
FD	0.306	0.268	0.305	0.286	0.371	0.366
	(0.031)***	(0.023)***	(0.023)***	(0.014)***	(0.054)***	(0.033)***
FI	-0.039	-0.156	-0.211	-0.156	-0.178	-0.089
	(0.053)	(0.012)***	(0.012)***	(0.011)***	(0.064)***	(0.024)***
EFREE	-0.389	-0.363	-0.390	-0.377	-0.175	-0.238
	(0.049)***	(0.045)***	(0.047)***	(0.035)***	(0.097)	(0.114)**
ED	-0.006	-0.008	-0.009			
	(0.002)***	(0.002)***	(0.002)***			
GEX	-0.122	-0.103	-0.090	-0.202	-0.529	-0.637
	(0.066)	(0.053)	(0.057)	(0.046)***	(0.114)***	(0.060)***
INF	-0.018	-0.019	-0.023	-0.012	-0.115	-0.042
	(0.015)	(0.012)	(0.010)**	(0.007)	(0.084)	(0.023)
MOB	-0.083	-0.081	-0.081	-0.075	-0.095	-0.087
	(0.005)***	(0.005)***	(0.005)***	(0.004)***	(0.016)***	(0.009)***
TRADE	0.104	0.091	0.094	0.092	0.049	0.060
	(0.010)***	(0.010)***	(0.009)***	(0.010)***	(0.017)***	(0.014)***
FI*ECOWAS	-0.248					
	(0.053)***					
FI*COMESA		0.175				
		(0.066)***				

Table 19 Contd.

FI*SADC			0.171			
			(0.137)			
FI*ECCAS				0.838		
				(0.241)***		
FI*EAC					2.470	
					(1.512)	
FI*ARABMAG						-0.284
						(0.107)***
Observations:	405	405	405	407	432	432
AR(2):	0.871	0.911	0.784	0.924	0.930	0.962
Sargan Test:	0.239	0.289	0.259	0,252	0.875	0.417
Number of Cross section included	39	39	39	39	41	41

*Table 19 shows estimates of the relationship between financial innovations and economic growth. All equations were estimated using the first difference dynamic GMM procedure proposed by Arellano and Bond (1991). Instrument used in the estimations include dummies for four official languages spoken in Africa: Arabic, English, French and Portuguese. We assigned "1" if a country has any of the official languages and "0" otherwise. All estimations were carried out using EVIEWS Version 9. FD means financial development, calculated as domestic credit to the private sector as a ratio of gross domestic product (GDP). FI is one of the proxies for financial innovations, calculated as the change in the share of domestic credits of GDP. EFREE is Heritage Foundation's Economic Freedom estimated as an index of 12 indicators. And ED is external debts calculated as the total external debts of a country as ratio of GDP. Other indicators include: GEX, government expenditure measured by the share of general government final consumption expenditure to GDP; INF, inflation measured by changes in the annual consumer price index; MOB is our measure for technological innovation measure as the number of mobile cellular subscription per 100 of the population; and TRADE is the level of trade openness measured as total trade (exports plus imports) as a ratio of GDP. In addition, we also employed other measures of financial innovation. These include: ATM which is the level of automated teller machines (ATMs) diffusion measured by the number of ATMs per 100,000 of the population; PCB is private credit bureau calculated as the speed with which countries introduce private credit bureau in a financial system using the year by which the first country introduce private credit bureau as a benchmark; and PCR is private credit registry measured as the current year as a ratio of the year the year in which a country introduced private credit registry. Information on PCB and PCR were obtained from the World Development Indicators (2017) and Trikke et al. (2012). Finally, we constructed dummies for five regional groupings in Africa namely, Economic Community of West African States (ECOWAS), Economic Community of Central African Countries (ECCAS), East African Countries (EAC), ArabMaghreb Countries and COMESA. ***Significant at 1% level and **Significant at 5% level.*

Source: Estimated From WDI (2017) and GFDD (2017) Data

5.6 Conclusion

In this chapter, I analyzed the long run effect of both financial development and financial innovation on economic growth for 44 African countries. I employed a cross-sectional approach on averaged observations from 2002 to 2015. The aim was to determine whether both financial development and financial innovation induce economic growth convergence between countries in the sample and the Aghion et al.'s (2005) world's technological frontier. I interacted the level of the two variables each with initial income and interpreted the significant negative coefficient of the interaction effect as evidence of convergence. I also relied on the interaction parameters for each country and estimated the possibilities for the countries to converge using a convergence benchmark. The result financial lead to economic growth convergence provided other policy measures are present. For the individual countries, the table in Appendix A shows that 25 out of the 44 countries are likely to converge to the growth path of the USA if they develop their financial markets. However, financial innovation makes African countries grow apart from the growth path of USA.

The second portion of the paper examined whether financial innovation has any impact on short run growth prospect of the countries. I applied the dynamic GMM approach for this objective. The analyses were performed on the overall sample, sample above the average level of financial innovation and sample below the average level of financial innovation. In addition, I ascertained whether financial innovation across six sub-regions in Africa induces economic growth in the respective regions. For the whole sample and the sample below the average level of financial innovation, financial innovation is detrimental to economic growth. For the sample above the average,

financial innovation has no effect on economic growth. This indicates that the negative effect on growth in the overall sample is driven by low level of financial innovations from the samples below the average level. On the other hand, whereas financial innovation in COMESA and ECCAS induces economic growth in those regions, that of ECOWAS and ARABMAG is detrimental to economic growth. The evidence makes a strong case for measures to promote productivity-oriented financial intermediation in Africa.

CHAPTER SIX

BANK MARKET POWER, FINANCIAL INNOVATIONS AND ECONOMIC GROWTH IN AFRICA

6.1 Abstract

The objective of this paper is to examine whether bank with market power, to the extent that they channel resources to support innovations, can promote economic growth in Africa. Again, the dynamic GMM procedure was adopted in order to realize the above objective. Four proxies for financial innovation (growth in credits, number of ATMs per 100,000 people, the speed with which a country introduces a private credit bureau and the speed with which a country introduces a public credit bureau) were used and the Boone Indicator is used to measure bank market power. The result showed mixed interaction effects depending on the measure for financial innovation. Growth in credit showed no interaction effect. The banks do not use penetration of ATMs to induce economic growth in Africa. However, the banks use private credit bureaus and public credit bureaus to induce economic growth in Africa. The results imply that not all innovations from the banking systems support growth and therefore regulations should support the banks to engage innovations that induce growth. Countries which have not yet set up private and public credit bureaus must be encouraged to do so since that can promote economic growth.

6.2 Introduction

In this chapter, I examine how banks with market power can induce or use financial innovation to facilitate the channeling of financial resources into economic growth in Africa. In chapter two, we realized that, the level bank market power is rising and at the same time the level of financial innovation in Africa is low (see Figure 5 in chapter five and Table 2). Table 2 for example shows that the number of ATM per 100,000 of population is around 17, which is the lowest level of ATM penetration in relation to other regions in 2015. It appears that, financial innovation outside the banking sector such as mobile money transfer is gaining grounds in the continent but it is very

difficult for one to determine how these innovations impact directly on financial intermediation that is productive, due to inadequate data.

In the absence of data that show direct linkages of mobile money transfer and financial intermediation, I assume in this study that most financial activities eventually pass through the financial system for effective intermediation. Thus, we state that innovation in a system generates its level of funding from the financial systems. Therefore, a growth in credit to the private sector reflects the size of innovations for all firms that depend on external finance in order to implement their innovations. This assumption also requires that the rents from innovation should compensate both innovators and financiers. The theoretical justification for this measurement of systemic financial innovation is found in King et al. (1993a), Aghion et al. (2005) and Laeven et al. (2015). Can an environment with lower level of financial innovations and rising market power influence economic growth? This is the main question I answered in this chapter.

Financial innovation is responsible for many of the development in financial products such as mobile money transfer, services in the remittances industry, and new financial services such as SMS banking, internet banking, and mobile banking among others. Financial products that I enumerated above are in turn promoting financial inclusion Bara et al. (2016). The proliferation of new financial products is expected to lead to more competition especially when there are lesser activities restrictions in the banking sector. On the other hand, high level of competition can lead to contestable behavior among banks that can cause the banks to innovate. Beyond a certain level of competition, the banks can maintain profits from innovation if there is intellectual

properties protection (Aghion, Harris, Howitt & Vickers, 2001; Aghion, Bloom, Blundell, Griffith & Howitt, 2005; Acemoglu & Akcigit, 2012). In the absence of intellectual properties protection in weaker institutional quality regime, banks with market power can create relationship that can enable them to create monitoring scheme to spot and supports innovations. The banks can induce innovation-led economic growth in two ways by implementing new screening technologies to spot and assist firms with positive net present value projects or they can come up with new product such as many electronic cards in vogue to assist in service provision (Laeven et al., 2015).

In some banks, customers can transfer money from their mobile money accounts to their bank account and vice-versa. With this service, customers need not have a bank branch within their vicinity. All they have to do is to locate a mobile money vendor around their vicinity, deposit any amount into their mobile money account and within few minutes, they can re-transfer the money into their bank account by the help of their mobile phone. Through integration of mobile money transfer services, customer can withdraw money from their accounts at the comfort of their homes, pay their bills anywhere, anytime, and earn interest on their mobile money deposits. It appears that, in no distance future, financial innovation can determine totally the scope, the structure and credit allocation activities of the banking system.

However, innovations in the financial sector (especially in Africa) has limited level of innovativeness. This is because, most of the financial innovations (electronic cards, internet banking, mobile banking, mobile money etc.) are transfers from other part of the world. For example, the electronic cards that existed in the USA since the 1960s are now new financial products in some part of Africa although with much more

improvement. We derive other forms of innovations from products from other industries. For instance, the synthesis of ICT product and financial service delivery. Finally, intellectual protection of new financial products is very low which does not provide protection for rent and therefore discourages further innovations. This can increase competition as higher degree of imitation and standardization encourage more innovations (Acemoglu et al., 2012). Therefore, it is important for us to know the extent to which financial innovation interrelates with the level of competitiveness in the banking system to induce economic growth.

The Schumpeterian position (Aghion, Harris, Howitt & Vickers, 2001; Aghion, Bloom, Blundell, Griffith & Howitt, 2005; Acemoglu & Akcigit, 2012) suggests that innovation and competition convolute to improve access to finance, which in turn can promote economic growth. Allen and Gale (2004) posits that bank competition increases the risk-taking behaviour (innovation) of banks to the extent that they engage in activities (such as trading in derivatives) that are injurious to effective financial intermediation. The 2008 financial crisis happened because of excessive risk-taking activities of large financial agents in the developed world at the blind side of regulation. Bank competition are responsible for the likelihood of investment risks in some jurisdictions (Gonzalez, 2016), increase credit restrictions (Alvarez & Bertin, 2016) and bank fragility (Diallo, 2015).

The relationship-banking hypothesis also posits that large banks facilitate access to finance to small and innovative firms, which may not have collaterals for funds (Petersen et al. 1995). This suggest that bank with market power can improve economic growth by improving access to credit in an opaque economy. Competitive banks may

lack the information to evaluate the prospects of small firm. Their inability to create relationship with smaller firm may stifle innovations and productivity growth. In addition, according to Schumpeter (1912), small firms are responsible for technological innovations. A competitive banking system does not have the patient to effectively screen out bad borrowers. The implication is that bank competition can result in indiscriminate credit allocation, which can exclude small firms from getting access to finance (Dell'Arricia, 2000). If competitive banking systems cannot channel funds effectively to small firms, lack of access to credit may mean that projects would not get financed which in turn can restrict productivity growth.

Furthermore, we can appreciate the link between financial innovations and bank competition by understanding the relation between product market competition and innovation, since financial innovation is closely related to technological innovation. As discussed earlier, (technological) innovation means new products, new organizations (institutions) and new processes (Tufano, 2003; Frame & White, 2004). Innovations and inventions are closely related even though the time lag between the two necessitate that inventions precede innovations. Inventions are clearly the ideas that actualize innovations and innovations are inventions that have been commercialized (Afuah, 1998).

In the theoretical literature, competition in the product market is detrimental to innovation especially in a keenly contested industry (Aghion, Harris, Howitt, & Vickers, 2001; Aghion, Bloom, Blundell, Griffith, & Howitt, 2005; Acemoglu & Akcigit, 2012). The basic information in these theoretical exposition is that in product markets, competition initial increases innovations among firms in a neck-to-neck competition. In a competitive environment, firms can obtain distinctive competencies through products and

process innovations and innovating firms would increase post-innovation rents. For laggards, innovation would reduce their post-innovation rents unless they develop internal capabilities to catch up with innovators. This implies that, further innovation in a competitive industry depend on the speed with which laggards catch up to the leaders of innovations.

However, lack of intellectual property protection reduces the rents from innovation due to imitations by laggards (Acemoglu et al., 2012). The Schumpeterian models suggest that, in the absence of intellectual property protection, firms can enjoy profits from innovations when they can engineer some form of monopoly power for a sufficient period. In effect, market power provides protection to innovators but competition can erode rents thereby encouraging further innovation under full-competition periods. In the intermediate period, firms can split profits from innovation equally. However, in the financial sector, the literature above may suggest that, under intense competition, no bank can profit from innovation for a very long time since there is little restriction on financial product imitation.

Thus, intensive competition is overcome by innovations that provide incumbents some profits over the competition. The laggrds must also keep up with the level of innovation until they catches up with the incumbent before either the incombent extend innovation or the laggards overtake the incumbent in innovativeness.

Inherent in the Schumpetrian models is the assertion that a litlle imitation is important for growth because it serves as an incentive for competition-driven innovation. However, beyond a certain limit, imitation can discourage innovation due to its negative effects on rents. For firms that operate with the same level of technology, they can only

survive if they innovate in a competititive industry (Aghion, et al., 2005). Intellectual property rights ensure rent protection for incumbents (Acemoglu et al., 2012). The inference is that, in the absence of intellectual property protection, firms would reduce their research and development activities in a keenly competitive environment unless they have monopoly power. Therefore, market power can encourage innovations that can lead to economic growth.

In addition, some views suggest that financial agents derive their rents by recognizing technological innovators and funding their innovation (King et al., 1993; Aghion et al., 2005) and by innovating in screening processes that would give them the advantage of being the first to recognize and sponsor technological innovation (Laeven et al., 2015).

At the empirical level, Aghion et al. (2005) regressed the patents on the Lerner Index and found invented U-shaped relationship between competition and innovations an a panel specification. This illustate the non-linear causality between competition and innovations in the product market. The implication is that competition increases innovation initially and at certain points in time the effect, there is a diminishing effect of competition on innovations. The explanation is that competition increase the rents of innovation so incumbent firms can derive more incentive to innovate. But after a certain period, intense competition adds no further benefits to innovation. However, through creative destruction that pushes the equilibrium level of competition upwards, a new level of competition-innovation transmission can occur that can lead to growth.

The evidence in Cornaggia, Mao, Tian and Wolfe (2015) suggests that financial supports to small private firms from comepetitive bank discourages takeover intent of

large public firms. They also found that bank competition reduces innovation by public firms when there is deregulation. From their study, we can infer that private firms are able to ward-off predatory firms because bank competition allocates more funds for the them to implement their new projects. The implementation of projects improves the value of the firm to the extent that large firms find it more expensive to acquire smaller firms.

From the previous chapter, we found that the low level of financial innovation does not induce economic growth in Africa even though in some sub-regions, the level of financial innovation is positively related to economic growth. In this paper, I contend that, bank with market power to the extent that they innovate and also channel resources to support technological innovations by firms can induce economic growth. At the country-level, I expect the level of bank market power to allocate funds more effectively to innovating financial and non-financial economic agents to improve economic growth in Africa.

To achieve the objective in this paper, I gathered data from 44 African countries between 2002 and 2015. As usual, I applied the first difference GMM procedure prescribed by Arrelano and Bond (1995) which incorporates the first differences of the dependent variables in the estimations. The GMM procedure was expected to assist in dealing with possible endogeneity bias assocaited with the variables. Since African countries are seperated also by official languages spoken, we created lingo-regional dummies that includes Arabic, English, French and Portugues speaking countries. These were used as intruments in the estimations. In all estimations, we controlled for the level of financial development, trade openess, government expenditure, remittances inflows and inflation and the level of economic institutions. I used the Boone Indicator to

measure bank market power and also four indicators to measure to measure financial innovations (growth in credits to the private sector, ATM penetration, the speed with which a country adopts private credit bureaus, PCB and the speed at which a country adopts private credit registry). Next, I interacted the proxies for the both bank market power and financial innovation and interpreted the interaction relationship as its impact on the level of economic growth in Africa. Finally, economic growth was measured by the growth rate of per capita gross domestic product (GDP) over the period.

The results show that when growth in credit was used as a measure for financial innovation, the interaction term for bank market power and financial innovation did not produce any significant effect on economic growth in Africa. The insignificant effect implies that we cannot ascertain a meaning information that banks with market power supports innovations that improve economic growth. However, the adoption of ATMs, PCB and PCR individually influence economic growth in the wake of high bank market power. Bank with market power use ATM services to induce economic growth but the existing of PCBs and PCRs do not assist bank with market power to influence growth. This indicates, at the macro-level, bank with market power do leverage their information advantage to influence credit allocation toward growth rather than resorting to public and private information systems. The results may also imply that bank with market power withhold credit to firms because of low levels of innovation.

The rest of the paper is organized as follows: Section two discusses the methodology employed to achieve the objectives in this study as well as the description of the data and sources of data on the variables included in the various estimations.

Section three presents and discusses the results. Finally, section five concludes and provides recommendations.

6.3 Method

A sample of 44 African countries were included in this study and the period under investigation is 2002 to 2015. We constructed an unbalanced panel data structure consisting data from the world development indicators (WDI, 2017), world governance indicators and the Global Financial Development Database (2017), all from the World Bank. All the datasets are at the country level.

We relied on the endogenous growth models in the extant literature that specified that economic growth depend on trade openess, government expenditure, and inflation, and specified the following model:

$$G_{it} = \beta_1 G_{it-1} + \beta_2 C_{it} + \beta_3 BI_{it} + \beta_4 FI_{it} + \beta_6 BI_{it} * FI_{it} + \varepsilon_{it} \quad (6.1)$$

where:

G is economic growth measured by the gross rate per capita gross domestic product (GDP)

$$A\ set\ of\ control\ variables\ (C) = \begin{cases} Mobile\ Telephone\ Subscription \\ Instititutions \\ Trade\ Openness \\ Governemnt\ Expenditure \\ Inflation \end{cases}$$

$$Bank\ Market\ Power\ (BI) = \{Boone\ Indicator$$

$$Financial\ Innovations\ (FI) = \begin{cases} Growth\ in\ private\ sector\ credit \\ ATM\ per\ 100{,}000\ population \end{cases}$$

We applied the first differences generalized method of moment (GMM) analytical procedure popularized by Arrelano et al. (1991). The GMM procedure deals with the

endogeity characteristic associated with our dataset. In all estimations, we used the official languages which are also related to the legal origin of the countries involved, as instruments. In this regard, we constructed dummies that included Arabic, English, French and Portugues offcial languages and classified the countries accordingly in these official language origins.

6.4 Empirical Results

The empirical sections of the previous chapters contain the description of the variables in this chapter. In addition, the results for the other independent variables have the same sign for those that are significant and therfore requires litle dicussions. Therefore, under this section, I discussed results on the mian variables that bother on the impact of the interaction between bank market power and financial innovation on economic growth in Africa. Table 20 presents the results of the dynamic GMM estimates.

In Column 04 of Table 20, bank market power is negatively related to economic growth. The differences in the direction of the coefficients can be attributed to the uniqueness of the two estimates. Column 01, the proxy for financial innovation is FI which is the growth in credit whilst PCR is the proxy for financial innovation in Column 04. Column 04 also excludes external debt (ED) because its inclusion cause the probability value of the AR(2) to be small causing serial correlation. Since, ED has been insignificant throughout all estimations, its exclusion in the last column may not be the cause of the change in sign. Therefore, the sign of the relation between bank market power and financial innovation is negative because of the inclusion of PCR into the estimation.

PCR provide information about creditors and the result is an indication that public credit registries and bank market power are substitutes in inducing economic growth. The interaction term between BI and PCR further provides a stronger confirmation to this claim. The coefficient of the interaction term is negative 4.464 and it is significant at 0.01 significant level. This result gives some credence to the suggestion in the relatioship-banking hypothesis that bank with market power have their systems of generating information about customers in the absence of any other information gathering systems, in the intermediation process. In the absence of credit registry in Africa, bank with market power would ensure that credits go to credible borrowers towards economic growth.

In Column 02, the interaction between bank market power and ATM penetration has positive effect on economic growth. The interaction coefficient is positive 4.068 and it indicates that ATM services in the banking system complements the financial intermediation activities by banks with market power to promote growth. ATMs are used for deposits and withdrawals of funds. Customers can also use ATMs to pay bills online and buy items globally. Without the interaction relationship with bank market power, ATM services do not have significant impact on economic growth. This results confirm the assertion by Johnson and Kwak (2012) that most of the financial innovations that relates to banks' service delivery do not have direct impact on effective or productive financial intermediation that channel funds into growth sectors. Ansong et al. (2011) also suggest that in Africa, most of the electronic cards services rather promote withdrawals more than deposits thereby hampering financial savings.

In Column 04, the interaction between bank market power and private credit registry is positive and sigificant at 0.01 level. The coefficient of the interaction term is positive at 1.036. This means the level of bank market power and the institution of private credit registries in Africa are complement in inducing economic growth. Private credit bureaus provide bank with market power borrower information that assist the banks to lend to less risky customers only. Less risky customers normally have viable projects that require funding from the banks. Therefore, by rellying on credible information in credit allocation, bank market power supply funds into produtive sectors.

The results shows that the convolution between bank market power and financial innovation is essential for growth. Without, some level of bank market power, financial innovation, in absolute terms, has negative implication for economic economic growth because most financial innovations in vogue do not have direct impact on financial intermediation. For financial innovation that has direct impact on financial intermediation (PCB), their effect on economic growth is positive but insignificant.

In the Francophone countries in Africa, PCRs have existed for several decades. However, whereas PCBs provide private information to protect creditors, PCRs operate under the various Central Banks and they normally supply information for Central Bank Monitoring and Supervision. Djankov et al. (2007) emphasize that, in terms of the volume of information, PCB provide more information about borrowers' credit scoring than the information content of PCRs. The implication is that the banks would relly on more borrower information from PCBs than PCRs. This explains the complementary relationship between PCBs and the level bank market power towards growth. In the

absence of PCRs, bank with market power can still influence economic growth through effective credit allocation.

Table 20: Bank Market Power, Financial Innovation and Economic Growth in Africa

Eq Name:	01	02	03	04
GDPG(-1)	-0.078 (0.025)***	-0.075 (0.035)**	-0.088 (0.023)***	-0.074 (0.030)**
FD	0.125 (0.048)***	-0.013 (0.047)	0.090 (0.036)**	0.097 (0.017)***
FI	-0.083 (0.025)***			
EFREE	-0.302 (0.046)***	-0.320 (0.054)***	-0.240 (0.045)***	-0.178 (0.042)***
ED	0.006 (0.014)	-0.008 (0.010)	0.019 (0.013)	
GEX	-0.117 (0.068)	-0.188 (0.082)**	-0.130 (0.066)**	-0.095 (0.049)
INF	-0.003 (0.019)	-0.004 (0.017)	-0.012 (0.017)	0.005 (0.017)
MOB	-0.046 (0.011)***	-0.014 (0.021)	-0.030 (0.014)**	-0.051 (0.024)**
TRADE	0.071 (0.025)***	0.117 (0.020)***	0.092 (0.019)***	0.086 (0.018)***

REM	-0.211 (0.169)	0.009 (0.204)	-0.194 (0.151)	-0.226 (0.139)
BI	0.940 (0.210)***	4.089 (1.741)**	0.371 (0.233)	-5.252 (1.992)***
FI*BI	-0.088 (0.078)			

Table 20 Contd.

ATM		-0.112 (0.128)		
ATM*BI		-0.304 (0.153)**		
PCB			-5.220 (9.507)	
PCB*BI			9.287 (4.398)**	
PCR				3.792 (8.896)
PCR*BI				11.260 (4.161)***
Observations:	357	270	357	359
AR(2):	0.878	0.873	0.864	0.576
Sargan Test:	0.280	0.260	0.230	0.196
Number of Cross section included	33	32	33	34

Table 20 shows estimates of the relationship between financial innovations and economic growth. All equations were estimated using the first difference dynamic GMM procedure proposed by Arellano and Bond (1991). Instrument used in the estimations include the first lags of all explanatory variables and dummies for four official languages spoken in Africa: Arabic, English, French and Portuguese. We assigned "1" if a country has any of the official languages and "0" otherwise. All estimations were carried out using EVIEWS Version 9. FD means financial development, calculated as domestic credit to the private sector as a ratio of gross domestic product (GDP). FI is one of the proxies for financial innovations, calculated as the change in the share of domestic credits of GDP. EFREE is Heritage Foundation's Economic Freedom estimated as an index of 12 indicators. And ED is external debts calculated as the total external debts of a country as ratio of GDP. Other indicators include: GEX, government expenditure measured by

*the share of general government final consumption expenditure to GDP; INF, inflation measured by annual changes in the consumer price index; MOB is our measure for technological innovation measure as the number of mobile cellular subscription per 100 of the population; and TRADE is the level of trade openness measured as total trade (exports plus imports) as a ratio of GDP. Finally, we also employed other measures of financial innovation. These include: ATM which is the level of automated teller machines (ATMs) diffusion measured by the number of ATMs per 100,000 of the population; PCB is private credit bureau calculated as the speed with which countries introduce private credit bureau in a financial system using the year by which the first country introduce private credit bureau as a benchmark; and PCR is private credit registry measured as the current year as a ratio of the year the year in which a country introduced private credit registry. Information on PCB and PCR were obtained from the World Development Indicators and ***Significant at 1% level and **Significant at 5% level.*

6.5 Conclusion

We find from the foregoing analysis that financial innovations that are directly related to financial intermediation such as establishment of private credit bureaus and public credit registry enable banks with market power to promote economic growth in Africa. However, financial innovations such as the electronic cards in the banking systems do not induce economic growth. Bank systems regulations should ensure that more information sharing systems are established to help screen out credible borrower to ensure sustained economic growth.

CHAPTER SEVEN

THE EFFECT OF BANK MARKET POWER ON ECONOMIC GROWTH IN AFRICA: DO INSTITUTIONS AND REGIONAL INTEGRATION MATTER?

7.1 Abstract

This paper provides investigations into the nexus between bank market power economic growth using country-level bank data from 44 African countries from 2002 to 2015. Secondly, the paper also explores how institutional quality factors influence the mechanisms through which banks with market power influence economic growth. Finally, the paper analyzed how the level of bank market power interact with sub-regional integration to induce economic growth across six sub-regions in Africa. I employed the first differenced GMM model to achieve the above objectives. The results show that less competitive banking system in Africa induces economic growth. In addition, institutional quality improvement induces positive economic growth and improves the degree at which bank market power affect economic growth. In West Africa, the less competitive nature of the banking environment induces economic growth but the less competitive nature in the banking environment of the other sub-regions discourage economic growth. The results call for policy directions that improve economic and political institutions as well as the competitiveness of sub-regional banking environment.

7.2 Introduction

Banks are prime media through which sizeable amount of financial intermediation activities take place in Africa. Banks mobilize funds from surplus units, screen out bad borrowers and provide credit to viable firms and credible entrepreneurs. Banks reduce adverse selection and morale hazard through screening processes that ensure efficient and effective credit allocation. By efficient credit allocation, I mean the banks employ technologies that reduce intermediation cost. Effective credit allocation means the intermediation process only ensure that credit goes to productive sectors of economies. Bank market power can promote economic growth through efficient and effective

distribution of credit to small firms, which have future growth prospects (Petersen & Ragan, 1994, 1995). For emerging economies, bank market power improves economic growth by expanding capital accumulation that also depends on effective credit rationing (Acemoglu, Aghion, & Zilibotti, 2002). However, Kim, Park and Song (2016) found that large banks with market power can promote fragility of smaller banks. The underperformance of small banks can stifle access to finance by firm, reduce the soundness of the financial and reduce economic growth.

Various studies have been conducted on the development of the banking system and its effect on economic growth. Some earlier studies concentrated on the appropriateness of the measurements for bank competition (bank market power) and the comparison of the level of bank market power across regions (Clerides et al., 2015; Fosu, 2013; Anzoategui, Martinez Peria, & Rocha, 2010). Other studies examined how the level of banking system competition affect access to external finance at the industry-level (Beck, Demirgüç-Kunt, & Maksimovic, 2004; Love & Martínez Pería , 2015). Generally, these studies, which concentrate on the banking systems of developed nations, suggest that less competitive banking environments restrict access to finance by firms that heavily depend on external funds. By restricting access to finance, banks with market power can have detrimental effect on the growth of industries and therefore productivity growth of the general economy. The studies were however conducted at the micro-level and therefore did not directly examine how less competitive banking evironment induces economic growth at the country-level. Micro-level studies do not often control for some growth fundamental factors like human capital accumulation, trade, foreign direct investment, government expenditure and external debts. The effect is that micro-level

studies are likely to produce different results from country-level studies. Also, when we conduct country-level studies, we can have a wider spectrum to generalized our results. In addition, for systems characterized by high financial intermediation inefficiencies and lower levels of financial development, banks with market power can engineer higher level of stability by leveraging their scale economy to improve financial intermediation toward improvement in productivity. A study at the country level is important for policy making by governments, regional integration stakeholders, bankers who are interested in cross-border banking, international investors and traders among others.

The objective of this study is to determine how the level of bank market power influence economic growth. The study is timely in the sense that Africa's banking system has become dynamic with new products, markets, cross-border banking, deregulation and more competition as major features (see chapter two for a discussion on the development of the banking system in Africa). Given the importance of the banking system in financial intermediation or credit allocation, it is imperative that we conduct investigations into how the structure of the banking system support economic growth in the continent.

The second contribution of this paper is on how various forms of institutions affect economic growth in Africa when the banking system is less competitive. From the literature, we realize that institutions promote growth (Acemoglu & Robinson, 2012, La Porta et al., 1998) in the sense that countries with high institutional quality are more likely to grow faster than countries with low institutional quality. In this paper, I examined how economic and governance institutions affect economic growth with the hope that various forms of institutions would affect economic growth differently. A study on the role institutions in the intermediation channels is important because, the nature of

governance and economic institutions can determine the extent of intermediation leakages which can have an impact on resource allocation towards growth. In regimes of high institutional quality that supports rule of law, effective public sector, good governance, stable political environment and high level of inclusivity, we expect the structure of the banking system to channel more resources into productive sectors.

The relationship-banking hypothesis provides the foundation for this aspect of the paper. In that proposition, bank with market power have their in-house institutions that assist them to create and sustain banking relationship with their clients. Therefore, in the wake of weak institutional quality, banks with market power can still spot and allocate funds to firms with risky but viable projects. The suggestion is that, institutions and bank market power are substitutes in influencing capital accumulation towards economic growth.

The study examines whether the level of bank market power in Africa and the various institutional quality factors are complements or substitutes in inducing economic growth in the continent. I implemented this by linking the interaction of bank market power and institutional quality to economic growth and interpreted the interaction relationship as how institution influence bank market power to promote growth. The study interpreted a positive interaction relationship as complementary effect and a negative interaction relationship as substitution effect. This relationship exists theoretically. Pagano (1993) posits that financial intermediation leakages exist in every financial markets. However, the extent of the leakages depends on the structure of the banking system. A less competitive banking system can exacerbate the level of financial market leakages by increasing bank spread. This can have negative effect on growth if

there is greater political influence that force credit flow into the public sector. The relationship-banking hypothesis however, suggests that in the absence of strong institutions, bank with market power can channel funds into productive sectors because bank with market power possess information advantage.

Next, based on the premise that regional integration provides larger markets across boundaries for banks, we can infer that regional integration can increase the degree of market power of banks. Regional integration can also enable firms to source credits across their national boundaries. A responsive banking system can provide funds to facilitate trade and investment across countries within a sub-region. In this paper, I also contend that sub-regional integration can induce a wider market penetration by the banks within a sub-region thereby enabling them to assist in trade financing and infrastructural development. This can have positive effect on productivity growth.

The Heritage Foundation's economic freedom index measured economic institutional quality. Governance institutions were measured by the control of corruption, government effectiveness, regulation quality, political stability and absence of violence/terrorism (henceforth, political stability), rule of law, and voice and accountability from the World Bank's World Governance Indicators.

I also constructed dummies for the official languages in Africa (Arab, English French and Portuguese) and used them as instrument since official languages in Africa are strongly associated with the legal origin of the respective countries. For example, the Anglophone countries have mostly adopted the Common Law legal system whilst the Francophone countries mostly implement the Civil Law system. Therefore, by using the

official languages, we are as well emphasizing that the legal origin correlates with the level of economic growth.

I also examined the impact of regional integration on how the less competitive nature of the banking system induces economic growth. To implement this objective, the paper constructed dummies for six sub-regional groups under the African Union. Then, we found the multiplicative interaction of the sub-regional dummies with the Boone Indicator and interpreted the sum of the coefficients of the Boone Indicator and the interaction term as the magnitude and direction of contribution of bank market power (in the respective sub-regions) to economic growth in Africa.

The paper applied the first difference dynamic generalized method of moment (GMM) procedure proposed by Arellano and Bond (1991) in order to achieve the above objectives. The GMM technique is efficient when estimating panel data with large number of cross sections and smaller time series dimension (Moral-Benito, Allison, & Williams, 2017). The GMM procedure include the lagged dependent variable and transforms all other variables into their first differences in order to eliminate the individual country specific differences. The model is also efficient in eliminating the possible endogeneity issues among the variables and it provides consistent estimates (Rioja & Valev, 2004). I used the first differences of both dependent and independent variables as instruments in addition to the dummies of official languages.

I evaluate the consistency of the estimates on the assumption that the instruments do not correlates with the error term. To verify this assumption, I employ Sargan's J test (Sargan, 1958) to ensure the validity of the instrument. The results show that the instruments do not correlate with the error term, implying my estimations are not affected

by possible endogenous relationship among the policy variables in this study. To check for serial correlation among the standardized errors, I performed the Arellano and Bond's serial correlation (AR(2)).

The organization of the rest of the paper is as follows: The next section discusses the empirical model specification. Section three describes the data and their sources. Section four presents the discussion of the empirical results. Section five concludes and provides recommendations.

7.3 Model Specification

Endogenous growth models posit that economic growth depends on capital stock and human capital accumulation (Romer, 1990; Mankiw, Romer & Weil, 1992). Therefore, this study includes human capital as control variables. In order to achieve the above hypotheses, this study estimates the following general regression model:

$$G_{it} = \beta_1 BI_{it} + \beta_2 C_{it} + \beta_3 INST_{it} + \varepsilon_{it} \qquad (7.1)$$

where in all our regressions,

- G is the growth rate of per capita GDP, a measure for economic growth for each African country i at time t;
- BI is indicator used to measure bank market power within a country i, at time, t;
- C is a set of control variables including, human capital (HC); government expenditure (GEX); inflation (INF); foreign direct investment (FDI); trade openness (TRADE) and technological innovation (MOB); and
- INST is institutions

The GMM representation of equation as follows:

$$G_{i,t} = \alpha_t + \sum_{j=1}^{p} \beta_1 GDPG_{i,t-j} + \sum_{j=1}^{p} \beta_2 BI_{i,t-j} + \sum_{j=1}^{p} \beta_3 C_{i,t-j} + \sum_{j=1}^{p} \beta_4 INST_{i,t-j} + f_i + \varepsilon_{it} \quad (7.2)$$

where,

- f_i is country-specific effect;
- i represents the countries and t is the time series dimension of the data;
- j is the lag length;
- p is the maximum lag length; and
- $\beta_1, \ldots \beta_4$ are the coefficients of the estimations.

In order to do away with the individual country heterogeneity, we transformed the model into the first differences as follows:

$$\Delta G_{i,t} = \sum_{j=1}^{p} \beta_1 \Delta GDPG_{i,t-j} + \sum_{j=1}^{p} \beta_2 \Delta BI_{i,t-j} + \sum_{j=1}^{p} \beta_4 \Delta VCON_{i,t-j} + \sum_{j=1}^{p} \beta_5 \Delta INST_{i,t-j} + \Delta\varepsilon_{i,t}\,, t = 1, \ldots, T\ \,, j = 1, \ldots, p \quad (7.3)$$

where, $\Delta G_{i,t} = G_{i,t} - G_{i,t-1}$ and this definition applies to all explanatory variables as well. Similarly, $\Delta\varepsilon_{i,t} = \varepsilon_{i,t} - \varepsilon_{i,t-1}$. The above equation (7.3) retains only time effect but eliminates the cross-sectional effect.

In the next dynamic GMM model, we introduced the interaction terms for the interaction between bank market power and institutional quality measures (the level of economic freedom (EFREE), control of corruption (COR), government effectiveness (GE), regulation quality (RQ) and political stability (PS)). To interpret the effect of the interaction between bank market power and institutional quality, we differentiated Equation (7.4) with respect to BI. We then summed β_2 and the product of β_4 and the

mean INST as the coefficient of the interaction effect. Except in cases where the interaction term has dummies, we interpreted all other interaction relationship by the above interpretation.

$$\Delta G_{i,t} = \sum_{j=1}^{p} \beta_1 \Delta G_{it-j} + \sum_{j=1}^{p} \beta_2 \Delta BI_{it-j} + \sum_{j=1}^{p} \beta_3 \Delta C_{it-j} + \sum_{j=1}^{p} \beta_4 \Delta BI * INST_{it-j} + \Delta \varepsilon_{i,t} \quad (7.4)$$

I investigated the hypothesis that the sub-regional integration can propel banks with market power to channel resources into higher productivity growth in Africa. To implement this, I constructed six dummies for six sub-regions under the African Union and interacted the resulting dummies with my measures of bank market power. I interpreted the sum of the coefficient of the Boone Indicator and the coefficient of the interaction between the Boone Indicator and the regional dummies ($\beta_2 + \beta_4$ in equation 7.5) as the magnitude and the direction of the interaction terms.

$$\Delta G_{i,t} = \sum_{j=1}^{p} \beta_1 \Delta G_{i,t-j} + \sum_{j=1}^{p} \beta_2 \Delta BI_{i,t-j} + \sum_{j=1}^{p} \beta_3 \Delta VCON_{i,t-j} + \sum_{j=1}^{p} \beta_4 \Delta BI * REG_{i,t-j} + \Delta \varepsilon_{i,t} \quad (7.5)$$

In equation (7.5), REG is the placeholder for the sub-regional dummies. The sub-regional dummies include ECOWAS, which is a dummy that ascribes "1" if a country in African belongs to the Economic Community of West African States and "0" otherwise. EAC is dummy which ascribes "1" if a country in African belongs to the East African Countries and "0" otherwise. ECCAS is dummy which ascribes "1" if a country in African belongs to the Economic Community of Central African States and "0" otherwise. COMESA is dummy which ascribes "1" if a country in African belongs to the Economic Community

of West African States and "0" otherwise. ARABMAG is dummy which ascribes "1" if a country in Africa belongs to Arab Maghreb Union and "0" otherwise. SADC is dummy which ascribes "1" if a country in African belongs to the Southern African Development Community and "0" otherwise.

7.4 Data and Data Sources

I obtained data on GDP per capita growth rates, government expenditure, inflation, the share of foreign direct investment in GDP and trade openness from the World Development Indicators (2017). I also obtained data on human capital (average year of schooling) from the Penn World Table Version 9. The Heritage Foundation (2018) provided data on Economic freedom indices. In addition, the Global Financial Development Database (2017) supplied data on mobile cellular penetration, Boone Indicator and the Lerner Index. Finally, the study obtained the country-level governance indictors from World Governance Indicators (2017).

I constructed a panel data structure for all variables from 2002 to 2015. This period is significant for two main reasons. First, the period allowed for the coverage of majority of the countries in Africa since most of series did not have observations prior to 2002. For instance, the World Governance Indicators has annual series starting from 2002. This enabled me to reduce the missing values in the data structure. The second reason is that 2002 coincides with the establishment of the AU. Therefore, the period offers a timely opportunity for the assessment of how the level of bank market power in Africa can contribute to the AU's agendum on promoting sustainable economic growth.

However, there are still gaps in the data structure to the effect that our final dataset is unbalanced. The GMM approach adopted eliminates time-variant

heterogeneities and ensures persistent results given the uneven nature of my panel structure. Table 22 presents that descriptive statistics of the variables whilst Table 21 reports on the descriptions and justifications of each variable.

7.4.1 Dependent Variable

The dependent variable is real GDP per capita growth rate. The WDI (2017) reports the real per capita GDP at 2010 US dollar constant prices. The median economic growth rate of the 44 African countries is 2.36. The growth rate is as low as -36.83 per cent in some countries and as high as 32.25 in other countries. This means that there is high variability in economic growth among countries in Africa. This is reflected in the high standard deviation of growth rates at 4.53. Table 23 shows that the dependent variable correlates weakly with all the independent variables. It has positive association with human capital, inflation, foreign direct investment, Lerner Index, control of corruption, government effectiveness, political stability, role of law, and voice and accountability. On the other hand, the dependent variable correlates negatively with government consumption expenditure, Boone indicator and the degree of economic freedom.

7.4.2 Independent Variables

The mean level of bank market power (BI), as measured by the Boone Indicator is -0.07. The implication is that the level of competition in the banking systems in Africa is decreasing. The Lerner Index also depict a picture of high market power in the banking system, indicating a wider divergence between price and marginal costs. However, whereas the number of observations for the Boone Indicator is 529, that of the Lerner Index is 388. We expect the difference in the number of observations to affect the

econometric estimates on each measure of bank market power, so that the coefficient of the GMM estimates would differ. I use the two proxies to check the robustness of the practical explanation of the relationship between bank market power and economic growth. Figure 3 (page 120) shows that the Boone indictor slope upwards, which indicates increasing level of bank market power over the period. This study expects bank market power to have a positive effect on economic growth, by arguing that bank with market power can effectively channel credits to productive sectors than banks operating in a more competitive environment because of their size economy and information endowment that sustain relationship with firms.

Human capital (HC) is key for the economic development of any nation. The level of human capital shows the extent to which a country has developed absorptive capacity to leverage the use of technology into economic growth. A country with a high level of human capital that harnesses investment, capital accumulation, foreign direct investment, and other growth drivers, is more likely to grow faster than a country with a level of human capital that does not magnify the growth drivers. According to the endogenous growth models, the level of knowledge, education, health, fertility, research and development can enhance the capability of capital to accelerate growth beyond the countries' long-term growth potential (Lucas, 1988; Mankiw, Romer, & Weil, 1992). Developed countries that have developed their human capital have more per capital income than countries in Africa with lower level of human capital. From Table 11, the mean human capital measured by Barro-Lee's mean age of schooling is 1.74 over the period. This compares unfavorably with United States' average age of schooling of 3.41 over the period 2002-2014. This means Africa needs to develop her human capital if she

wants to reach the high-income level status. The expectation is that human capital accumulation in Africa can improve the technological endowment in Africa and propel higher economic growth.

The mean government final consumption expenditure (GEX) is 14.89 percent of GDP. The size of government expenditure is as low as 2.74 percent of GDP in some countries and as high as 38.41 percent in other countries. From the Keynesian view, increases in government expenditure can have stimulating effect on economic growth. This however depends on the source of revenue that supports such increment. If the government finances her expenditure through taxation, business would not obtain enough funds to expand their output and that can constrain economic growth. The effect of government expenditure on economic growth also depends on whether expenditure is financed through domestic borrowing, external borrowing or expansion in money supply. If governments finance their expenditure through domestic borrowings, it crowds out private sector access to finance, since excessive government borrowings can result in high cost of borrowing by the private sector. Government borrowings outside the national boundaries allow the private sector to access funds in the domestic financial system to finance their expansions. If the government prints more currency to finance her consumption, the effect would be more money in the system that can have downward effect on interest rates. Low interest rates imply more access to finance by the private sector. Thus, the effect of government expenditure on economic growth is multifaceted and unclear.

Inflation rates (INF) in Africa has been very volatile over the period. The rate has been as low as -35.84 percent in some countries and as high as 44.39 percent in other countries. High inflation normally has negative effect on economic growth as it constraints purchasing power of businesses and individuals. However, if high inflation were as result of increases in money supply, then interest rates would be lower if the rate

of increase in money supply exceeds that rate of increase in prices. This would free-up more funds into the private sector for growth. Inflation can have positive impact on growth if it is expected. Unexpected inflation can have negative effect on economic growth. We expect inflation to have a negative effect on economic growth.

Foreign direct investment (FDI) is an engine of growth that that has received much attention in recent times. The new growth theory suggests that if a country's internal structures such as institutions and human capital are receptive and responsive to harnessing foreign direct investment, then her economy can grow faster towards its long-term prosperity. Foreign direct investment will not enhance economic growth if the country has not developed absorptive capacity to channel foreign direct investment into growth. FDI can also be in the form of transfer of new knowledge and technology that can have positive effects on economic growth.

Weak institutions and irresponsive financial systems can undermine the effectiveness of foreign direct investment into economic growth. A determining factor of FDI into Africa has been her natural resources, especially her oil. According to Blancheton and Opara-Opimba (2013), who cited UNCTD (2010), the top ten recipients of close to 84 percent of FDI in 2009 were oil-producing countries. This means only small amount of FDI went to the rest of 44 African countries. Table 11 shows that the mean FDI has been 5.27 percent of GDP over the 14-year period, 2002-2015. More FDI can improve the infrastructure level in the continent and this demands that Africa should restructure her systems to accommodate more FDI. However, FDI inflow has been as high as 89.48 percent of GDP in some countries.

Economic institutions, defined as in the degree of economic freedom (EFREE), has positive impact on economic growth (Gwartney, Lawson & Holcombe, 1999; Williamson & Mathers, 2011). It is believed that, a society where exits high degree of protection of property rights, judicial effectiveness, government spending, fiscal health, business freedom, labour freedom, monetary freedom, trade freedom, investment freedom and financial freedom, economic freedom is high and that has positive impact on economic growth. In this study, I analyze the impact of economic institution on economic growth by using the composite index of economic freedom produced by Heritage Foundation. As I mentioned earlier, most African countries are considered economically unfree in the 2018 Economic Freedom Index by the foundation. The mean level of 55.24 for the 44 countries included in the study (see Table 21) is considered as "mostly unfree". Since the level of economic freedom is weaker among countries in Africa, this study expected a negative relationship between the degree of economic freedom and economic growth.

The study also employed Kaufman's governance indicators to measure the impact of governance institutions. According to Acemoglu and Robinson (2012), differences in political systems account for the cross-country differences in per capita income. The inauguration of the African Union in 2002 couple with acceptance of the tenets of democracy across most countries in Africa (in recent times) require an examination whether good governance or the lack of it influence economic growth in Africa. We also analyze whether in the wake of less competitive banking systems, good governance can serve as a substitute to the level of bank market power toward economic growth in Africa.

The six governance indicators included in the study are control of corruption, government effectiveness, regulation quality, rule of law, political stability and voice and accountability. The definition of these variables, according to Kaufmann et al. (2010), is provided in Table 10. Kaufmann et al. (2010) employed multiple indexing methodology to measure the perception of stakeholders on these variables. The initial data were measured on the scale: -2.5 to 2.5. Table 22 shows that mean values for these indicators for African countries have been negative over the period 2002 to 2015. This indicates lower level of governance in Africa. Table 23 also show high degree of correlation among these variables. Therefore, in the econometric analysis, I substituted these variables into separate estimations to avoid inefficient estimates.

Table 21: Variables and their Descriptions

Variable	Description
GDP Per Capita Growth Rate (G)	This is the standard measure of economic growth of countries. The GDP per capita growth rate measures the extent to which the average income per person in an economy has grown over a period. A high growth is an indication that an economy is expanding and for that matter businesses have more incentives to expand. Rising income also implies that banks and other financial institutions have the capacity to create more credit from possible rising deposits. All other things being equal, we expect the level of bank market power to have positive impact on economic growth through effective allocation of credits. It is calculated by subtracting the GDP year's GDP per capita from the Current Year's GDP per Capita (at 2010 US dollar constant price) as a ratio of the previous year's GDP per capita. *Source:* World Development Indicators (2017).
Human Capital (HC)	Human capital is key for the transformation of many economies. The knowledge of the people in a particular country is a determinant of their ability to generate and utilize technology toward the improvement in capital accumulation into economic growth. Human capital is measured by the average year of schooling. *Source:* Pen World Table Version 9.0.
Government Expenditure (GEX)	The Keynesian view holds that government can stimulate economic growth through her expansion fiscal policy that raise expenditure without having to raise tax revenue. If government want to increase economic activities but does not want to do so through increasing tax revenue, the government can resort to the bond financing from the banking sector. Such an act can have dual effect on economic growth. If the amount raised through the issue of debts instruments are used to finance capital expenditure, it will boost investment and capital accumulation and then economic growth. On the other hand, acquired funds that are used to finance government consumption can have negative impact on economic growth if consumptions do not necessarily lead to the expansion of the business sector or consumption is on imported products. This is calculated as general government expenditure as a ratio of GDP. *Source:* World Development Indicators (2017)

Table 21 Contd.

Inflation (INF)	Inflation, fundamental reduces the purchasing power of consumers. In this case, inflation will reduce the general patronage of goods and services which can affect the expansion of the private sector. Inflation can also raise cost of production which can have a downward effect on intermediate productivity. However, inflation can also be a result of an expansionary monetary policy which increases the money supply and therefore makes more credits available to businesses for their expansion at cheaper cost. In this case, the effect of inflation on output can be positive. It is calculated as the annual change in the consumer price index. *Source:* World Development Indicators (2017).
Foreign Direct Investment (FDI)	Foreign direct investment is a measure of capital inflow and at the same time the level of financial integration at a point in time. Foreign direct investments have mostly direct impact on the real sector. The banking system can facilitate the flow of foreign direct investments but the attraction of FDI also depends on the performance of the real economic and the institutional framework within a jurisdiction. On the surface, FDI should have positive impact on economic growth but if a country's local conditions such as the level of education, institutions and financial systems have no absorptive capacity to accommodate FDI into productivity, then FDI can be counter-productive. *Source:* World Development Indicator (2018).
Boone Indicator (BI)	This is my measurement of bank market power. It is estimated by regressing bank marginal cost on bank market share or any measure of profitability. The coefficient of the estimates is used to define the level of market power. This measurement has a direct implication on bank efficiency as its estimations signifies that efficient banks (banks with increasing marginal costs) stand the risk of reducing their market share. In a competitive banking system, the Boone Indicator is negative and large in magnitude. When the Boone Indicator is negative and smaller is an indication of rising bank market power. According to the relationship banking hypothesis, large banks can effectively channel credit into productive sectors than smaller firms. *Source:* Global Financial Development Database (2018).
Lerner Index (LI)	Alternatively, we measured bank market power by the Lerner Index. The Lerner Index, which defines the relative divergence between price and marginal cost. The larger the Lerner Index, the

	higher the level of bank market power and vice versa. We expect the Lerner Index to have positive effect on economic growth in Africa. *Source:* Global Financial Development Database (2018).

Table 21 Contd.

Economic Freedom (EFREE)	The Heritage Foundation (2018) constructed the economic freedom index by finding equal weighted index of 12indicators: property rights, judicial effectiveness, government spending, fiscal health, business freedom, labour freedom, monetary freedom, trade freedom, investment freedom and financial freedom to form a single that defines a country's level of economic freedom. The score ranges from 0 to 100 with a score of o implying the most repressed regime and a maximum score of 100 reflecting the freest regime. The index also group countries into clubs of economic freedom. The first club (Free) include countries which record scores between 80 and 100; the second club (mostly free) include countries with scores between 70 and 79.9; and the third club (moderately free) include countries with scores between 60 and 69.9. In addition, countries which record scores between 50 and 59.9 are classified as "Mostly Unfree" whilst countries which record scores 49.9 or below are classified a repressed. Even though African countries have made significant advancements in the rankings since 2011, the 2018 edition of the Economic Freedom Index report classified 32 African countries as either mostly unfree or repressed. In the report, 8 African countries (Botswana, Rwanda, South Africa Ivory Coast, Uganda, Seychelles, Burkina Faso and Cape Verde) were classified as "Moderately Free" countries. Only Mauritius qualified to be included in the "Mostly Free" but no country in Africa was considered "Free". This means that there is much room for improvement in terms of deregulation of African Economies. Source: *Heritage Foundation*
Control of Corruption (COR)	The next sets of variables and their definition were culled from Kaufmann et al. (2010). COR is control of corruption and it measures on a scale -2.5 to 2.5, "perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests".
Government Effectiveness (GE)	GE is government effectiveness. It measures on a scale -2.5 to 2.5, the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

Table 21 Contd.

Mobile Phones Penetration (MOB)	We used this indicator to measure the level of technological innovations that can facilitate information flow, transactions, development of new financial products and allocation of funds. It is especially a useful indicator when measuring the impact of mobile money, mobile banking, electronic payment, internet banking, SMS banking since access to cellular technology facilitates diffusion of these products in Africa. This is calculated as the number of cellular phones subscription per 100 of the population. We expect technological innovation to have positive impact on economic growth. *Source:* World Development Indicators (2017)
Trade Openness (TRADE)	Trade among countries facilitate the flow of resources from more resource endowed economies to less endowed economies. Trade enables countries to also sell their output in other countries which has positive effect on aggregate demand. In this direction, we expect trade openness to have positive effect on capital accumulation towards growth. However, trade openness can have a crowding effect on capital accumulation in it results in the net importation of consumption product since the acceleration effect of imported consumption is smaller than the acceleration effect of imported investment. This calculated as the sum of annual exports and imports as ratio of GDP. *Source:* World Development Indicators (2017).
Regulation Quality (RQ)	RQ is regulation quality (it measures on a scale -2.5 to 2.5) which capture perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. *Source:* World Development Indicators (2017).
Political Stability and Absence of Violence (PS)	PS is political stability and absence of violence/terrorism. It captures, on a scale of -2.5 to 2.5, the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. *Source:* World Development Indicators (2017)
Rule of Law (ROL)	ROL is rule of law. It captures on a scale of -2.5 to 2.5, perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and

	violence. *Source:* World Development Indicators (2017)
Voice and Accountability (VOICE)	VOICE is voice and accountability which measure on a scale of -2.5 to 2.5, capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. *Source:* World Development Indicators (2017)

Source: Author (2018)

Table 22: Summary Statistics of the Variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
GDPG	2.26	2.36	32.25	-36.83	4.53	615
HC	1.74	1.66	2.68	1.09	0.39	481
GEX	14.89	14.29	38.41	2.74	5.56	579
INF	6.94	5.57	44.39	-35.84	6.63	610
FDI	5.27	3.18	89.48	-	7.88	613
BI	-0.07	-0.04	1.13	-3.20	0.24	529
LI	0.29	0.30	0.64	-	0.16	388
EFREE	55.24	55.60	77.00	31.50	6.75	579
COR	-0.58	-0.66	1.25	-1.84	0.58	615
GE	-0.67	-0.67	1.04	-1.87	0.59	615
PS	-0.52	-0.36	1.18	-1.69	0.88	615
ROL	-0.61	-0.62	1.06	-1.86	0.59	615
RQ	-0.58	-0.55	1.12	-2.24	0.55	615
VOICE	-0.58	-0.71	0.97	-2.00	0.70	615

The table shows the summary statistics of the variables in this paper. GDPG is the growth of per capita gross domestic product (GDP), a measure of economic growth. HC is human capital, measured by the Barro-Lee (2014) average age of schooling published by Penn World Table Version 9.0. GEX is government expenditure measured by government final consumption expenditure as a ratio of GDP. INF is Inflation measured by the annual changes in the consumer price index. FDI is foreign direct investment measured by inflow of foreign direct investment as ratio of GDP. BI is Boone Indicator, a measure for bank market power, calculated in the GFDD (2017) as the coefficient of the regression between bank market share and bank market share aggregated at the country-level. LI is the Lerner Index, a measure of bank market power, calculated as price of a bank minus marginal cost as a ratio of price aggregated at the country-level. TRADE is trade openness measured as the sum of export and imports as a ratio of GDP. EFREE is economic freedom which is an index of twelve indicators, property rights, judicial effectiveness, government spending, fiscal health, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom and financial freedom. The next sets of variables and their definition were culled from Kaufmann et al. (2010). COR is control of corruption and it measures on a scale -2.5 to 2.5, "perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests". GE is government

effectiveness. It measures on a scale -2.5 to 2.5, the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. RQ is regulation quality (it measures on a scale -2.5 to 2.5) which capture perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.PS is political stability and absence of violence/terrorism. It captures, on a scale of -2.5 to 2.5, the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. ROL is rule of law. It captures on a scale of -2.5 – 2.5, perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. And, VOICE is voice and accountability which measure on a scale of -2.5 to 2.5, capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

Source: Estimated from Various Sources: WDI (2017), GFDD (2017), World Governance Indicator (2017), Economic Freedom Index (2018), and the Penn World Table Version 9.0.

Table 23: Correlation Matrix of the Variables

	GDPG	HC	GEX	INF	FDI	BI	LI	EFREE	COR	GE	PS	ROL	RQ	VOICE
GDPG	1.00													
HC	0.04	1.00												
GEX	-0.04	-0.09	1.00											
INF	0.14	0.09	-0.22	1.00										
FDI	0.10	-0.08	-0.07	0.14	1.00									
BI	-0.18	-0.03	0.17	-0.12	-0.01	1.00								
LI	0.01	0.02	0.15	-0.03	-0.03	0.06	1.00							
EFREE	-0.03	0.47	-0.03	-0.04	-0.02	0.05	0.05	1.00						
COR	0.03	0.31	0.23	-0.15	-0.04	0.09	0.16	0.66	1.00					
GE	0.07	0.49	0.20	-0.13	-0.13	0.04	0.20	0.73	0.85	1.00				
PS	0.00	0.06	0.11	-0.22	0.02	0.18	0.05	0.40	0.62	0.57	1.00			
ROL	0.02	0.39	0.14	-0.16	-0.07	0.13	0.11	0.71	0.83	0.88	0.71	1.00		
RQ	0.00	0.44	0.19	-0.16	-0.04	0.06	0.07	0.80	0.78	0.87	0.62	0.86	1.00	
VOICE	0.01	0.21	0.10	-0.07	-0.11	-0.01	0.05	0.51	0.50	0.56	0.59	0.63	0.65	1.00

The table shows the summary statistics of the variables in this paper. GDPG is the growth of per capita gross domestic product (GDP), a measure of economic growth. HC is human capital, measured by the Barro-Lee (2014) average age of schooling published by Penn World Table Version 9.0. GEX is government expenditure measured by government final consumption expenditure as a ratio of GDP. INF is Inflation measured by the annual changes in the consumer price index. FDI is foreign direct investment measured by inflow of foreign direct investment as ratio of GDP. BI is Boone Indicator, a measure for bank market power, calculated in the GFDD (2017) as the coefficient of the regression between bank market share and bank market share aggregated at the country-level. LI

is the Lerner Index, a measure of bank market power, calculated as price of a bank minus marginal cost as a ratio of price aggregated at the country-level. TRADE is trade openness measured as the sum of export and imports as a ratio of GDP. EFREE is economic freedom which is an index of twelve indicators, property rights, judicial effectiveness, government spending, fiscal health, business freedom, labour freedom, monetary freedom, trade freedom, investment freedom and financial freedom. The next sets of variables and their definition were culled from Kaufmann et al. (2010). COR is control of corruption and it measures on a scale -2.5 – 2.5, " perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests". GE is government effectiveness. It measures on a scale -2.5 – 2.5, the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. RQ is regulation quality (it measures on a scale -2.5 – 2.5) which capture perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.PS is political stability and absence of violence/terrorism. It captures, on a scale of -2.5 – 2.5, the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. ROL is rule of law. It captures on a scale of -2.5 – 2.5, perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. And, VOICE is voice and accountability which measure on a scale of -2.5 – 2.5, capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

Source: Estimated from Various Sources: WDI (2017), GFDD (2017), World Governance Indicator (2017), Economic Freedom Index (2018), and the Penn World Table Version 9.0.

7.5 Empirical Results

Table 24 reports the results on the model that includes estimates on the impact of bank market power on economic growth. In the first estimation (01), we included the Boone Indicator and other control variables, human capital, government expenditure, inflation, foreign direct investment and trade openness. In the second estimation (02), we included the Lerner Index to check the robustness of the impact of bank market power on economic growth in Africa. The third estimation (03), we included the economic freedom. The subsequent estimations (04, 05, 06, 07, 08 and 09) included control of corruption, government effectiveness, regulation quality, political stability, rule of law and voice of accountability, respectively.

The first lag of the depending variable is negatively related to the level of economic growth in 01, 03 and 09. The coefficient of the lagged dependent variable was not significant. On the other hand, the lagged dependent variable was positively related to economic growth when the Lerner Index, control of corruption, government effectiveness, regulation quality, rule of law and political stability entered the model. This illustrates the positive magnifying effect of other growth drivers such as governance institutions on economic growth as shown by the new growth theories.

7.5.1 Bank Market Power and Economic Growth in Africa

The Boone Indicator has positive but insignificant effect on economic growth. This implies that the banks with market power do not act to promote economic growth in Africa on their own. The relationship between bank market power and economic growth may depend on another fundamental factor. Later in this paper, I will examine how the level of institutional quality moderate the transmission mechanism through which bank

with market power influence economic growth. Even though there exist positive practical relationship between the level of bank market power and economic (when the Boone Indicator was employed as a proxy), this relationship is not statistically reliable at the 5% significant level. The Lerner Index, however, shows a stronger positive significant relationship between bank market power and economic growth in Africa. The result shows that a one percentage point increase in the Lerner Index increases economic growth by 2.4 percentage point. The implication is that a less competitive banking system is beneficial for economic growth in Africa. This is in line with the relationship banking hypothesis (Petersen et al., 1995) that posit that in less competitive banking environments, banks with market power are able to spot and monitor relatively unknown borrowers and grant them credits to support their projects. This implies that less competitive banking system provide access to external finance to ensure growth of businesses and the economies in Africa. The result is however contrary to the one in the studies that reported that less competitive banking framework constrains access to finance (e.g. Beck, Demirgüç-Kunt, & Maksimovic, 2004; Love & Martínez Pería , 2015).

7.5.2 Control Variables and Economic Growth in Africa

Human capital has strong negative effect economic growth in all estimations for the period. This is contrary to the endogenous growth theorists' position that the level of education has strong positive effect on economic growth. This means that in Africa, the level of education has negative impact on economic growth.

Government expenditure has mixed impact on economic growth depending on the variables we rotated in the estimations. In estimation 01 which include the insignificant

Boone Indicator, the level of government expenditure has strong positive relationship with economic growth at the 5 percent significant level. However, the Lerner index entered and produced significant result, the level of government expenditure had strong negative relationship with economic growth. The differences in the results can be partly attributed to differences in the number of observation but it also shows that when the level of bank market power becomes growth enhancing, the level of government consumption expenditure becomes injurious to economic growth. When the level of government effectiveness entered the model, the level of government expenditure also had negative impact on economic growth. When all other institutional factors entered the respective estimations, the level of government expenditure positively affect economic growth. This implies that, in Africa, the effect of government expenditure on economic growth is conditional on the prevalence of other drivers of growth namely, the degree of bank market power and quality of institutions.

Furthermore, inflation is positively related to economic growth and this result is consistent in all estimations. This is contrary to the general view that price volatility is injurious to growth prospects of many economies. McKinnon (1973) and Shaw (1973) suggest that economic repressions of all forms do not promote financial development. Financial development generally has positive influences on economic growth. However, in economies where there are less cyclical industries (industries that produce consumer durables), inflation do not have strong impact on the activities of businesses. Businesses can transfer high prices to consumers for essential products such as drugs, food and financial services.

The level of foreign direct investment has indirect impact on economic growth. This result is consistent in all estimations. The extant literature explains that FDI may not influence positively on economic growth because economies may not have systems that harness inflow of FDI into growth. For FDI to contribute to economic growth, the level of human capital, institutional quality and technological advancement should be able to accommodate the inflow of FDI toward growth. If the countries' absorptive capacity is weak, FDI inflow may not contribute to economic growth.

Finally, the level of trade openness in Africa induces economic growth in all estimations over the period. This is consistent with the general view that trade openness is a contributor to economic growth. Trade allows countries to import inputs and technology from other countries to support production. It also affords countries the opportunity to exports their output to other economies that has positive effect on aggregate demand.

7.5.3 Institutional Quality and Economic Growth in Africa

The study also sought to examine whether strong institutions influence positively on economic growth in Africa. The institutional quality variables include economic freedom, control of corruption, government effectiveness, regulation quality, role of law, political stability and voice of accountability. The results are shown in Table 13. The Table shows that there is no significant relationship between the level of economic freedom and economic growth in Africa. However, other institutional quality drivers have strong positive relationship with economic growth in Africa.

Control of corruption has strong positive and significant impact on economic growth in Africa. This means that if the economies will reduce corruption, they will grow at a faster rate. This is consistent with the consensus that corruption retards growth in Africa. High rates of corruption divert resources meant for capital expenditure into the pockets of few corrupt officials that hampers the production of outputs with positive externalities. This result is consistent to the result in Fayissa and Nsiah (2013) which also found strong positive impact of control of corruption on economic growth of 39 countries in Africa in the period 1995 to 2004. However, Issahaku, Abor and Amidu (2018) found that control of corruption does not contribute to economic growth. The authors studied the relationship from the perspective of developing countries for the period 1996 to 2013 using the two-stage instrumental variables econometrics technique. The implication is that in some jurisdiction, effort to control corruption yields no positive results on economic growth.

Government effectiveness also has strong positive impact on economic growth in Africa. Table 24 shows, economic growth will improve by 11.68 percentage point, if Africa is committed to improving the quality of public services, the quality of civil services, the degree independence from political pressure, the quality of policy formulation and implementation as well as the degree of credibility of government's commitment to such policies. This implies that public services and its effectiveness are major contributors to the growth prospects of Africa. This result is consistent with the results in Issahaku et al. (2018) who found that government effectiveness has strong positive relationship with economic growth in high and upper-middle income countries. The authors however, found a strong negative impact of government effectiveness and

economic growth in lower income countries and lower-middle income countries. They stressed that, government effectiveness had negative impact economic growth because of low quality of institutions in those countries. Thus, improvement in government effectiveness in Africa is essential for high growth in per capita income.

Furthermore, regulatory quality also has strong positive impact on economic growth. In regimes where the governments have instituted and implemented responsive policies and regulations that allow the private sector to develop, economic growth would be high. This calls for a continuous monitoring and strengthening of regulations that, for instance, allows the financial sector to provide greater credits to firms that heavily rely on external finance to implement projects. This result is in line with the finding in Fayisa et al. (2013) but the finding is contrary to the one in Issahaku et al. (2018). Both the current study and Fayisa's paper applied the first difference dynamic GMM whilst Issahaku's study applied the two-stage least squares procedure. This might have partly accounted for the differences in results.

Next, the paper also examined the impact of political stability on economic growth in Africa. Acemoglu et al. (2012) posits that political systems largely determine differences in cross-country per capita income emphasizing that sound political systems are essential for economic growth. Kaufmann et al. (2010) suggest that if the citizens do not harbour the feeling that their governments would be destabilized or overthrown, then the political system is sound and that can impact positively on the growth prospects of Africa. Our estimates show that political stability increases the growth rate of per capita income by about 5.58 standard deviations. In recent times, the African continent has enjoyed relative stability (except occasional scenes of protests and election petitions in

Ghana, Gambia, Kenya and Togo). If Africa strengthens her level of political stability, it will have greater positive impact on economic growth.

Similarly, the level of rule of law in Africa has positive impact on economic growth. Increases in rule of law will increase economic growth by close to 10 percentage points and this impact is significant at the 1 percent level. If the systems to ensure enforcement of contracts and laws, protection of property rights, sound adjudication of cases and avoidance of crime and violence were invigorated, the impact on economic growth would be greater. Again, Fayisa et al. (2013) found a similar result for 39 African countries.

Finally, voice and accountability has strong positive impact on economic growth in Africa. This means that participative governance, freedom of expression, freedom of association and free media are beneficial for economic growth in Africa. The result is also consistent with the result in Fayisa et al. (2013).

Table 24: Bank Market Power, Institutions and Economic Growth in Africa

Eq Name:	01	02	03	04	05	06	07	08	09
GDPG(-1)	-0.047	0.029	-0.001	0.092	0.100	0.089	0.032	0.048	-0.026
	(0.015)***	(0.012)**	(0.011)	(0.009)***	(0.015)***	(0.012)***	(0.022)	(0.012)***	(0.019)
HC	-13.430	-4.945	-8.349	-1.985	0.924	-2.993	-5.790	-6.321	-10.189
	(2.044)***	(1.632)***	(2.161)***	(1.636)	(3.007)	(1.826)	(3.280)	(1.464)***	(4.053)**
GEX	0.261	-0.152	0.056	0.303	-0.104	0.406	0.407	0.384	0.221
	(0.033)***	(0.021)***	(0.031)	(0.053)***	(0.045)**	(0.049)***	(0.054)***	(0.041)***	(0.069)***
INF	0.028	0.016	0.004	0.028	0.021	0.020	0.065	0.115	0.054
	(0.011)***	(0.005)***	(0.010)	(0.017)	(0.016)	(0.024)	(0.032)**	(0.015)***	(0.029)
FDI	-0.125	-0.139	0.037	-0.115	-0.135	-0.120	-0.088	-0.141	-0.071
	(0.028)***	(0.019)***	(0.031)	(0.010)***	(0.045)***	(0.014)***	(0.013)***	(0.015)***	(0.040)
TRADE	0.117	0.067	0.055	0.030	0.019	0.036	0.045	0.030	0.035
	(0.012)***	(0.007)***	(0.011)***	(0.002)***	(0.005)***	(0.002)***	(0.003)***	(0.002)***	(0.004)***
BI	0.325								
	(0.182)								
LI		2.404							

Table 24

Contd.

	(0.774)***								
EFREE		-0.025							
		(0.039)							
COR			5.312						
			(0.302)***						
GE				11.677					
				(1.000)***					
RQ					6.693				
					(0.572)***				
PS						5.578			
						(0.490)***			
ROL							9.896		
							(0.255)***		
VOICE								10.986	
								(1.010)***	
Observations:	348	292	361	386	386	386	386	386	386
AR(2):	0.985	0.195	0.607	0.998	0.997	0.975	0.937	0.937	0.503
Sargan Test:	0.303	0.281	0.342	0.260	0.386	0.303	0.343	0.274	0.381
No. of Cross Section	35	31	36	37	37	37	37	37	37

The dependent variable is GDPG. GDPG is the growth of per capita gross domestic product (GDP), a measure of economic growth. HC is human capital, measured by the Barro-Lee (2014) average age of schooling published by Penn World Table Version 9.0. GEX is government expenditure measured by government final consumption expenditure as a ratio of GDP. INF is Inflation measured by the annual changes in the consumer price index. FDI is foreign direct investment measured by inflow of foreign direct investment as ratio of GDP. BI is Boone Indicator, a measure for bank market power, calculated in the GFDD (2017) as the coefficient of the regression between bank market share and bank market share aggregated at the country-level. LI is the Lerner Index, a measure of bank market power, calculated as price of a

*bank minus marginal cost as a ratio of price aggregated at the country-level. TRADE is trade openness measured as the sum of export and imports as a ratio of GDP. EFREE is economic freedom which is an index of twelve indicators, property rights, judicial effectiveness, government spending, fiscal health, business freedom, labour freedom, monetary freedom, trade freedom, investment freedom and financial freedom. The next sets of variables and their definition were culled from Kaufmann et al. (2010). COR is control of corruption and it measures on a scale -2.5 – 2.5, " perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests". GE is government effectiveness. It measures on a scale -2.5 – 2.5, the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. RQ is regulation quality (it measures on a scale -2.5 – 2.5) which capture perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.PS is political stability and absence of violence/terrorism. It captures, on a scale of -2.5 – 2.5, the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. ROL is rule of law. It captures on a scale of -2.5 – 2.5, perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. And, VOICE is voice and accountability which measure on a scale of -2.5 – 2.5, capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. All equations were estimated using the first difference GMM econometric procedure. The language origins of African countries were used as transformed instruments. Other instruments include the lagged values of both the dependent, the independent and control variables. All estimations were done with the help of EVIEWS Version 9.0. AR(2) tests the Arrelano and Bond second order serial correlation and Saran Test tests the hypothesis that the instruments correlate with the error term. ***significant at 0.01 level and **significant at 0.05 level.*

Source: Estimated from Various Sources: WDI (2017), GFDD (2017), World Governance Indicator (2017), Economic Freedom Index (2018), and the Penn World Table Version 9.0.

7.5.5 The Interaction between Bank Market Power and Institutions and Economic Growth in Africa

The next sets of empirical estimations allow us to test the hypothesis that the quality of institutions interacts with the level of bank market power to induce economic growth in Africa. The expectation is that in regimes of weaker institutions, bank market power serves as a substitute and facilitate the flow of external finance into productive sectors in Africa. In each of the estimations, 01, 02,…,09, we multiplied measures of institutional quality (economic freedom, control of corruption, government effectiveness, regulation quality, political stability, rule of law and voice and accountability) by measures of bank market power (Boone Indicator). We then differentiated equation 7.4 with respect to bank market power for the interaction relation and interpreted the resulting relation: $\beta_2 + \beta_4 INST$ where β_2 is the coefficient of the relationship between bank market power and economic growth, β_4 is the coefficient of the interaction between bank market power and institutions and $INST$ is the average of each of the seven measures of institutional quality. A positive interaction coefficient implies that both bank market power and a specific institutional measure are complement in inducing economic growth whilst a negative coefficient indicates that both are substitutes in inducing economic growth in Africa. We assume that, the subscripts for countries and time are still in place. The results are presented in Table 25.

The interaction between bank market power and control of corruption has a strong positive impact on economic growth. The interaction increased economic growth by 1.741 ($\frac{\partial G}{\partial BI} = 4.80 + 4.08 * [-0.58]$) standard deviations when we differentiated the effect of bank market power, as I explained in the above. This shows that efforts to

control corruption and the level of bank market power are complement in inducing economic growth in Africa. Corruption will divert funds from the banking system into unproductive activities in Africa. If corruption is controlled, the banking system can do effective intermediation.

The interaction between the level of bank market power and the degree of economic freedom (coefficient of interaction is 0.164) induces economic growth. The interaction term between the bank market power and economic freedom shows a complementary effect toward economic growth. This result means that bank with market power require free economic systems to do effective intermediation that channel fund into productive sector. The result is contrary to the findings in Fernandez et al. (2010) which found that bank concentration and the level of institutional quality are substitutes in inducing economic growth.

In addition, the interaction between government effectiveness and the level of bank market have positive impact on economic growth in Africa. The coefficient of the interaction term is 3.140 and it is significant at the 0.01 level. This means that if Africa improves the quality of the civil and public services and governments reduces their interference in the intermediation process, banks with market power can channel credit into productive sectors to induce higher economic growth.

Furthermore, Table 25 also shows a strong positive interaction effect between regulation quality and bank market power towards economic growth. The estimated coefficient of the interaction effect is 5.836. This means that the regulation quality level in Africa complements the level of bank market power to induce economic growth. When

regulations are strong such as to facilitate the flow funds from the financial sector to the private sector, the level of bank market power has positive effect on economic growth. Weak regulations in the less competitive nature of the banking system in Africa can lead to misallocation of funds from productive sectors.

Similarly, the interaction between the level of political stability and bank market power is 5.562 and it is highly significant. This shows that the level of political stability and bank market power are complements in inducing higher economic growth. A stable political environment requires the can promote sound banking system to be more to induce higher growth. This means that as African countries are pursuing political stability, they must also put in place mechanisms to make their banking systems more responsive to growth oriented sectors. In stable political environments, bank with market power can still ensure effective intermediation in order to induce economic growth.

Finally, the interaction between the level of bank market power and rule of law is positive 3.507. Again, this means that the level of bank market power and rule of law in Africa are complements. The quality of rule of law and bank market power must increase together to induce economic growth. The implication is that, given the level of bank market power, Africa must strengthen her mechanism to enforce laws and contracts protect the property and the rights of individuals and businesses; and ensure swift adjudication of cases in court. These have inducing-effects on economic growth in Africa.

Thus, when we analyzed the effect of each of the institutional quality factors we realized that their interactions with the level of bank market power have positive

responses on economic growth. Studies, including the current one, have shown that institutional quality in Africa is lower relative to the level in high-income countries. In addition, our descriptive analysis also shows that the level of bank market power in Africa is also higher implying that the banking system is less competitive. The interactions actually depict the multiplicative effect of low quality institutional system and less competitive banking system on economic growth. The interaction terms therefore test the hypothesis, inherent in the relationship-banking hypothesis, that in weaker institutional framework, a less competitive banking system allocate financial resources to productive sectors than a more competitive banking system. From the results, we find the confirmation of the hypothesis only in systems characterized by weaker political stability.

Table 25: The Interaction Effect of Bank Market Power, Institutions and Economic Growth in Africa

Eq Name:	01	02	03	04	05	06	07	08
GDPG(-1)	-0.044	0.064	-0.042	0.002	0.046	-0.038	-0.022	-0.068
	(0.016)***	(0.018)***	(0.011)***	(0.020)	(0.036)	(0.020)	(0.020)	(0.022)***
HC	-12.592	-11.099	-8.688	-10.484	-1.974	-9.943	-12.841	-13.314
	(2.137)***	(2.176)***	(1.946)***	(2.728)***	(6.621)	(1.699)***	(1.878)***	(2.720)***
GEX	0.297	-0.205	0.127	0.203	-0.096	0.348	0.321	0.329
	(0.042)***	(0.050)***	(0.067)	(0.045)***	(0.100)	(0.044)***	(0.064)***	(0.044)***
INF	0.036	0.005	0.029	-0.002	0.029	0.047	0.022	0.118
	(0.013)***	(0.014)	(0.011)***	(0.024)	(0.033)	(0.012)***	(0.020)	(0.015)***
FDI	-0.113	-0.190	0.004	-0.122	-0.153	-0.088	-0.149	-0.142
	(0.030)***	(0.064)***	(0.027)	(0.036)***	(0.042)***	(0.028)***	(0.033)***	(0.038)***
TRADE	0.108	0.091		0.108	0.032	0.083	0.089	0.093
	(0.014)***	(0.014)***		(0.010)***	(0.018)	(0.013)***	(0.012)***	(0.014)***
BI	3.998		-40.035	7.749	25.174	6.700	7.114	3.940
	(1.761)**		(6.260)***	(2.151)***	(3.330)***	(2.888)**	(5.032)	(2.553)
COR	1.140							
	(0.685)							
BI*COR	3.419							
	(1.614)**							
LI		-12.595						
		(8.620)						
EFREE		0.394	0.401					
		(0.057)***	(0.066)***					
LI*EFREE		0.216						
		(0.165)						
BI*EFREE			0.723					
			(0.112)***					
GE				5.745				
				(0.836)***				
BI*GE				6.879				

				(1.840)***				
RQ					8.153			
					(0.992)***			
BI*RQ					35.160			
					(4.821)***			
PS						3.212		
						(0.296)***		
BI*PS						3.161		
						(1.461)**		
ROL							7.295	
							(1.036)***	
BI*ROL							6.161	
							(4.165)	
VOICE								8.672
								(1.032)***
BI*VOICE								4.776
								(3.032)
Observations:	348	280	334	348	348	348	342	348
AR(2):	0.990	0.996	0.999	0.951	0.993	0.976	0.845	0.999
Sargan:	0.308	0.401	0.491	0.370	0.586	0.272	0.290	0.270
Cross-section:	35	30	33	35	35	35	34	35

Table 25 The table shows the summary statistics of the variables in this paper. GDPG is the growth of per capita gross domestic product (GDP), a measure of economic growth. HC is human capital, measured by the Barro-Lee (2014) average age of schooling published by Penn World Table Version 9.0. GEX is government expenditure measured by government final consumption expenditure as a ratio of GDP. INF is Inflation measured by the annual changes in the consumer price index. FDI is foreign direct investment measured by inflow of foreign direct investment as ratio of GDP. BI is Boone Indicator, a measure for bank market power, calculated in the GFDD (2017) as the coefficient of the regression between bank market share and bank market share aggregated at the country-level. TRADE is trade openness measured as the sum of export and imports as a ratio of GDP. EFREE is economic freedom which is an index of twelve indicators, property rights, judicial effectiveness, government spending, fiscal health, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom and financial freedom. The next sets of variables and their definition were culled from Kaufmann et al. (2010). COR is control of corruption and it measures on a scale -2.5 – 2.5, " perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests". GE is government effectiveness. It measures on a scale -2.5 to 2.5, the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. RQ is regulation quality (it measures on a scale -2.5 to 2.5) which capture perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.PS is political stability and absence of violence/terrorism. It captures, on a scale of -2.5 – 2.5, the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. ROL is rule of law. It captures on a scale of -2.5 to 2.5, perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract

enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. And, VOICE is voice and accountability which measure on a scale of -2.5 to 2.5, capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. All equations were estimated using the first difference GMM econometric procedure. The language origins of African countries were used as transformed instruments. Other instruments include the lagged values of both the dependent, the independent and control variables. All estimations were done with the help of EVIEWS Version 9.0. AR(2) tests the Arrelano and Bond second order serial correlation and Saran Test tests the hypothesis that the instruments correlate with the error term. ***significant at 0.01 level and **significant at 0.05 level.

Source: Estimated from Various Sources: WDI (2017), GFDD (2017), World Governance Indicator (2017), Economic Freedom Index (2018), and the Penn World Table Version 9.0.

7.5.6 Interaction between Regional Integration and Bank Market Power toward Economic Growth in Africa

Table 26 shows the results on the role of sub-regional grouping in the bank market power-economic growth nexus. The interaction between bank market power and ECOWAS have strong positive effect on economic growth in Africa. The coefficient of the interaction estimation is positive (0.716) and significant at the 1 percent level. This means the less competitive banking environment in the ECOWAS region is beneficial to economic growth. The interaction between bank market power and EAC has negative effect on economic growth. The coefficient of the interaction effect is negative 37.782 and significant which signify a that bank market power does not promote economic growth in the East African Community. The interaction between the level of bank market power and ECCAS and negative (-64.778) and strong (significant at the 1 percent level). Furthermore, the level of bank market power in COMESA does not promote economic growth. Similarly, the empirical results show that the level of bank market power does not induce economic growth in the ARABMAG. Finally, the level of bank market power was not significant in explaining economic growth in the SADC sub-region. Thus, apart from the ECOWAS region, bank market power does not support economic growth in the other five sub-regions.

The results show very interesting features of the growth effects of less competitive banking systems in the various regions in Africa. In terms of cross-border banking, the evidence shows that a more competitive banking environment would be growth enhancing in ECCAS, COMESA, ARABMAG and EAC since less competitive system did not support economic growth. Therefore, regulations in those systems should

be directed at improving the number of banks and financial products in those markets. The positive impact of bank market power on growth in the ECOWAS region was driven by its high competitiveness across the globe. Earlier, (in Chapter Two) we presented that the Lerner Index in West Africa was the lowest across regions. If the level of competitiveness in the region induces economic growth, then we find also a support for the assertion that economic growth is higher in more competitive banking environment. The ECOWAS should laisse with the banks in her effort toward sustainable economic development since the banking system appears responsive to the growth prospects of the region. The evidence in this study undoubtedly, provide useful information about how the banking system supports the developmental agenda of the AU and her regions. However, for the continuation of the discourse on how the financial sector contributes to the growth orientation of the continent, researchers must adhere to the call and investigate how the integration of the banking systems can provide synergetic effect on economic growth.

Table 26: The Interaction Effect of Bank Market Power, Regional Integration and Economic Growth in Africa

Eq Name:	01	02	03	04	05	06
GDPG(-1)	-0.048 (0.023)**	-0.035 (0.013)***	-0.006 (0.025)	-0.055 (0.017)***	-0.050 (0.016)***	-0.037 (0.019)
HC	-9.057 (3.302)***	-12.512 (2.240)***	-7.322 (2.932)**	-12.272 (1.709)***	-12.077 (2.210)***	-15.122 (3.109)***
GEX	0.072 (0.123)	0.272 (0.039)***	0.219 (0.062)***	0.234 (0.045)***	0.260 (0.044)***	0.292 (0.082)***
INF	-0.003 (0.023)	0.005 (0.013)	-0.034 (0.022)	0.011 (0.013)	0.013 (0.010)	0.016 (0.015)
FDI	-0.186 (0.051)***	-0.093 (0.037)**	-0.202 (0.041)***	-0.125 (0.026)***	-0.115 (0.027)***	-0.122 (0.034)***
TRADE	0.134 (0.021)**	0.107 (0.011)**	0.129 (0.024)**	0.104 (0.010)**	0.106 (0.014)**	0.099 (0.011)**
BI	-34.858 (6.657)***	0.354 (0.172)**	0.588 (0.284)**	0.226 (0.211)	0.269 (0.148)	0.304 (0.237)
BI*ECOWAS	35.574 (6.747)***					
BI*EAC		-38.136 (11.526)***				

Table 26 Contd.

BI*ECCAS			-65.366 (23.344)***			
BI*COMESA				-27.784 (6.544)***		
BI*ARABMAG					-35.466 (9.132)***	
BI*SADC						-16.621 (12.340)
Observations:	348	348	348	348	348	348
AR(2):	0.999	0.847	0.624	0.818	0.867	0.927
Sargan Test:	0.575	0.340	0.480	0.279	0.259	0.238
Number of Cross section	35	35	35	35	35	35

ECOWAS is dummy which ascribes "1" if a country in African belongs to the Economic Community of West African States and "0" otherwise. EAC is dummy which ascribes "1" if a country in African belongs to the East African Countries and "0" otherwise. ECCAS is dummy which ascribes "1" if a country in African belongs to the Economic Community of Central African States and "0" otherwise. COMESA is dummy which ascribes "1" if a country in African belongs to the Economic Community of West African States and "0" otherwise. ARABMAG is dummy which ascribes "1" if a country in Africa belongs to Arabmaghreb Union and "0" otherwise. SADC is dummy which ascribes "1" if a country in African belongs to the Southern African Development Community and "0" otherwise.

Source: Estimated from Various Sources: WDI (2017), GFDD (2017), World Governance Indicator (2017), Economic Freedom Index (2018), and the Penn World Table Version 9.0.

7.6 Conclusion

This study examines the possibility the banks with market power would influence economic growth in Africa. Although prior studies carried out similar investigations elsewhere, most did not conduct the investigation using aggregated country-level observations. By conducting the investigations in the context of Africa, we produced information concerning how the level competitiveness in the banking system contributes to economic sustainable growth agenda by the AU. The paper also investigates how economic and governance influence economic growth and interact with the level of bank market power to induce growth. The results confirm the relationship-banking hypothesis that suggests that large banks have the ability to allocate credits effectively even in systems of weaker (Petersen et al. 1995).

Finally, the study analyzed how the level of bank market influence growth in six sub-regions on the continent. This is to support discourses on how the characteristics of the sub-regional banking environment can support economic growth in the continent. We found that a more competitive banking environment in the various sub-regions would be beneficial to economic growth. However, in West Africa, a less competitive banking system can induce more growth. This result is a contribution to the discussions that regional integration can enhance how the banking system contributes to economic development.

Thus, the investigations are important because the information in this paper offer policy directions on how the banking system contributes to the sustainable economic development in Africa and emerging economies in general. The paper proposes finance-institution framework that can make Africa grow faster and develop her economic and

governance institutions. When a state is not empowered to expand tax revenue or to exercise greater autocracies to ensure development, the state becomes handicap. In that case, inadequate access to finance requires that there should be an effective intercourse between the financial sector and the states machineries to induce sustainable development. The paper also portrays the avenues where public institutions can support (through sound policies) the financial sector to contribute to private sector development when the states in not empowered to raise revenue through taxation. We also found that, in the all sub-regions, a more competitive bank environment should be encouraged in order to induce economic growth.

CHAPTER EIGHT

SUMMARY, CONCLUSION AND RECOMMENDATIONS

8.1 Summary

Economic growth of countries is essential for private sector development, foreign direct investment, welfare of the people, and institutional quality, among others. Over the past three decades, various empirical studies emphasize a strong link between finance and economic growth. This thesis contributes to the literature on the finance-growth nexus, finance-law nexus, relationship-banking hypothesis, bank competition-financial fragility hypothesis, growth convergence view and other theoretical underpinnings that link financial development to economic growth. The setting for the study was solely within the African continent because of the continent's uniqueness regarding the nature of financial development and economic growth.

Despite the fact that the banking system dominate the financial markets in Africa, existing studies failed to examine the influence of some elements of the bank market power on economic growth in African countries. Prior studies did not also examine how various levels of financial development affect economic growth in Africa. The extant studies also, did not examine how institutions can have influence access to credit in order to effect on economic growth through bank market power and financial innovations. Finally, the extant literature did not examine how finance cause conditional growth convergence to the growth path of the world's technological leader for African countries.

In the empirical analyses, I used the first difference dynamic GMM econometrics models in order to achieve the above objective. The first GMM estimate

is more efficient in dealing with heterogeneity inherent in our data set. It allows the control of instrumental variable effect and reduce endogeneity bias. The efficacy of the GMM estimates were also examined using Sargan Tests and first and second order autocorrelation test. Both tests confirmed the potency of the instrumental variables included in the estimations. For the convergence estimates, the study applied the robust least square estimation on a cross-sectional dataset.

8.2 Conclusion

8.2.1 Bank Market Power and Economic Growth in Africa. Do Institutions and Regional Integration Matter?

1. Bank market power in the African banking system has positive effect on economic growth. This confirms the relationship-banking hypothesis that suggest that bank with market power promote access to credit that lead to growth.
2. Governance institutions has positive and strong influence on economic growth. This implies that economic growth would increase in Africa if:
   (a) there are systems that protect investors from expropriation of their foreign direct investments;
   (b) the is rule of law and swift adjudication of cases and enforcement of laws;
   (c) Africa maintains political stability to the extent that there is an end to civil war and there are no threats of political stability; and
   (d) the public sector is effective and provides services that support the smooth activities of the private sector.
3. The interaction between control of corruption and bank market power influence economic growth strongly. This means in the absence of corruption,

bank with market power can induce capital accumulation for improvement in productivity growth in Africa.

4. The interaction between economic freedom and bank market has strong positive influence on economic. This indicates that economic institutions that allow freedom to do business and instils the tenets of free economic systems complement the intermediation activities of bank with market and that in turn has strong positive influence on economic growth.
5. The interaction between regulation quality and the level of bank market power induces economic growth in Africa. Sound regulations including regulations of the financial system ensures the soundness of intermediation environment and that in turns ensures that funds are move from surplus units to deficit units for improvement in productivity.
6. The interaction between political stability and bank market power has strong and positive effect on economic growth in Africa. This means in times of political stability, bank with market can channel funds into productive sectors of the economies than a competitive banking system.
7. The interaction between rule of law and the level of bank market power has positive influence on economic growth. The bank with market power do effective intermediation in environment where the law is not a respecter of persons, there is protection of property rights, and the court system is impartial.
8. In ECOWAS regions, the level of bank market power influence economic growth positively. However, the level of bank market power in EAC, ECCAS, COMESA and ARABMAG does not have direct influence on economic

growth. In addition, bank market power does not have meaningful impact on economic growth in SADC.

8.2.2 Financial innovations and Economic Growth in Africa

1. The descriptive information shows that financial innovation in African has been low. Low innovations also imply low financial innovations because of the near direct relationship between technological innovations and financial innovations. This calls for the need to attract private investment in the financial sector that levers technological innovations toward economic growth.
2. The resources to the public sector, measured by government expenditure do not induce economic growth. Public sector expenditure can have a crowding out effect if it does not support investment in the private sector or lead to capital accumulation. In most African countries, the private sector is the larger employer. Therefore, to improve employment and growth there must be proactive measures to channel more credits into the private sector. This also can mean that African governments must reduce their participation in the domestic credit market and allow the private sector access to productive resources.
3. The level of financial development in Africa over the period 2002 to 2015 speed up the speed with which African countries can converge to the growth path of the world's technological leader.
4. The level of financial innovations, however, lead to economic growth divergence between African countries and the USA.
5. The level of financial innovation does not promote economic growth. The result is consistent with for samples below that average level of financial innovation. However, for sample above the average level of financial

innovation, there is no evidence that the level of financial innovation affects economic growth in Africa.

6. Across the various sub-regions, financial innovation has a strong positive effect on economic growth in Economic Community of Central African States (ECCAS) and East African Community (EAC). In Economic Community of West African States (ECOWAS) and Arab Maghreb (ARABMAG), financial innovations does not have direct effect on economic growth.

8.3.3 Determinants of Bank Market Power in Africa: Does Economic Freedom Matter?

1. There is high cost of borrowing in Africa. The Average Lerner Index is about 29 percent, which reflect a very wide disparity between price and marginal cost. Similarly, interest rate spread averages around 12 percent, which is high. These indicators show that banks' bargaining power is high on the continent. High bargaining power of banks has consequences on the ability of firms that depend on external finance to access funds for implementation their innovations.
2. Bank efficiency reduces the level of bank market power in Africa. This implies that bank customers in Africa do switch their dealing with banks as soon as they experience a marginal increase in lending rates at the expense of increment in deposit rates. The ability of customers to switch banks can ignite collusive strategies among banks that can eventually force interest rate spread to increase.
3. Bank concentration unexpectedly has strong indirect relationship with bank market power in Africa. Bank competition in a concentrated market is possible

if banks have similar strategic orientation that encourage syndicated activities in the banking system and enable banks to charge higher margin.

4. Foreign banks in Africa do not promote bank market power. These means cross-border banking activities increases the number of banks and enhance bank competition in Africa.
5. In countries where stock markets exist, stock market development did not have any significant effect on bank market power. The stock markets provide an alternative outlet for firms to obtain funds. Stock markets facilitate access to credit and put downward pressure on spreads in a market characterized by less competition. More stock market however influences access to credit and that in turn lead to bank market power in other systems that should encourage bank competition and therefore allow access to finance, financial innovations, bank stability and bank efficiency.
6. The level of insurance penetration in Africa has no significant effect on the level of bank market power. From the relationship-banking hypothesis, we can infer that deposit insurance enable banks to strengthen their relationship with their clients. This helps to reduce bad loans and allocate funds to even relatively unknown clients.
7. The level of economic freedom has strong and positive effect on the level of bank market power. This means that bank with market power will perform better in a more liberalized economic environment.
8. The level of bank concentration and efficiency are substitutes in promoting bank market power. This means that bank with market power relies on their size advantage at the expense efficient in their intermediation activities.

8.3.4 Bank Market Power, Financial Innovations and Economic Growth in Africa

1. Bank market power has positive relationship with economic growth in Africa for the period 2002 to 2015.
2. Financial Innovations is again detrimental to economic growth in Africa for the period 2002 to 2014, for all the measurements of financial innovations. The consistency of the findings across periods support the call for improve credit allocation into the private sector for growth. In addition, new financial products in Africa should be the ones that can encourage investments into capital accumulation that promote economic growth.
3. The interactions between the level of bank market power and financial innovations promote economic growth in Africa. The implication is that in Africa, the level of market power influence the level of financial innovations that determine the magnitude of capital accumulation towards economic growth.
4. Bank with market power do not rely on information from public credit registries in their intermediation activities. They however, rely heavily on information from private credit bureaus when allocating credit into productive sector.
5. ATM services in Africa may not have direct influence on economic growth but the services complement the activities of banks with market power in promoting effective financial intermediation towards economic growth.

8.4 Recommendation

8.4.1 Financial Support to the Private Sector

The private sector is the largest employer in most modern economies for which African countries are no exception. Banks in African can have greater

contribution to economic growth if they can proactively look for and support smaller businesses that innovative. Since innovations are closely linked to economic growth, bank credit allocations meant to support private enterprises that innovate would lead to more growth. This requires that banks in African should improve the use of technologies that facilitate the screening of credible entrepreneurs and distribute credit to support their ventures. Financing innovative firms require banks to engage in financial innovations that help screen out bad borrowers.

8.4.2 Regulations in the Banking Sector

It is true that the banking sector is one of the heavily regulated in most economies. Over the years, regulations have been tailored to curb bank fragility and promote stability in the banking systems. In the absence of calculated regulations to boost credit allocation to the private sector, banks would engage in activities that bring short-term rent at the expense of long run growth. We find little evidence on regulations that facilitate financial innovations and bank competition in Africa. As the findings in this study suggest, regulations that boost financial innovations and bank competition can enhance economic growth in Africa.

8.4.3 Improving World Economic Growth through Finance Transfer

The basic tenet of globalization and economic integration is that resources should be channeled into economies where the elasticity associated with the use of resources in terms of economic growth is more than unity. The strict sense of growth convergence imply that world's output would increase if resources are channeled from high income countries into low income countries where an introduction of technology would lead to more than proportionate increase in productivity. It follows that, investors can have higher returns if they invest in the real sector of poor income countries than they would have earned with an equivalent investment in rich

countries. In the same token, this study advocates for the transfer of financial innovations into emerging markets where financial market stakeholder can have increasing return to scale on their investment.

8.4.4 Improvement in Institutional Quality

The findings in this essay shows that institutions have both first order and greater second order effects on economic growth through financial innovations and bank competition. Institutions (economic freedom) also has positive effects on bank competition and limit bank market power which may mean downward pressure on interest rates and improve access to credits. African countries must intensify efforts to control corruption, promote rule of law, enhanced protection of property rights, promote free international trade, promote sound monetary systems, among others, as these institutional improvements can enhance banking system's effectiveness towards improved economic growth.

8.4.5 There must be Selective Financial Innovations

This suggestion emerges from the empirical results that shows that there is a strong negative effect of financial innovations on economic growth. This finding does not necessarily suggest that financial innovations should be very discouraged in African financial market. The finding connotes that banks and investors should invest in only financial innovations that facilitate the allocations of credits into productivity. Most of the financially innovative products such mobile money and electronic cards are meant to promote withdrawals from banks rather than promoting savings and capital accumulation towards growth. Nevertheless, this should not be, because of the possible crowding out effect of such product development on capital towards economic growth.

8.4.7 Lending Interest Rates Must Come Down

The degree of banks' bargaining power in Africa determine the extent to which banks can shift their inefficiency to their customers in the form of higher lending rate. In this study, we have seen that improvement in bank efficiency reduces bank market power. It follows that Central Banks on the continent must strengthen their supervision of the internal affairs of the banks to ensure that the banks keep their overheads down that would keep interest rates down. The supervision should also ensure that banks do not transfer the cost of bank inefficiency to businesses. In addition, all efforts to promote bank market power in the banking sector would ensure efficiency, bring interest rates down and ensure availability of cheaper credit for technological innovations.

REFERENCES

Abel, A. B., Bernanke, B. S., & Smith, G. W. (1999). *Macroeconomics.* Ontario: Addison-Wesley.

Aboagye, A. Q. Q., Akoena, S. Antwi-Asare, T. & Gockel, A. (2008). Explaining the market power of Ghanaian Banks. *South African Journal of Economics*, 76(4), 569-585.

Aboagye, A. Q. Q., & Idun, A. A. (2012). Financial innovation and economic growth in Ghana: Evidence from autoregressive distributive lags and Granger causality approaches. Available at SSRN: dx.doi.org/102139/ssrn.2180425.

Acemoglu, D., Aghion, P., & Zilibotti, F. (2002). *Distance frontier, selection and economic growth.* Cambridge, MA: NBER.

Acemoglu, D., Akcigit, U. (2012). Intellectual property rights policy, competition and innovation. *Journal of the European Economic Association,* 10(1), 1-42. http://dx.doi.org/10.1111/j.1542-4774.2011.01053.x.

Acemoglu, D., Gancia, G., & Zilibotti, F. (2012). Competing engines of growth: Innovation and standardization. *Journal of Economic Theory*, 147(2), 570-601.

Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origin origins of comparative development: An empirical investigation. *American economic Review*, *91*(5), 1369-1401.

Acemoglu, D., & Robinson, J. (2012). *Why nations fail: The origin of power, prosperity and poverty.* New York: Crown Publishers.

Acharya, V., & Xu, Z. (2016). Financial dependence and innovation: The of public versus private firms. *Journal of Financial Economics*, 1-21. Retrieved from http://dx.doi.org/10.1016/j.jfineco.2016.02.010

African Development Bank Group. (2010). *Financial sector integration in three regions of Africa.* Tunis: Sildar.

African Development Bank Group. (2018, May 16). *African Development Bank Group*. Retrieved from African Develepment Bank Group Web site: http://www.afdb.org

Retrieved from http://dx.doi.org/10.1016/j.jimonfin.2014.06.004.

Afuah, A. (1998). *Innovation management: Strategies, implementation and profit*. New York, Oxford University Press.

Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. (2005). Competition and innovation: An inverted-U relationship. *The Quarterly Journal of Economic*s, 120(2), 701-728.

Aghion , P., & Durlauf, S. (2009). *From growth theory to policy design.* Washington, DC:The World Bank

Aghion, P., Harris, C., Howitt, P. & Vickers, J. (2001). Competition, imitation and growth with step-by-step innovation. *Review of Economic Studies*, 68(3), 467-492.

Aghion, P., & Howitt, P. (2009). *The economics of growth.* Cambrigdge, MA.: MIT Press.

Aghion, P., Howitt, P., & Mayer-Foulkes, D. (2005). The effect of financial development on convergence: Theory and evidence. *Quarterly Journal of Economics, 120*(1), 173-222.

Agyei-Ampomah, S. (2011). Stock market integration in Africa. *Managerial Finance, 37*(3), 242-256. Retrieved from https://doi.org/10.1108/03074351111113306

Allen, F., & Gale, D. (1998). Optimal financial crises. *The Journal of Finance, 53*(4), 1245-1284.

Allen, F., & Gale, D. (2004). Competition and financial stability. *Journal of Money, Credit and Banking, 36*(3), 453-480.

Alvarez, R., & Bertin, M. J. (2016). Bank competition and firm-level financial constraints in Latin America. *Emerging Market Review*, Forthcoming.

Amidu, M. (2014). What influences banks lending in Sub-Saharan Africa. *Journal of Emerging Market Finance, 13*(1), 1-42.

Amidu, M., & Wolfe, S. (2013). Does bank competition and diversification lead to greater stability? Evidence from emerging markets. *Review of Development Finance*(3), 152-166.

Andrianaivo, M., & Kpodar, K. (2011). *ICT, financial inclusion and growth evidence from African countries.* International Monetary Fund.

Andrianaivo, M. & Yartey, C. A. (2010). Understanding the growth of African financial markets. *African Development Review*, 22(3), 394-418.

Ang, J. B. (2014). Innovation and financial liberalization. *Journal of Banking & Finance, 47,* 214–229. Retrieved from http://dx.doi.org/10.1016/j.jbankfin.2014.07.007

Ansong, A. , Marfo-Yiadom, E., Ekow-Asmah, E. (2011). The effect of financial innovation on financial savings: Evidence from an economy in transition. *Journal of African Business,* 12(1), 93-113.

Anzoategui, D., Martinez Peria, M. S., & Rocha, R. R. (2010). Bank Competition in the Middle East and Northern Africa Region. *Review of Middle East Economics and Finance, 6*(2), 26–48.

Arellano, M. & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies,* 58(2), 277.

Bain, J. (1956). *Barrier to new competition.* Cambridge, Harvard Press.

Bara, A., Mugano, G., & Le Roux, P. (2016). Financial innovation and economic growth in the SADC. *African Journal of Science, Technology, Innovation and Development*, 8(5/6), 483-495.

Barro, R. (1991). Economic growth in a cross-section of countries. *Quarterly Journal of Economics,* 106(2), 407-443.

Barro, J. R., & Lee, J. (2010). *A new data set of educational attainment in the world 1950-2010.* Available online at http:/www.barrolee.com.

Barth, J. R., Caprio, G. Jr. & Levine, R. (2013). Bank regulation and supervision in 180 countries from 1999 to 2011. *Journal of Financial Economic Policy*, 5(2), 111-219.

Beck, T., Chen, T., Lin, C., & Song, F. M. (2016). Financial innovation: The bright and the dark sides. *Journal of Banking and Finance, 72*, 28-51. Retrieved from http://dx.doi.org/10.1016/j.jbankfin.2016.06.012

Beck, T., De Jonghe, O., & Schepens, G. (2013). Bank competition an stability: Cross-country heterogeneity. *Journal of Financial Intermediation, 22*, 218-244.

Beck, T., Demirgüç-Kunt, A., & Maksimovic , V. (2004). Bank competition and access to finance: International evidence. *Journal of Money, Credit and Banking, 36*(3), 627-648 .

Beck, T., Fuchs , M., Singer , D., & White, M. (2014). *Making cross-border banking work for Africa.* Eschborn : GIZ.

Bempong, E., & Sy, M. (2015). The banking system in Africa: Main facts and challenges. *African Economic Brief, 6*(5), 1-16.

Berger, A. N., Hasan, I. & Klapper, L. F. (2004). Further evidence on the link between finance and growth: An international analysis of community banking and economic performance. *Journal of Financial Services Research*, 25, 169-202.

Bikker, J. A., Shaffer, S., & Spierdijk, L. (2009). Assessing competition with the Panzar-Rosse model: The role of scale, costs and equilibrium. *Utrecht School of Economics, Tjalling C. Koopmans Research Institute Discussion Paper Series 09- 27.*

Blancheton, B., & Opara-Opimba , L. (2013). Foreign direct investment in Africa: What are the key factors of attraction other than natural resources? *Savings and Development, 37*(1), 1-34.

Bonaccorsi di Patti, E. & Dell'Ariccia, G. (2004). Bank competition and firm creation. *Journal of Money, Credit and Banking*, 36(2), 225-251,

Boone, J. (2008). A new way of measuring competition using the profit elasticity: American sugar industry, 1890-1914. *The Economic Journal, 118,* 1245-1261.

Boubakri, N., El Ghoul, S., & Saffar, W. (2015). Firm growth and political institutions. *Journal of Multinational Financial Management, 31*, 104-125.

Boyd, J. H. & De Nicolo, G. (2005). The theory of bank risk-taking and competition revisited. *The Journal of Finance*, 60(3), 1329-1343.

Boyd, J., De Nicolo, G. & Jalal (2009). Bank competition, risk taking and asset allocation. IMF Working Paper, 09/143,1-50.

Boyd, J. H., & Prescott, E. C. (1986). Financial intermediary-coalitions. *Journal of Economic Theory, 38*, 211-232.

Burton, M., Nesiba , R., & Lombra, R. (2003). *Financial markets and institutions.* USA: Thompson South Western.

Cetorelli, N. (2001). Competition among banks: Good or bad? *Economic Perspectives*, 2/Q, Federal Reserve Bank of Chicago.

Cetorelli, N. & Gambera, M. (2001). Banking market structure, financial dependence and economic growth: International evidence from industry data. *The Journal of Finance*, 56(2), 617-648.

Cetorelli, N., & Peretto, P. F. (2012). Credit quantity and credit quality: Bank competition and capital accumulation. *Journal of Economic Theory, 147*, 967-998.

Cetorelli, N. & Strahan, P. (2006). Finance as a barrier to entry: Bank competition and industry structure in local U.S. markets. *Journal of Finance*, 61(1), 437-61.

Chavula, H. K. (2013). Telecommunications development and economic growth if Africa. *Information Technology for Development, 5*(1), 5-23.

Claessens, S., & Laeven, L. (2004). What drives bank competition? Soome international evidence. *Journal of Money, Credit and Banking, 36*(3), 563-583.

Clarke, M. Z. (2004). Geographic deregulation of banking and economic growth. *Journal of Money, Credit and Banking*, *36*(5), 929-942.

Clerides, S. Delis, M. D., & Kokas, S. (2015). A new data set on competition in national banking markets. *Financial Markets, Institution & Instruments,* 24(2-3), 267- 311.

Cohen, D. (1996). Tests of the "Convergence Hypothesis": Some further results. *Journal of Economic Growth, 1*(3), 351-361.

Cohen, W. M., & Lavinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128-152.

Cornaggia, J., Mao, Y., Tian, x., & Wolfe, B. (2015). Does bank competition affect innovation? *Journal of Financial Economics, 115*, 189-209.

Cornell University, INSEAD & WIPO (2016). *The global innovation index 2016: Winning with global innovations.* Ithaca, Fontainebleau and Geneva, Authors.

Dell'Ariccia, G. (2000). Learning by lending, competition and screening incentives in the banking industry. *International Monetary Fund, mimeo*.

Demirgüç-Kunt, A., & Maksimovic, V. (1998). Law, Finance, and Firm Growth. *The Journal of Finance*, *53*(6), 2107-2137. Retrieved from http://www.jstor.org/stable/117462

Demirguc-Kunt, A., Laeven, L., & Levine, R. (2004). Regulations, market structure, institutions and the cost of financial intermediation. *Journal of Money, Credit and Banking*, *36*(3), 593-622.

Demsetz, H. (1973). Industry structure, market rivalry and public policy. *Journal of Law and Economics*, 16, 1-10.

Diallo, B. (2015). Bank competition and crises revisited: New results. *Economic Letters, 129,* 81-86.

Djankow, S., McLiesh, C. & Shleifer, A. (2007). Private credit in 129 countries. *Journal of Financial Economics*, 12(2), 77-99.

Fayissa , B., & Nsiah, C. (2013). Impact of governance on economic growth in Africa. *Journal of Developing Areas, 47*(1), 91-108.

Fernandez de Guevara, J., & Maudos, J. (2011). Banking competition and economic growth: Cross-country evidence. *The European Journal of Finance, 17*(8), 739-764.

Fernandez, A. I., Gonzalez, F., & Suarez, N. (2010). How institutions and regulation shape the influence of bank concentration on economic growth. *International Review of Law and Economics, 30*, 28-36.

Fernandez, A. I., Gonzalez, F., & Suarez, N. (2013). How do bank competition, regulation, institutions shape the real effect of banking crises? International evidence. *Journal of International Money and Finance, 33*, 19-40.

Fernández de Guevara, J. & Maudos, J. (2007) Explanatory factors of market power in the banking system *Manchester School*, 75(3), 275-296. DOI: 10.1111/j.1467-9957.2007.01017.x ·

Fosu, S. (2013). Banking competition in Africa: Subregional comparative studies. *Emerging Market Review, 15*(2), 233-254.

Frame, S. W., & White, L. J. (2004). Empirical studies of financial innovations: Lots of talks, little action? *Journal of Financial Literature, 42*(1), 116-144.

Fu, X. M., Lin, Y. R., & Molyneux, P. (2014). Bank competition and financial stability in Asia Pacific. *Journal of Banking & Finance, 38*, 64-77.

Galindo, M.-Á., & Méndez, M. T. (2014). Entrepreneurship, economic growth, and innovation: Are feedback effects at work? *Journal of Business Research, 69*, 825-829. Retrieved from http://dx.doi.org/10.1016/j.jbusres.2013.11.052

Gerschenkron, A. (1952). Economic backwardness in historical perspective. In B. F. Hoselitz, *The progress of underdeveloped areas* . Chicago, IL: University of Chicago Press.

Gerschenkron, A. (1952). *Economic backwardness in historical perspective: A book of Essays.* Cambridge, MA.: Belknap Press of Harvard University Press.

Global Financial Development Database (GFDD) (2017). The World Bank.

Gonzalez, F. (2016). Creditor rights, bank competition and corporate investment during the global financial crisis. *Journal of Corporate Finance, 37*, 249-270.

González, L. O., Gil, L. I., Cunill, O. M., & Lindahl, J. M. (2016). The effect of financial innovation on European banks' risk. *Journal of Business Research , 69*, 4781–4786. Retrieved from http://dx.doi.org/10.1016/j.jbusres.2016.04.030

Greene, W. H. (2003). *Econometric analysis*. New Jersey, NJ: Pearson Education Inc.

Gujarati, D. N. *Basic econometrics* (5th edition). New York, NY: McGraw-Hill.

Guzman, M. G. (2000). Bank structure, capital accumulation and growth: A simple macroeconomic model. *Economic Theory, 16*, 421-455.

Gwartney, J. D., Lawson , R. A., & Holcombe, R. G. (1999). Economic Freedom and the Environment for Economic Growth. *Source: Journal of Institutional and Theoretical Economics (JITE) / Zeitschrift für die gesamte Staatswissenschaft, 155*(4), 643-663.

Gwartney, J., Lawson, R., Hall, J., & Murphy, R. (2016). *Economic freedom of the world. 2016 Annual Report.* Fraser Institute. www.fraserinstitute.org.

Gylfason, T. (1999). *Principles of economic growth.* New York: Oxford University Press.

Hahn, R. W. (1984). Market Power and Transferable Property Rights. *The Quarterly Journal of Economics, 99*(4), 753-765. Retrieved from http://www.jstor.org/stable/1883124

Hartzenberg, T. (2011). *Regional integration in Africa.* Geneva: World Trade Organization Economic Research and Statistics Division.

Hasan, I., & Tucci, C. L. (2010). The innovation–economic growth nexus: Global evidence. *Research Policy*, *39*, 1264–1276. Retrieved from doi:10.1016/j.respol.2010.07.005

Haselip, James. (2014). Book review: Why nation fail by Daron Acemoglu and James robinson. *The Extractive Industries and Society*, *1*, 119-120.

Hausman, A., & Johnston, W. J. (2014). The role of innovation in driving the economy: Lessons from the global financial crisis. *Journal of Business Research (2014) , 67*, 2720–2726. Retrieved from http://dx.doi.org/10.1016/j.jbusres.2013.03.021

Heritage Foundation (2018). *2018 index of economic freedom*. Available at www.heritage.org.

Hicks, J. (1935). Annual survey of economic theory: The theory of monopoly. *Econometrica, 3*, 1-20.

Hirsch-Kreinsen, H. (2011). Financial market and technological innovation. *Industry and Technology*, *18*(4), 351-368.

Hsu, P.-H., Tian, X., & Xu, Y. (2014). Financial development and innovation: Cross-country evidence. *Journal of Financial Economics*, *112*, 116-135.

Huber, P. J. (1973). Robust regression: Asymptotic, conjectures and Monte-Carlo. *The Annals of Statistics*, 1(5), 799-821.

Idun, A. A. & Aboagye, A. Q. Q. (2014). Bank competition, financial innovations and economic growth in Ghana. *African Journal of Economics and Management*, 5(1), 30-51.

IHS Global Inc. (2015). *EVIEWS version* 9. IHS Global Inc.

Issahaku, H., Abor, J. Y., & Amidu, M. (2018). The effect of remittances on economic growth: Reexamining the role of institutions. *The Journal of Developing Areas*, *52*(4), 29-46.

Jayaratne, J., & Strahan, P. E. (1996). The finance growth-nexus: Evidence from bank branch deregulation. *Quarterly Journal of Economics, 111*, 639-670.

Jennings. (2013). Institutions and prosperity. *European Journal of Political Economy, 29*, 252-258.

Johnson, S., & Kwak, J. (2012). Is financial innovation good for the economy? *Innovation Policy and the Economy, 12*(1), 1-16.

Kaufmann, D. & Kraay, A. (2010). World governance indicators 2016. Washington, DC: World Bank.

Keeley, M. (1990). Deposit insurance, risk and market power in banking. *American Economic Review, 80*, 1183-1200.

Kim, T., Koo, B., & Park, M. (2013). Role of financial regulation and innovation in the financial crisis. *Journal of Financial Stability 9 , 9*, 662– 672. Retrieved from http://dx.doi.org/10.1016/j.jfs.2012.07.002.

Kim, H., Park, K. & Song, S. (2016). Banking market size structure and financial stability: Evidence from eight Asian countries. *Emerging Markets Finance & Trade*, 52(1), 975-990.

King, R., & Levine, R. (1993a). Finance, entrepreneurship and growth: Theory and evidence. *Journal of Monetary Economics, 32*, 513-542.

King , R., & Levine, R. (1993b). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics, 108*, 717-726.

Kodong, O., Natto, D., & Biekpe, N. (2015). Explaining cross-border bank expansion in East Africa. *Journal of International Financial Markets, Institutions & Money*(36), 71-84.

Korotayev, A., & Zinkina, J. (2014). On the structure of the present-day convergence. *Campus-Wide Information Systems, 31*(2/3), 139-152.

Korotayev, A., Zinkina, J., Bogevolnov, J., & Malkov, A. (2011). Global unconditional convergence among larger economies after 1998. *Journal of Globalization Studies, 2*(2), 25-62.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., & Vishny, R. W. (1997). Legal Determinants of External Finance. *The Journal of Finance, 52*(3), 1131-1150. Retrieved from http://www.jstor.org/stable/2329518

La Porta, R., Lopez- de- Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and Finance. *Journal of Political Economy, 106*(6), 1113-1155. Retrieved from http://www.jstor.org/stable/10.1086/250042

Laeven, L., Levine, R., & Michalopoulos, S. (2015). Financial innovation and endogenous growth. *Journal of Financial Intermediation, 24*, 1-24.

Lagoarde-Segot , T., & Lucey, B. M. (2007). Capital market integration in the Middle East and North Africa. *Emerging Markets Finance & Trade, 43*(3), 34-57.

Lechman, E., & Marszk, A. (2015). ICT technologies and financial innovations: the case of exchange traded funds in Brazil, Japan, Mexico, South Korea and the United States. *Technological Forecasting & Social Change, 99*, 355-376.

Leon, F. (2016). Does the expansion of regional cross-border banks affect competition in Africa? Indirect evidence. *Research in International Business and Finance , 37*, 66-77.

Leon, F. (2015). Does bank competition alleviate credit constraints in developing countries. *Journal of Banking & Finance, 57*, 130-142.

Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature*, 35(2), 688-726.

Levine, R. (1998). The Legal Environment, Banks, and Long-Run Economic Growth. *Journal of Money, Credit and Banking*, *30*(3), 596-613. Retrieved from http://www.jstor.org/stable/2601259

Levine, R. (2001). International financial liberalization and economic growth. *Review of International Economics, 9*(4), 668-702.

Li, K., Niskanen, J., Kolehmainen, M., & Niskanen, M. (2016). Financialinnovation: Credit default hybrid model for SMElending. *Expert Systems With Applications , 61*, 343-355. Retrieved from http://dx.doi.org/10.1016/j.eswa.2016.05.029

Liu, G., Mirzaei, A., & Vandoros, S. (2014). The impact of bank competition and concentration on industrial growth. *Economics Letters, 124*, 60-63.

Love , I., & Martínez Pería , M. S. (2015). How bank competition affects firms' access to finance. *The World Bank Economic Review*, *29*(1), 413–448,.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3-42.

Mahoney, P. G. (2001). The Common Law and Economic Growth: Hayek Might Be Right. *The Journal of Legal Studies*, *30*(2), 503-525. Retrieved from http://www.jstor.org/stable/10.1086/322053

Mankiw, G. N. (2004). *Principles of economics* (3rd ed.). Ohio: Thomson/South-Western.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics, 107*(2), 407-437.

Marcus, A. J. (1984). Deregulation and bank financial policy. *Journal of Banking and Finance, 8*, 557-565.

Mason, E. (1939). Price and production policies of large scale enterprises. The American Economic Review, 29(1), 61-74

McKinnon, R. (1973), *Money and capital in economic development*, Washington DC, Brookings Institution.

Miller, T. & Kim, A. B. (2018). *Economic freedom: Policies for prosperity.* Heritage Foundation. Available at www.heritage.org/index/book/chapter-1.

Mirzaei, A., & Moore, T. (2014). What are the driving forces of bank competition across different income groups of countries? *Journal of International Financial Markets, Institutions & Money, 32*, 38-71.

Mishkin, F. S. & Eakins, S. (2009). *Financial markets and institutions* (6th Edition), New York, NY: Pearson.

Moral-Benito, E., Allison, P., & Williams, R. (2017, April 23). *Dynamic panel data modeling using maximum likelihood: An alternative to Arellano-Bond.* Retrieved from https://www3.nd.edu/~rwilliam/dynamic/Benito_Allison_Williams.pdf

Nguyen, M., Skully, M., & Perera, S. (2012). Bank market power and revenue diversification: Evidence from selected ASEAN countries. *Journal of Asian Economics, 23*, 688-700.

Norden, L., Buston, C. S., & Wagner, W. (2014). Financial innovation and bank behavior: Evidence from credit markets. *Journal of Economic Dynamics & Control , 43*, 130–145.

Nunn, N., & Puga, D. (2012). Ruggedness: The blessing of bad geography in Africa. *The Review of Economic and Statistics, 94*(1), 20-36.

Pagano, M. (1993). Financial markets and growth: An overview. *European Economic Review, 37*, 613-622.

Peltzman, S. (1977). The gains and losses from industrial concentration. *Journal of Industrial Economics*, 35(4), 443-456.

Petersen, M. A., & Rajan, R. G. (1994). The benefits of lending relationships: Evidence from small business data. *The Journal of Finance*, 49(1), 3-37.

Petersen, M. A., & Rajan, R. G. (1995). The effect of credit market competition on lending relationships. *Quarterly Journal of Economics*, 110, 407–443.

Rioja, F., & Valev, N. (2004). Finance and sources of growth at the various stages of economic development. *Economic Inquiry, 42*(1), 127-140.

Robinson, J., (1952): *The Generalization of General theory in the rate of interest and other essays*, London, MacMillan.

Romer, P. M. (1990). Endogenous technical change. *Journal of Political Economy, 98* ,71-102.

Romer, P. M. (1986). Increasing returns and long-run growth. *The Jounal of Political Economy, 94*(5), 1002-1037.

Rose, P. S., & Hudgins, S. C. (2008). *Bank mangement and financial services* (7th ed.). New York, NY: McGraw-Hill/Irwin.

Rosen, H. S., Gayer, T., & Civan, A. (2014). *Public finance* (10th ed.). New York, NY: McGraw-Hill Education.

Rousseau, P. L., & Wachtel, P. (2011). What is happening to the impact of financial deepening on economic growth? *Economic Inquiry*, 49(1), 276-288.

Rousseeeuw, P. J. & Yohai, V. J. (1984). Robust regression by means of S-estimator. In Franke, J., Hardle, W. & Martin, D. (eds.) *Nonlinear time series*. Notes in Statistics, 26, Berlin: Springer-Verlag.

Roy, U. (1997). Intra-industry competiveness and economic growth. *Journal of Economics and Business*, 49, 117-125.

Sachs, J. D. (2003). *Institutions don't rule: Direct effects of geography on per capita income*. NBER Working Paper No. 9490, JEL No. O11, P16, P51, R11.

Sachs, J. D., Warner, A., Aslund, A., & Fischer, S. (1995). Economic reforms and process of global integration. *Brookings Papers on Economic Activity, 1*(25), 1-118.

Saez, L., & Shi, X. (2004). Liquidity pools, risk sharing and financial contagion. *Journal of Financial Services Research, 5*, 5-23.

Samuelson, P. A., & Nordhaus, W. D. (2005). *Economics (18th edition)*. Boston, MA: McGraw-Hill.

Sargan, J. D. (1958). Testing for misspecification after estimating using instrumental variables. *Econmetrica, 26*(3), 393-415.

Schularick, M., & Steger, T. M. (2010). Financial integration, investment and economic growth: Evidence from two eras of financial globalization. *The Review of Economics and Statistics*, *92*(4), 756-768.

Schumpeter, J. A. ((1934)[1912]). *The theory of economic development: An inquiry into profits, capital, interest and the business cycle.* Cambridge: Havard University Press.

Sengupta, R. (2007). Foreign entry and bank competition. *Journal of Financial Economics, 84*, 502-528.

Schaeck, K., & Cihak, M. (2014). Competition, efficiency, and stability in banking. *Financial Management*, 43, 215–241.

Shaffer, S. (1998). The winners curse in banking. *Journal of Financial Intermediation, 7*(4), 359-392.

Shaw, E.S. (1973). *Financial deepening in economic development*. New York, Oxford University Press.

Siddiqui, D. A., & Ahmed, Q. M. (2013). The effect of institutions on economic growth: A global analysis based on GMM dynamic panel estimation. *Structural Change and Economic Dynamics, 24*, 18-33.

Soedarmono, W., Machrouh, F., & Tarazi, A. (2011). Bnak market power, economic growth and financial stability. *Journal of Asian Economics, 22*, 460-470.

Solow, R. (1956). A Contribution to the theory of economic growth. *The Quarterly Journal of Economics, 70*, 65-94.

Stiglitz, W. (1989). Imperfect information in the product market. In R. Schmalensee, & R. Willing, *Hand of industrial organization* (Vol. 1). Amsterdam: Elsevier.

Susanti, Y., Pratiwi, H., Sulistojowati, H., & Liana, T. (2014). M estimation, S estimation and MM estimation in robust regression. *Internation Journal of Pure and Applied Mathematics*, 91(3), 349-360.

Triki, T., & Gajigo, O. (2012). *Credit bureaus and registries and access to finance: New evidence from 42 African Countries.* Tunis: African Development Bank Group.

Tufano, P. (2003). Financial innovation. In *Handbook of the Economics of Finance* (pp. 307-335). Elsevier.

Ulgen, F. (2014). Schumpeterian economic growth development and fiancial innovations: A conflicting evolution. *Journal of International Economics, 10*(2), 257-277.

Valverde, S. C., Del Paso, R. L., & Fernández, F. R. (2007). Financial Innovations in Banking: Impact on Regional growth. *Regional Studies, 41:3,, 41*(3), 311-326. Retrieved from http://dx.doi.org/10.1080/00343400600928350

Van Horne, J. C. (1985). Of financial innovations and excesses. *The Journal of Finance*, 40(3), 620-631. https://doi.org/10.1111/j.1540-6261.1985.tb04984.x

Verbeek, M. (2004). *A guide to mordern econometrics* (2nd ed.). Rotterdam: John Wiley & Sons, ltd.

Williamson , C. R., & Mathers, R. L. (2011). Economic freedom, culture, and growth. *Public Choice, 148*(3/4), 313-335.

Wooldridge, J. M. (2009). *Introductory econometrics: A modern approach* (4th edition). Mason, OH: South-Western Cengage Learning.

World Bank (2007). *Financial Sector Integration in Two Regions of Sub-Saharan Africa.* Washington, DC: World Bank.

World Bank (2017) (GFDD, 2017). *Global financial development report 2017*. Washington DC. World Bank.

World Bank (2017) (WDI, 2017). *World development indicator report 2017*. Washington DC. World Bank.

Xiao, S., & Zhao, S. (2012). Financial development, government ownership of banks and firm innovationo. *Journal of International Money and Finance, 31*, 880-906.

Xin, F., Zhang, J., & Zheng, W. (2017). Does credit market impede innovation? Based on the banking structure analysis. *International Review of Economics and Finance, xxxx*, xxxx–xxxx. Retrieved from http://dx.doi.org/10.1016/j.iref.2017.01.014.

Yohai, V. J. (1987). High breakdown-point and high efficiency robust estimates for regression. *The Annals of Statistics*, 15(2), 642-656.

APPENDICES

Appendix 1: Estimates of Financial Development Induced Convergence Parameters for 44 Countries

Country	FD	FI	Convergence Coefficient	Remarks
Algeria	14.3	0.99	-1.1885	Unlikely to converge
Benin	16.92	1	-1.385	Unlikely to converge
Botswana	25.77	1.23	-2.04875	Likely to converge
Burkina Faso	16.71	1.11	-1.36925	unlikely to converge
Burundi	16.5	-0.15	-1.3535	unlikely to converge
Cameroon	11.94	0.53	-1.0115	Unlikely to converge
Cape Verde	52.1	2.26	-4.0235	Likely to converge
Central African Republic	9.08	0.46	-0.797	Unlikely to converge
Congo DR	3.62	0.43	-0.3875	Unlikely to converge
Congo Rep	6.83	1.23	-0.62825	Unlikely to converge
Cote d'Voire	14.87	0.73	-1.23125	unlikely to converge
Djibouti	26.43	0.29	-2.09825	Likely to converge
Egypt	39.8	-2.04	-3.101	Likely to converge
Equatorial Guinea	5.63	0.85	-0.53825	Unlikely to converge
Ethiopia*	20.44	-0.51	-1.649	Likely to Converge
Gabon	10.95	0.15	-0.93725	Unlikely to converge
Gambia	12.94	0.34	-1.0865	Unlikely to converge
Ghana	15.28	0.61	-1.262	Unlikely to converge
Guinea	6.88	0.74	-0.632	Unlikely to converge
Guinea-Bissau	5.54	0.55	-0.5315	Unlikely to converge
Kenya	27.77	0.68	-2.19875	Likely to converge
Lesotho	11.93	0.43	-1.01075	Unlikely to converge
Liberia	12.16	1.22	-1.028	Unlikely to converge
Libya	10.76	0.01	-0.923	Unlikely to converge
Madagascar	10.76	0.36	-0.923	Unlikely to converge
Malawi	9.49	0.27	-0.82775	Unlikely to converge
Mali	15.67	0.87	-1.29125	Unlikely to converge
Mauritania	22.97	-0.23	-1.83875	Likely to converge
Mauritius	83.13	3.21	-6.35075	Likely to converge
Morocco	57.34	1.55	-4.4165	Likely to converge
Mozambique	19.02	1.74	-1.5425	Likely to converge
Namibia	47.83	0.89	-3.70325	Likely to converge
Niger	9.29	0.53	-0.81275	Unlikely to converge
Nigeria	17.49	-0.17	-1.42775	unlikely to converge
Rwanda	14.52	0.75	-1.205	Unlikely to converge
Senegal	24.23	1.29	-1.93325	Likely to converge
Sierra Leone	4.96	0.25	-0.488	Unlikely to converge

South Africa	141.28	0.62	-10.712	Likely to converge
Sudan	9.81	0.3	-0.85175	Unlikely to converge
Tanzania	11.23	0.7	-0.95825	Unlikely to converge
Togo	22.36	1.88	-1.793	Likely to converge
Tunisia	66.7	1.27	-5.1185	Likely to converge
Uganda	11.49	0.52	-0.97775	Unlikely to converge
Zambia	11.2	0.94	-0.956	Unlikely to converge
Grand Average	22.86	0.7	-1.8305	Likely to converge

Appendix 2: Frequency of Systemic Bank Crises in African Countries

Country	1990 - 2011	2002- 2011
Algeria	5	0
Angola	0	0
Benin	3	0
Botswana	0	0
Burkina Faso	5	0
Burundi	5	0
Cameroon	5	0
Cape Verde	0	0
Central African Republic	2	0
Chad	5	0
Congo, Dem. Rep.	8	0
Congo, Rep.	3	0
Cote d'Ivoire	3	0
Djibouti	5	0
Egypt, Arab Rep.	0	0
Equatorial Guinea	0	0
Eritrea	1	0
Ethiopia	0	0
Gabon	0	0
Gambia, The	0	0
Ghana	0	0
Guinea	1	0
Guinea-Bissau	4	0
Kenya	3	0
Lesotho	0	0
Liberia	5	0
Libya	0	0
Madagascar	0	0
Malawi	0	0
Mali	2	0
Mauritania	0	0
Mauritius	0	0
Morocco	0	0
Mozambique	2	0
Namibia	0	0
Niger	0	0
Nigeria	8	3
Rwanda	0	0
Sao Tome and Principe	0	0
Senegal	2	0
Seychelles	0	0

Sierra Leone	5	0
Somalia	0	0
South Africa	0	0
South Sudan	0	0
Sudan	0	0
Swaziland	5	0
Tanzania	0	0
Togo	2	0
Tunisia	1	0
Uganda	1	0
Zambia	4	0
Zimbabwe	5	0
Total	100	3

Appendix 3: Descriptive Statistics of the Panel Observations in Chapter Five

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Observations
U_U1	1.21	1.14	29.42	-63.07	5.31	-3.66	47.63	611
C_W	-1.62	-1.69	-0.38	-2.38	0.48	0.62	2.37	611
FD	23.19	14.16	160.13	0.00	26.04	2.85	12.38	586
ATM	12.69	4.15	218.25	0.00	26.08	4.86	32.31	434
FI	0.72	0.62	18.82	-28.07	3.11	-1.73	26.21	596
GEX	14.89	14.29	38.41	2.74	5.56	1.04	5.13	579
EFREE	55.24	55.60	77.00	31.50	6.75	-0.06	4.24	579
ATE	39.92	30.65	100.00	0.02	30.97	0.72	2.22	569
MOB	46.02	34.94	171.38	0.00	40.25	0.85	2.93	611
PCBF	0.03	0.00	0.46	0.00	0.09	3.08	12.22	613
PCR	0.32	0.08	1.00	0.00	0.36	0.53	1.64	613
TRADE	74.73	67.97	311.36	19.10	36.18	2.44	14.11	592
HC	1.74	1.66	2.68	1.09	0.39	0.34	2.18	481