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Financial development of financial liberalization : growth an (in)stability effects. A case study of Rwanda

DUSENGE, Jean Félix

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FINANCIAL DEVELOPMENT OR FINANCIAL LIBERALIZATION: GROWTH AND (IN)STABILITY EFFECTS

A case study of RWANDA

Thesis presented by
Jean Félix DUSENGE

Supervisor:
Professor Alain DE CROMBRUGGHE (UNamur)

Tutor:
Jeremy Gross (UNamur)

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ABSTRACT

The objective of this study is to examine the relationship between financial development and economic growth in Rwanda over the period from 1980 to 2016. Specifically, the study investigates whether the credit allocated to the private sector and the expansion of liquid liabilities have led to the increase in growth rate of GDP in Rwanda. The short-run and long-run relationship between financial development and economic growth and other conditioning variables on economic growth are estimated by using the Autoregressive Regressive Distributed Lag (ARDL). The findings from this study conclude that there is a positive and statistically significant relationship between financial development and economic development. Moreover, investment was identified as an important conduit through which financial development contributed to economic growth. However, the study found no significant evidence about the contribution of trade openness in promoting economic growth in Rwanda.

The lack of evidence for the contribution of trade in promoting economic growth suggests important policy implication to reform the structure of exports and imports. Currently, this sector heavily relies on a limited export basket dominated by low value added commodities and this dependence on commodities exports has resulted in an export decrease over the years due to international price volatilities. Therefore, policymakers should look at the ways to diversify the export composition to increase revenues by exporting high value commodities and minimize the risks caused by international price volatilities.

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LIST OF ABBREVIATIONS

ARES	Académie de recherche et d'enseignement supérieur
ARDL	Autoregressive distributed lag
BNR	National Bank of Rwanda
CPI	Consumer Price Index
FSDP	Financial Sector Development Programme
GDP	Gross Domestic Product
FDI	Financial Development Institutions
FSDI	Financial sector development index
MFI	Micro Finance Institution
NISR	National Institute of Statistics for Rwanda
SACCOs	Savings and Credit and Co-operatives
VECM	Vector Error Correction Model

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CHAPTER ONE: INTRODUCTION

1.0. Introduction

Since the 1970s, several countries have liberalized their financial systems in an attempt to bolster their economic growth. From then, the role of financial liberalization in boosting the economic growth has attracted the attention of a lot of economists. A number of theoretical and empirical studies have been conducted on the subject. However economic theories are still ambiguous about the relationship between financial openness and economic growth.

One strand of literature based on the principle of competitive and efficient markets states that financial openness should foster economic growth and development. This is through improving the allocation of capital, enhancing better risk management through diversification, allowing unlimited international capital flows, lowering the cost of capital and generally deepening the financial system hence encouraging investments with higher returns (Marcel and Bussiere (2004) and King and Levine (1993)). However, others point out indirect or even negative link between finance-growth nexus. Rousseau and Wachtel (2007) argue that financial liberalization effects depend on countries' economic environments. According to these authors, countries with moderately developed financial sectors or countries with middle levels of per capita income benefit highly from a financial deepening compared to other countries. Stiglitz (2000) also showed that the increased frequency of financial crises is closely associated with financial market liberalization. According to this author, liberalization is systematically related to greater instability since capital flows are cyclical in nature, and this exacerbates economic fluctuations.

In the past three decades, nearly all countries in Sub-Saharan Africa have implemented liberalization of the financial sector with the objective of fostering economic growth. Roseline and Esman (2011) asserted that starting from the 1980s most countries embraced the financial liberalization process through easing or lifting bank interest rate caps, reducing interference in credit allocation decisions, lowering compulsory reserve requirements and entry barriers, and privatizing many state-owned commercial banks.

In Rwanda, the financial system started shortly after its independence in 1962 with the creation of the Central bank in 1964 and some financial institutions thereafter. Nevertheless, the financial system remained undeveloped until the late 1990s, a period in which the country embarked on financial liberalization. This process started by liberalization of exchange rate in 1995 and interest rate in 1996. Moreover, in the same year (1996), the banking structure was opened to foreign investment and entry requirements for MFIs were relaxed (Joy, 2014).

To add to the existing knowledge as well as to provide more critical assessments on the finance-growth nexus, this study examined whether financial development should be viewed as an engine of growth and investment. This was done by assessing the possible contribution of financial development proxied by credit to private sector and financial liabilities to the economic growth of Rwanda.

1.1. Problem Statement

Financial liberalisation has been intensively studied in the past but there is still no consensus on its consequences. Some studies emphasise positive impacts of financial liberalisation on economic growth. King and Levine (1993) show that high levels of financial development are correlated with productivity growth and economic development. Fowowe (2008) also states that the potential long-run gains of better functioning financial markets and the subsequent development of the real sector ultimately lead to faster economic growth.

Other strand of literature stresses the dual effects of financial liberalization on economic growth. Ranciere et al (2006) state that on one hand, financial liberalization tends to relax borrowing constraints, leading to higher investment and higher average growth, but on the other hand, it encourages risk-taking, generates financial fragility and increases the probability of financial crises, which often have severe recessionary consequences. Roseline and Esman (2011) assert that financial liberalization positively affects banking crisis, implying that financial liberalization can potentially cause volatility in the financial system with possible negative growth implications. Given this background, there is a need to provide more critical assessments on how efforts put in place by countries to develop their financial sector contribute to their economic growth.

1.2. Objectives of Study

1.2.1 General objective

The main aim of this study is to assess empirically the relationship between financial development and economic growth in Rwanda and to investigate whether or not the financial development can be taken as an engine for economic growth.

1.2.2 Specific objectives

1.2.2.1. To investigate whether the credit allocated to the private sector had led to improvements in growth rate of GDP.

1.2.2.2. To determine whether the expansion of liquid liabilities has led to increase in growth rate of GDP.

1.3. Research Questions

This study focuses on various strategies and reforms taken by Rwanda in the bid to improve the financial sector as one way of fostering economic growth. This is done by trying to answer the following questions;

1.3.1. Is financial development an engine of growth and investment?

1.3.2. Do credits facilities allocated to the private sector have a positive impact in terms of GDP growth?

1.3.3. Do liquid liabilities have a gain in terms of GDP growth?

1.4. Organization of the Study

This study is organized as follows; Chapter 1 presents the general introduction, problem statement, study objectives, research questions; Chapter 2 reviews existing literature on the relationship between financial liberalization and growth; Chapter 3 outlines the methodology; Chapter 4 reports empirical results and Chapter 5 concludes.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1. Theoretical Literature

Even though it has been extensively studied, the relationship between financial development and economic growth remains a contentious subject in economic scholars. The initial thinking about the finance-growth nexus started long ago with the widely recognised work of Schumpeter (1911) who stated that the improved quality and quantity of financial services plays a significant role in economic growth.

Patrick (1966) classified the possible relationship between financial development and economic growth in two categories; the supply-leading and demand following. The supply leading view which recognizes a positive impact of financial development on economic growth states that the creation of financial institutions and markets increases the supply of financial services which in turn leads to economic growth. According to him, the supply-leading finance performs the functions of transferring resources from traditional non performing sectors to modern high-growth sectors and stimulating an entrepreneurial response in these modern sectors.

The seminal works of McKinnon (1973) and Shaw (1973) argue that government restrictions on the banking system such as interest rate ceiling, high reserve requirements and directed credit programs hinder financial development and reduce output growth. McKinnon (1973) proposes a complementary relationship between the accumulation of money balances (financial assets) and physical capital accumulation in developing countries. The author argues that due to underdeveloped financial markets in most developing countries, there are limited opportunities for external finance and all firms are confined to self-finance. Therefore, firms must accumulate sufficient savings in the form of monetary assets to finance the investment projects. Similarly, Shaw (1973) argues that high interest rates are essential in attracting more saving. According to him, with more supply of credit, financial intermediaries promote investment and raise output growth through borrowing and lending.

Contrary to the above hypothesis which states that, financial development lead economic growth, Patrick (1966) proposes an alternative argument; the demand -following view, in which he argues that as the economy grows, it generates additional and new demands for financial services and hence the economic growth leads and finance follows. Moreover, he concludes that the lack of financial institutions in underdeveloped countries is simply an indication of the lack of demand for their services. Robinson (1952) as quoted in Mohamed (2008) also had pointed out that finance does not exert a causal impact on growth. Instead financial development follows economic growth as a result of higher demand for financial services. As such, the financial sector responds positively to economic growth as the real economy grows.

Recent literature on finance-growth nexus theory has also debated a lot on the relationship between financial development and economic growth and two opposing views still persist.

King and Levine (1993) show that high levels of financial development are correlated with faster production growth rates and economic efficiency advancements. According to the authors, a more-developed financial system fosters productivity improvement by choosing higher quality entrepreneurs and projects, by more

effectively mobilizing external financing for these entrepreneurs, by providing superior vehicles for diversifying the risk of innovative activities, and by revealing more accurately the potentially large profits associated with the uncertain business of innovation.

Nevertheless, there is a growing literature that shows that the link between financial development and economic growth is not direct. For example, Rioja and Valev (2004) find that financial development significantly promotes growth in countries with intermediate levels of financial development whereas additional improvements in financial markets have an uncertain and small effect on growth of low and high income countries respectively. According to Masten et al. (2008), the evidence of the non-linearity in the effect of financial development on growth is based on the estimated threshold model which suggests that financial development has the largest effect on growth in countries with a level of financial development below some threshold, while the effect is found to be close to zero above the threshold.

This dual effect of growth-finance nexus was empirically addressed in the study by Loayza and Ranciere (2006) by distinguishing between the short run impact of credit expansions on growth and the long run positive of financial deepening on growth. According to them, a positive long-run relationship between financial intermediation and output growth can coexist with a negative short-run relationship. Similarly, Marcel and Bussiere (2004) also contends that after financial liberalization, countries tend to gain in the short-term due to the investment boom and a surge in portfolio and debt inflows, but may not grow faster or even experience temporary growth reversals in the medium- to long-term. They suggest that the quality of domestic institutions, the size of FDI inflows and the sequencing of the liberalization process are important driving forces for growth in the medium to longer term. The authors summarize this process in what they call "short-run gain and long-run pain of financial liberalization".

2.1.1. FINANCIAL DEVELOPMENT, FINANCIAL LIBERALISATION AND VOLATILITY

Even though they are used almost interchangeably in the literature about finance-growth nexus, there is a need to distinguish financial development from financial liberalization. Agnieszka (2013) asserted that financial globalization (liberalization) refers to the process of the progressive removal of barriers in the international movement of capital flows while financial development refers to the upgrading of the quality of financial transactions. According to this author, the former pertains basically to the supra-national dimension, in which financial system refers to the intensification of transactions between the national economy and the rest of the world. The latter, instead, is more tightly embedded in the national context, with the financial depth observed within the borders of a single economy. According to Silke et al. (2013) financial liberalization refers to official government policies that focus on deregulating credit as well as interest rate controls, removing entry barriers for foreign financial institutions, privatizing financial institutions, and/or removing restrictions on foreign financial transactions.

The possible relationship between financial liberalization and economic growth brought up the mixed views in the literature as far as the volatility is concerned. Some studies suggest that a more developed financial system is associated with reduced growth volatility. Denizer et al. (2002) show that countries with more

developed financial sectors experience less fluctuations in output, consumption and investment growth and that private sector finance is particularly important in reducing macroeconomic volatility. Raddatz (2006) states that financial development has a large causal effect in the reduction of macroeconomic volatility resulting from the role of the financial system in liquidity provision. He stresses that in particular, financial system development leads to a comparatively larger reduction in the volatility of output in sectors with high liquidity needs. According to this author, among different aspects of the financial system, the depth of financial intermediaries plays the main role in the reduction of volatility.

By contrast, others argue that financial liberalization is linked to high volatility and financial crises. For instance, Stiglitz (2000) argues that the increased frequency of financial crises is closely associated with financial market liberalization. Liberalization is systematically related to greater instability since capital flows are cyclical in nature, and this worsens economic fluctuations. Easterly et al. (2000) also asserted that while a high degree of capital account openness could in principle smooth a country's adjustment to shock, it may also expose the country to another, adverse source of dynamic reaction.

2.2. Empirical Literature

Several empirical findings support the supply leading hypothesis proposed by Patrick (1966). King and Levine (1993) used cross-section analysis to examine the relationship between financial development and economic growth during the period 1960-89. Four indicators were used as proxies of financial development; the ratio of liquid liabilities to GDP, the ratio of deposit bank assets to the sum of deposit money and central bank assets, ratio of private credit to domestic credit (both public and private) and ratio of private credit to GDP. The findings of the study showed that a better financial system stimulates economic growth by accelerating the rate of productivity enhancement.

Levine et al. (2000) conducted the study on 74 countries for the period 1960 to 1995. The ratio of liquid liabilities to GDP, ratio of deposit money banks domestic assets to deposit money banks domestic assets plus central bank domestic assets and ratio of credit issued to private enterprises to nominal GDP were used as financial indicators, along with a broad set of control variables. The findings confirmed the positive correlation between financial system and economic growth. The authors suggested that legal and accounting reforms that strengthen creditor rights, contract enforcement, and accounting practices can boost financial development and accelerate economic growth.

Khan and Senhadji (2003) examined the relationship between financial development and economic growth. By using the two-stage least squares method over a dataset of 159 countries, their findings suggest that financial development has a positive and statistically significant effect on economic growth.

Hassan et al. (2011) examined the panel regressions of 168 countries using both cross-sectional and time-series approaches to study the linkages between financial development and economic growth in low-, middle-, and high income countries. In their study, they developed various multivariate time-series models to investigate the direction and relationship between finance and growth in these countries and explore some policy

implications. The main finding of the study is consistent with the argument that well-developed domestic financial sectors in developing countries may substantially contribute to an increase in savings and investment rates, which ultimately trigger economic growth.

Fatima (2004) examined the causal relationship between financial development and economic growth in Morocco for the period 1970-2000. The ratio of liquid liabilities (M3) to GDP, ratio of domestic credit provided by the banking sector as a percent of GDP, and domestic credit to the private sector to GDP were the financial depth indicators used. Using the Granger causality test, the study found a short-run relationship between financial development and economic growth.

Ang and McKibbin (2007) examined the causal relationship between financial development and economic growth in Malaysia using time series data from 1960- 2001. The ratio of liquid liabilities (or M3) to nominal GDP, commercial bank assets to commercial bank plus central bank assets , and ratio of domestic credit to private sector to nominal GDP were used to construct an index as a proxy for financial depth using principal components analysis. Their findings suggest that growth exerts a positive and unidirectional causal effect on finance in the long run.

In their study about the relationship between financial development and economic growth in Sierra Leone for the period 1970-2008, Kargbo and Adamu (2009) employed the method of principal components to construct a financial sector development index (FSDI) used to proxy development in the sector. Using the autoregressive distributed lag (ARDL) approach, the study finds a unique cointegrating relationship among real GDP, financial development, investment and real deposit rate. The results suggest that financial development exerts a positive and statistically significant effect on economic growth.

Analyzing the links between a number of relevant financial indicators and economic growth in Rwanda over the period 2006–2014, the Central bank in Rwanda has employed a triangulation of the Vector Error Correction Model (VECM) and Granger non-causality approaches and impulse response functions to investigate the dynamic inter-relationship between various measures of financial sector development and economic growth and for addressing questions of the direction of causality between financial sector development and growth in the country. Empirical results suggest that broad money (M3), an intermediate target that Rwandan monetary authorities use in influencing the level of economic activities in the economy, has a positive and significant long run correlation with GDP and that causality runs both ways. This confirms the existence of a nexus between financial sector development and economic growth in Rwanda and the role of BNR in the economic development of the country in the period under review (BNR, 2016a).

In contrast to the direction of the financial development proponents' researchers, other prominent studies have argued that it is economic growth that facilitates the creation and development of financial development. For instance, Demetriades and Hussein (1996), in an effort to determine the relationship between financial development and economic growth, used time series data to analyze the effects of this relationship in 16 countries using data from 1960 to 1990. The authors used the proportion of bank deposit liabilities to GDP and the proportion of bank lending in the private sector to GDP as indicators of financial development. The result of

their study showed how the causal effect between the dependent variable (financial development) and long-run growth moves in a different direction for the respective countries surveyed.

Lastly, the findings of some studies do not support the finance-growth relationship. For instance, Mohamed (2008) examined the impact of financial development on economic growth using evidence from Sudan from 1970 to 2004. The author used the most recently developed autoregressive distributed lag (ARDL) approach to co-integration analysis. The results indicate a weak relationship between financial development and economic growth in Sudan. Lucas (1988) does not support the view that finance is a major determinant of economic growth. He argues that its role has been over-stressed by economists. Ahmed (2013) in his study on the role of financial liberalisation in promoting financial deepening and economic growth in 21 countries in Sub Saharan Africa suggests that financial liberalisation has a negative effect on income growth.

2.3. ECONOMIC AND FINANCIAL DEVELOPMENT IN RWANDA

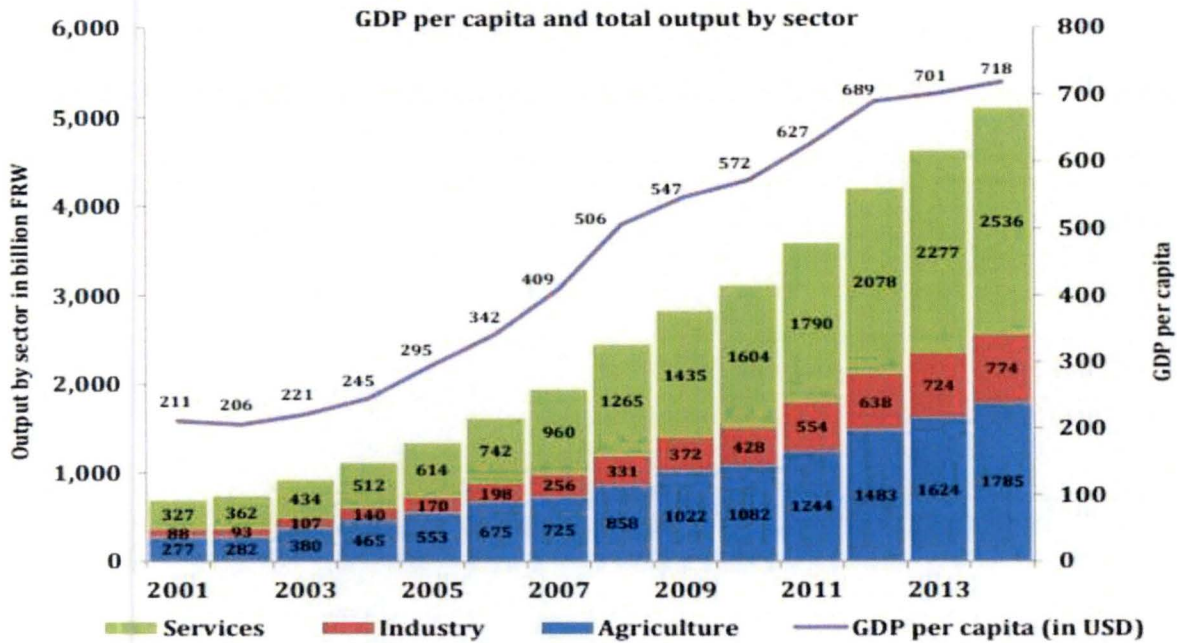
2.3.1. A brief review of Rwandan economic development

Rwanda has an area of 26,338 km² and a population estimated at 12.7 million in 2017, with a growth rate of 2.6%, and an urban population representing 25.8% of the total population. Over 70% of Rwandan households live in rural areas and depend on subsistence farming. It has one of the highest population densities in Africa with 467 inhabitants per square kilometre, with women and youth representing respectively 52% and 68% of the total population. The literacy rate is estimated at 65% and life expectancy is 66.6 years (NISR, 2017).

Because of population pressure, rural conditions are characterized by a shortage of cropland food production which is not keeping pace with population growth, necessitating the importation of food especially from neighbouring countries. Cash crops (coffee and tea) occupy about 13% of the land and constitute 80% of exports. Besides agriculture, there is exploitation of scarce natural resources in some regions like cassiterite, wolframite, and methane recently discovered in Lake Kivu.

Rwandan economy improved considerably since 2000 and was classified as one of the fastest growing economies in central Africa with the GDP growth of around 8% per year, well above the average for all Sub-Saharan African countries between 2002 and 2016 (WB, 2017).

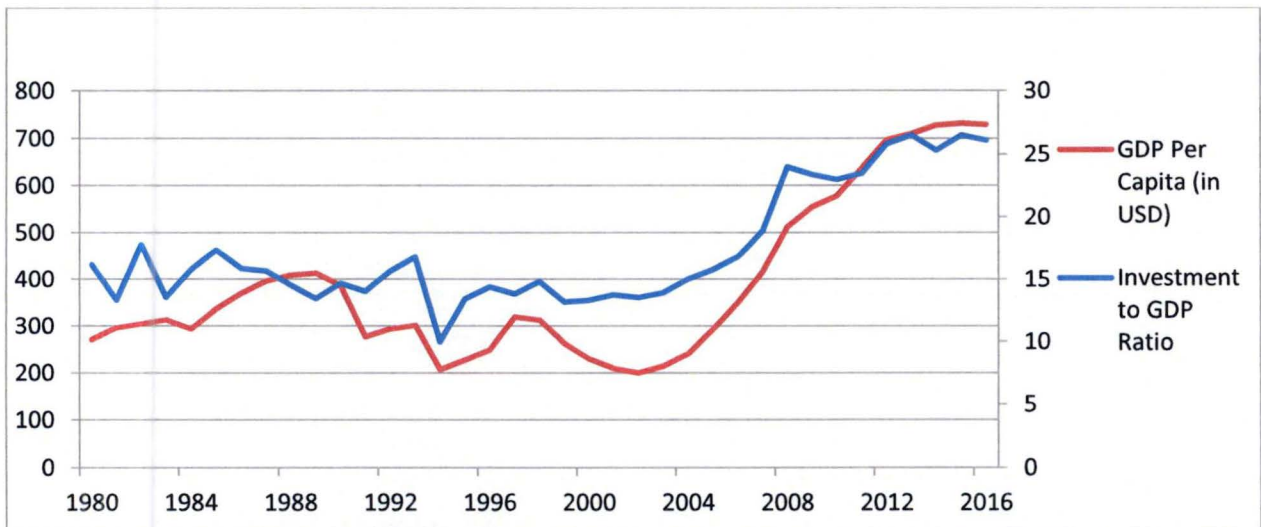
Figure 1: GDP at current prices from 2001-2014



Source: NISR, 2015.

Moreover, Rwanda has made great strides in improving living conditions and reducing poverty. Poverty has fallen by 3 percentage points, from 60% of the population living under the poverty line in 2000/2001 to 56.9% in 2006. From 2006 to 2014, the poverty declined from 56.9% to 39.1. However, 16.3% of Rwandan population are still extremely poor (NISR, 2015).

Figure 2: Investment and Real GDP per Capita in Rwanda



Sources: World Bank: World Development Indicators (2016)

Own calculations from data provided by IMF

2.3.2. Overview of the Rwandan banking system

2.3.2.1. Structure of Rwandan banking sector

The financial sector in Rwanda consists of a wide and growing array of institutions: banks, microfinance institutions, savings and credit cooperatives (SACCOs), insurance companies, and pension funds. Like many developing countries, the Rwanda financial sector is largely dominated by banking sector which hold around 66.9 percent of the total financial sector assets. The pension sub-sector comes second, with 17.1 percent of the total financial sector assets. Insurance institutions hold 9.7 percent of the total financial sector's assets. Microfinance institutions account for 6.3 percent of total financial sector assets. The National Bank of Rwanda (BNR) is the sole regulator of the above mentioned financial sector sub-sectors. Prior to 1995, Rwanda had only 3 commercial banks and currently (as of June 2015), 17 banks were registered with the Rwandan National bank: eleven commercial banks, four micro-finance banks, one development bank, and one cooperative bank. There are also 416 Savings Credit and Co-operatives (SACCOs), and microfinance institutions¹.

Table 1: Structure of Rwanda's Financial System

	2011			Jun- 15			Jun- 16		
	Number	Assets (billion Frw)	% of total assets of FS*	Number	Assets (billion Frw)	% of total assets of FS*	Number	Assets (billion Frw)	% of total assets of FS*
Banks	15	1,084	70.8%	17	2,000	66.4%	17	2,278	66.5%
Insurance	8	158	10.3%	14	295	9.8%	15	329	9.6%
Pension	1	212	13.8%	1	530	17.6%	1	585	17.1%
Microfinance	11	77	5.1%	493	188	6.2%	493	230	6.7%
TOTAL	35	1,531	100%	525	3,013	100%	526	3,422	100%
*FS: Financial Sector									

Source: BNR (2016b)

Rwandan banking system is more privately and domestically owned. As of June 2015, close to 61 percent of banking assets were domestically owned. Foreign assets were 39 percent. Private ownership stood at 55 percent of the total banking system assets². As at June 2013, the Rwandan commercial banks continued to dominate the banking industry with a proportion of 80.4 percent of the total banking system's assets while other specialized banks (Microfinance banks, development bank, and cooperative bank) account for 19.6 percent of the total banking system's assets. In spite of that, the Rwandan banking remained concentrated with the four largest banks together holding over 54 percent of the total system assets. One major bank is holding 32.0

¹ National bank of Rwanda, financial report 2015

² National bank of Rwanda, financial report 2015

percent of the total commercial banks' assets while the smallest bank holds 3.4 percent of the total commercial bank sector's assets³.

2.3.2.2. FINANCIAL SECTOR REFORMS IN RWANDA AND THEIR IMPACT ON ECONOMIC GROWTH

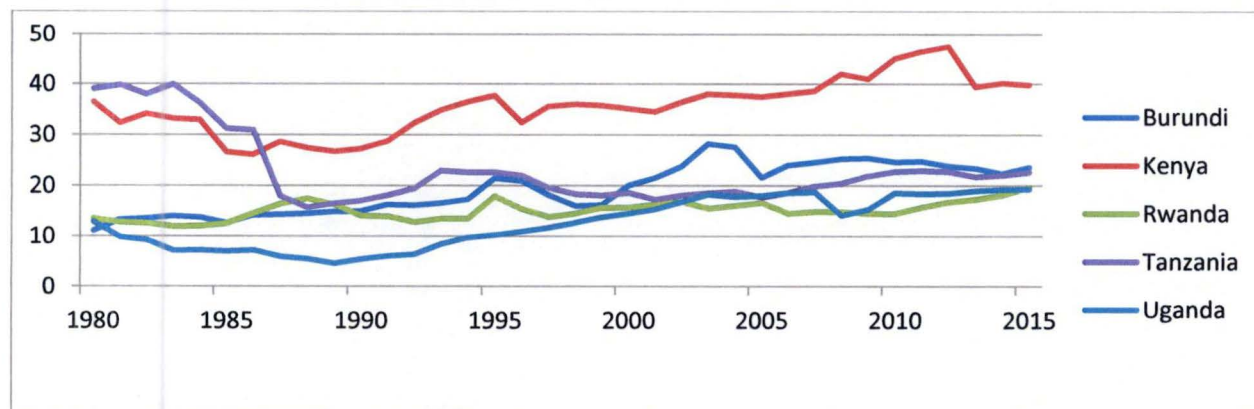
It is recognized that when financial services reach out to the population broadly and efficiently, they accelerate economic growth, efficient allocation of resources and improved wealth distribution. In this study, we restrict the definition of financial liberalisation to domestic financial sector liberalisation; we do not include the analysis of exchange rate regimes or free capital movements.

The financial system in Rwanda has undergone significant developments since the establishment of the National Bank of Rwanda in 1964. Nevertheless, the financial sector remained relatively weak until 1994 with a limited number of financial institutions and most of them not only operated on shoestring but also were concentrated in few major cities.

In an attempt to develop a stable and sound financial sector that is sufficiently deep and broad, capable of efficiently mobilizing and allocating resources to address the development needs of the economy and reduce poverty, different reforms of the financial system have been implemented since 1995 such as liberalization of exchange rate in 1995 and interest rate in 1996. Moreover, in 1996, banking structure was opened to foreign investment and entry requirements for MFIs were relaxed (Joy, 2014).

Consequently, these reforms have gradually generated positive results in many important aspects, including in particular, an expansion of the banking system (financial deepening) and an even faster expansion of bank lending to the private sector.

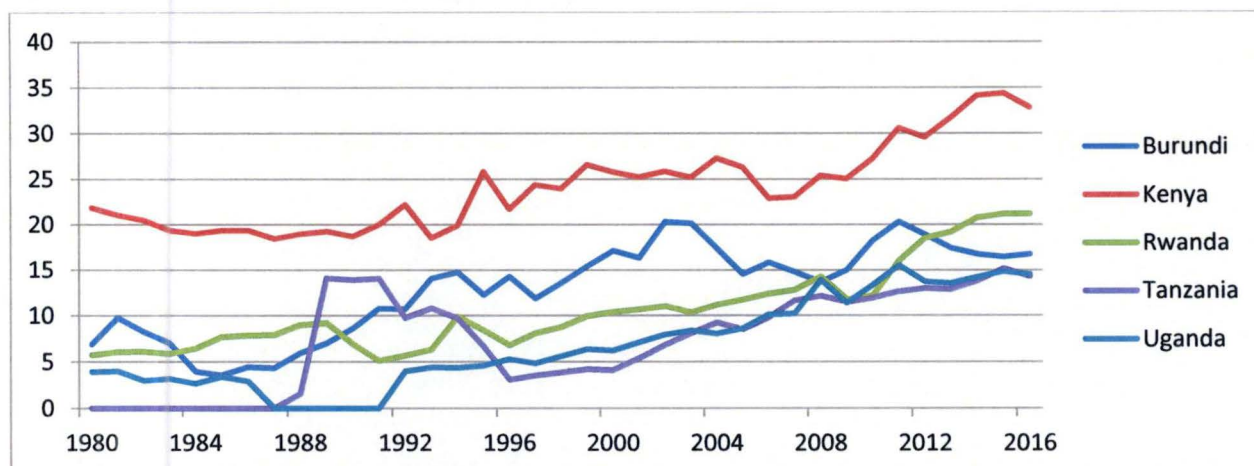
Figure 3: Liquid Liabilities to GDP in EAC Countries



Source: World Bank: World Development Indicators (2017)

³ National bank of Rwanda, financial report 2013

Figure 4: Domestic Credit to Private Sector, Percent of GDP in EAC countries

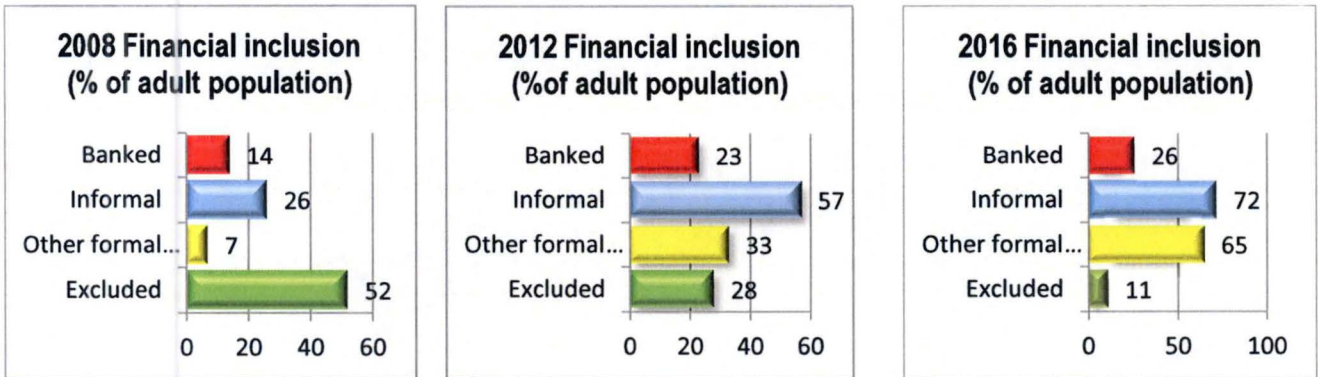


Source: World Bank: World Development Indicators (2017)

Nevertheless, the great financial development took place after 2000 when different initiatives to foster the financial sector were implemented. Among them, the Rwandan Financial Sector Development Programme (FSDP) was launched in 2006 with the objectives of enhancing access and affordability of financial services; enhancing savings mobilization; developing appropriate policy, legal and regulatory framework for non-bank financial institutions; as well as organising and modernising the national payment system. This resulted in the increase in the number of financial institutions and the expansion in the financial services offered. By June 2015, the number of banks reached 17 and the ratio of broad money (M3) to GDP rose gradually to 20% in 2015. The ratio of private sector credit to GDP stood at 22 percent as of end 2015, compared to 11.6 percent in 2009 (BNR, 2016b).

Moreover, in order to increase the geographical coverage of the financial services throughout the country, in 2008, the government proposed a strategy of integration of the rural population in the financial system. This strategy "set up at least a Savings Credit and Co-operatives (SACCOs) within each UMURENGE (local administrative entity) throughout the country. Consequently, the financial sector of Rwanda has improved greatly. 89% of Rwandan adults are financially included, with 28% of the Rwandan population in the formal financial system (26% served by commercial banks and 65% served by non-bank formal institutions), and 72% use informal financial mechanisms.

Figure 5: Financial inclusion in Rwanda

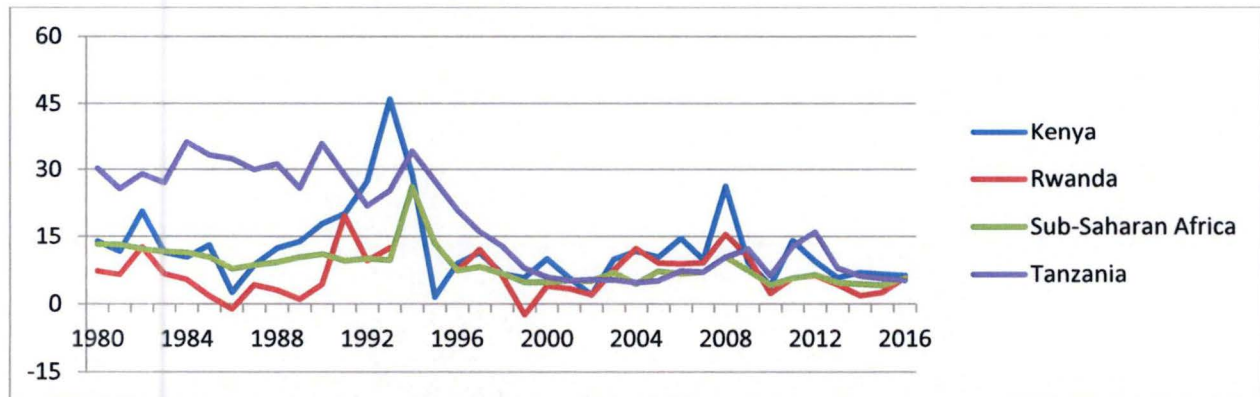


Source: *FinScope Rwanda 2008 and 2016*.

2.3.2.3. FINANCIAL VOLATILITY IN RWANDA

It is quite axiomatic that low inflation is a central element for the macroeconomic stability of a country. Rwandan economy has been characterized by the problems of inflation in the past years. Those were mainly triggered by the climate change that affected negatively agriculture production in some areas of the country and the four year's war and social tensions (1990–1994) that culminated into genocide. Nevertheless, after the genocide the monetary authorities in Rwanda have implemented various strategies to keep the inflation rate to the lowest possible level. According to BNR (2016b), the central bank of Rwanda has been targeting an inflation level of around 5% for economic policy purposes.

Figure 6: Evolution of inflation in Rwanda



Source: *World Bank: World development indicators (2017)*.

As illustrated by figure 6, like other countries in the region, inflation rate in Rwanda fluctuated substantially in the past years. However, the central bank managed to keep the inflation at bay and at the low level compared to the inflation levels in neighbouring countries and the average level of Sub Saharan countries. In addition to sound monetary policies implemented by the BNR, this achievement was also due to the fact that Rwandan financial system has limited cross-border connection to the global financial system. Therefore, volatilities in global financial markets are not fully transmitted to Rwandan market compared to other neighbouring countries.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Source of data and scope of the study

Time series data for Rwanda on financial and macroeconomic indicators are collected over the period from 1980 to 2016. Data are from the 2017 edition of the World Bank's Global Financial Development Indicators database and various issues of the National Bank of Rwanda various reports. The selection of this period is based on the fact that the researcher wanted to take into consideration pre- and post-financial liberalization periods. Since the financial liberalization took place in Rwanda in 1995-1996, the period under scrutiny will be of great interest to analyse the effect of those financial reforms on economic growth.

3.2. Empirical analysis

3.2.1. Model specification and rationale of variables

The growth model used in this study takes the following form: $Y_{it} = \alpha_0 + \alpha F_{it} + \beta X_{it} + \varepsilon_{it}$.

Where Y is the real GDP per-capita used as a proxy for economic growth, F_{it} is a measure of financial sector development, X is a set of standard variables in the growth literature while ε_{it} is an idiosyncratic error term.

This growth model follows the financial liberalization augmented standard Barro growth equation used by Rousseau and Wachtel (2007) and Mohamed (2008). To ensure comparability with other growth models used previously, we use two familiar measures of financial development, the ratios to GDP of liquid liabilities (M3) and credit allocated to the private sector. M3 as a percent of GDP has become a standard measure of financial depth and an indicator of the overall size of financial intermediary activities in studies of finance-growth nexus. Bank credit to the private sector is often argued to be a more superior measure of financial development. Ang and McKibbin (2007) state that since the private sector is able to use funds in a more efficient and productive manner than the public sector, the exclusion of credit to the public sector better reflects the extent of efficient resource allocation.

The $X_{i,t}$ is a set of control variables: Investment, government consumption; inflation and trade openness. Investment has been proven as a significant positive contributor while Government expenditure is expected to negatively impact economic growth due to the crowding out effect. Trade openness is included to capture the effects of internal trade on growth while the inflation variable was included in model one to account for the volatility of growth. Gross investment as a ratio of GDP, government consumption as a ratio of GDP, the sum of exports and imports as a ratio of GDP and the CPI were used as proxies for investment, government consumption; inflation and trade openness respectively.

It would have been more insightful for the study on Rwanda, a country which has been receiving huge sums of foreign aids, to include also a variable accounting for the contribution of this financing on economic growth. However, the non-availability of data on foreign aid to Rwanda precluded such achievement.

In order to ensure the robustness of our results, we estimate two alternative versions of the model to investigate the impact of financial development on economic growth in Rwanda, using annual time series data for the period 1980 to 2016. The two models are:

$$\text{Model 1: } \text{LRGDP}_t = \alpha_0 + \alpha_1 \Delta \text{LINV}_t + \alpha_2 \Delta \text{LGOV}_t + \alpha_3 \Delta \text{LTRD}_t + \alpha_4 \Delta \text{LCPS}_t + \alpha_5 \Delta \text{LCPI}_t + \varepsilon_{1t}$$

$$\text{Model 2: } \text{LRGDP}_t = \beta_0 + \beta_1 \Delta \text{LINV}_t + \beta_2 \Delta \text{LGOV}_t + \beta_3 \Delta \text{LTRD}_t + \beta_4 \Delta \text{LM3Y}_{t-1} + \varepsilon_{2t}$$

Here, all the variables in the above models are expressed in natural logarithm. Therefore, LRGDP_t is the log of the real GDP per capita, ΔLINV_t is the log difference of the ratio of investment to GDP; ΔLGOV is the log difference of the ratio of government spending to GDP. ΔLTRD is the log difference of the ratio of the sum of exports and imports to GDP, ΔLCPS_t is the log difference of the ratio of credit to private sector to GDP, ΔLM3Y_t is the log difference of the ratio of liquid liabilities to GDP, ΔLCPI_t is the log difference of consumer price index while ε is a white noise error term.

3.2.2. Econometric Methodology

This study uses autoregressive distributed (ARDL) bounds test to examine the co-integration relationship between financial development and economic growth. This approach was extensively used in the literature to analyze the relationship between financial development and economic growth, especially in studies involving one country such as in Mohamed (2008) and in Kargbo and Adamu (2009).

This approach was selected because of its flexibility that it can be applied when the variables are of different order of integration. In addition to that, it is more appropriate measure in the case of small samples. Given that our sample size is limited with a total of 37 observations only, conducting bounds test was considered to be appropriate. In addition, endogeneity problems are addressed with this technique. According to Pesaran and Shin (1999), modeling the ARDL with the appropriate lags will correct for both serial correlation and endogeneity problems. Moreover, Kargbo and Adamu (2009) assert that the issue of endogeneity is particularly relevant since the causal relationship between financial development and economic growth cannot be ascertained beforehand.

An ARDL representation of equation (1) and (2) can be specified as follows:

$$\begin{aligned} \Delta \text{LRGDP} = & \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta \text{LRGDP}_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta \text{LINV}_{t-i} + \sum_{i=1}^p \beta_{3i} \Delta \text{LGOV}_{t-i} + \sum_{i=1}^p \beta_{4i} \Delta \text{LM3Y}_{t-i} \\ & + \sum_{i=1}^p \beta_{5i} \Delta \text{LCPS}_{t-i} + \sum_{i=1}^p \beta_{6i} \Delta \text{LCPI}_{t-i} + \sum_{i=1}^p \beta_{7i} \Delta \text{LTRD}_{t-i} + \delta_1 \text{LRGDP}_{t-1} \\ & + \delta_2 \text{LINV}_{t-1} + \delta_3 \text{LGOV}_{t-1} + \delta_4 \text{LM3Y}_{t-1} + \delta_5 \text{LCPS}_{t-1} + \delta_6 \text{LCPI}_{t-1} + \delta_7 \text{LTRD}_{t-1} \\ & + v_t \end{aligned}$$

Where Δ is difference operator, p is the lag length and v_t is assumed to be serially uncorrelated.

The ARDL bounds test in this study was done in two steps. Firstly, the analysis of the cointegration relationship between variables was conducted based on the F-statistics.

The null hypothesis of no cointegration relationship which is defined as $H_0 = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ is tested against the alternative hypothesis $H_1 = \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$ of the existence of cointegrating relationship.

The decision about the cointegration relationship is based on two sets of critical values for the cointegration test provided in Pesaran and Pesaran (1997) and Pesaran et al (2001)⁴. These tests were used in similar studies such as in Mohamed (2008) and Odhiambo (2010).

Secondly, after ascertaining the cointegrating relationship, the long run and error correction estimates of the ARDL model were estimated. Moreover, the diagnostic test statistics and test for parameter stability of the selected ARDL model were performed. The error correction representation of the series can be specified as follows:

$$\begin{aligned} \Delta \text{LRGDP} = & \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta \text{LRGDP}_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta \text{LINV}_{t-i} + \sum_{i=1}^p \beta_{3i} \Delta \text{LGOV}_{t-i} + \sum_{i=1}^p \beta_{4i} \Delta \text{LM3Y}_{t-i} \\ & + \sum_{i=1}^p \beta_{5i} \Delta \text{LCPS}_{t-i} + \sum_{i=1}^p \beta_{6i} \Delta \text{LCPI}_{t-i} + \sum_{i=1}^p \beta_{7i} \Delta \text{LTRD}_{t-i} + \gamma \text{ECM}_{t-1} + v_t \end{aligned}$$

While other variables were previously explained, the ECM_{t-1} is the lagged error-correction term obtained from the long-run equilibrium relationship.

⁴ The lower critical bound assumes that all the variables are $I(0)$, meaning that there is no cointegration among the variables, while the upper bound assumes that all the variables are $I(1)$. If the computed F statistic is greater than the upper critical bound, then the null hypothesis is rejected suggesting that there exists a cointegrating relationship among the variables. If the F-statistic falls below the lower critical bounds value, it implies that there is no cointegration relationship. Moreover, if the F-statistic falls between the lower and upper critical bounds values, the results are inconclusive, hence further tests are required.

CHAPTER 4 EMPIRICAL RESULTS AND INTERPRETATION

4.1. Unit Root Test Results

Before analyzing the estimated results using ARDL approach to co integration, we first begin by investigating the non-stationarity in all variables by applying the Augmented Dickey–Fuller (ADF) test. This test examines the null hypothesis that the considered variable has a unit root versus the alternative hypothesis that the variable is stationary. From the following table, it is clear that all variables are integrated of order one i.e. stationary after first difference except LGOV and LTRD which are stationary in level. This result gives support to the use of ARDL bounds approach to determine the long-run relationships among the variables.

Table 2: Unit Root Test Results

Variable	Lag	ADF test statistic	
		Level	First difference
LGDP	1	-0.806080***	-4.240110***
LINV	1	0.362384	-9.504621***
LGOV	0	-2.762389*	
LCPS	1	-0.592957	-5.530059***
LM3Y	1	-2.160918	-6.466330***
LCPI	1	-0.590064	-5.700116***
LTRD	0	-2.998237**	

Note: (1) Critical values follow McKinnon (1996)

(2) Three, two and one asterisks indicate 1%, 5% and 10% statistical significance respectively.

4.2. Cointegration Analysis

ARDL analysis involves firstly investigating the presence of long run relationships in both models. Given a relatively small sample size (37) and the use of annual data, a lag length of 2 is used in the bounds test. Table 3 reports results of the bound test for the existence of a long run relationship. As shown in the table the calculated F-statistics in the two models are higher than the upper bound critical value at the 1% level in both models, implying that the null hypothesis of no co-integration cannot be accepted and that there is indeed a co-integration relationship among the variables in each of the models.

Table 3: F-Statistics Test for Long Run Co-integration

Critical value bounds of the F-statistics					
Model	1% Level		5% Level		Calculated F.statistics
	1(0)	1(1)	1(0)	1(1)	
1	3.06	4.15	2.39	3.38	5.13
2	3.29	4.37	2.56	3.49	5.31

Critical values were obtained from Pesaran & al (2001).

4.2.1. Long-Run Results

The existence of a long run relationship among real GDP and its explanatory variables suggests the estimation of long run coefficients and short run dynamic parameters. Table 4 and 5 show the long run coefficients for the first and the second model respectively. In model 1, private sector credit and investment have the expected positive sign and exert statistically significant effects on real GDP. The coefficient of private credit to GDP ratio implies that a 1% increase in the private credit increases real GDP by 0.61 percent.

An increase in credit allocated to private sector is associated with an efficient and productive use of resources which in turn helps the increase in the real GDP. This positive impact is compatible with the supply leading view of the relationship between financial development and economic growth in accordance with the prediction by Patrick (1966). Various recent researches also corroborated this view (Levine et al. 2000), Ang and McKibbin (2007).

Financial development raises the capacity of financial intermediaries to supply funds and feeds economic growth through the channel of increased investment. This is confirmed by the positive and statistically significant effect of the ratio of investment to GDP at the 1 percent level. The magnitude of the coefficient implies that a 1 percent increase in investment to GDP ratio increases real GDP by 1.48 percent. These positive impacts are in line with other previous studies such as Fowowe (2008) and Kargbo and Adamu (2009).

As expected, the government spending exerts a negative effect on real GDP and it is statistically significant at 5 percent level. A 1 percent rise in government expenditure decreases real GDP by 0.32 percent. These results are not surprising because the study of Roseline and Esman (2011) found also the negative relationship government expenditure and GDP in their study on Sub Saharan Countries and concluded that larger government expenditure tend to be inefficient and they crowd out private investment, thus affecting the overall performance of the economy.

Similarly, the inflation exerts a negative effect on real GDP and it is statistically significant at 5%. A 1 percent rise in inflation decreases real GDP by 0.14 percent. This is due to the fact that high inflation affects negatively the economic growth by discouraging investments in productive sectors. These findings corroborate the findings by Hassan et al (2011) which show that inflation have impaired the economic growth in both developing and developed countries since the 1980s.

Surprisingly, trade openness, measured as the sum of exports and imports as a share of GDP, does not seem to have a significant effect on real GDP. The estimated coefficient is negative (-0.41) and statistically insignificant. An important fact worth mentioning here is the export structure for Rwanda. The country is still over-reliant on a limited export basket dominated by low value added commodities and this dependence on commodities exports has resulted in an export decrease over the years due to international price volatilities. According to World Bank (2017), the export volumes of coffee have been stagnant while the volume of tea production has nearly doubled, although with muted economic impact given low value addition. Declining prices and low production of traditional minerals has also substantially affected export earnings.

Table 4: Long-Run Estimates of Model 1: Autoregressive Distributed Lag Estimates

Regressor	Coefficient	t value	P value
LINV	1.487	8.726	0.0000
LGOV	-0.324	-2.429	0.0237
LCPS	0.610	3.899	0.0008
LTRD	-0.418	-2.039	0.0536
LCPI	-0.145	-2.361	0.0275
C	3.106	4.371	0.0002

Note: Dependent variable is LOGRGDP and ARDL (2,1,0,1,2,1) is selected based on Schwarz Bayesian Criterion

For model 2, M3Y is used instead of credit provided to private sector over GDP as a financial variable to assess the strength of an independent link between financial sector development and economic growth. However, these replacements produce no significant change in the results obtained above in model 1. Table 5 reports results using model 2. The investment variable again is significant and with a positive coefficient value. Government spending still has the expected negative sign and statistically significant while trade openness indicator remained negative and statistically insignificant.

Table 5: Long-Run Estimates of Model 2: Autoregressive Distributed Lag Estimates

Regressors	Coefficient	t value	P value
LINV	1.689267	13.42474	0.0000
LGOV	-0.317609	-2.670771	0.0129
LTRD	-0.383057	-2.469651	0.0204
LM3Y	0.527420	3.299085	0.0028
C	1.851266	3.749769	0.0009

Note: Dependent variable is LOGRGDP and ARDL (2,1,1,0,0) is selected based on Schwarz Bayesian Criterion

4.2.2. Short Run Dynamics

The co-integrated variables provide support for using an error correction model mechanism (ECM) representation in order to investigate the short run dynamics.

The results of short-run dynamic coefficients indicate that the variables have the expected signs as in the long run. Short run estimates of the ratio of investment to GDP have positive and statistically significant effect on economic growth at the 1 percent level. The short run positive and significant effect of investment to GDP is consistent with the findings of Marcel and Bussiere (2004) who recognize a positive relationship between investment and economic growth especially in the short run.

Short run estimates for both financial development indicators have positive and statistically significant effect on growth in the short run. These results corroborate the findings of Fatima (2004) who found also a short-run relationship between financial development and economic growth.

Like in the long run estimates, the short run estimates for government expenditure remained negative and statistically significant while trade openness also remained negative but statistically not significant.

Table 6: Error –Correction Estimates of Model 1

Regressor	Coefficient	t value	P value
D(LINV)	0.435413	4.708046	0.0001
LGOV	-0.186806	-1.955468	0.0633
D(LTRD)	-0.459983	-7.386226	0.0000
D(LCPS)	0.540236	6.658103	0.0000
D(LCPS(-1))	-0.276492	-3.559343	0.0018
D(LCPI)	0.250057	2.771612	0.0111
ECM(-1)	-0.575603	-6.764647	0.0000

Note: Note: ECM - ARDL (2,1,0,1,2,1) is selected based on Schwarz Bayesian Criterion.

Table 7: Error –Correction Estimates of Model 2

Regressor	Coefficient	t value	P value
D(LINV)	0.552544	5.052148	0.0000
LGOV	-0.179384	-2.223257	0.0357
D(LTRD)	-0.390231	-5.666073	0.0000
LM3Y	0.297883	1.981594	0.0582
ECM(-1)	-0.564793	-6.167482	0.0000

Note: Note: ECM - ARDL (2,1,0,1,0) is selected based on Schwarz Bayesian Criterion

4.3. Stability test of the models

To check the robustness of the model used, stability tests were performed using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) of the recursive residual test for structural stability. A graphical representation of CUSUM AND CUSUMQ statistics are shown in fig.7 and fig.8. If the plot of the CUSUM and CUSUMSQ remains within the 5 per cent critical bound the null hypothesis that all coefficients are stable cannot be rejected. As it is clear from fig.7 and fig 8, the plots of the CUSUM AND CUSUMQ are within the boundaries and hence these statistics confirm that all the coefficients of estimated models are stable over the study period.

Figure 7: Plots of CUSUM and CUSUMQ statistics for stability test (model1)

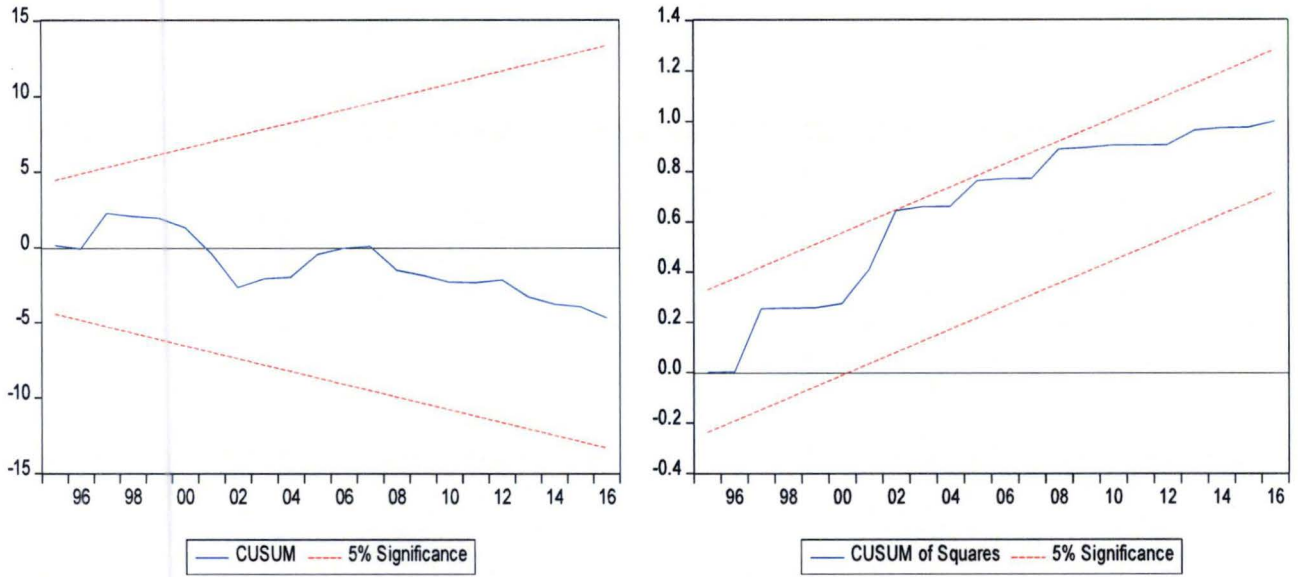
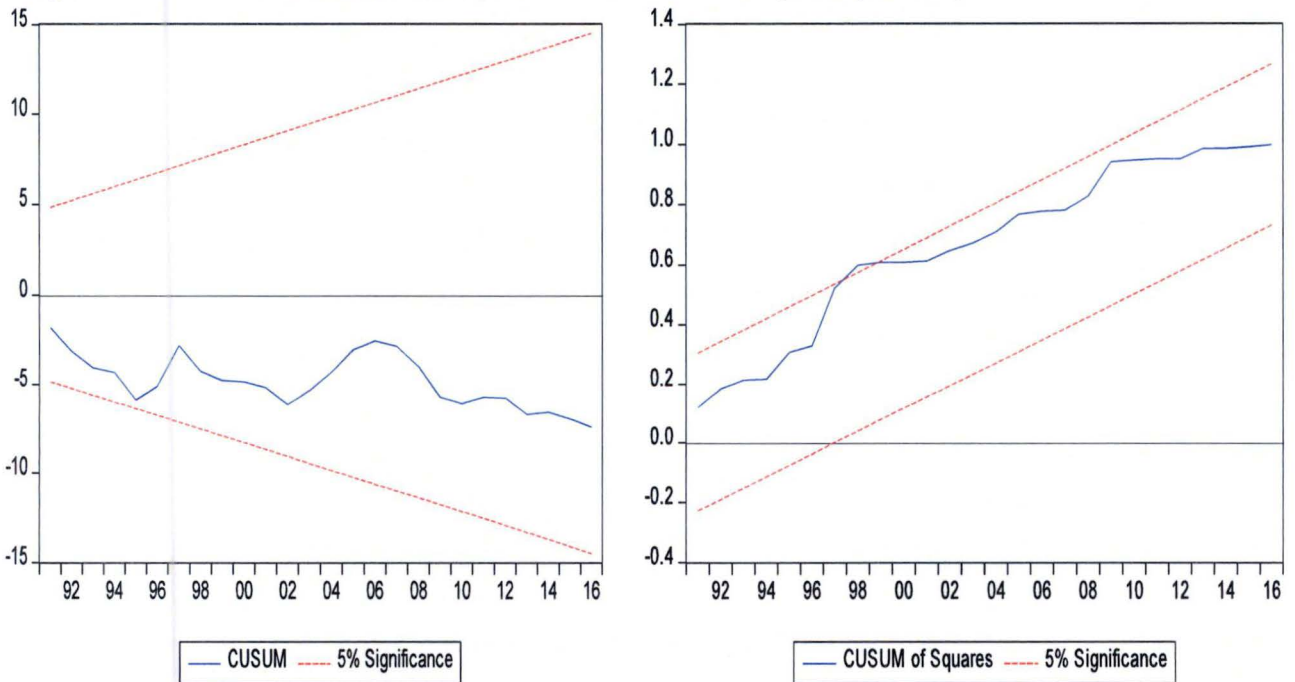


Figure 8: Plots of CUSUM and CUSUMQ statistics for stability test (model2)



CHAPTER FIVE: CONCLUSIONS AND POLICY IMPLICATIONS

The study has examined the relationship between financial development and economic growth in Rwanda over the period 1980-2016. The autoregressive distributed (ARDL) bounds testing approach to cointegration was adopted to estimate the long run relationship and short run dynamic parameters of the models. The results of the test suggest that there exists a relationship among real GDP, financial development, investment, government spending and trade openness.

Generally, the findings from this study found a positive relationship between financial development and economic growth in Rwanda whereas investment was identified as an important conduit through which financial development contributes to economic growth. In both the short run and long run, financial development indicators namely credit to private sector and liquid liabilities to GDP exerted positive effects on economic growth. Similarly, the ratio of investment to GDP exerted positive effects on economic growth. The positive and statistically significant effect of financial development is supportive of the supply leading hypothesis in accordance with the predictions by Patrick (1966). The results imply that financial development contributes to economic growth through the channel of increased investment.

Even though the findings of this study show that financial development contributed to economic growth in Rwanda, there is still imbalance between credit allocations among economic sectors that contribute to the GDP. For instance, the BNR (2016) argues that 67% of allocated bank credit went to mortgage industries and commercial hotels while only 2.1% were provided to agriculture sector yet this sector constitute 80% of the total population. Moreover, the financial system in Rwanda is highly concentrated with the banking sector holding 66% while the MFI (which are highly reachable by the population not only due to their geographic coverage but also due to their limited loans requirements) hold only 6.7% of total financial assets. Therefore, to ensure a sustainable and inclusive economic growth, the government should improve financial inclusion among the population by strengthening especially the MFI.

The study found a negative albeit insignificant relationship between trade openness and economic growth in Rwanda. This is not surprising based on the structure of trade in Rwanda. The country highly rely on a limited export basket dominated by low value added commodities (coffee and tea) and this dependence on commodities exports has resulted in an export decrease over the years due to international price volatilities. Moreover, the country suffers heavily from being landlocked which makes difficult the trade with the rest of the world. Therefore, it becomes imperative for the country to diversify its export composition in order to increase revenues by exporting high value commodities and minimize the risks caused by international price volatilities.

The study found a long run negative relationship between inflation and economic growth in Rwanda. This is logical since high inflation discourages the investment for both domestic and foreign investors which in turn impact negatively on the economic growth. Moreover, it destroys the terms of trade in the country by increasing the price of domestic goods more than the regional and the world market price. Therefore, in order to ensure the sustainable growth, the monetary authorities should monitor closely the inflation rate and put in place sound monetary policies to keep it at the lowest level possible.

The coefficient of the lagged error correction term is negative and statistically significant, further confirming the existence of a long run relationship among real GDP and its determinants. The plots of the CUSUM and CUSUMSQ tests suggest the existence of a stable relationship between economic growth and financial development.

However, this study has only examined the financial development and economic growth nexus in Rwanda without tackling the causality among variables. Any future research on this issue should consider the possibility of exploring causality relationship between financial development and economic growth so as to support the supply leading side or the demand following side as it has been contentiously discussed in the literature on finance-growth nexus.

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