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THE ROLE OF FINANCIAL INTERMEDIATION IN ECONOMIC GROWTH IN ETHIOPIA

By: Alehegne Anteneh

Thesis Submitted in Partial Fulfillment of the Requirement for the Award of Master of Science in Development Economics (MSc)

Advisor: Dr. Moges Shiferaw

Adama, Ethiopia

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APPROVAL OF BOARD EXAMINERS COLLEGE OF BUSINESS AND ECONOMICS

UNIVERSITY OF ADAMA SCIENCE AND TECHNOLOGY

As thesis advisor, I hereby certify that I have read and evaluated this research work Contribution, under my guidance, by Alehegn Anteneh entitled "THE ROLE OF FINANCIAL INTERMEDIARIES IN ECONOMIC GROWTH IN ETHIOPIA". I recommend that it can be submitted as fulfilling the Thesis requirement.

Moges Shiferaw (PHD) _____ _____

Advisor Signature  Date 04/01/2017

As member of board of Examiners of the M.Sc. Thesis Open Defense Examination, we certify that we have read and evaluated the thesis prepared by Alehegn Anteneh and examined the candidate. We recommended that it can be accepted as fulfilling the thesis requirements for the degree of masters of Science in Development Economics.

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Chairperson Signature Date

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_____ _____ _____

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ABSTRACT

This study investigates the role of financial intermediaries in economic growth of Ethiopia for the period (1971-2014) by using VAR model. The methodologies employed for this study were: Johansen cointegration test, Granger causality, Vector Error Correction model test. The broad money supply as a share of GDP or financial sector development was used as proxy for financial intermediaries and real GDP growth for economic growth. Unit root tests were conducted by employing ADF and PP test. The cointegration test was portrayed, long run relationship between variables. The Granger causality test showed unidirectional causal relationship found from financial sector development to real GDP Growth. There are two findings. The regression result shows that, the relation between financial sector development and real GDP growth is positive both in the short and long run. Therefore, financial sector development is a significant factor to determine real GDP growth at 10% critical level in the short run and at 5% critical level in the long run. However, gross domestic saving is not a significant factor to determine real GDP growth in the short run but gross domestic saving is a significant factor to determine real GDP growth in the long run. Similarly, population growth and export have a positive significant effect on real GDP growth. By contrast, regime structural change has negative significant effect in the long run. Secondly, the analysis of Granger causality test results shows that, unidirectional causal has found from financial sector development to real GDP growth. The variance decomposition demonstrates that, financial sector development is the most important source of shock to real GDP. The Overall policy implication of the study recommends that, the "finance -led growth" strategy is effective by extensively addressing expansion of modern financial intermediaries, infrastructure, transport related and transaction costs.

Key Words: Economic growth, financial intermediaries, cointegration, Granger Causality, VAR, Ethiopia

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ACRONYMS

ADF: Augmented Dickey-Fuller

AIC Akaike Information Criterion

APR: Annual Percentage Rate

ARDL: Auto Regressive Distributed lags

ATM: Automatic Tellers Machine

CBE: Commercial Bank of Ethiopia

CPI: Consumer Price Index

CRPS: Credit to Private Sector

CSA: Central Statistics Authority

DBE: Development Bank of Ethiopia

DFID Department for International Development

DRM Domestic resource mobilization

DUM Dummy Variable

ECA: Economic Commission for Africa

ECE: Economic Commission for Europe

ECM Error Correction Method

ECO – Economic

ECT: Error Correction Term

EEA Ethiopian Economic Association

EPRDF: Ethiopian People's Revolutionary Democratic Front

ESCAP: Economic and Social Commission for Asia and the Pacific

ESCWA: Economic and Social Commission for Western Asia

FDI: Foreign Direct Investment

FSD Financial sector development

GCF Gross Capital Formation

GDP: Gross Domestic Product

GDS: Gross Domestic Saving

GNDI: Gross National Disposable Income

HQ: Hannan-Quinn Information Criteria

IMF: International Monetary Fund

LM: Lagrange Multiplier

MDG: Millennium Development Goals

MFI: Micro-Finance Institutions

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

NGO Nongovernmental organization

OECD Organization for Economic Cooperation and Development

OLS: Ordinary Least Square

PASDEP: Plan for Accelerated and Sustained Development to End Poverty

PPF: Production Possibility Frontier

REO: Regional Economic Outlook

RGDP: Real Gross Domestic Product

ROA Return on Assets

ROI Return on investment

SIC: Schwarz (Bayesian) Information Criteria

SMS Short message sending

SPSS Statistical Package for Social Sciences

SSA: Sub-Saharan Africa

SWIFT: Society for Worldwide Interbank Financial Telecommunication

UNDP : United Nations Development Program

UNCTAD: United Nations Conference on Trade and Development

UNDESA: United Nations Department of Economic and Social Affairs

VAR: Vector Auto Regression

VECM: Vector Error Correction Model

WB: World Bank

WBG: World Bank Group

WDI: World Development Indicators

WEO: World Economic Outlook

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CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Economic growth is the stable routes of achievement through which the useful and abundant power of a nation is enhanced in outstanding track to generate ever-increasing levels of nationwide productivity and returns (Todaro & Smith, 2005). From the time when the early 1970s, the subject of rapid economic growth has been the core plan in economic policy formulation for the majority of the Sub-Saharan Africa countries and other least developed economies of the world (IMF, 2005). Hence, most development economists and state policy makers have emphasized particular attention to analyzing the experiences of these countries to facilitate economic growth and progress their living conditions.

Global Real GDP growth is expected at 2.4 percent in 2015, and 2.9 percent in 2016. In high-income economies (Developed countries) real GDP growth is experienced at 1.6 percent in 2015, and 2.1 percent in 2016. Developing-countries Real GDP growth is expected to stabilize at around 4.3 percent in 2015, and 4.8 percent in 2016 (Basu, 2016). Among the developing countries, Africa's overall growth momentum is set to continue, with GDP growth expected to accelerate from 4.6 percent in 2015 to 4.9 percent in 2016 (UNCTAD, 2015). Sub-Saharan Africa real GDP growth is experienced at 4.5 percent in 2015, to 5.1 percent in 2016 (IMF, 2016).

Ethiopia is a lower-income country with a small-sized economy, located in Sub-Saharan Africa. It has the world's 79th largest economy by nominal GDP. Its real GDP growth is experienced at 11.4 percent in 2010, and also from 2011 up to 2015 registered on average real GDP growth rate of 10.3 percent (IMF, 2016). The growth of the Ethiopian economy has also been significant compared to the 4.4 percent growth estimated for Sub - Saharan Africa in 2015. This remarkable growth was mainly recognized to service sector grew by (10.2 percent), agricultural sector (6.4 percent) and industrial sector (21.6 percent) (Wakiaga, Kibret, & Mamuye, 2014).

One of the areas towards which public policies have been directed is improving the domestic saving rate of national economies. The rationale of the policy is that saving serves as a source of capital formation which in turn influences the productivity of labor and its growth over time (Yohannes, 2014). The fact that investment would be financed either from current or future saving of a national economy to developing countries in particular, implies that improving domestic saving rate is an important policy target. Abu concluded that, saving targeted public policies are effective in encouraging domestic saving (Abu, 2004). Domestic savings are likely to play a very important role in promoting real GDP growth (Vaibhav, Brajesh, & Ravindra, 2009).

For Sub-Saharan Africa (SSA), the average gross domestic saving ratio to GDP declined from 22.8% in the 1970s to 20% in the 1980s and drop to 15.5% in the 1990s before recovering thereafter it rises 21% in the 2000 up to 2012 (IMF, 2016). In Ethiopia Gross Domestic Savings (% of GDP) was last measured

at 22.5% in 2014, according to the World Bank (Wakiaga, Kibret, & Mamuye, 2014). Tsegabirhan concluded that even by sub-Saharan Africa standards, Ethiopia's rate of domestic saving has been very low (IMF , 2010) stated in (Tsegabirhan, 2010) in Ethiopia.

The empirical evidence on the link between growth and saving is mixed at best. The evidence clearly supports a positive relationship running from saving to growth in the short run. In both cross-country settings as well as country-level analyses, higher levels of saving appear to lead to higher rates of economic growth (Elbadawi & Mwega, 2012). In addition, the evidence shows that, in the character of growth and saving, experience of the change of higher saving leads short-run stimulate in GDP growth (Rodrik, 2000).

Elbadawi and Mwega concluded that the relationship between saving and growth is less robust in the long run (Elbadawi & Mwega, 2000).) While Rodrik studies concluded that a positive relationship between the level of saving and long-run GDP growth (Rodrik, 2000). This finding is consistent with the classical Solow growth model, where increases in savings rates raise growth only during a transitory period but have no effects on the growth rate in the steady state in the absence of an increase in productivity or growth of the labour force (Léonce, 2014). Ndikumana concluded that the reverse causal relationship seems to be more robust: a spurt in growth permanently rises saving to higher rates. The evidence on a positive long-run effect of growth on saving and a short-term positive relationship running from saving to growth has important policy implications (Ndikumana L. , 2014).

Levine concluded that saving is as a condition for investment and investment is a critical condition for economic growth. In fact empirical evidence has established that investment is the most robust driver of long-run growth (Levine & Renelt, 1992). In addition, Ndikumana in his empirical studies concluded that there is a strong positive effect of financial development on domestic investment (Ndikumana L. , 2000). Hence, Leonce concluded that the relationship between saving and investment relies critically on sufficient amount of savings on the one hand, and on the efficacy of financial intermediation on the other hand (Léonce, 2014). King and Levine (1997) suggest that financial intermediation is an important part of the story of economic growth (Levine, Ross, & King, 1993).

Ross Levine explained how financial intermediary solves the market frictions and creates opportunities for economic growth (Levine R. , 1997). He argued that financial intermediaries mobilize savings, allocate resources and ease trades and contracts by solving market frictions that generate higher production and economic growth. Levine and King concluded that the role of financial intermediation in achieving higher economic growth have been accessed by two channels through which financial intermediaries stimulate economic growth through capital accumulation channel where the introduction of a financial intermediary generates higher investment and thus higher economic growth. The other one is the efficiency gains, the effect of financial intermediation on economic growth (Levine, Ross, & King, 1993). Thorsten and Kunt concluded that financial intermediary development has a causal effect on

economic growth (Thorsten, Demirgüç, Kunt, & Levine, 1999). Keatinge concluded that by comparing the level of access to financial services in a neighboring country such as Kenya, it can be deduced that there is considerable room for expansion of these services in Ethiopia. Kenya has 5.2 commercial bank branches and 9.5 ATMs per 100,000 adults, in contrast with Ethiopia's 2.0 and 0.3 respectively (Keatinge, 2014).

1.2 Statement of the problem

In the late 1980s, the Endogenous Growth Theory emerged and covered the way for new theories exploring the link between economic growth and financial sector development. Under the basic endogenous growth model, the development of financial sector might affect economic growth (Pagano, 1993). Current years have seen a key debate regarding the nature of the association between financial intermediation and economic growth. According to the present endogenous model of growth, financial intermediation is very important for growth. Endogenous model of growth, it has been argued that financial development can affect growth in three ways; namely raising the efficiency of financial intermediation, increasing the social marginal productivity of capital and influencing the private savings rate (Bencivenga, 1991). Sanusi discoursed that the 'availability of investible funds is a key factor in the growth process of any economy (Sanusi, 2002). Ndikumana concluded that saving is a source of capital accumulation, which in turn is the main driver of long run growth. This is the basis of the standard growth model developed by Robert Solow and subsequently expanded by his successors (Ndikumana L. , 2014). Aron concluded that saving is necessary for long-run economic growth. A study on savings in South Africa opens with the statement that "low domestic saving rates in South Africa may achieve a low-growth trap" (Aron, 2000).

Empirical studies examining the direction of causality among saving, investment and economic growth yield differing results. The study conducted by (Verma & Wilson, 2005) stated in (Lira, 2015) concluded that no evidence in support of Solow and endogenous growth policy of encouraging higher saving and investment in order to increase economic growth. In another study (Verma, 2007) findings concluded that saving definitely determines investment both in the short and long-run. However, Jangili examined the direction of causality among saving, investment and economic growth in India, the results support the traditional view that saving and investment Granger cause economic growth collectively as well as individually and not vice versa. Therefore, this suggests that higher saving and investment lead to higher economic growth in India (Jangili, 2011). Wafure and Menson also concluded that saving is an important macroeconomic variable, which shock on capital accumulation, productivity and economic growth in Nigeria (Obi, 2012).

Budha studied the direction of causality among saving, investment and economic growth in Nepal, the results revealed the existence of feedback causality between investment and GDP and between gross domestic saving and investment. In addition, there is no evidence of Granger causality between gross

domestic saving and GDP (Budha, 2012). Hundie also obtained similar results in the case of Ethiopia; however, the only difference is that Granger causality from investment to saving is stronger than Granger causality from economic growth to saving (Hundie, 2014).

Agrawal concluded the analyze of the determinants of saving and investment ratios in South Asian countries. Amongst others, the results provided evidence that higher saving rates cause higher growth rates of real Gross National Product (GNP) in two countries (Bangladesh and Pakistan) and that higher growth rates Granger cause higher saving rates in the other two countries (India and Sri Lanka) (Agrawal, 2000). In another study, he investigated the direction of causality among saving and growth in seven Asian countries by using vector autoregressive (VAR) model. The results show Granger causal flow from growth (or income) to saving, although in some countries, there is also evidence of a feedback effect from saving to growth (Agrawal, 2001).

Furthermore, estimation of the saving functions based on Engle and Granger's static ordinary least squares (OLS) and Stock and Watson's dynamic OLS (DOLS) also provided evidence that the high saving rates in Asia are due to the high rate of growth of income per capita, declining shares of dependent population, and some special institutional features, such as the high central provident fund rates in Singapore (Lira, 2015).

In the context of Lesotho, there are very few studies that examined dynamics of the relation among saving, investment and economic growth. Jangili investigated the interaction among financial development, private saving and economic growth in Lesotho. Firstly the results showed that financial development does not Granger cause economic growth and that neither economic growth nor private saving Granger cause financial development. In addition, there is evidence of Granger causality between financial development and private saving (Jangili, 2011). In addition, empirical studies find that there is a strong positive effect of financial development on domestic investment (Ndikumana L. , 2005).

Levine stressed out the informational role of financial intermediation in an endogenous growth model and argues that its role is significantly related to productivity of capital and economic growth (Levine R. , 1997). In a related study, Bencivenga stressed that through its reduction of liquidity risks, efficient financial intermediation stimulates savers to hold their wealth increasingly in productive assets, contributing to productive investment and growth (Bencivenga, 1991). King and Levine concluded that the scale and efficiency of financial intermediation are forcefully and significantly correlated with economic growth in a cross-section of countries (Levine & Renelt, 1992). While past work shows that the level of fnancial development is a good predictor of economic growth (Levine, Ross, & King, 1993).

Andrew and Agbada concluded that, these empirical findings clearly indicate that there is significant relationship between financial intermediation and Output (GDP) in Nigeria (Andrew, Agbada, & suji, 2013). Roman have been conducted to highlight the importance of financial development to economic

growth and the correlation between the two concluded that financial development is the driving force of economic growth (Roman, 2012). HaileKibret & Kassahun studied the link between financial development and economic growth in Ethiopia. Their findings suggest that financial development and economic growth have a positive linkage and the granger causality test result shows a bi-directional causality between the two (Haile Kibret & Kassahun, 2011). Omer Mohammed findings concluded that financial depth statistically significant at 5 percent critical level and have a positive effect on GDP growth in Ethiopia (Omer, 2016).

According to Seid study done on the Ethiopian economic growth, fixed capital formation is statistically insignificant (Seid, 2000). Yohannes concluded that financial development is the main crucial variable that has a significant effect on gross national saving ratio in the long run since in the long run people will be sensitive to the dynamics of financial sector in Ethiopia (Yohannes, 2014). But Haile (2012) and Keho (2011) who found that financial development has been insignificant effect on gross national saving and economic growth in the long run in Ethiopia (Yohannes, 2014).

Therefore, uncertainties or mixed results are highly debating on the concerning of the policy recommendation of the role of financial intermediation in economic growth which is verified by different practisionaries or policy makers. Based on this fact, there is a mixed result regarding the role of financial intermediaries in economic growth across countries. Moreover, there are few empirical results regarding the role of financial intermediaries in economic growth in Ethiopia .Therefore, in order to see its effect; I have an interest of conducting this research and adding some new empirical insights to the previous researchers and literatures of the role of financial intermediaries in economic growth in Ethiopia.

1.3 Research Questions

To carry out the stated objectives, our investigation tried to reply the subsequent research questions:

1. How the short- run versus long- run financial intermediation effects in economic growth of Ethiopia.

2. What is the response of real GDP growth when a shock is happened on financial intermediation /financial sector development/, gross fixed capital formation, population growth, gross domestic saving, export, credit to private sector and regime structural change?

3. What is the direction of causality from independent to dependent variables?

1.4 Objectives of the study

1.4.1 General objectives

The general objective of this study would be investigating the role of financial intermediaries in economic growth of Ethiopia.

1.4.2 Specific Objectives of the Study

In line with the general objective, the study would have the following specific objectives:

1 To investigate the short- run versus long- run effects of financial intermediation in economic growth of Ethiopia.

2.To examine the response of real GDP growth, if endogenous and exogenous shock happened on the variables of population growth, gross domestic saving, export, gross fixed capital formation, financial intermediation/ financial sector development/, credit to private sector and regime structural change.

3. To know the direction of causality from independent to dependent variables.

1.5 Significance of the Study

Yet until now, there appeared to be few empirical studies to investigate the role of financial intermediation in real GDP in Ethiopia. Therefore, this study is conducted to provide a comprehensive approach to understand the role of financial intermediaries in economic growth in Ethiopia.

Further, once the study identified the key financial intermediation indicators then it would have shown their financial intermediaries roles in economic growth in Ethiopia. As a result, it provides a signal to national economy of Ethiopia for better economic growth contribution & efficiency improvements. Besides, since financial intermediaries are a pillar for economic growth, the current study affords an insight for policy makers when they are formulating finance and economic growth related policy adoptions.

1.6 Scope of the Study

This study shall focus on the role of financial intermediation in Ethiopia's economic growth using variables such as Real GDP growth, financial sector development, gross domestic saving, fixed capital formation, credit to private sector , export, population growth and regime structural change. This study will focus frontally on Ethiopia and will cover the period from 1971 to 2014. The study includes the three large governments owned commercial banks namely, Commercial Bank of Ethiopia (CBE), Construction and Business Bank (CBB), Development Bank of Ethiopia, and also includes the sixteen leading private commercial banks, 35 micro finance institution and 17 insurance companies in the country in terms of both branch network and market share namely.

1.7 Limitation of the Study

The study has encountered some sort of problems. In excess of the considered variables, there would be other variables to be included in the model. In fact, the study has considered stochastic error term to capture the effect of unobservable factors. But, the effect of those unobserved variables could not fully be incorporated in the stochastic error terms so this would have little effect on the overall findings of the present study.

1.8 Organization of the Study

For a systematic and scientific approach, this research work has divided into six chapters. Therefore, chapter one, introduces the research subject briefly and outlines the research background, incorporating the problems and results from past studies. The problem statement is given and research objectives have been clearly described and based on which, hypotheses are formed and model is specified. Apart from this, it also identifies the significance, scope and limitations of the study. In chapter two, both relevant theoretical and empirical literature are discussed. Chapter three concentrates on the explanation of an overview of the Ethiopian economy. The data and methodology of the research is presented in chapter four. Chapter five concentrates on the results and discussions of the data. Chapter six summarizes the findings of the study, concludes the results and forwards recommendations based on the findings of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical literature Review of Financial Intermediation and growth theory

As early as the eighteen and nineteenth centuries some economists made salient contributions to the theory of growth. Their contributions to the growth theory are still used today as a solid foundation to modern theories of growth.

Levine concluded that, the idea of economic growth is fundamental to economists because of its significance for nation's economic improvement. Thus, the main determinants that drive economic growth have been a part of concentration for a very longtime to economists because of their important role in the improvement of the way of living style of the public. According to this literature, financial intermediaries cause economic growth by pooling individual savings and making investments in productive assets, which raise income (Levine R. , 1999).

Hence, the purpose of this chapter is to outline briefly the main theories of growth and financial intermediaries. This study would be briefly discuss the contribution of classical economists, Neoclassical Economists, MacKinnon Shaw Hypotheses (MS- Model), Endogenous theory of financial intermediaries and growth.

2.1.1 Economic Growth

Economic growth, which is defined as an increase in Gross National Product (GNP) or increase in Gross Domestic Product (GDP), has been the main purpose of most economic studies and models from Adam Smith (the father of Classical Economics) until the present time. Economic growth is defined as the increase in the market value of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real Gross Domestic Product (IMF, 2012).

2.1.1.1 Modern Economic Growth Models

Modern theories of economic growth have been premised on the same assumption about investment and saving as sources of economic growth. There are three economic growth models include the Classical and Keynes growth model, the neoclassical model which is proposed by (Domar, 1946) and (Harrod R. , 1939), endogenous growth model introduced by (Solow., 1956), and financial repression hypothesis modeled by (Mckinnon's, 1973) and (Shaw E. S., 1973). The detail for each of economic growth model is presented here below.

2.1.1.1.1 Keynes and the Classical Model

2.1.1.1.1.1 The Classical Model Theory of Growth

The classical economists based their predictions about full employment on a principle known as Say's Law, the creation of French economist J. B. Say (1776–1832). According to Say's Law, "Supply creates

its own demand." If all the income created in the act of producing output is spent by households, supply will have created its own demand, and all the output will be sold.

But the classical economists did not see saving as a problem. Saving would *not* cause a reduction in spending because businesses would borrow all the saved money for investment—the purchase of capital goods, such as factories and machinery. In the classical model the interest rate is determined by the demand for and supply of loanable funds, money available to be borrowed. If households desired to save more than investors wanted to borrow, the surplus of funds would drive down the interest rate (Keynes J. , 1936) and (Kalecki, 1971). Keynes stated that, the interest rate would continue to fall until the amount that households wanted to save once again equaled the amount businesses desired to invest. At this equilibrium interest rate there would be no uninvested savings. Businesses would be able to sell all their output either to consumers or to investors, and full employment would prevail (Keynes J. , 1936) and (Kalecki, 1971).

2.1.1.1.1.2 The Keynesian Theory of Growth

Unlike Smith's conception of saving (frugality) as an important prerequisite of growth, Keynesians approach gives emphasis to the demand aspect. According to the Keynesian theory of growth demand from consumer and state were the prerequisite for economic growth. This assumption means that changes in income, especially disposable income, is the prime influence on consumption expenditures. If the household sector has more income because of the economy is expanding, then they increase consumption expenditures. If the household sector has less income because of the economy is contracting and a large group of workers is unemployed, then they decrease consumption expenditures.

2.1.1.1.2 The Neo-Classical Growth Model

In neoclassical models, perfect competition is assumed, in order to achieve economic efficiency. According to it, capital is paid its marginal product, which must be above the discount rate for investment to be profitable for the entrepreneurs. But in the long term the diminishing returns of production factors might hinder economic growth. The neoclassical theory of growth has its origins in the Harrod-Domar model that intends to explain the relationship between investment, growth rate and employment in an economy with stationary growth. For these two economists, production capacity was proportional to the stock of capital. (Barro & Sala-i-Martin, 1992) proposed an alternative to the neoclassical growth model, which were considered the link between the endogenous growth and the Solow growth model.

2.1.1.1.2.1 Harrod - Domar Growth Model

According to the Harrod–Domar, the model implies that economic growth depends on policies to increase investment, by increasing saving, and using that investment more efficiently through technological advances.

The endogeneity of savings: Perhaps the most important parameter in the Harrod–Domar model is the rate of savings. Can it be treated as a parameter that can be manipulated easily by policy? That depends on how much control the policy maker has over the economy. In fact, there are several reasons to believe that the rate of savings may itself be influenced by the overall level of per capita income in the society, not to mention the distribution of that income among the population (Harrod & Domar, 1948).

If we define the capital-output ratio as k and assume further that the national net saving ratio, s, is fixed proportion of national output and that total new investment is determined by the level of total savings, we can construct the following simple model of economic growth (Michael, Todaro, & Stefen, 2009). If we assume that there is some direct economic relationship between the size of the total capital stock, K, and total GDP. The Harrod-Domar model, points out that output depends on the investment rate and the productivity of that investment. In an open economy, investment is financed by domestic saving and foreign savings. This model explains economic growth in terms of a saving ratio and capital-output coefficient (Yohannes, 2014). The model concludes that an economy does not "naturally" find full employment and stable growth rates (Harrod R. , 1948) and (Domar E. , 1957).

2.1.1.1.2.2 The Solow Growth Model

The Solow model expanded the Harrod-Domar Model that stressed the critical role of savings, investment & capital accumulation. It formalized & expanded the Harrod Model by adding labor, capital, and technology (Solow R. , 1956). Furthermore, Solow argued that exogenous technological improvement and capital accumulation drive economic growth. The result of the Solow growth model was that many came to believe that financial markets had only minor influence on the rate of investment in physical capital, and the changes in investment were viewed as having only minor effects on economic growth (Solow R. , 1956).

This empirical concept of conditional convergence depends on other factors like saving rate, population, production function, initial endowment of human resources, and government policies, among others, by influencing steady-state levels of capital and output per worker (Solow R. , 1994). But, when it comes to understand the determinants of saving, population growth, and worldwide technological change, variables that are treated as exogenous in the Solow model (Mankiw & McCallum, 1992).

2.1.1.1.2.3 Endogenous Growth Models

The endogenous growth model provides an understanding of the importance of financial development in economic growth; a point often obscured in the neoclassical growth models. The development of endogenous growth theory in recent years has offered the opportunity to define and explain the link between financial development and economic growth. Financial development can affect the rate of economic growth by altering productivity growth and the efficiency of capital. It also affects the accumulation of capital through its impact on the saving rate or by altering the proportion of saving (Pagano, 1993) and (Levine R. , 1997) stated in (De Gregorio & Guidotti, 2004).

Levine stressed the informational role of financial intermediation in an endogenous growth model and argues that its role is significantly related to productivity of capital and economic growth (Levine R. , 1997). In a related study, Bencivenga and Smith stressed that through its reduction of liquidity risks, efficient financial intermediation stimulates savers to hold their wealth increasingly in productive assets, contributing to productive investment and growth (Bencivenga, 1991). In addition, Levine explicitly modeled a two-way relationship between financial markets and economic growth (Paul S. , 1992) stated in (Melkamu, 2015).

Hence, endogenous growth models are characterized by the assumption of non-decreasing returns to factors of production, and as an implication of this, it concludes that countries that save more grow faster indefinitely and that countries do not need to converge in income per capita even if they have the same preferences and technology. On the empirical side, endogenous growth models become an alternative to the Solow model, when this fails to explain cross country differences, mainly related to the concept of convergence (Mankiw N. , 1992). Barro and Sala-i-Martin concluded that, a well developed financial system could improve the efficiency of financing decisions and favoring a better allocation of resources and accelerate economic growth (Barro & Sala-i-Martin, 1992).

2.1.2 Saving and Economic Growth

The role of saving and investment in promoting economic growth has been widely discussed in the literature. According to classical economists such as (Lewis, W, 1955), increased saving is a necessary and sufficient condition for investment since it avails more funds for investment, which in turn accelerates growth. Regarding investment, the Harrod-Domar growth model identifies this as the key to promoting growth of any economy. Further, the neoclassical (Solow R. , 1956) model argues that an increase in the saving rate boosts steady-state output by more than its direct impact on investment because the induced rise in income raises saving, leading to a further rise in investment (Hundie, 2014). Saving the other side of consumption is critical for the development process of a nation. Again saving what is left after consumption governs the growth path of a country. The more the peoples of the nation

saves the more resources are available for investment there by accelerating economic growth (Yohannes, 2014).

The central preoccupation of endogenous growth theory is the role of savings accumulation. The heart of this theory is as follows: by accumulating savings, economies can redirect current consumption (or real income) to productive investment; such productive investment will increase future per-worker real output. Savings represents a self-financing mechanism that can make investment possible. If savings accumulation is in fact a policy lever for economic growth, then countries should encourage domestic savings in order to finance investment in efficiency-enhancing activities, such as machines (physical capital) or education (human capital) (Selina, 2013).

2.1.3 Savings and financial intermediation

The role of financial intermediaries in the institutionalisation of savings, in this context, the role of financial intermediaries in mobilizing savings and channelling them to various sectors become critical. He analysed the volume of assets of various financial intermediaries, trends in their types and distribution, in relation to long-run economic growth. (Goldsmith R. W., 1969)

Financial markets play an important role in the mobilization of financial resources for long term investment through financial intermediation (Dr. Mohamed, 2009). Paralleling the work on endogenous growth, a key debate is to what extent financial intermediaries influence real output. A financial intermediary is a market actor which borrows from a large number of small lenders, known as depositors, and pools these funds to make larger loans to borrowers (Dutkowsky & Donald, 2012). Therefore, the primary role of banks is to finance the demand for investment in the market by pooling individual savings (Selina, 2013).

McKinnon and Shaw argue that financial intermediaries encourage savings and hence increase an economy's savings rate, thus increasing the overall investments (the volume mechanism). All three of these studies showed that high growth economies tended to have well-developed financial markets; however, these studies did not provide evidence on the causal direction of this relationship. Robinson argued that this causality is reversed: economies that are growing attract financial intermediaries that wish to provide capital to already successful businesses. That is, financial development might follow economic growth (Robinson & Joan, 1952). According to various studies, the dominant mechanism for understanding financial intermediation's effect on growth is the efficiency of investment (Greenwood, 1990).

2.1.4.1 Financial Repression Hypothesis: The Mackinnon Shaw Hypotheses (MS- Model)

This theory is usually associated with the works of Cameron et al. (1973), (McKinnon, 1973) and (Shaw E. S., 1973), and holds that financial development would contribute most significantly to economic

growth. If real rates of interest have been positive over a period of time, it may be said that there has been no financial repression, but financial deepening. Shaw proposes a debt intermediation hypothesis, whereby expanded financial intermediation between savers and investors resulting from financial liberalization (higher real interest rates) and development, increase the incentive to save and invest, stimulates investments due to an increased supply of credit, and raises the average efficiency of investment. The view stresses the importance of free entry into and competition within the financial markets as prerequisites for successful financial intermediation (Shaw E. , 1973).

2.1.4.2 The Structure and Performance of the Financial System in the Pre and Post Reform Period

Following the Mckinnon (1973) and Shaw's (1973) paradigm, financial liberalization has been high on the agenda of developing countries. The financial repression school - as it is sometimes referred to - argues that government intervention in the sector (in particular through subsidized interest rate and (favored) credit allocation) not only distorts the financial market but also depresses saving and leads to inefficient investment. The policy prescription that follows is liberalization. This has been endorsed by international financial and development institutions (such as the World Bank and IMF) and had been high on the agenda of reform packages that came with name 'Structural Adjustment Programs'/SAPs (Alemayehu, 2006).

2.1.5 Financial sector development and economic growth models

Financial sector includes insurance, microfinance, banking and informal financial circulations such as iqueb and iddir, private leaders, etc. Banking is part of the financial service systems and serves as formal or modern financial intermediaries for large scale business operators. The relationship between finance and growth has been a field of interest throughout the development of modern economics. There is consistent agreement that financial deepening and financial efficiency has a positive impact on growth.

The theoretical relationship between financial development and economic growth goes back to the study of (Schumpeter J. , 1911) who focuses on the services provided by financial intermediaries and argues that the development of the financial sector is expected to have a positive impact on economic growth (Stiglitz, 1994). Moreover, financial development has a significant influence on economic development, poverty alleviation, and economic stability (Feyen, 2012). Smith added financial systems lower transactions costs, facilitates trade and specialization fundamental inputs to technological innovation (Smith, 1776). Levine concluded that positive, first-order relationship between financial development and economic growth. i.e., well-functioning financial systems play an independent role in promoting long run economic growth (Levine R. , 2005). Further, Beck and Levine find that financial development has a positive impact on total factor productivity (Beck, Levine, & Loayza, 2000). Bagehot refuses the idea that the finance growth nexus understanding of economic growth (Bagehot, 1873) and (World Bank, 2013) stated in (Hailay, 2013).

2.1.6 Financial Intermediation and Endogenous Growth

The Financial Market therefore constitute of all financial institutions that receive financial resources from the surplus units of the economy in the form of savings and transfer them to the deficits units through lending activities. This role of transferring financial resources from the surplus units to the deficit units is what is referred to as financial intermediation. Thus, a financial market comprises of all institutions that play the role of financial intermediation. These set of institutions are therefore referred to as financial intermediaries (Dr. Mohamed, 2009).

A body of theoretical literature suggests a strong and positive link between financial development and economic growth. This is mainly explained in the endogenous growth literature is in line with this argument that financial development has a positive impact on the steady state growth. Those theories explained that finance affect on growth mainly from capital accumulation and productivity improvement. However, empirical literature on this line of thinking provides inconclusive results on finance-growth nexus (Rexiang & Rathanasiri, 2011). The argument just given suggests that financial intermediaries may naturally tend to alter the composition of savings in a way that is favorable to capital accumulation.

In short, an intermediation industry permits an economy to reduce the fraction of its savings held in the form of unproductive liquid assets, and to prevent misallocations of invested capital due to liquidity needs (Bruce & Bencivenga, 1991). Then, if the composition of savings affects real growth rates, intermediaries will tend to promote growth. Here the analysis draws heavily on the contributions of the "endogenous growth" literature, as exemplified by (Romer P. , 1986), (Prescott & Boyd, 1987), (Rebelo, 1987), and (Lucas, 1988). One of the many insights of this literature is that savings behavior will generally influence equilibrium growth rates. In particular, to the extent that intermediaries tend to promote capital investment, they will also tend to raise rates of growth.

2. 1.7 A Model of Intermediation and Growth

In keeping with previous discussion, a model is now developed with a role for financial intermediaries (banks, insurance, microfinance, etc.) in liquidity provision. Here the analysis draws heavily on (Diamond, 1983). In order to make "savings matter" for growth, there is an externality in production as in (Romer P. , 1986). Romer discussed the empirical plausibility of such externalities (Bruce & Bencivenga, 1991). A similar technology is derived by (Prescott & Boyd, 1987) under the assumption that there are external effects associated with expertise (Romer P. M., 1987). Finally, in order to emphasize that it is not necessary for intermediation to alter total savings out of income in order to stimulate growth, the first model is structured so that there is no scope for the saving rate to vary (Bruce & Bencivenga, 1991).

A. The environment

The economy consists of a sequence of three-period-lived, overlapping generations. Time is indexed by ***t*** =0, 1,.. .. . At ***t*** =O there is an initial old generation, endowed with an initial per firm capital stock of ***k,***, as well as an initial "middle-aged" generation, which is endowed with a per firm capital stock of **k**, units at ***t*** = 1.

There are two goods in this economy, a single consumption good and a single capital good. The consumption good is produced from capital and labor. For reasons to be discussed, all capital is owned by a subset of old agents, henceforth called entrepreneurs.

Entrepreneurs use only "their own" capital in production; for simplicity it is assumed that there are no rental markets for capital. Letting $\mathbf{k_t}$, denote the capital held by an individual entrepreneur at ***t*** and $\bar{k}_t$, the "average capital stock per entrepreneur" at ***t***, an entrepreneur who employs **L**, units of labor at **t** produces the consumption good according to the production function $K^{-\delta}_{t\,k}\,\Theta_{Lt}^{1-\Theta}$, where Θ E (0, 1), and δ = 1-Θ. (**δ** is distinguished from 1 - Θ notationally to emphasize that it represents an "external effect" in production). For simplicity, it is assumed that capital depreciates completely in one period. Also, except for the initial old and middle-aged generations, agents have no endowment of the capital (or consumption) goods at any date (Bruce & Bencivenga, 1991).

All young generations are identical (no population growth), and contain a continuum of agents. Each young agent is endowed with a single unit of labor when young, which is supplied in elastically. There is no labor endowment at age 2 or 3. Finally, letting c_i denote age **i** consumption, all young agents have the utility function.

$$U(C1, C2, C3, \phi) = (C2 + \phi C3)^{-\Upsilon}/\Upsilon \qquad (1)$$

Where**,** $y > -1$, and where ϕ is an individual-specific random variable realized at the beginning of age2. ϕ has the probability distribution

$$\phi = \begin{cases} 0 & \text{with probability } 1 - \pi \\ 1 & \text{with probability } \pi \end{cases} \qquad (2)$$

Since young agents do not value age-one consumption, all young period income is saved.

Hence financial structure trivially cannot affect agents' decisions about how much of their income to save. Finally, the formulation of preferences in (1) and (2) implies a "desire for liquidity" on the part of savers familiar from (Diamond, 1983) stated in (Bruce & Bencivenga, 1991).

There are two assets in this economy. There is a "liquid investment" (which in view of the previous discussion is best thought of as inventories of the consumption good), where one unit of the consumption good invested at t returns n >0 units of consumption at either **t + 1** or **t +2**. Thus the return on the liquid investment does not depend on the date of liquidation. There is also an "illiquid" capital investment, in

which one unit of the consumption good invested at **t** returns **R** units of the capital good at **t+2**. This delay represents the "slow cycle of production" discussed by Cameron. If investment in the capital good is liquidated after one period (i.e. at **t +1**) its "scrap value" is **x** units of the consumption good; $0 \leq x < n$.

B. Labour markets

All capital, then, resides in the hands of age-3 entrepreneurs at each date. As mentioned above, there is no rental market in capital. Thus, given an inherited (from past decisions) capital stock of **kt,** and an average "per entrepreneur" capital stock of $\mathbf{K_t^-}$, a representative entrepreneur chooses a quantity of labour employed (L,) to maximize profits; i.e. Lt =argmax $\{K_t^{-\delta}{}_{Kt}{}^{\Theta}{}_{Lt}{}^{1-\Theta-}{}_{WtLt}\}$ where Wt, the real wage rate, is taken as parametric. Then labour demand, as a function of kt, Kt-, and Wt, is given by

$$Lt = Kt\,[(1-\Theta)\,K^{-\delta}\mathbf{t/wt}]^{\mathbf{1/\Theta}} \qquad (3)$$

It remains to discuss labour-market-clearing. There are equal numbers of young and old agents at each date, and each young agent supplies one unit of labour. Not all old agents are entrepreneurs, however. In particular, a fraction $\mathbf{1} - \boldsymbol{\pi}$ of all agents has a realized value of zero for the random variable $\boldsymbol{\phi}$**.** These agents, not caring about old-age consumption, liquidate all assets at age two, and hence have no capital. In other words, these agents are not entrepreneurs, and obviously hire no labour. Only a fraction π of old agents are entrepreneurs, each of whom hires L, units of labour. Labour-market clearing, then, requires Lt = **l**/ π for all ***t.*** Averaging **(3)** over firms and equating the result to $\mathbf{l/\pi}$ gives the equilibrium real wage rate at ***t*** as

$$Wt = \bar{K}t(1-\Theta)\pi^{\Theta} \qquad (4)$$

Finally, it is possible to derive the perceived return to capital for entrepreneurs. Substituting

(4) into (3), and using the fact that per firm profits at ***t*** are just $\Theta Kt^{-\delta}Kt^{\Theta}Lt^{1-\Theta}$,

$$\Theta Kt^{-\delta}Kt^{\Theta}Lt^{1-\Theta} = \Theta Kt^{-\delta}Kt[(1-\Theta)Kt^{-\delta}/Wt\,]^{((1-\Theta)/\Theta)} = \Theta\pi^{\Theta-1}Kt = \Theta\Psi Kt$$

Thus each entrepreneur retains the "return to capital" $\Theta\Psi Kt$, where $\Psi = \pi^{\Theta-1}$

Alternatively, one could set $\boldsymbol{\delta}$ =0, in which case results retaining the flavour of those in the sequence could be obtained for the steady-state capital stock with and without intermediation (Bencivenga V. R., 1989a) stated in (Bruce & Bencivenga, 1991).

C. *The model with financial intermediaries*

Financial intermediaries resembling those of (Diamond, 1983) stated in (Bruce & Bencivenga, 1991) are now introduced. These intermediaries accept deposits from young savers, and invest in both the liquid asset and the illiquid capital investment. Investment in the liquid asset is a form of reserve holding by financial intermediaries (banks, insurance, microfinance, etc.). Then for each unit deposited at date ***t,*** financial intermediaries (banks, insurance, microfinance) place $\boldsymbol{Zt}$ E [0, **1**] units in the liquid investment, and $\boldsymbol{q_t}$ E [0, **1]** units in the illiquid investment, where

$$Zt + q_t = 1 \quad (5)$$

Some depositors withdraw from financial intermediaries (banks, insurance, and microfinance) one period after making a deposit. These agents get r_{1t} units of the consumption good for each unit deposited. Agents who withdraw two periods after making a deposit receive r_{2t} units of the capital good, and r_{2t}, units of the consumption good per unit deposited.' These payments must, of course, satisfy a set of resource constraints. Let $\alpha 1t$ be the fraction of the financial intermediaries' (banks, insurance and microfinance) liquid assets liquidated after one period, and let $\alpha 2t$ be the fraction of the financial intermediaries' (banks, insurance and microfinance) illiquid assets liquidated after one period. Then the relevant resource constraints are

$$(1- \Pi)r1t = \alpha 1tZtn + \alpha 2tqtx \quad (6)$$

$$\Pi r2t = (1- \alpha 2t) Rqt \quad (7)$$

$$\Pi ŕ2t = (1- \alpha 1t) Ztn \quad (8)$$

Since 1 - Π is the fraction of agents who withdraw one period after making a deposit.

These agents thus receive the proceeds of all investments that accrue in the form of capital goods, and any proceeds from liquid assets not liquidated after one period. The latter accrue in the form of consumption goods, which accounts for the term *ŕ2t* as stated in (Diamond D. a., 1983). This view of financial intermediaries (banks, insurance, and microfinance) as an "investment pool" receives some support in the literature on the history of early banking Stated in (Bruce & Bencivenga, 1991).

$$- (1- \Pi/\Upsilon) (r1tWt)^{-\Upsilon} – \Pi/\Upsilon [\Theta\Psi (r2tWt) + ŕ2tWt]^{-\Upsilon} \quad (9)$$

$$Max0\leq q\leq 1-(1-\pi /\Upsilon)[(1-qt)nWt /1-\pi]^{-\Upsilon} –(\pi/\Upsilon)[\Theta\Psi(RqtWt /\pi)]^{-\Upsilon} \quad (10)$$

$$qt = \Phi/(1/\Phi) \quad (11)$$

Where $$\Phi = (\pi/1-\pi)^{1/(1+\Upsilon)}[\pi\, n/(1-\pi)\Theta\Psi r]^{\Upsilon/1+\Upsilon} \quad (12)$$

Then agents with **ϕ** = 1 will withdraw at time ***t*** +2 if:-

$$(\Theta\Psi R/\pi)(\Phi/1 +\Phi) \geq (n/1 - \pi)(1/ 1+\Phi) \quad (13)$$

Thus only agents with **ϕ** =0 withdraw after one period. That all savings are intermediated is immediate, since intermediaries choose returns to maximize the expected utility of young savers.

Equilibrium

In equilibrium, of course, $$ŕ_{t+2} = r_{2t}Wt = RqtWt/\pi = K_{t+2} \quad (14)$$

Then (4) and (14) imply that $$ŕ_{t+2} / ŕ_t = R (1-\Theta)\, \pi^{\Theta-1} qt = R(1- \Theta)\Psi\Phi/(1 +\Phi) = \mu \quad (15)$$

Since per firm output at time ***t,*** denoted Yt equals $Kt^{-\delta}\, Kt^{\Theta}\Psi = \Psi ŕ_t$ (in equilibrium), and since the number of firms is constant over time, (15) also gives the equilibrium rate of growth of output.

2.1.8 Intermediation and Growth with Variable Savings

In order to demonstrate our results do not depend on young agents saving their entire income (or a fixed fraction of their income), these agents are now given a non-trivial savings decision. Thus the previous specification of preferences is replaced with u(c1, c2, c3 ;***ϕ)***= lnc1 +ln (c2 + ϕc3), where cj is age-j consumption as before. All other aspects of the environment are unaltered (Bruce & Bencivenga, 1991).

A. The model with intermediation

The reasoning underlying by Proposition 1 (Suppose that ΘΨR > n. Then $\alpha 1t$ = 1 and $\alpha 2t$ = 0. (Reserves are entirely liquidated after one period, while none of the capital investment is liquidated "prematurely")) continues to be valid here, as does the reasoning implying that all savings are intermediated. Thus at date **t** young agents earn the labour income Wt and choose how much of it to save. All savings are deposited in financial intermediaries (banks, insurance, microfinance, etc.). Financial intermediaries (banks, insurance, microfinance) choose a value $\mathbf{r}_{1t}$ for the quantity of consumption goods received (per unit deposited) by agents who withdraw after one period, and a value r2t, for the quantity of capital received (per unit deposited) by agents who withdraw after two periods. Agents who own k units of capital when old continue to receive the profit (or return on capital) ΘKeg. Each young agent chooses a quantity of savings (deposits) taking as given the values Wt, r_{1t}, r_{2t}, and $\acute{\kappa}_{t+2}$.

Savings behavior

Anticipating the result that, in equilibrium, agents will withdraw after one period if ***Φ*** =0, young agents choose a level of savings (deposits) dt, to maximize ln (wt -dt)+ (1-π) ln (r1t,dt) +π ln (ΘΦr2t,dt). The solution sets dt =Wt/2.

The behavior of intermediaries

As above, intermediaries take deposits (viewing the quantity of deposits as exogenous). For each unit deposited, the intermediary acquires qt E [O, 1] units of the capital investment, and Zt E [0, 1] units of the liquid asset, with qt +Zt =1. In addition, since Proposition 1 continues to be valid, r1t = nZt/(l -π) = (1-qt)n/(l -π), and r2t = Rqt/π. Then the problem of the intermediary is to choose qt E [O, 1] to maximize the indirect utility of a representative depositor, i.e. to solve

$$\max \ln (Wt/2) + (1-\pi) \ln [(1 -qt)nWt/2(1- \pi)] +\pi \ln (\Theta\Phi RqtWt/2\pi)$$

Taking Wt as given. The solution to this problem is to set qt = πΧt

The equilibrium growth rate

In equilibrium $\acute{\kappa}_{t+2}$ is given by

$$\acute{\kappa}_{t+2} = r_{2t}\, d_t = RqtWt/2\pi = RWt/2 = Kt+2 \qquad (16)$$

Since Wt continues to be given by (4), (17) can be rewritten as

$$\acute{\kappa}_{t+2} / \acute{\kappa}_{t=(1/2)R(1-\Theta)\pi}{}^{\Theta} = \mu \qquad (17)$$

2.1.9 Conceptual Frame Work

In excess of theoretical discussions it is deemed appropriate to provide a diagrammatic representation that links those variables that are employed for this study. As a result of this, the conceptual framework for this study is outlined by the below Figure 2.1.

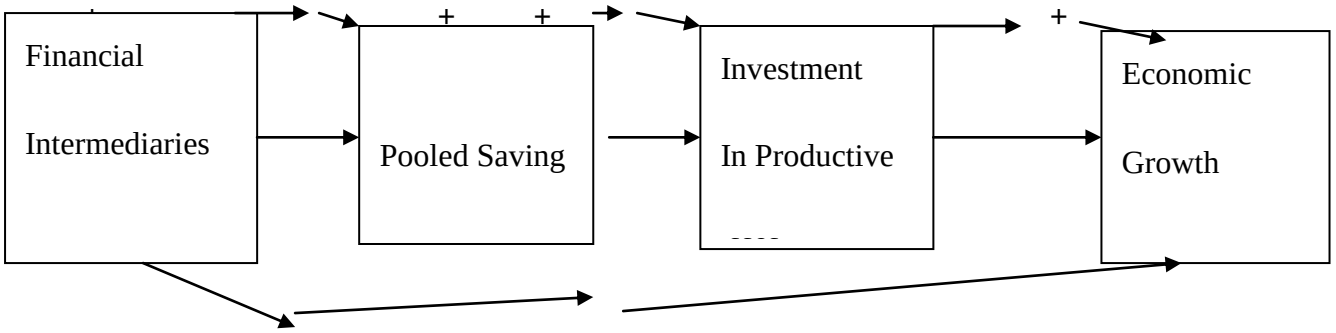


Figure 2.1: Financial intermediation and growth

2.2. Empirical Literature Review of Financial Intermediation and Economic Growth

To start with the empirical discussions from the work of King and Levine (1993) they have been used an endogenous growth model to examine how financial systems affect economic growth.

The majority of the empirical literature is used a cross-country growth regressions, which are helpful for investigating the determinants that the largest part without fail prove as essential factor under concern. on the other hand, cross-country investigation simply describe thought to what appears main in broad or on common; critical insight for nation studies are needed to realize the process and the most significant factors in individual countries (Rodrik, 2000).

A considerable number of empirical studies have been conducted on the causality between saving, investment and economic growth around the world. This is due to continuing divergence in saving and investment rates in developing countries, the growing concern over declining saving rates in the majority of Organization for Economic Cooperation and Development(OECD) countries as well as the growing emphasis of the importance of capital accumulation in the literature on economic growth (Hundie, 2014; Verma & Wilson, 2005). Stiglitz and Levine argued that one of the key roles of financial intermediaries is the choosing between competing sectors of the economy, between competing firms and between competing investment projects (Stiglitz, 1994; Levine & Renelt, 1992).

Empirical studies examining the direction of causality among saving, investment and economic growth yield differing results. The study conducted by (Verma & Wilson, 2005) used annual time series for the period 1950-2001 to examine this issue in India and found no evidence in support of Solow and endogenous growth policy of encouraging higher saving and investment in order to increase economic growth. In another study (Verma, 2007) employed ARDL bounds testing approach to cointegration and VECM based Granger causality test to examine the same issue in India for the period 1950/51 - 2003/04. The findings provided evidence in support of Carroll-Weil hypothesis and that saving unambiguously

determines investment both in the short and long-run. In addition, there was no evidence in support of the commonly accepted models in India, that investment is the engine of economic growth.

However, (Jangili, 2011) examines the direction of causality among saving, investment and economic growth in India for the period 1950/51- 2007/08. Using Johansen-Juselius cointegration test and Granger causality test based on VECM, the results support the traditional view that saving and investment Granger cause economic growth collectively as well as individually and not vice versa. Therefore, this suggests that higher saving and investment lead to higher economic growth in India. Similar results were obtained in India by (Mishra & Jain, 2012) and (Mehta & Rami, 2014) using the same methodology and time series data spanning the periods 1950 - 2008 and 1951-2012,respectively. Applying Johansen-Juselius maximum likelihood cointegration test and ECM approach to determine the interaction among these three variables, (Obi, 2012) also found that saving is an important macroeconomic variable, which impacts on capital accumulation, productivity and economic growth in Nigeria. Furthermore, the authors conclude that increase in capital stock generates more saving and enhances productivity as well as economic growth.

In another study, (Kalebe, 2015) investigated the short and long-run causal relationship between saving and economic growth in Lesotho, the results indicated that saving Granger causes economic growth, both in the short-run and long-run, without any feedback in the opposite direction. Therefore, the study concludes that policies aimed at enhancing economic growth should stimulate and spur meaningful saving levels in Lesotho.

Several empirical studies found a positive effect of the saving rate on the long term growth (Page, 1994); (Cardenas & Escobar, 1998); (Motley, 1994); and (Krieckhaus, 2002) though the neo-classical growth theory predicted only temporary positive effect of increased saving rate on the growth rate in the economy due to corresponding negative effect on capital productivity. The endogenous growth theory (Barro & Sala-i-Martin, 1995); and (Romer D. , 2006) de-linking the capital productivity from the savings, explained such positive relationship between long term growth and saving rate (Vaibhav, Brajesh, & Ravindra, 2009).

Savings will also increase if there are lifecycle factors promoting savings (Deaton & Paxson, 1993). If, however, one believes in the super-neutrality of money in the ultimate sense, inflation cannot have any effect on savings in the long run (Heer & Suessmuth, 2006).

(Budha, 2012) employs ARDL bounds testing procedure to co integration and VECM based Granger causality test to study the direction of causality among saving, investment and economic growth in Nepal. Using data for the period 1974/75-2009/10, the results reveal the existence of feedback causality between investment and GDP and between gross domestic saving and investment. In addition, there is no evidence of Granger causality between gross domestic saving and GDP. (Hundie, 2014) also obtained similar results in the case of Ethiopia using ARDL bounds testing and Yamada and Toda (1998); Dolado

and Lutkepohl (1996) (TYDL) and Innovation Accounting Techniques (impulse responses and variance decomposition). However, the only difference is that Granger causality from investment to saving is stronger than Granger causality from economic growth to saving.

(Agrawal, 2000) used instrumental variable methods to analyze the determinants of saving and investment ratios in South Asian countries. Amongst others, the results provided evidence that higher saving rates cause higher growth rates of real Gross National Product (GNP) in two countries (Bangladesh and Pakistan) and that higher growth rates Granger cause higher saving rates in the other two countries (India and Sri Lanka). In addition, the results for Nepal fail to reject non-causality in either direction. Therefore, these results sharply contrast with the previous empirical findings (mostly based on data from East Asian countries, which have among the highest saving rates in the world) that saving rates do not cause growth but are determined by it.

In another study, (Agrawal, 2001) investigates the direction of causality among saving and growth in seven Asian countries by using VECM (Engle and Granger) and vector autoregressive (VAR) model. The results show Granger causal flow from growth (or income) to saving, although in some countries, there is also evidence of a feedback effect from saving to growth. The author, therefore, concludes that development policy should focus less on promoting high saving rates but instead concentrate more on promoting high growth rates. Furthermore, estimation of the saving functions based on Engle and Granger's static ordinary least squares (OLS) and Stock and Watson's dynamic OLS (DOLS) also provided evidence that the high saving rates in Asia are due to the high rate of growth of income per capita, declining shares of dependent population, and some special institutional features, such as the high central provident fund rates in Singapore. In addition, interest rates are found to have little impact on savings.

In the context of Lesotho, there are very few studies that examined dynamics of the relation among saving, investment and economic growth. (Jangili, 2011) investigated the interaction among financial development, private saving and economic growth in Lesotho. Using Johansen-Juselius cointegration and VECM based Granger causality tests, firstly the results showed that financial development does not Granger cause economic growth and that neither economic growth nor private saving Granger cause financial development. In addition, there is evidence of Granger causality between financial development and private saving. In another study, (Kalebe, 2015) investigated the short and long-run causal relationship between saving and economic growth in Lesotho using the ARDL bounds testing approach to cointegration and VECM based Granger causality test. Granger causality test results indicate that saving Granger causes economic growth, both in the short-run and long-run, without any feedback in the opposite direction. Therefore, the study concludes that policies aimed at enhancing economic growth should stimulate and spur meaningful saving levels in Lesotho.

A body of theoretical literature suggests a strong and positive link between financial development and economic growth. This is mainly explained in the endogenous growth literature is in line with this argument that financial development has a positive impact on the steady state growth. Those theories explained that finance affect on growth mainly from capital accumulation and productivity improvement. However, empirical literature on this line of thinking provides inconclusive results on finance-growth nexus (Rexiang & Rathanasiri, 2011).

A large literature on development and early industrialization asserts that the extent of financial intermediation in an economy is an important determinant of its real growth rate.' However, to date relatively little progress has been made towards developing general equilibrium models in which financial intermediaries influence rates of growth. The argument just given suggests that financial intermediaries may naturally tend to alter the composition of savings in a way that is favorable to capital accumulation.

Then, if the composition of savings affects real growth rates, intermediaries will tend to promote growth. Here the analysis draws heavily on the contributions of the "endogenous growth" literature, as exemplified by (Romer P. , 1986), (Prescott & Boyd, 1987), (Rebelo, 1987), and (Lucas, 1988). One of the many insights of this literature is that savings behavior will generally influence equilibrium growth rates. In particular, to the extent that intermediaries tend to promote capital investment, they will also tend to raise rates of growth.

HaileKibret & Kassahun used data of Ethiopia from 1971-2010 and studied the link between financial development and economic growth. They applied the Stock Watson Dynamic OLS method using liquid liabilities of commercial banks to GDP ratio as a financial development indicator. Their findings suggest that financial development and economic growth have a positive linkage and the granger causality test result shows a bi-directional causality between the two (Haile Kibret & Kassahun, 2011). Omer Mohammed findings concluded that financial depth statistically significant at 5 percent critical level and have a positive effect on GDP growth in Ethiopia (Omer, 2016).

According to Seid study done on the Ethiopian economic growth during the period 1960/61 and 1998/99 by applying methods of Johansen co-integration, fixed capital formation is statistically insignificant (Seid, 2000). Yohannes concluded that financial development is the main crucial variable that has a significant effect on gross national saving ratio in the long run since in the long run people will be sensitive to the dynamics of financial sector in Ethiopia (Yohannes, 2014). But Haile (2012) and Keho (2011) who found that financial development has been insignificant effect on gross national saving and economic growth in the long run in Ethiopia (Yohannes, 2014).

The seminal work of (Barro R. , 1991) opened new ground for the investigation of the impact of fiscal policy (government expenditure) on economic growth. In line with this, (Barro R. , 1991) and (Sala-i-

Martin & N., 1992), Easterly and (Rebelo, 1987) emphasized that government activity influences the direction of economic growth. Similarly, (Dar Atul & AmirKhalkhali, 2002) pointed out that in the endogenous growth models, fiscal policy is very crucial in predicting future economic growth.

In light of this empirical literature, it is evident that the discussion on the causal relationships among saving, investment and economic growth as theorized by different schools of thought is inconclusive. This is in part on account of the dynamics and nature of causality among the variables. Nevertheless, the majority of studies do agree that saving and investment play a pivotal role in explaining growth in the economy. Therefore, the paper attempts to establish the causal relationships among the three variables in the specific context of Ethiopia using trivariate framework. To start with the empirical discussions from the work of King and Levine (1993) they have been used an endogenous growth model to examine how financial systems affect economic growth.

2.3 Critics of the strong association between Intermediation and Growth

Classical economists of the Nineteenth Century have paid some attention to the role of financial intermediation in running the wheels of economic growth smoothly. Bagehot concluded that money market developments in England could make capital flow across the country in search of the highest rate of return (Bagehot, 1873). Hamilton argued that financial intermediaries were the happiest engines that ever were invented for spurring economic growth (Hamilton, 1781).

Economists in studying theories of economic growth in the 1950s showed renewed interest. Robert (Solow R. , 1956) and (Swan, 1956) developed a model of economic growth. Solow-Swan model of development and growth has no role of financial intermediation. For all practical purposes, the economies were seen to be well approximated by a one good (corn producing corn) model. The growth model that dominated had only two elements in production: capital and labor.

Some models show that economic agents create debt contracts and financial intermediaries to ameliorate the economic consequences of informational asymmetries, with beneficial implications for resource allocation and economic activity. However, other models note that higher returns from better resource allocation may depress saving rates enough such that overall growth rates actually slow with enhanced financial development (Bencivenga, 1991); (Levine, Ross, & King, 1993). Furthermore, (Robinson J. , 1952) argues that financial development primarily follows economic growth and the engines of growth must be sought elsewhere. In terms of policy, if financial intermediaries exert an economically large impact on growth, then this raises the degree of urgency attached to legal, regulatory, and policy reforms designed to promote financial development (Ross, Norman, & Thorsten, 1999). Bruce and Bencivenga concluded that, if the composition of savings affects real growth rates, intermediaries will tend to promote growth (Bruce & Bencivenga, 1991). Here the analysis draws heavily on the contributions of the "endogenous growth" literature, as exemplified by (Romer P. M., 1986), (Prescott & Boyd, 1987),

(Rebelo, 1987), and (Lucas R. E., 1988). One of the many insights of this literature is that savings behavior will generally influence equilibrium growth rates. In particular, to the extent that intermediaries tend to promote capital investment, they will also tend to raise rates of growth (Bruce & Bencivenga, 1991).

This paper rigorously examines whether the exogenous component of financial intermediary development influences economic growth. We also present evidence concerning the policy recommendation of financial development. While past work shows that the level of financial development is a good predictor of economic growth (Levine, Ross, & King, 1993); (Levine R. S., 1998); (Neusser & Kugler, 1998); (Rousseau & Wachtel, 1998), these results do not settle the issue of causality stated in (Ross, Norman, & Thorsten, 1999).

These references to the connection between finance and economic growth, however explicit, did not have central stage in the thinking of classical economists. It was (Schumpeter J. , 1911) who put the role of financial intermediation at the center of economic development.

However, (Robinson J. , 1952) does not share this view, suggesting that it is economic growth that stimulates financial development. According to them, financial development is the result of growth in the real economy. Economic development creates a demand for particular types of financial arrangements, and the financial system responds automatically to these demands. Apart from the theoretical facts, empirical studies have shown evidence and have provided different results across countries. According to these studies, the difference in the level of financial sector development may have very important implications for the correlation and direction of causality between financial sector development and economic growth (Roman, 2012).

(Levine, Ross, & King, 1993) and (Barro R. , 1991), which postulated that financial sector development leads to economic growth. In developing their theory, King and Levine used variables to measure a state's level of financial development (ratios of liquid liabilities or claims on the private sector to GDP) with the traditional growth regression for data ranging from 1960-1989. The authors found a strong and statistically significant relationship, which led them to believe that financial development, defined in terms of ratios of liquid liabilities and the level of credit extended to the private sector, was positively related to growth. Their work provided the empirical foundation for the widespread acceptance of the finance growth relationship.

Even though several studies examined that there are strong associations between financial intermediation and growth following econometrical analysis, the dilemma is the specifications of the econometric models persist. Hence, when all these procedures are built-in in a regression, is complicated to investigate the results as well and separately. Thus, the methodological difficulties depart the outcome of

empirical studies is releases to various interpretations. They wind up that the empirical study is uninformative and ignore the connection between financial intermediation and growth an open issue.

The evaluation so far has seriously examined the empirical literature of the role of financial intermediation on economic growth. It would come into view on equilibrium, which resembles to be more empirical verification of a constructive relationship between financial intermediation and economic growth. Yet, the investigation of this occurrence is still an area under discussion to dispute and further empirical research. The most controversial concern is the measure of financial intermediation. These measures are extremely crucial for empirical investigation for the reason that the way intermediation is measured is an important in the specification of the econometric methodology.

To generalize, for the reason of the perception of uncertainty, disagreement and mixed results, I am interested to study and investigate the role of financial intermediation on economic growth in Ethiopia over time.

CHAPTER THREE: TRENDS OF FINANCIAL INTEREMIDATION AND EONOMIC GROWTH OF ETHIOPIA

3.1 Trends of Economic Growth

3.1.1 The Imperial Regime (1953/54-1973/74)

For the period of the Monarch regime, economic and population growth raised an average annual rate of 4.5% and 1.9% correspondingly, at the same time the growth of per capita income was 2.3%. More than 15 years of the Royal period, from 1960/661 to 1973/74, the mean growth rate of the GDP registered by the country was 4.5 %. However, this number is relatively greater than the plan the one who predict in the First Five year economic development plan which was 4.3%.(see First Five-Year Development Plan, 1957-61; Second Five-Year Development Plan from 1962/63-1966/67); third-Five year economic development plan from 1969-1973; an average growth rate of the agricultural, the service sector and industry sector accounted 1.58 %, 6.11 % and 5.8 % respectively. During these periods the growth of service sector and industry sector were more than the agricultural sect oral growth (MoFED).

3.1.2 The Military Regime (1974/75-1990/91)

The improper economic policy and very poor administration together with prolonged internal, peripheral, social, political conflict and high population growth in line with unpredictable nature of growth had been made worse for the poor performance of the economy. During this time economic performance were very low. The annual average real GDP growth during this period was 1.8% which was lower than the growth in real GDP during the Imperial era), whereas the population grew at annually an average 2.6%. During this period the real GDP growth rate was declining while the population growth was raised. As the result, the per capita real GDP was less than 0 i.e. -1.9, this reflects that, the worsening of the standard of living compared to the former monarch period (MoFED).

Due to unstable political conflicts and unpredictable nature, the economic performances of the country during this period were highly suffered. Hence, this irregularity of growth is strongly connected to the growth of agriculture, which, in turn, is susceptible to vibrant nature. If there is better favorable weather, the growth of agriculture is increased which in turn, leads to the bigger the growth of the economy (Alemayehu, 2001). The average growth rate from 1975/76–1977/78 was 1.24%, whereas the per capita income growth was -2.1percent.

From the period 1978/79 to 1982/83 the Nation's economy growth, on average has increased to 3.78%, this period was described by comparative stability and better weather conditions, similarly, during this period the per capita growth was 1.42 percent. From 1983/84-1984/85 the economic performance of the country has been declined due to severe natural disaster i.e. drought. During this time the Nation‟s economic growth has been reduced by 2.3 and 3.2 percent, respectively. On the other hand, the growth rate was increased and showed significant revival from the preceding years. From the period 1985/86 -

1987/88, the economy was revived and reached to 5.8 percent. However, from 1988 -1989 the GDP growth was declined to 1.2 percent.

3.1.3 Post-1991 Period

After 1991 the economy's restoration and a growing forward motion was setting to revive from underperformance trend of economy that characterized during the Military administration. Under the umbrellas of the Bretton Woods Institutions (IMF and WB), the new administration encompassed structural adjustment policies, and the country seen a shift in the economic system in permitting higher attention for the private sector to play an important role in the economy.

During EPDRF regime the overall economic achievement has depicted relative progress for the period, and hence as the result the country practiced broad-based growth through deferent sectors. From 1992/93 to 2014/15, the real GDP and per capita income growth have registered an average annual growth of 8.3 and 4.72 percent, respectively. The growth rate in real GDP was higher than ever registered before.

During the time of 1997/98 and 2002/23, real GDP decreased by -3.4 and -2.16 percent respectively , these were because of the severe drought and bordering conflict with Eritrea, which had been an impact for agricultural production, hence this significantly dropping the share of agriculture to the GDP.

The Ethiopian economies has an impressive performance over the last decade with an average GDP growth of 11% which is twice the average growth of the Sub Saharan African countries and triple the world average growth over this period and has led to Ethiopia being rated as one of the fastest growing economies in the world (UNDP, 2014) .

However, the expectations of growth of annual average real GDP from 1992/93- 2014/15 almost had depicted positive growth. The following table portrayed the average growth of real GDP and the real per capita GDP over the three regimes.

Table 3.1 average growth rate of real GDP and real per capita income

% growth rate	Monarch 1953/54 – 1973/74	Military 1974/75 - 1990/91	EPRDF 1991/92 - 2014/15
REAL GDP	4.5%	1.8	8.3
REAL per capita GDP	2.3%	-1.9	4.7

Source: authors‟ calculation based on MOFED & NBE

From 1970/71 to 2014/15, Ethiopia's average growth rate of real GDP, population and real per capita GDP during this period were 8.1 %, 3.5 % and 2.75% respectively. The growth achievement and the later restructurings has also been adequate and instable, due to the former periods of uncertainty and nonstop drought, moreover the agricultural sector is highly reliant on vibrant nature.

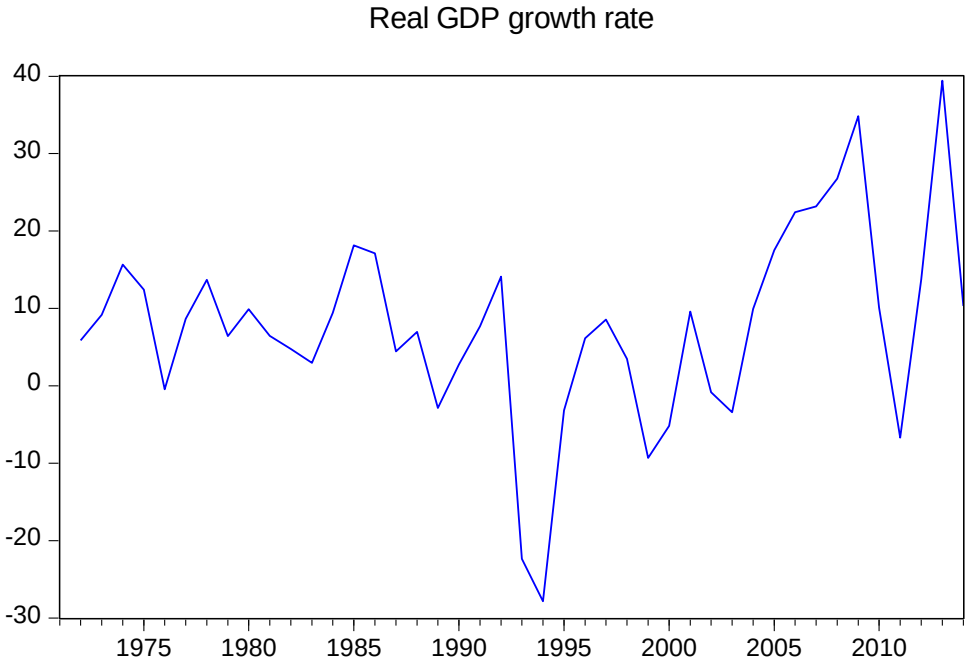
According to the (CSA) in 1997 census 80% of the population are located in rural areas and are primarily engaged in subsistence agriculture despite the emphasis and effort of the Government of Ethiopia to transform the agricultural sector from subsistence to the business oriented one it still depends upon the vagaries of nature.

The agricultural sector accounts for roughly 41 per cent of GDP and 90 per cent of exports. Whenever major natural disaster strikes such as famine of 1984 in Wollo, Green famine of 1994, the millennium famine 2002, impact of the drought lives a mark on the economy (Omer, 2016; Alebel, 2016).

The structure of GDP comprises Agriculture, Industry and service sector in 2014/15(EFY).The agricultural sector has been the backbone of the economy and accounted for 45 percent of the GDP but since the past few years the service industry which mainly include the construction sector has slowly surging the industry sector has remained the lowest among the sectors for decades.

Huge public investments with focus on infrastructure and pro-poor sectors explain much of the economic performance from the expenditure side. Government investments have mainly been carried out from domestic resource mobilization and augmented by external resource inflows. The Human Development Index i.e. composite index of life expectancy, education and income shows Ethiopia performing better than many low-income countries. Income distribution, as indicated by the Gini coefficient3 (0.336), is relatively less skewed than other low—income countries. Ethiopia also scores better than the median African country on governance attributes—especially social welfare, education and health (IMF, 2016)

Figure3. 1. Real GDP growth rate graph



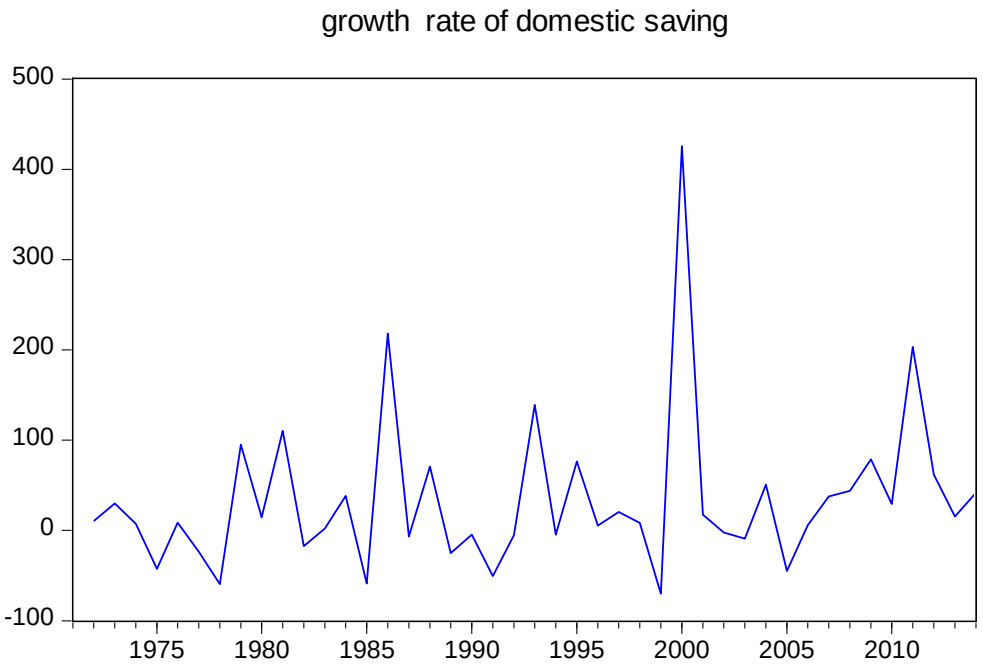
3.2 Saving growth rate

However, Ethiopia is experiencing a severe resource gap. Since 1960, domestic savings have been low: from FY 1961/62 to 2008/09, average domestic savings and investment as a percentage of nominal GDP were 12.8 per cent and 19 per cent, respectively (MoFED, 2010).

Between 1961 and 74, average domestic savings were about 22 per cent of GDP, while the investment ratio was slightly lower at 20 per cent. With the severe and profound development deficit, the country was not in a position to invest even as much as its average saving rate. From 1975 to 1992, under a centrally controlled economic management system, both average savings and investment ratios declined. Although the average investment ratio has increased substantially since 1992 reaching a peak of 25 per cent in FY 2003/04, savings have declined considerably (MoFED, 2004).

Most recently, both savings and investment ratios have fallen to about 4 per cent and 20 per cent, respectively, probably due to double-digit inflation in 2006–09 and the impact of the current global crisis (MoFED, 2010).

Figure 3.2. Saving growth rate graph



Domestic saving has been growing significantly in the past 44 years from 10.42% in 1972 to 14.72% in 1980 and then it increased to 15.61% in 2013 (MoFED, 2013).

Domestic savings has been growing significantly in the past few years from 12.8% of GDP in 2010/11 to 17.7% of GDP in 2013/14 (UNDP, 2014).

In Ethiopia Gross Domestic Savings (% of GDP) was last measured at 22.5% in 2014, according to the World Bank (IMF, 2016). The newly introduced saving instruments (bonds) and expansion in financial

services through the aggressive opening of banking branch networks have contributed to the surge in the domestic savings and also recently the saving house has boosted the saving further.

3.3 Saving and Investment

Indeed, there is ample evidence to show that countries that have enjoy or are enjoying economic prosperity have been linked with an efficient mechanism for mobilizing financial resources and allocating some for productive investment' (Sanusi, 2002).

It is fact that, a countries economic growth is significantly affected by the rate of investment and rate of saving. However, Low saving rate has been a dominant feature of the Ethiopian economy comparing to fast investment rate. The share of gross domestic savings from GDP was, on average, 12.9 percent for the last 15 years. On the other hand, gross capital formation as a share of GDP was 28.3 percent over the same years, which is higher than gross domestic saving (EEA, 2008). As a result, the resource gap was, on average, -15.4 percent over the last fifteen years, which was financed by external sources.

3.4 The Development of the Financial System in Ethiopia

3.4.1 The Pre –Reform Period

The pre-reform (Derg) period is characterized by fast growing government expenditure with an unequal growth in revenue. All private financial institution including three commercial banks, thirteen insurance companies and two non-bank financial intermediaries were nationalized. The government restructured the financial system and formed one commercial bank (CBE), a national bank (NBE), two specialized banks (AIB & HSB) and one insurance company (EIC). AIB was mainly responsible for financing agricultural and industrial projects with medium and long growth period, while HSB used to lend for construction of residential and commercial buildings.

CBE was engaged in trade and other short term financing activities while EIC was the only insurance firm responsible for the provision of all types of insurance services. The National Bank of Ethiopia (NBE) was granted the power to provide loan and advances to the government whenever revenue falls under expenditure. In addition the NBE was assigned to formulate the credit policy and determine the interest and exchange rate

It also fixed both deposit and lending rates, administered the allocation of foreign exchange and directly financed the fiscal deficit. Domestic credit extension was subject to central planning. The limit on direct advance allowed to the government from the NBE increased to 70 percent from 15 percent in 1963 (MoFED, 1999). This lending strategy of the banks showed that the productive sector was not given priority.

In 1988, about 55% of all commercial bank credit financed imports and domestic trade and services, agriculture and industry received only 6% and 13% of the commercial credit respectively (Wondaferahu, 2010).

CBE was the dominant bank accounting for more than 90% of the total deposits mobilized in the country (Alemayehu, 2006). The government on the other hand controlled the financial sector using direct financial instruments such as lowering the interest rate and discriminating the allocation of foreign exchange and credit. The foreign exchange earnings were surrendered to the NBE and the credit policy also favored the expansion of the socialized sector.

Basically the financial sector during 1974-1990 served the state and the development of the socialized sector. According to (prof. Ali I., 2000), nationalizing the private sector, controlling the saving and lending interest rates and limitation on credit reflected the classical manifestation of a repressed financial system. Financial intermediation and the development of the financial sector were affected due to poor resource utilization of the public sector on the one hand and the performance of this sector at the expense of the private sector.

3.4.2 The Post-Reform Period

In 1991, the Transitional Government of Ethiopia (TGE) took over and restructured the system to a market-based economy. The government's strategy for financial development is characterized by gradualism (Alemayehu, 2006).

It reformed the financial sector by granting power to the NBE and strengthening its capacity, granting commercial banks with adequate autonomy to operate within the general financial policy framework provided by the NBE and introduce a competitive bank and non-bank financial sector by allowing private sector participation in the sector. In 1994 the private sector was allowed to engage in the banking and insurance business. The number of banks which were active before the 1974 revolution was only 9 with 113 branches all together (Alemayehu, 2006). However during the fiscal year 2009/10 the number of banks operating in the country reached 15 with 681 branches (NBE, 2009/10). These banks play a major role in the development of the financial sector. The efficiency of these banks in turn defines the strength of the economy. Bank branch to population ratio improved from126, 258 in 2008/09 to 117,474 taking total population as 80 million in 2009/2010. At the end of 2009/2010 the share of private banks grew from 57% to 60% as a result of a significant capital injection by the private banks ((NBE, 2010).

The introduction of private banks in the country gradually led to improved banking services, including features as longer banking hours, ATMs, electronic banking and improved facilities.

These private banks in turn focused on fast growing sectors in order to promote economic growth. But the Ethiopian banking industry is still small despite the increase in the capital base when compared to other African countries (NBE, 2010). Although bank branches are expanding at a fast pace, banks are not

still accessible to most of the rural area. This can be justified by the high minimum balance required to open a bank account and the low geographic as well as demographic penetration.

During the period under consideration, the number of banks, insurance companies and microfinance institutions operating in the country were 19, 17 and 35, respectively. Against last year same period, number of bank branches, insurance branches and microfinance institutions' branches were increased 27.11%, 11.50% and 6.36% and reached 3,277, 407 and 1,638, respectively. Besides, number of leasing companies has reached five (NBE, 2016).

As of January, 2016 total assets, loans and bonds, deposit liabilities and capital of commercial banking sector were Birr 515.80 billion, Birr 431.50 billion, Birr 392.85 billion and Birr 32.67 billion, respectively. Over last year same period, total assets of commercial banking sector grew by 26.15%, total loans & bonds by 27.11%, total deposit liabilities by 22.97% and total capital by 16.78 % (NBE, 2016).

In a similar way, as at December 31, 2015, total assets, total capital, investment, and gross premium of insurance sector stood at Birr 11.3 billion, Birr 2.97 billion, Birr 6.99 billion, and Birr 3.54 billion which have shown a growth of 22.4%, 29.3%, 23.1%, and 13.1%, respectively. Moreover, Microfinance Institutions' total assets, total loans, total deposits and total capital increased by 33.1%, 23.2%, 16.4% and 8% and reached Birr 26.7 billion, Birr 18 billion, Birr 12.8 billion and Birr 6.3 billion, respectively Besides, leasing companies' total assets, total capital goods financing, and total capital reached Birr 2.28 billion, Birr 89.5 million and 1.48 billion, respectively. Thus, financial sector is growing considerably (NBE, 2015).

Unlike the Socialist Government, which was basically engaged in active participation in the production and distribution activities, the current government shifted its role to creating an enabling environment for the private sector and providing regulatory services. Besides privatization, the government has paved the way for foreign investors. But despite the efforts undertaken by the current government to create a conducive business environment, the flow of private investment, the growth of the private sector, and its participation in the economy have so far been quite low. This is partly due to the repression of the private sector under the Derg regime (World Bank, 2004).

In general the Ethiopian financial system is bank dominated with underdeveloped money and securities market which characterizes the inefficiency of financial intermediation. Financial markets are underdeveloped and currently there is no capital market in Ethiopia. The monetary and financial policy is not firm enough to let the financial institutions mobilize deposits with attractive interest rates and to extend credit to support the growth of the economy. With the growing number of banks entering the financial system, the financial sector supervision remains low. Currently there is no foriegn bank in the country and the system remains isolated from the effects of globalization while policy makers fear that liberalization will lead to loss of control over the economy (Wondaferahu, 2010).

Whereas studies show that liberalization has a long-run economic effect on the financial sector by making the domestic banking sector efficient. One of the advantages of financial liberalization is that it will increase the domestic banks' competitiveness. The efficiency of the banking sector can be enhanced by the privatization of state-owned banks as part of the liberalization process, thereby promoting economic growth.

When we come to the case of Ethiopia, a least developed country, financial liberalization may cause financial fragility rather than financial stability due to the underdevelopment of the existing financial system. Thus, before perusing financial liberalization, Ethiopia needs to develop policies that promote successful financial development and financial liberalization. This is because a strong financial system is important to mobilize savings and foreign resources to allocate them to efficient investments. The underdevelopment of the financial sector will raise the transaction cost and channel savings of households into physical assets which in turn reduces investment and hence, reduce growth.

Table 3.4: Number of Bank, Insurance and Microfinance Branches and Capital as of the 2nd quarter of 2015–16

Banks/insurance	No. of banks/ insurance	**No. of branches**				Capital	
		Regional Urban centers	Addis Ababa	Total no. of branches	% share from total	(ETB Millions)	Share of capital from total
State owned commercial and development and mortgage bank	3	994	266	1260	39.54	200,582.12	68.5
Private commercial Banks	16	1097	830	1927	60.46	92,262.77	31.5
Grand banking sector	19	2091	1096	3187	100	292,847.89	100
Total insurance companies	17			407		2,970	
Microfinance	35			1,638		6,300	

Source: NBE January, 2016

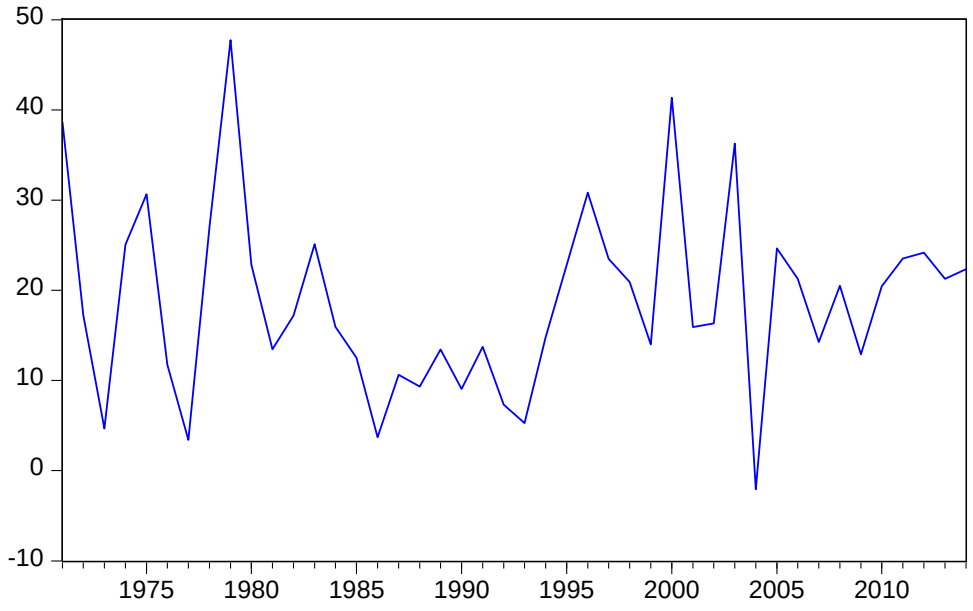
3.4.3 Indicators of Financial Development in Ethiopia

To assess the development of the financial sector a number of indicators are employed to find the relationship between financial development and economic growth. In this section the performance of the ratio of broad money to GDP (M2/GDP) and the share of domestic credit to the private sector as percent of GDP in Ethiopia are discussed. Standard indicators of financial intermediary development, such as liquid liabilities to GDP, banks deposits to GDP, and private credit to GDP have demonstrated financial deepening in most African countries over the past years (Thorsten, Demirgüç, Kunt, & Levine, 1999).

3.4.3.1 Broad Money Supply

Broad money consists of both narrow money and quasi-money, where narrow money contains currency outside the bank and net demand deposits and quasi-money includes both saving and time deposits. It is the broadest measure of financial development and it measures the depth of the financial system. It also indicates the degree of monetization with respect to the real economy.

Figure3.4.3.1.Financial sector development growth rate graph



Basically, broad money can be determined by net foreign assets and domestic credit. A higher M2/GDP ratio suggests that a larger financial sector and therefore greater financial intermediary development. During the Derg period, foreign reserve accounted for less than 10% of the monetary base (except for the three years ending in 1990/91), and growth in M2 was largely determined by domestic credit mainly to the government (MoFED, 1999).

3.4.3.2 Domestic credit to the private sector

Domestic credit issued to the private sector refers to the financial resources provided to the private sector, such as through loans, purchase of non-equity securities and trade credit and other account receivables, that establish a claim for repayment. For some countries these claims include credit to public enterprises. During the Derg regime, total domestic credit grew by almost 12% on average, faster than the growth in M2. Much of this growth was accounted for by the credit given to the central government.

Credit to the central government grew by 15.7% on average during the period 1980/81-1990/91 (MoFED, 1999). On the other hand, bank credit to the private sector grew slowly because of the restriction imposed on the economic activities of the private sector. After the economic reform however, bank claims on government grew on average by 3.2% while non-government borrowers increased by 20% per annum due to the increasing participation of the private sector. Credit disbursed to non-government borrowers accounted for 51% of the total domestic credit up from 30% in 1991/92. Unlike the Derg period, bank credit to the private sector became a major determinant for the expansion of the monetary base. For example the ratio of private credit as percent of GDP in 2004 was 19.1 the second highest in East Africa (Kiyota, Peitsch, & Stern, 2007). However, this does not necessarily mean that intermediation is stronger because Ethiopia's GDP is relatively low.

Figure 3.4.3.2. Growth rate of credit to private sector graph

3.4.3.3 Regime structural change

The IMF notes that progress has been slow on Ethiopian reforms related to improving the domestic business climate, including liberalization of the foreign exchange regime and creation of functioning financial markets. Expanding private sector banking and increasing financial intermediation are key

elements of this much-needed reform that will underpin economic growth (IMF, 2013) . The most recent available data indicate that Ethiopia is falling behind its sub-Saharan African peers, with credit to the private sector equal to only 14 percent of gross domestic product (GDP), a reduction of 5 percentage points since 2004, compared with the rising-peer average of 23 percent (Keatinge, 2014).

The IMF believes that, state-owned banks such as the CBE will come under increased strain. With the CBE representing 70 percent of total banking assets, the health of the Ethiopian economy is closely correlated with the performance of this bank. It would serve Ethiopia well to diversify the strain placed on the CBE by creating a greater role for private banks, including potentially opening access for foreign banks and offshore investors (IMF, 2013).

One of the main objectives of financial institutions is mobilizing resources (in particular domestic saving) and channeling them to the would-be investors. This intermediation role of financial institutions takes different forms in different economic systems. Ethiopia's history of the last three decades clearly shows the validity of this statement.

Under 'State Socialism' (1974 to 1991), popularly referred in Ethiopia as the 'Derg Regime', financial institutions were basically executing the economic plans outlined by the central planning organ. In that period regulation and supervision were not critical since the national plan was believed to regulate and direct the activities of the financial institutions. Moreover, financial institutions were directed to finance some public projects that may not pass proper financial appraisal simply based on either ideological ground or 'merit wants' argument (Alemayehu, 2006).

Following the *Derg* regime in 1991, post-1991 economic policy witnessed a marked departure from the previous "Socialist' System". Its main difference lies on openly adopting a market-oriented economic policy. In fact much of the policies adopted by the new government in Addis in 1991 had been already proposed by the defunct *Derg* regime virtually at the end of its reign (Alemayehu, 2006).

This new change in policy brought about a significant change in the functioning of the financial sector. Not only is the financial sector is going to serve the private sector, which had been demonized, but also new private financial institutions were emerging (Keatinge, 2014).

CHAPTER FOUR: DATA AND METHODOLOGY OF THE STUDY

Empirical methodology would be applied to address the stated objective that described in this research work. Vector Auto Regression (VAR) model would be considered, Because Vector Auto Regression (VAR) model is incorporated all empirical tools to obtain more accurate results within the known data for study. VAR is defined as a system of ARDL equations describing dynamic evolution of a set of variables from their common history (Asteriou, 2007; Bình, 2013).

We have used VAR model because of the following some good characteristics (Asteriou, 2007; Bình, 2013).

- First, it is very simple because we do not have to worry about which variables are endogenous or exogenous.

- Second, estimation is very simple as well, in the sense that each equation can be estimated with the usual OLS method separately.

- Third, forecasts obtained from VAR models are in most cases better than those obtained from the far more complex simultaneous equation models (see Mahmoud, 1984; McNees; McNees, 1986; Bình, 2013).

Next to this, all variables would be tested via **Eviews 9 software.** There are preconditions to study the data before realizing VAR models to be considered:

First, time series data incorporated in VAR model must be stationary. Hence, the checking of the unit root and statiaonarity would be employed to the data. These tests include Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) econometric approaches (Bình, 2013).

Secondly, the proper lag length would be determined. In line with this, VAR model explanation would be followed the process and some option tools presented for analysis of empirical results. The VAR model is composed of cointegration test (Using Johnson cointegration method, by applying trace and max-Eigen values), VECM, Granger causality test, Impulse response, Variance Decompositions and stability test.

4.1 Functional relationship

New development theorists of the neoclassical (Solow R. , 1956) model argues that an increase in the saving rate boosts steady-state output by more than its direct impact on investment because the induced rise in income raises saving, leading to a further rise in investment ((Jangili, 2011; Verma, 2007;

Hundie, 2014). The higher investment, through the multiplier effect, drives higher aggregate demand, which in turns accele-rates economic growth. This view is somehow supported by endogenous growth models, which predicts that an increase in savings rate increases economic growth through its positive impact on investment and capital accumulation (Barro & Sala-i-Martin, 1995).

In an endogenous model of growth, it has been argued that financial development can affect growth in three ways; namely raising the efficiency of financial intermediation, increasing the social marginal productivity of capital and influencing the private savings rate. This makes well functioning financial markets at the core of endogenous technical progress because a well functioning financial system increases the efficiency of the human capital as well as the physical capital.

(Levine R. , 1997) stressed the informational role of financial intermediation in an endogenous growth model and argues that its role is crucially related to productivity growth of capital. In a related study, (Bencivenga, 1991) stressed that through its reduction of liquidity risks, efficient financial intermediation stimulates savers to hold their wealth increasingly in productive assets, contributing to productive investment and growth.

The role of financial intermediation in economic growth is a question that is central to the study of economic growth. Regarding to these, there is no complete consensus over alternative proxy variables for intermediation in the literature. Indeed, most intermediation measures tend to measure only one aspect of finance policy and as noted by (Levine R. , 1997) the relationships between them are weak in many cases. Among this intermediation measures (conventionally expressed as financial sector development and the ratio of credit to private sector to real GDP) have been commonly used in the literature although it is the most problematic measure of intermediation, at least conceptually. Simultaneity and crude proxies are important practical problems. Such constraints make the empirical study on the relation between financial intermediation and economic growth variables very challenging.

The model was used in this study has been employed in a number of studies. The paper has built its model on the same principle employed in previous studies to estimate the role of financial intermediation in economic growth in Ethiopia.

Some of other studies used a binary indices of intermediation, indices of financial development, as the measure of financial intermediation. However, the long term data of such measures are not available. In order to remedy these problem and also financial intermediation includes assets to real GDP ratio and loans, advances to real GDP ratio and credit to private sector to real GDP ratio; the current study uses gross fixed capital formation to real GDP ratio and financial sector development as index of financial intermediation. Nevertheless, the empirical support for this hypothesis is mixed. While over long period, most theoretical and empirical researchers have found a strong and positive correlation between financial intermediation and economic growth, a considerable number of studies, applying a range of time series methodologies, found mixed results.

This study would have been used regression analysis computed by standard OLS formula to investigate the nexus between financial intermediation and real GDP growth. At the beginning we transformed all the variables under study into Log data because of the following reason:

Firstly, to find the percentage change in the dependent variable resulting from percentage changes in the independent variable. Thus, the study would have been found the responsiveness of a change in real GDP growth to changes in financial sector development, gross fixed capital formation, gross domestic saving, export, population growth credit to private sector and regime structural change (that is elasticity's of the variables), hence this would be the need to use the log-linear model.

Secondly, some of the variables may have very large values (in millions). Therefore, the need to use the log form is, to bring the values for all the variables to the same unit or level.

Lastly, the use of log transformation is necessary because it reduces the scale of the variables from a tenfold to a twofold, thus reducing the possibility of heteroscedasticity in the model (Gujarati, 1995).

This study will be used multivariate regression analysis computed by standard OLS formula to investigate the relation between financial intermediation and economic growth Real GDP growth. The GDP growth model is based on Odedokun's model which postulates that causation runs from financial development to economic growth (Odedokun, 1998).

In addition to this we will be used another determinant variables; Financial sector development (FSD), Export (EXPT), Gross capital formation (GCF), Gross domestic saving (GDS), Population growth (POP), Credit to private sector (CRPS) and Regime structural change (DUM). At the beginning we transformed all the variables under study into Log data. Then, the multivariate regression model is developed by the following. Then, the regression model is developed by the following specification:

Specification:

RGDP = f (FSD, GDS, EXPT, GFC, CRPS, POP, DUM)

Where; RGDP= Real Gross domestic product, i.e. an indicator of economic growth in Ethiopia

FSD = Financial Sector Development

GDS = Gross Domestic Saving

GFC = Gross Fixed Capital Formation

CRPS = Credit to Private Sector

EXPT = Export

POP = Population growth

DUM = Regime structural change

The equivalent equation which will be used for estimation can be written in logarithmic form as follows:-

$LRGDPt = \beta 0 + \beta 1\ FSDt + \beta 2\ LEXPTt + \beta 3 LGDSt + \beta 4\ LPOPt + \beta 5\ LGFCt + \beta 6 CRPS + \beta 7 DUMt + \varepsilon 1t$ …… (4.1)

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and β_7 are coefficients of elasticity's and εt is stochastic disturbance term with standard properties. The sign of each coefficient is dependent upon the relative contributions of the corresponding explanatory variables which in turn depend on the functioning of the economic system under consideration.

The functional relation or expected signs of the coefficients for the estimable model summarized in the following way;

Table 4.1: Expected signs of the coefficients for the model.

No	Variable	Expected sign
1	RGDP	+
2	FSD	+
3	GDS	+
4	GFC	+
5	CRPS	+
6	EXPT	+
7	POP	+
8	DUM	+

The coefficients of the term representing Real Gross domestic product (RGDP), Financial sector development (FSD), Gross Domestic Saving (GDS), Gross fixed Capital formation (GFC), Export

(EXPT), Population growth (POP), Credit to Private Sector (CRPS) and Regime structural change (DUM) are expected to be positive. Empirical approach to regression in this study would be then not simply to maximize the goodness of fit of the model but to include only those variables inherently plausible in the context of this study.

Variable definition

The Real Gross Domestic Product (RGDP): is the real gross domestic product deflated by GDP deflator, is used as a proxy for economic growth. The real GDP growth is expected to have a positive relationship with explanatory variables of GDS, GFC, FSD, CRPS, EXPT and POP.

Gross domestic saving deposit (GDS): is saving deposits; it provides an alternative to the broad money ratio especially when dealing with developing countries. The ratio measures the degree of monetization in the economy as well as the depth of the financial sector while it also shows an expansion of payment and saving functions.

Gross fixed capital formation (GFC): formally gross domestic fixed investment includes plants, machinery and equipment. It also includes the construction of roads, railways, and others such as schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. The variable is used as a proxy for capital stock. Gross fixed capital formation as a proxy for capital has been used in several other studies such as (Aryeetey and Fosu, 2004; Mansouri, 2005; Naguib, 2008). It is worth emphasizing that the capital used in the study refers to real capital calculated using 2015 constant prices**.** Fixed gross capital formation is expected to have positive effect on economic growth.

Financial sector development (FSD): indicators of the level of financial sector development- the traditional practice (Goldsmith, 1969) and (McKinnon, 1973) have been to use the size of the formal financial intermediary sector relative to economic activity to measure financial sector development or "financial depth." Users of financial depth hypothesize that the size of financial intermediaries is positively related to the provision of financial services. One measure of "financial depth" equals the ratio of liquid liabilities of the financial system to real GDP, which we term ***LLY.*** Liquid liabilities consist of currency held outside the banking system plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries (Goldsmith R. , 1969). Consequently, we construct a second financial development indicator to measure the relative importance of specific financial intermediaries. We study the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets and call this variable bank intuitively, (Gregorio, Jose, & Guidotti., 1995).

Liquid Liabilities = currency plus demand and interest-bearing liabilities of financial intermediaries as share of GDP (Thorsten, Demirgüç, Kunt, & Levine, 1999). We include this broad money of financial indicators to maximize the information on financial development in our study. Broad money consists of

both narrow money and quasi-money, where narrow money contains currency outside the bank and net demand deposits and quasi-money includes both saving and time deposits. It is the broadest measure of financial development and it measures the depth of the financial system. It also indicates the degree of monetization with respect to the real economy. Basically, broad money can be determined by net foreign assets and domestic credit. A higher M2/GDP ratio suggests that a larger financial sector and therefore greater financial intermediary development (Roman, 2012).

Credit to Private Sector (CRPS) = total claims on private nonfinancial sector by financial intermediaries as share of real GDP (Thorsten, Demirgüç, Kunt, & Levine, 1999) and thus, is more directly linked to investment and economic growth. A higher ratio is an indication of greater financial intermediation development. This ratio indicates the importance of the role played by the financial sector. It also measures the activity of financial intermediaries in one of their primary function of channeling savings to investors (Levine R. , 2003). Domestic credit issued to the private sector refers to the financial resources provided to the private sector, such as through loans, purchase of non-equity securities and trade credit and other account receivables, that establish a claim for repayment (Roman, 2012).

Exports (EXPT): As a measure of exports, the study uses the exports of goods and services in relation to GDP. Export is one of the factors, considered even in the traditional Keynesian theory that can facilitate economic growth. Empirical studies have confirmed that export positively affects economic growth (Marin 1992; Vohra 2001) stated in (Martin, 2005).

Population growth (POP): is the annual percentage change in population. Population here includes all residents in a country regardless of their legal status or citizenship except for refugees not permanently settled in the country of asylum, which is generally considered part of the population of the country of origin. Population growth is expected to have positive impact on economic growth.

Regime structural change (DUM): is the government financial and economic structural change starting from monarchy regime, Durg/military/ regime and EPRDF or recent regime. There is no policy or structural change for monarchy and military regime. But there is structural change for recent government or EPRDF.

Table 4.2. Source of data

Variable code	Variable name	Unit	Source	Remark
RGDP	Real Gross Domestic Product	Ethiopia Birr in million at 2015 price	IMF	1971 - 2014
FSD	Financial Sector Development	Ethiopia Birr in million at 2015 price	IMF	1971 - 2014
GDS	Gross Domestic Saving	Ethiopian Birr in million at 2015 price	MoFED	1971 - 2014
CRPS	Credit to Private Sector	Ethiopian Birr in million at 2015 price	MoFED	1971 - 2014
GFC	Gross Fixed Capital Formation	Ethiopian Birr in million at 2015 price	IMF	1971 - 2014
EXPT	Exports	Ethiopian Birr in million at 2015 price	UNCTAD	1971 - 2014
POP	Population growth	Ethiopian senses data in million	MOFED	1971 - 2014
DUM	Regime structural change	Structural change = 1 but no structural change = 0 in dummy variable	MOFED	1971 -2014

4.2 Model specification

4.2.1 Specification of the Econometric Model

This study would be used regression analysis computed by standard OLS formula to investigate the role of financial intermediation in GDP growth of Ethiopia. At the beginning we transformed all the variables under study into Log data. Then, the multivariate regression model is developed by the following specification.

4.2.1.1 Vector Autoregressive (VAR) Modeling and Co-Integration Analysis

Lately, long run linear associations between variables in the existence of short-run deviations from the long run equilibrium are confirmed by using co-integration test. Due to the confrontation of non-stationary series with a unit root, first differencing come into sight to offer the suitable clarification for guaranteeing series for stationary. First differencing, on the other hand, does acquire a main constraint in that to pay no attention to the long run belongings of the data. If two time series Yt and Xt are both integrated of order d (i.e. I (d)), then, in general, any linear combination of the two series would also be I

(d); that is, the residuals obtained on regressing Yt on Xt are I (d). If, however, there exists a vector b, such that the disturbance term from the regression (et = yt - bxt) is of a lower order of integration I (d-b), where b>0, (1987) (Engle & Granger, 1987) define yt and xt as co-integrated of order (d, b).

The process used for co-integration testing and approximation of the VAR in this study pursue the methodology developed and used by Johansen (1988, 1991), and Johansen and Juselius (1990).This method is preferred to the single equation based Engel-Granger two step procedure due to the following reasons. The Johansen (1988) technique permits testing for the presence of more than one cointegration vector. In addition, it allows approximating the model without priority limiting the variables as endogenous and exogenous. It is used to decide how each endogenous variable replies over time to a shock in that variable and in every other endogenous variable.

Johansen (1988, 1991) has displayed that the test for co-integration can be expressed as a test of reduced rank of a regression coefficient matrix. The coefficient matrix can be estimated persistently using linear regression procedures and the test statistic can be computed from the solution to an Eigen value problem. Moreover, linear limitation on the co-integrating parameters can be tested by computing the shortcomings of the Engle& Granger method likelihood ratio test statistic which follows a $\chi 2$ distribution (Walls, 1993).

The initial argument in this technique is the designation of VAR model in the succeeding form. Assuming K-lags of Zt, a general pth-order VAR demonstrating the interconnection between the n variables in the model; as given in Johansen and Juselius (1990) is of the form.

At the beginning we transformed all the variables under study into Log data be to avoid hetroscedasticity and to show elasticity of the variables. Then, the econometric VAR model would be specified as the unstructured VAR model.

$$Z\,t = \Omega + \partial 1 Z\,t\text{-}1 + \partial 2 Z\,t\text{-}2 + \ldots + \partial p Z\,t\text{-}p + \varepsilon t = \Omega + \sum_{i=1}^{p} \partial i Z t - i + \varepsilon t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (4.2)$$

Where, Zt is an (n χ 1) vector containing the n-variables (including LRGDP, FSD, LGFC/ RGDP, LGDS, LPOP, LEXP, CRPS/ RGDP and DUM) ∂ i; is (n χ n) matrix of coefficients; W is a vector of deterministic terms like trends and intercepts; and εt are iid (0, Σ) vector of error terms with Σ representing the contemporaneous covariance matrix.

4.2.1.2 The Vector Error Correction Model (VECM)

The VECM encompasses information on both the short-run and long-run properties of the model, with disequilibrium as a procedure of correction to the long run model. Next to the Granger representation theorem, if some variables are co-integrated, the vector error correction model (VECM) representation can be written as follows:

$\Delta Z_t = \psi\Omega + \prod Z_{t-1} + \theta_1 \Delta Z_{t-1} + \ldots + \theta_p \Delta Z_{t-p-1} + \varepsilon_t = \psi\Omega + \prod Z_{t-1} - \sum_{i=1}^{p-1} \theta i \Delta Z t - i + \varepsilon t \ldots\ldots$ (4.3)

Where, ΔZt signifies the first differences of the variables; $\theta 1 = \sum_{i=1}^{p-1} \quad aj + 1$ is (nine) coefficient matrix in the error correction term (which contains short-run parameters); and $\Pi = \sum_i^p a_i - 1$ is (nxn) matrix of long-run responses, which contains information about the long-run relationships. Further, the error terms are expected to be Gaussian or well behaved. Allowing to Davidson and Mackinnon (1999), the approximation of the VECM entails the decision of the fitting lag length since the cointegration outcome may be complex to the number of lags involved in the VAR. Thus, before to co- integration testing & approximation of the VECM, we must to decide the suitable lag length, which is decided employing the well-known model chosen principles, the Akaiki Information Criteria (AIC), the Final Prediction Error (FPE), the Hannan-Quinn Information Criteria (HQ), and the Schwarz (Bayesian) Information Criteria (SIC). The following issue is deciding the number of separate linear combinations of the variables (or more technically the number of independent co-integrating vectors). In the Johansen (1988) process, defining the rank of (r) of the long run matrix (Π) provides the number of co-integrating vector between the variables.

In general, there are three cases that may happen. The first case is when r=0, in which case the short-run dynamics depend merely on the lagged fluctuations in the variables and the levels of any of the variables in vector Z have no long run relationship (i.e., there is no cointegration relation; all rows are linearly dependent, and the system is non-stationary). By contrast, if r = n, all linear combinations would be stationary. In this case, approximating the level VAR and the VECM with unrestricted OLS would be provided the same results (Davidson and Mackinnon, 1999).

In accordance with these two extreme cases, one may find the usual intermediate case of $0<r<n$, indicating a co-integration association ship. In this case, the system is non-stationary, but there are r co-integrating interactions that are stationary; Π is said to have reduced rank and holds stationary long-run equilibrium information. However, the rank decision must be complemented by exogeneity and causality tests to attain an economically interpretable linear relationship among the variables (Badawi, 2005). To determine the rank of the long-run matrix and hence the number of co-integrating vectors, the two likelihood ratio tests (the trace**, λ trace**), and the maximal eigenvalue (λ maximum) statistics are used.

These statistics are given by:

λ trace (r) = $- T \Sigma^{n}_{i = r + 1} \lfloor n - (1 - \lambda i)$……(4.4)

λ maximum(r, r+1) = $-T \ln (1- \lambda r+1)$……(4.5)

Where r is the number of co-integrating vectors under the null; λ is the characteristic root (Eigen values) from the matrix; and T is the number of observation. The trace method tests current (actual) values of the fundamentals.

4.3 Methods of Data Analysis frame work and Estimation techniques

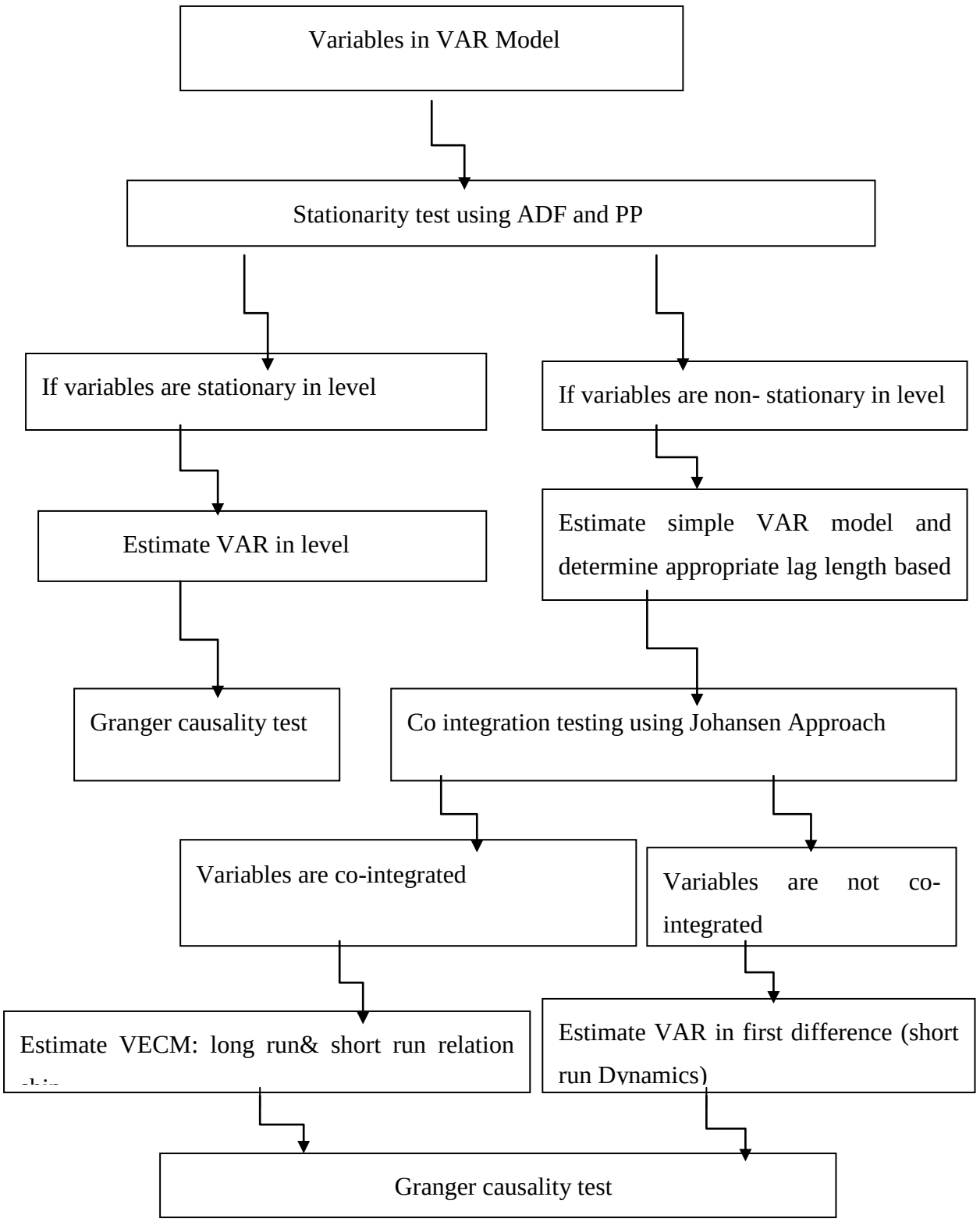


Figure 4.1 General procedure of data analysis of the VAR model

Source: (Alemayehu Kebede, 2011)

4.3.1 Stationary test

Any empirical work that contained a time-series data must be stationary (Davidson and Mackinnon, 1999). Before the estimation of a macroeconomic time-series model that considered in this study, it is necessary to identify the properties of the data. Hence, the variables in the model are stationary and their orders of integration are evaluated to avoid unfitting model specification and misleading results.

A key concept for underlying stochastic process that has received a great deal of attention and scrutiny by time series analysts are the so called stationary stochastic process (Gujarati, 2003 and Binh, 2013). Broadly speaking, "a time series is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed" (Gujarati, 2011).

In the time series literature, such a stochastic process is known as a weakly stationary or covariance stationary. By contrast, a time series is strictly stationary if all the moments of its probability distribution and not just the first two (i.e., mean and variance) are invariant over time. However, the stationary process is normal; the weakly stationary stochastic process is also strictly stationary, for the normal stochastic process is fully specified by its two moments, the mean and the variance. For most practical situations, the weak type of statiaonarity often suffices.

If a time series is not stationary in the sense just defined, it is called a non -stationary time series. In other words, a non- stationary time series will have a time-varying mean or a time-varying variance or both.

According to (Gujarati, 2004), Gujarati (2003, 2011 and (Bình, 2013), there are at least two reasons for non statiaonarity of the properties of time serious data. First, if a time series is non -stationary, we can study its behavior only for the time period under consideration. Each set of time series data will therefore be for a particular period. As a result, it is not possible to generalize it to other time periods. Therefore, for the purpose of forecasting or policy analysis, such (non- stationary) time series may be of little practical value. Second, if we have two or more non stationary time series, regression analysis involving such time series may lead to the phenomenon of spurious or nonsense regression (Gujarati, 2004), (Gujarati, 2011; (Dimitrios & Stephen, 2007) and (Bình, 2013).

In addition, a special type of stochastic process (or time series), namely, a purely random, or white noise, process, is also popular in time series econometrics. According to Gujarati (2003), we call a stochastic process purely random if it has zero mean, constant variance ($\zeta 2$), and are serially uncorrelated. This is similar to what we call the error term, μt, in the classical normal linear regression model, once discussed in the phenomenon of serial correlation topic. This error term is often denoted as $\mu t \sim iid\ (0, \zeta 2)$.

The statiaonarity of every series is confirmed by Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. A time series is said to be integrated of order d, denoted I (d), if it becomes stationary

after being differenced a minimum of d times (Dickey and Fuller, 1979, and 1981). The statiaonarity test results may be responsive to whether a constant and/or a time trend are/is incorporated in the regression. The correctness as well as a constant and/or a trend are ensured by proper testing whether they are statistically significant in the particular statiaonarity test regression equations.

4.3.1.1. Unit Root Testing

Unit root testing in times serious data is an important step to check whether the data is stationary or not. There are various means of testing for the existence of a unit root. These methods are Simple Dickey-Fuller Test, Augmented Dickey-Fuller Test, Phillips–Peron test and KPSS test (Asteriou, 2007) and (Bình, 2013). But this study only used the ADF and Phillips-Peron tests to verify the presence of a unit root.

4.3.1.1.1 Augmented Dickey-Fuller Test

As the error term is unlikely to be white noise, Dickey and Fuller extended their test procedure suggesting an augmented version of the test (called ADF test) which includes extra lagged terms of the dependent variable in order to eliminate autocorrelation in the test equation.

The lag length on these extra terms is either determined by Akaike Information Criterion (AIC) or Schwarz Bayesian/Information Criterion (SBC, SIC), or more usefully by the lag length necessary to whiten the residuals (i.e. after each case, we check whether the residuals of the ADF regression are auto correlated or not through LM tests and not the DW test .

There are three possible forms of the ADF test summarized as by the following equations:

Hence, the ADF equation in which no intercept term and time trend are included the following:

$\Delta Yt = \boldsymbol{\delta} Yt\text{-}1 + \sum^{p}_{i=1} + \square_i \Delta Yt\text{-}i + ut$ ……....(4.6)

For the case where the auto regression includes only intercept is stated as:

$\Delta Yt = \alpha + \delta Yt\text{-}1 + \sum^{p}_{i=1} \square_i \Delta Yt\text{-}i + ut$ ……..(4.7)

When the auto regression includes the intercept and a trend, the equation is of the following form:

$\Delta Yt = \alpha + \Upsilon^{T} + \delta Yt\text{-}1 + \sum^{p}_{i=1} \beta_i \Delta Yt\text{-}i + ut$ ..…….(4.8)

The difference between the three regressions concerns the presence of the deterministic elements α and T

Where Yt is any variable in the model to be tested for statiaonarity, εt is an error term and is the first-difference operator. In the above three equations, the null hypothesis of ADF is δ=0 against the alternative that $\delta < 0$, where a rejection of this hypothesis indicates that the time series is stationary and it does not contain a unit root (Enders 1995).

Following the approximation of the equations, the proper significant values would be used to test for the existence of a unit root are given by the Dickey-Fuller test, in which the significant values are diverse for three regressions. Following the approximation of the equations with OLS, the outcomes of t‟ statistics are evaluated with the particular critical values provide in the Dickey Fuller tables.

According to (Asteriou, 2007), if the econometrician not knows the actual data-generating process, there is a difficulty regarding whether which is most suitable to guess (4.6), (4.7), or (4.8). (Daldado, Jenkinson and Sosvilla-Rivero, 1990) put forward a course of action which begins from assessment of the majority general model given by (4.7) and then replying a set of questions regarding the appropriateness of each model and moving to the next model. It needs to be stressed here that, although useful, this procedure is not designed to be applied in a mechanical fashion. Plotting the data and observing the graph is sometimes very useful because it can clearly indicate the presence or not of deterministic regressors. Nevertheless, this process is the most rational means to test for unit roots when the form of the data-generating process is typically unknown.

4.3.1.1.2 Phillips-Perron (PP) tests

In practical studies, both the ADF and the Phillips-Perron (PP) test are mostly used. Because the distribution theory that supporting the Dickey-Fuller tests is based on the assumption of random error terms [iid(0, 2)], when using the ADF methodology we have to make sure that the error terms are uncorrelated and they really have a constant variance. Phillips and Perron (1988) developed a generalization of the ADF test procedure that allows for fairly mild assumptions concerning the distribution of errors. The regression for the PP test is similar to equation (3).

$$\Delta Y_t = \alpha + \delta Y_{t-1} + \varepsilon_t \quad \text{.....(4.9)}$$

While the ADF test corrects for higher order serial correlation by adding lagged differenced terms on the right-hand side of the test equation, the PP test makes a correction to the t statistic of the coefficient from the AR(1) regression (semi-difference method) to account for the serial correlation in εt.

So, the PP statistics are just modifications of the ADF t statistics that take into account the less restrictive nature of the error process. The expressions are extremely complex to derive and are beyond the scope of this lecture. Luckily, since most statistical packages have routines available to calculate these statistics, it is good for researcher to test the order of integration of a series performing the PP test as well. The asymptotic distribution of the PP t- statistic is the same as the ADF t statistic and therefore the MacKinnon (1991, 1996) critical values are still applicable.

As with the ADF test, the PP test can be performed with the inclusion of a constant and linear trend, or neither in the test regression. Dickey-Fuller tests may have low power (H0 of unit root not rejected,

whereas in reality there may be no unit root) when ρ is close to one. This could be the case of trend statiaonarity (H0) (Binh, 2013).

4.3.2 Diagnostics test

4.3.2.1 Residual vector normality test

Residual normality test is an important post estimation diagnostic test in empirical work studies.

This empirical work employs the multivariate extension of the Jarque-Bera (JB) test for residual normality, which relates the third and fourth moments of the residuals to those from the normal distribution (EViews 9. User's guide). This test is a combined asymptotic test in which the statistic is calculated from the skewness and kurtosis of the residuals as follows.

JB= T/6 [S2 + ((β2-2)2)/4]……..(4.10)

Where T is the number of observation; S is the coefficient of skewness, β3 is a measure of kurtosis; and the test statistic is χ 2 distributed. The joint test is based on the null hypothesis that the residuals are normally distributed (i.e., S = 0 and β3= 3). Rejection of the null hypothesis at the standard critical values indicates non-normality of the residuals.

4.3.2.2 Error Vector Autocorrelation Test

The other diagnostic test for assessing the entire specification and robustness of the results of an econometric model is the test of serial correlation of the residuals. This study would be used the Breusch-Godfrey Lagrange Multiplier (LM) test, which was a multivariate test for residual serial correlation up to some specified lag order. The test statistic for the chosen lag order (L) is computed by performing an auxiliary regression of the residuals (εt) on the original variables and the lagged residuals (εt-L).

LM= (T-q) R^2ε^……(4.11)

Where q is the degrees of freedom and R2ε^ is the coefficient of determination obtained from the auxiliary regression, and the LM test statistic is χ 2 distributed. The LM tests the null hypothesis of no serial correlation against an alternative of auto correlated residuals.

4.3.2.3 Heteroskedacity Test

The diagnostic test in our study involved is the test of heteroskedasticity. White"s test is employed to assess the heteroskedasticity of the residuals. White's test is used to test the null hypothesis weather the residuals are homoskedastic or hertoskedasticty in nature. More over this tests identified proper specification. The test of regression is performed by regressing each cross-product of the residuals on the cross-products of the regressors and testing the joint significance of the regression.

4.3.3. Impulse Response Functions and Variance Decomposition

4.3.3.1. Impulse Response Functions

Impulse response examination is used to explore the connection between variables and evaluate corrections to long-run equilibrium. The deviations from the equilibrium are stationary. The impulse response function suggests over time the consequence on a variable of an exogenous shock to additional variable. The existence of a shock displays how quickly the system reappears to equilibrium. The response is measured in terms of the standard deviation.

Impulse-response functions offer information for investigating the dynamic behavior of a variable due to a random shock or innovation in other variables. The impulse response suggests the cross effect on present and forthcoming values of the endogenous variables of one standard deviation shock to the variables. The impulse response functions displayed the sign, magnitude, and presence of real and nominal shocks to the dependent variable. A shock to a variable in a VAR not only straightly touches that variable but also is diffused to all other endogenous variables in the system through the dynamic structure of the VAR.

Fundamentally, the impulse response traces how one variable, such as financial sector development, responds overtime to a shock in another variable (real GDP of the country) and associates this response to shocks from other variables. Impulse response only traces out the time path of the effects of shocks of other variables contained in the VAR model on a specific variable. Additionally, this method is intended to conclude how each variable responds over time to an earlier shock in that variable and to shocks in other variables (Shin et al., 2006).

4.3.3.2 Variance Decomposition

This approach measures the proportion of forecast-error variance in a variable that is explained by innovations themselves and the other variables. In other words, variance decompositions illustrate the portion (or relative importance) of variance in the prediction for each variable in the system that is attributable to its own innovations and to shocks to other variables in the system. Enders in Shan et al. (2006) proposed that the forecast-error variance decomposition permits inferences to be drawn concerning the proportion of the movements in a particular time-series due to its own earlier shocks vis-a–vis shocks arising from other variables in a VAR model. The technique breaks down the variance of the forecast error for each variance following a shock to a particular variable, and in this way, it identifies which variables are strongly affected and those that are not.

4.3.5 Granger Causality Test

The objective of causality test in multivariate time series analysis is to ascertain which variable causes (precedes) another variable. This procedure was suggested by Granger (1969) and improved by Sims

(1972). Assumed two variables X and Y, X is said to Granger cause of Y if lagged values of X forecast Y better. If lagged values of X forecast Y and, at the same time, lagged values of Y forecast X, then there is a bi-directional causality between X and Y. Over-all, a time series X is said to Granger-cause another time series Y if it can be portrayed that the series X values offer statistically significant evidence roughly the forthcoming values of series Y; if not, X does not Granger-cause Y (Vebeek, 2003).

According to Granger (1988), the presence of co integration among on X and Y must be assessed before accomplishment of a causality test. If a co integrating association is ascertained, then causality must occur in a minimum one direction. Causality can be unidirectional, that is, it can run only from X to Y; in this study, for instance, the co integration may be from financial intermediation to real GDP growth, or it may be from real GDP growth to financial intermediation. As suggested in the literature, there may be bi-directional causality, that is, all of the variables would be caused each other. In the two-variable case, X and Y, the notation would be (X⇔Y). When causality turns from one variable to the other and, in turn, runs from that other variable to the other, then response effects are said to persist. If the innovation to Y and innovation to X are interrelated, then it is said that there is direct causality. On the other way, there may be no causality at all; in this case, the variables are said to be independent.

CHAPTER FIVE: RESULTS AND DISCUSSION

5.1 Properties of time series data

In time series data, particularly in empirical work multi-co linearity diagnostic testing is an important step to check, whether the explanatory variables have provided the same information or not. When the explanatory variables are highly correlated (perfectly collinear) then data cannot inform the desired exactness. This means the movement in the dependent variable is due to the movements in one or the other explanatory variables. This implies that the point of approximation might vary roughly over subsamples and it is often the case that individual coefficients are insignificant, although the general fit might be high and the mutual importance of the coefficients is also high. However, the estimators can still be consistent and asymptotically normally distributed (Greene, 2003).

There are various methods detecting the consequences of multi co-linearity problems. This study used the correlation analysis methods to detect the problem of multi-co-linearity. If the independent variables of pair-wise correlation matrix values are nearer to one or more than 0.8 coefficient of the variable, this showed that a multi-co-linearity problem.

The study confirmed that explanatory variables of LGCF/ RGDP and CRPS/ RGDP have a multi- co-linearity problem. Because the coefficient of LGCF/ RGDP and CRPS/ RGDP are more than 0.8 that approached to one. See table 5. 1 below that satisfied the classical linear assumption.

Table 5.1. Correlation Matrix with multi co-linearity problem

	FSD	LEXPT	LGDS	LPOP	LGCF/ RGDP	CRPS/ RGDP	DUM
FSD	1.000	0.049	0.069	0.019	-0.113	0.112	0.092
LEXPT	0.049	1.000	0.685	0.652	0.910	0.805	0.542
LGDS	0.069	0.685	1.000	0.698	0.819	0.826	0.726
LPOP	0.019	0.652	0.698	1.000	0.869	0.631	0.680
LGCF/ RGDP	-0.113	0.910	0.819	0.869	1.000	0.735	0.596
CRPS/ RGDP	0.112	0.805	0.826	0.631	0.735	1.000	0.414
DUM	0.092	0.542	0.726	0.680	0.596	0.414	1.00

Source: Own computation Using Eview 9 based on UNCTAD.

Table 5.1. Shows that the Correlation matrix of the explanatory variables (FSD, LEXPT, LGDS, LPOP, LGCF/ RGDP, CRPS/ RGDP and DUM) are less than 0.8 and are less than one. But the result of LGCF/ RGDP and CRPS/ RGDP are approached to one (1) means LGCFRGDP and CRPS/ RGDP have perfect information with other variables, Hence this showed that, there is a multi co-linearity problem found between the explanatory variables. That means there is serial correlation among the variables. Then I should drop LGCF/ RGDP and CRPS/ RGDP variables and go to the next correlation test.

Table 5.2. Correlation Matrix without multi co-linearity problem or no serial correlation

	FSD	LEXPT	LGDS	LPOP	DUM
FSD	1.000	0.049	0.069	0.019	0.092
LEXPT	0.049	1.000	0.685	0.652	0.542
LGDS	0.069	0.685	1.000	0.698	0.726
LPOP	0.019	0.652	0.698	1.000	0.680
DUM	0.092	0.542	0.726	0.680	1.00

Source: Own computation Using Eview 9 based on UNCTAD.

Table 5.2 shows that the Correlation matrix of the explanatory variables (FSD, LEXPT, LGDS, LPOP and DUM) are less than 0.8 and are less than one. Hence this showed that, there is no multi co-linearity problem found between the explanatory variables. That means there is no serial correlation among the variables.

5.1.1 Unit roots testing

Unit root testing is an important step to test the non-statiaonarity of time series data. Spurious regression problem is the result of non-stationery time's series data. This leads to wrong conclusion and, it makes less forecasting power between variables. As we stated in the methodological section, official testing for statiaonarity and the order of integration of individual variable are mainly carried out by using various techniques (typically ADF and Phillips-Perron). The analysis of the ADF and PP techniques is done with different trend assumptions (only intercept, both trend and intercept). Executing the investigation by using these two options would be classified either only the intercept or both the trend and intercept were equally important. The unit root testing under ADF (Table 5.3) incorporated all variables at level, first differenced and second differenced in line with the test equation of intercept, trend and intercept. The test equations have shown that all variables were non stationery at level at 5 % and at 1st differenced at 10% critical values respectively.

Table 5.3: Augmented Dickey Fuller unit root testing.

Variable	Test Statistic Under Different Assumptions		Decision	Order of integration
	Intercept	Trend and intercept		
LRGDP	-0.240839(-2.936942)	-1.678721(-3.526609)	Accept	I(1)
DLRGDP	-2.329076(-2.936942)	-2.390239(-3.526609)	Accept	I(1)
DDLRGDP	-8.489395(-2.936942)**	-8.394062(-3.526609)**	Reject	I(0)
FSD	-6.211448(-2.931404)	--0.666004(-1.949097)	Accept	I(1)
DFSD	-9.287129(-2.935001)**	-9.146613(-3.523623)**	Reject	I(0)
LEXPT	0.084472(-2.931404)	-1.073045(-3.518090)	Accept	I(1)
DLEXPT	-5.681939(-2.933158)**	-5.655898(-3.520787)**	Reject	I(0)
LGDS	1.183705(-2.933158)	-1.952966(-3.518090)	Accept	I(1)
DLGDS	-8.282864(-2.933158)**	-8.789926(-3.520787)**	Reject	I(0)
LPOP	O.620365(-2.931404)	-2.313657(-3.518090)	Accept	I(1)
DLPOP	-6.192526(-2.933158)**	-6.221139(-3.520787)**	Reject	I(0)
DUM	-1.024128(-2.931404)	-1.947969(-3.518090)	Accept	I(1)
DDUM	-6.480741(-2.933158)**	-6.401086((-3.520787)**	Reject	I(0)

Source: authors Calculations based on eview9.

Note: D and DD shows variables are 1st & 2nd differenced respectively and L shows the variables are in log form. If the the t-stastics is greater than the 5 % critical level, we reject the null hypothesis otherwise we accept. Values in the parenthiss are (t-statistics at *, **, and ***) indicated at 1%, 5 % and 10% critical level respectively. The non statiaonarity of the variables were confirmed by the acceptance of the null hypothesis at 5% and 10% critical values at level and 1st differenced respectively. The financial sector development, export, gross domestic saving, and population were checked their statiaonarity under the test equations of intercept, trend and intercept. The variables have no unit roots at

1% critical level after transforming in to the 1st Differenced. Hence, this strengthened that the rejection of null hypothesis at one percent critical value. All the explanatory variables were stationery at 1st differenced under the test equation of intercept, trend and intercept at 1% critical values. By contrast, the real gross domestic product growth was stationery at 2nd differenced at 1% critical values. Finally, the ADF unit root test depicted that, all the variables under test equation of intercept, trend and intercept were stationery at 1 % and 5% critical values in 1st and 2nd differenced respectively. This displayed that the variables are integrated of order one, or I (1).

Table 5.4: Phillips Perron Unit Root testing

Variable	Test Statistic Under Different Assumptions		Decision	Order of integration
	Intercept	Trend and intercept		
LRGDP	0.197191(-2.931404)	-0.880811(-3.518090)	Accept	I(1)
DLRGDP	-3.667430(-2.933158)	-3.649950(-4.192337)	Accept	I(1)
DDLRGDP	-9.167103(-2.935001)**	-9.366386(-3.523623)**	Reject	I(0)
FSD	-6.212522(-2.931404)	-2.372776(-2.619851)	Accept	I(1)
DFSD	-23.15359(-2.933158)**	-24.82211(-3.520787)**	Reject	I(0)
LEXPT	0.109772(-2.931404)	-1.213335(-3.518090)	Accept	I(1)
DLEXPT	-5.637229(-2.933158)**	-5.597951(-3.520787)**	Reject	I(0)
LGDS	1.239183(-2.931404)	-1.952966(-3.518090)	Accept	I(1)
DLGDS	-8.282864(-2.933158)8**	-9.987149(-3.520787)**	Reject	I(0)
LPOP	0.617162(-2.931404)	-2.313657(-3.518090)	Accept	I(1)
DLPOP	-6.192209(-2.933158)**	-6.218680(-3.520787)**	Reject	I(0)
DUM	-1.024128(-2.931404)	-2.000553(-3.518090)	Accept	I(1)
DDUM	-6.480743(-2.933158)**	-6.401030(-3.520787)**	Reject	I(0)

Source: authors calculation based on eview 9

Note: D shows variables are 1st differenced and L shows the variables are in log form. If the t-statistics is greater than the 5 % critical level, we reject the null hypothesis otherwise we accept. Values in the parenthesis (t-statistics in *, **and***) are indicated at 1%, 5 % and 10% critical level respectively.

We have also conducted Phillips perron (PP) unit root test (table 5.4) using different test equation to check the stationerity of the variables. Under the test equatuion of intercept, trend and intercept, this test depicted that all variables have unit root at five percent critical value at level. This circumstance confirmed that the acceptance of null hypothesis . Beacuase of non stationerity case all the variables are transformed into 1st differenced.

All variables were stationery at 1st differenced under the test equation of intercept, trend and intercept at 1% and 5 % critical values respectively. Hence, the rejection of null hypothesis is confirmed. There for, the phillips Perron test told to us all variables is integrated at order one I or (1). Thus, both the Agumented Dickey Fuller and the Phillips perron test portrayed that the variables were integrated at order one I (1) and also told its stationerity after transformed into 1st and 2nd differenced respectively.

5.2 Econometric analysis

5.2.1 Cointegration test result and Vector error correction model

5.2.1.1 Cointegration test result

5.2.1.1.1 Information criteria for model selection

As an Information criterion for a model selection, we should select the model with smallest information criteria before we proceed to cointegration test. The information criterion has been widely used in times serious to determine the appropriate lag length. Lukephol (1991) presented a number of results regarding consistent lag order selection in the VAR model. There are various lag length criteria to select the lag order of VAR. We would prompt to specify maximum lag to test for. The table below were displayed various information criteria for all lags up to specified maximum.

This criterion were included LR (sequential modified LR test statistic), FPE (Final prediction error), AIC (Akaike information criteria), SIC Schwarz information criterion and HQ (Hannan-Quin information criterion). If there were no exogenous variables in the VAR, The lags start from 1; otherwise start from 0. Table (5.5) below indicated that lag one (1) is selected from each column criterion by asterisks “*” at 5% significance level.

Table 5.5. Optimal lag selection by selection criteria

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	-219.0242	NA	0.001415	10.46624	10.71199	10.55687
1	106.5230	545.1024*	2.04e-09*	-3.001071*	-1.280829*	-2.366699*
2	47.68849	33.58709	1.05e-06	0.356659	2.655353	1.193717
3	70.90184	28.30896	1.33e-06	0.443813	3.787368	1.661351

Source: Author's estimation based on Eview 9 software.

*Indicates lag order selection by the criterion.

5.2.1.1.2 Lag Exclusion Test

We have conducted Lag exclusion test to choose optimal number of lag for each variables in the VAR model. For each lag, Chi-Squared (Wald) test statistics for the joint significance of all variables is reported for each equation separately and jointly. The first lags of all variables were individually and jointly considered in the testing for co-integration and approximation of the VAR model analysis. Table 5.6 displayed that, the first lags of all of the endogenous variables were significant both separately and mutually. The lag exclusion test is recommended to choose the use of the first lags for all variables in the VAR model and it provides information to proceeds the succeeding step.

Table 5.6: VAR lag Exclusion Wald test

Lag	Equation						Joint
	LRGDP	FSD	LEXPT	LGDS	LPOP	DUM	
Lag1	2650.989	6.796564	737.4380	448.2478	48485.14	498.5255	464298.0
	[0.000000]	[0.340071]	[0.000000]	[0.000000]	[0.000000]	[0.000000]	[0.000000]
df	6	6	6	6	6	6	36

Chi-squared test statistics for lag exclusion: Numbers in [ ] are p-values

5.2.2 The Johansen Co-integration Test Result

We had been conducted the Augmented dickey fuller and Phillips Perron test to investigate the statiaonarity of the variables under different test equations. The variables of Financial sector development, Export, Gross domestic saving, Population and real GDP growth were stationary after transformed in to 1st and 2nd differenced respectively. Before proceeding into co integration test the variables must be non-stationery. The existence and the number of co-integrating relationship between variables were strengthened and evaluated by the trace statics and maximum Eigen value test. In addition into Johansen test, it is possible to use Engel Granger two step procedures for co integration test. But it has suffered from short coming as we compared to Johansen co integration test.

Table 5.7: co integration rank test

Test	Null hypothesis	Alternative hypothesis	Eigenvalue	Cointegration test statistics	Co integration Value(5%)
Trace Statistics	H0:r≤ 0	HA: r >0	0.794763	135.7477*	103.8473
	H0:r≤1	HA: r>1	0.500764	69.23704	76.97277
	H0:r≤2	HA: r>2	0.345732	40.06062	54.07904
	H0:r≤3	HA: r>3	0.258475	22.24262	35.19275
	H0:r≤4	HA: r>4	0.129866	9.682649	20.26184
	H0:r≤5	HA: r>5	0.087375	3.840092	9.164546
Maximum Eigen value	H0=0	HA: r=0	0.794763	66.51068*	40.95680
	H0=1	HA: r=1	0.500764	29.17642	34.80587
	H0=2	HA: r=2	0.345732	17.81799	28.58808
	H0=3	HA: r=3	0.258475	12.55997	22.29962
	H0=4	HA: r=4	0.129866	5.842557	15.89210
	H0=5	HA: r=5	0.087375	3.840092	9.164546

Source own: compilation based on eview 9 software; * denotes rejection of the hypothesis at the 0.05 level.

As a rough guide use case 2 if none of the series have appeared a trend (Eview 9 user guide II page 941). In addition to this guide, (Daldado, Jenkinson and Sosvilla-Rivero, 1990) also put forward a course of action which begins from assessment of the majority general model used by intercept and then replying a set of questions regarding the appropriateness of model and moving to the next model. Hence, case 2 is selected for making appropriate co-integrating equation among the variables. It should also be perceived that, the pre-tests and validations would confirm the reliability of the outcomes. Thus, see table 5.6 the co-integration test was assessed based on the number of co integration rank achieved from case2.

The outcomes, which were obtained from the Johansen method of co-integration rank test, might also be sensitive to the deterministic trend assumptions and the number of lags of the endogenous variables and exogenous to go through the VAR model. The result might be varying under Johansen co integration test due to deterministic trend assumption test specification. The decisions were made based on the assumption that specified. This study has chosen case 2 - intercept (no trend) in the co-integrating equation and no intercept the VAR method.

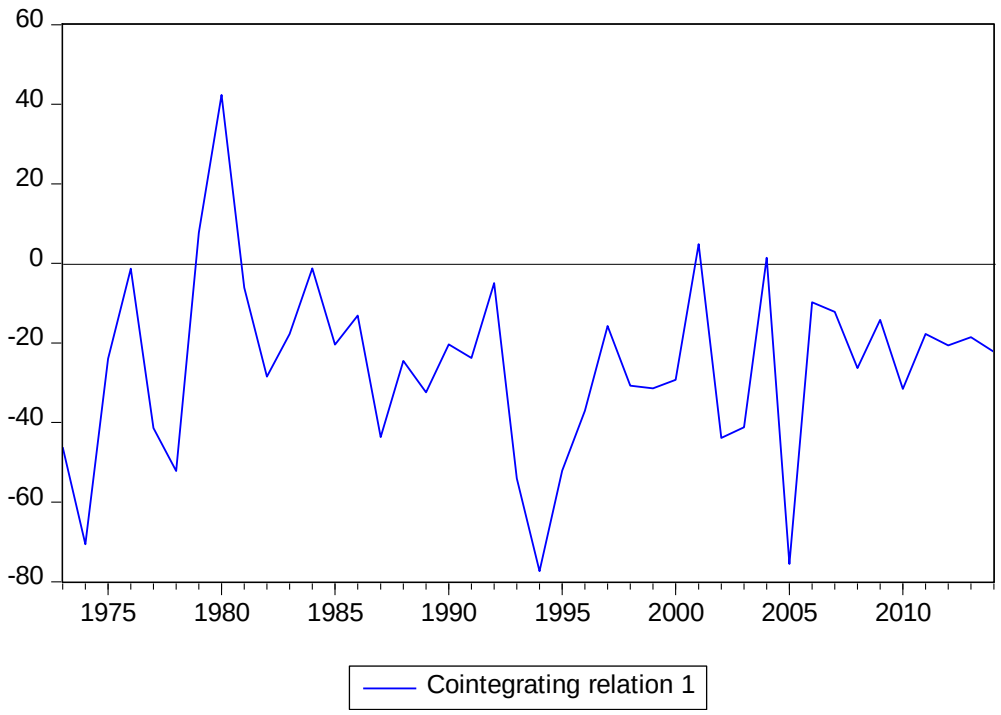
The above trace statistics and maximum Eigen value table have confirmed that, the existence of co integration relation or association ship in the long run at 5% critical values. Therefore, both the trace and maximum Eigen value statistics were strengthened that the rejection of null hypothesis at rank 0 therefore this leads us to accept alternative hypothesis of the presence of one co-integrating equation found from financial sector development, export, gross domestic saving, population growth and regime structural change to real GDP growth. The hypothesized number of co-integrating equations at rank 1, rank 2, rank 3, rank 4 and rank 5 both in the trace and maximum Eigen value statistics were also reported that the acceptance of null hypothesis at 5% critical value. These also further strengthened that; long run co-integrating relationships are existed between variables.

The probability value (in Appendix 2) are also confirmed the presence of long run co integration relationship between explanatory and dependent variables. The p-value of hypothesized co-integrating equation at rank zero in trace statistics is 0.07% which is less than 5%, therefore, this showed that the rejection of null hypothesis and the acceptance of alternative hypothesis of the presence of one co-integrating equation in the long run from independent to dependent variables. The hypothesized number of co-integrating equation in trace statistics (in appendix 2) the p- value at, rank 1, rank 2, rank 3, rank 4 and rank 5 are 16.8% , 46.7%, 57.9%, 67.0%, and 43.6% respectively, Which were more than 5% hence, this too confirmed and strengthened that the acceptance of null hypothesis. The maximum Eigen p-values (appendix-2) told us the existence of long run co-integrating relation runs from the exogenous to endogenous variables. This helps further to know the long run co-integrating relationship found from

financial sector development, export, gross domestic saving, population growth and regime structural change to real GDP.

In sum, both the trace and maximum Eigen test statistics and p-values have displayed that, the existence of one co-integrating equation in the long runs from financial sector development, export, gross domestic saving, population growth and regime structural change to real GDP growth. To emphasize more attention for co-integration test statistics values, we also added co integration relation graph in figure 5.2 below. The graph below has shown that a co-integration relationship is existed between the independent and dependent variables in the long run.

Figure 5.2 co integration relation graphs



Source: Author's estimation based on eview9 software

Model Stability Test

The instability of the VAR model and the outcome of the post-estimation diagnostics could disturb the reliability and soundness of the results of the impulse response functions and the remaining diagnostics. Therefore, we should confirm the verification of the VAR model stability prior we proceed to additional investigation.

The stability test (Appendix-3) of roots of characteristics polynomial of VEC is imposed 4 unit roots by signifying that the VECM model to be stable. Likewise, the stability result could also be visualized from the graph of the inverse roots of the AR characteristic polynomial in (Appendex18). The Inverse root of AR characteristic polynomial were portrayed that no point lies outside the circle.

To confirm stability, the Cusum test (appendix 16) also told us the stability line is found inside between the upper and lower 5% critical values lines. The test approved that, the VECM model lies inside between the upper and lower boundary lines and the model has probable one co-integrating equation in the system. This ratified the presence of one co integration relationship runs from financial sector development, export, gross domestic saving, population growth and regime structural change to real GDP growth. The outcomes and the test of Unrestricted VAR (VECM) model showed model stability condition.

5.2.3. Vector Error Correction Model (VECM)

We have conducted VAR model estimation and optimal lag selection based on the information criteria. By using this information criteria lag 1(one) is selected and it is an optimal lag order length. After optimal lag selection, we have been used the Johansen test of co-integration.

This co-integration test told us, one possible long run association ship runs from financial sector development, export, gross domestic saving, population growth and regime structural change to real GDP growth. Following, the conformation of long run co-integration relationship between the independent and dependent variables, we have been developed Unrestricted VAR (VECM) and estimated the model consequently. However, the model has consisted two parts: these were the matrix of long-run co-integrating coefficients and the short-run coefficients.

Long-run Relationship

We have seen that, one co-integrating relationships by utilizing the Johansen co integration test. This study aims to examine the role of financial intermediaries on economic growth in Ethiopia. The equation is solved through Johansen test to approve the soundness of the selected equation to agree the rationality of choosing the above-listed equation by giving more weight. Hence, this long run RGDP model estimation is obtained from the normalized co integration equation and the coefficient were called long run coeffiecnt.

Table 5.8: Estimated Long-Run relationship based on VAR Model of LRGDP

Variable	Coefficient	Standard error	t-statistics
FSD	1.983735	0.20592	[9.63352273]
LEXPT	13.94978	8.27889	[1.684981924]
LGDS	11.86316	2.69652	[4.399433344]
LPOP	62.22303	25.7128	[2.419924318]
DUM	-32.59379	10.6334	[-3.065227491]
C	-733.3582	224.986	[-3.259572596]

Source: own computation based on eview9 software

Note: t-statistics and p-values are moves opposite direction; if t-statistics is more than 2 p-values is statistically significant.

The result of Table 5.8 indicates that all the variables entered in the regression model have expected signs for financial sector development, gross domestic saving, export and population growth, however an inverse sign for regime structural change regardless of their significant level. As described in the theoretical and empirical literature parts, financial sector development, gross domestic saving, export and population growth have positive relationship with real GDP growth of Ethiopia but export has no statistical significant effect on real GDP growth at 5% critical level. While the regime structural change has a negative effect on real GDP economic growth and statistical significant at 5% critical level. But export has no statistical significant effect at 5% critical level on real GDP growth of Ethiopia. By contrast at 5% critical level, financial sector development, gross domestic saving and population growth have positive statistical significant effect and export has a positive statistical insignificant effect at 5% critical level on real GDP growth in long run growth during the study period.

The long run estimated model presented as follow:-

CointEq = LRGDPt - (-733.3582 + 1.983735*FSDt + 13.94978*LEXPTt + 11.86316*LGDSt + 62.22303*LPOPt – 32.59379*DUM) =0 ……..……. 5.1

The above long-run equation showed the role of financial intermediaries on real GDP growth in Ethiopia. As we have specified earlier, the growth model is in a log-linear form, the coefficients can be interpreted as elasticity with respect to real GDP. Hence, the Long run economic growth of Ethiopia in the study period can be described by financial sector development, export, gross domestic saving, population growth and regime structural change.

The coefficient of financial sector development (FSD) is1.983735, this indicates that, in the long run, holding other things constant, a one percent change in financial sector development 1.983735 percent change is revealed in real GDP during the study period. It implies that a one percent increases in financial sector development one lagged period (in previous year), the current Real GDP growth can be increased by 1.98% and hence it has a positive significant effect on long run economic growth. Therefore, financial sector development is positively related with real GDP growth of Ethiopia.

This study finding is consistent with theory of economic growth which states that capital formation is the major determinates of economic growth (Keynesian growth theory and Solow growth theory). The study finding is also contrasted with the result of the Solow growth model which states that financial markets had only minor influence on the rate of investment in physical capital, and the changes in investment were viewed as having only minor effects on economic growth. Furthermore, this study's result is consistence with the empirical study of Levine (2003) which states that the sensitivity of investment to

internal funds is greater in countries with poorly developed financial system. Beck, Demirguc-Kunt and Maksimovic (2005) show that financial development weakens the impact of various barriers to firm growth and that small firm benefit the most from financial development.

However, this study is also consistent with previous study of (Roman, 2012) in Ethiopia which is examining as Private sector credit to real GDP (FSD) has a positive and significant relationship with real GDP in the long run. Because private sector credit to real GDP ratio is the components of financial sector development or financial intermediation development.

In a 1995 study, de Gregorio and Guidotti found the same positive relationship between long-run growth and financial development across countries, with respect to the mechanism for financial intermediation's effect on growth, de Gregorio and Guidotti concluded that the main channel is efficiency, rather than volume, of investment (1995).

De Gregorio and Guidotti's depiction of financial intermediation's effect on growth can be briefly summarized. As previously stated, financial intermediation is thought to increase growth either via the volume of savings (and hence investment) or via the efficiency-enhancing quality of that investment.

In a related study, (Bencivenga, 1991) stressed that through its reduction of liquidity risks, efficient financial intermediation stimulates savers to hold their wealth increasingly in productive assets, contributing to productive investment and growth. Levine (1997) followed the same line of thought, but stressed the importance of stock markets in stimulating the financing of investment in less liquid investment projects.

However, this study is also consistent with previous study of (Bruce & Bencivenga, 1991) Diamond and Dybvig (1983), Romer (1986), McKinnon (1973) and Shaw (1973), Roman (2012,) in Ethiopia. In my perception, there might be three possible reasons behind the mixed result. For the first case, an estimation methodology might be responsible for unexpected result. The second reason behind the insignificant result may be associated with the data inconsistency; hence to solve this problem, we took from two organizations; Minster of Finance and Economic Development (MoFED) (1971-2014), From IMF and World Bank (1971-2014) which cover 44 years. Third case might be measurement error encountered during data checking system. Therefore, these were the potential treat for unexpected result.

To summarize, empirical evidence on financial sector development and economic growth yield different result from one study to another. This is believed to be mainly due to the methodology employed, the development level of the countries under consideration or the financial intermediation development indicator used in the study.

The coefficients of Gross domestic Saving (GDS) is 11.86316 indicates that, in the long run, holding other things constant, a one percent change in Gross domestic Saving 11.86316 percent change is observed in real GDP during the study period.

The gross domestic saving is found to be positive and statistical significant at 5% critical level. This implies that a one percent increase in gross domestic saving at one lagged period, the current real GDP growth can be increased by 11.86% hence this denotes that, gross domestic saving has a positive statistical significant effect on real GDP growth in the long run. The long-run association of gross domestic saving and economic growth is found to be positive and statistical significant at 5% critical level. This implies that, gross domestic saving is a significant or determinant factor on real GDP growth in long run for the study period.

However, in economic theory, the concern of the growth outcome of gross domestic saving is highly debated in developing countries. Another criticism in Harrod- Domar growth model is that the model implies poor countries should borrow to finance investment in capital to trigger economic growth; however, history has shown that this often causes repayment problems later.

Furthermore, this study's result is inconsistence with the empirical studies of (Roman, 2012) which is examining as domestic saving has a negative effect on real GDP economic growth of Ethiopia in the long run. However, the study of Roman (2012) concluded that, domestic saving has a negative and insignificant effect on real GDP economic growth of Ethiopia in the long run.

The coefficient of population growth for this study result is 62.22303, which indicates that, in the long run, holding other things constant, a one percent change in population growth leads to 62.22303 percent change is observed in real GDP during the study period. This implies that, the long run effect of population growth on economic growth is found to be positive and statistical significant at 5% critical level. This means that, one percent increase in population growth one lagged period, the real current GDP growth is increased by 62.22% hence this denotes that, population growth has a positive statistical significant effect on real GDP growth in the long run. The long-run association of population growth and economic growth is found to be positive and statistical significant at 5% critical level. This implies that, population growth is a significant or determinant factor on real GDP growth in long run for the study period.

The relationship between population and economic growth is robust and positive during the period of the analysis. This is a signal that the more the population magnitude the higher the potential work force and the broad the market dimension and the subsequent rise in total demand. Policies emphasized on population growth should therefore be amended to reaching a highly active labor participation and inclusive growth. Population growth in Ethiopia is not a problematic issue but its relation to the available

resources of the economy. Partners should therefore be stimulated to have a good-sized family. This way, the opposing effects of population growth on the economy could be reduced.

Furthermore, the volume of the current population could be encouraged. This could be done through the delivery of sufficient educational facilities, health facilities and other public facilities. Suitable educational facilities could improve the abilities and capability of the population which in turn could raise the production resulting in GDP growth.

This study is consistent with the previous studies of population and economic growth (Gideon Kiguru Thuku, Gachanja Paul and Obere Almadi, 2013; Fumitaka Furuoka, Ahlburg, 1996; Easterlin, 1967; Kelley and Schmidt 1996; Kuznets 1967; Simon, 1992; Thirlwall, 1972; Alebel, 2016).

The coefficients of export (EXPT) is 13.94978 indicates that, in the long run, holding other things constant, a one percent change in export leads to 13.94978 percent change is observed in real GDP during the study period.

The coefficient of export is positive but statistical insignificant at 5% critical level; this implies that an increase in export in one lagged period, the real current GDP growth is increased by 13.94% and it has no significant effect on the current real GDP growth. The long-run association of export and economic growth is found to be positive but it has no statistical significance at 5% critical level. This implies that, export is not a significant or determinant factor on real GDP growth in long run for the study period.

To generalize, export has no significant effects on real GDP growth in the long run, although positively related to the economic growth. This study is consistent with the previous studies conducted by (Nirodha, 2013) in Texas Tech University; (Nwakaire, 2013) in Nigeria and (Tewodros, 2015; Alebel, 2016) in Ethiopia.

Such results clearly show that the relationship between export and growth is not straightforward and that the growth effect of export is very difficult to capture empirically.

The coefficient of regime structural change (DUM) is -32.59379 indicates that, in the long run, holding other things constant, a one percent change in regime structural change leads to 32.59379 percent change is observed in real GDP during the study period.

The regime structural change is found to be negative and statistically significant at 5% critical level. This implies that a one percent increase in regime structural change at one lagged period, the current real GDP growth can be decreased by 32.59%, hence this denotes that, financial sector regime structural change in Ethiopia has a negative significant effect on real GDP growth in the long run, it implies that, it has an inverse relationship with real GDP growth towards in the long run.

Short run Relationship

Since there is co- integration between variables in the model, it can be specified as a VECM (table 5.9) and it showed the results of the LRGDP) equation in the error-correction model. By using this equation, the short-run causality of financial intermediaries on real GDP growth could be analyzed and investigated. The values of the variables one lagged period differenced in (table5.9) are interpreted as the short-run parameters that signify the short-run causality of financial intermediaries on real GDP growth.

In addition to this, we have conducted Wald coefficient diagnostic test to know the joint significance of the 1st differenced of all one period lagged variables. Hence, this test helps to examine the short run causal relationship from independent and dependent variables. Appendix 18 showed that, the joint short run causal relationship found from the 1st differenced of one period lagged financial sector development, export, gross domestic saving, population growth and regime structural change to real GDP growth. Consequently, there is distinct short run causal relationship found from the 1st differenced of one period lagged of financial sector development, export, gross domestic saving and population growth are statistical significant at 5% critical level but regime structural change is statistical insignificant at 10% critical level to real GDP growth.

The 2nd differenced of one period lagged of real GDP growth is found to be positive and significant at 5% critical level. This implies that, it has a positive significant effect on real GDP growth in the short run. In addition to this, the 1st differenced of one period lagged of export and population growth are positive and statistical significant at 5% critical level. And financial sector development has positive significant effect on real GDP growth at 10% critical level. But gross domestic saving has positive insignificant effect on real GDP at 5% critical level. This implies that export and population growth have a positive significant effect on real GDP growth in the short run. And financial sector development has a positive significant effect on real GDP growth in the short run. But gross domestic saving has a positive insignificant effect on real GDP growth in the short run.

The 1st differenced of one period lagged of export is found to be positive and significant. This implies that export is a significant factor for real GDP growth in the short run. Hence, this denotes that, export is significant factor on real GDP in the short run but it is not significant in the long run.

In short-run, financial sector development has found to be positive and statistically significant at 10% critical level, which means that, financial sector development has significant factor for real GDP growth in the short run. But gross domestic saving is found to be positive and statistically insignificant at 5% critical level, which means that, gross domestic saving is insignificant factor for real GDP growth in the short run. But population growth is found to be positive and statistically significant at 5% critical level, which means that, population growth is significant factor for real GDP growth in the short run. But

regime structural change has a positive insignificant effect on real GDP growth at 10% critical level in the short run.

Table 5.9: Short-Run dynamics ofΔ (ΔLRGDP) based on VECM

Error correction	Dependent variable: (LGDP)			
	Coefficient	Standard error	t-statistics	P-value
CointEq1	-0.092741	0.02040	-4.54612	0.0022
D(DLRGDP(-1)	0.393931	0.12719	3.09712	0.0038
D(FSD(-1))	0.000681	0.00104	0.65224	0.0518
D(LEXPT(-1))	0.242696	0.08091	2.99953	0.0050
D(LGDS(-1))	0.026136	0.02664	0.98108	0.3333
D(LPOP(-1))	3.582204	1.73858	2.06041	0.0469
DDUM	0.040086	0.06923	0.57901	0.5663

Source: authors computation based on eview9 software

The coefficient of the error correction term of the equation has hold the expected negative sign and it is significant at 5% critical level, indicating that it is error-correcting or it is the speed of adjustments towards the long run equilibrium. This warranties that while the real GDP may be in the short term deviates from its long-run equilibrium value, it would gradually come together to its equilibrium. The ECT (-1) -0.092741 shows that 9.27 percent of the deviation of the potential real GDP from its equilibrium value is removed each year; hence, the actual full adjustment would require a less than a year. This means that there may be structural flexibilities that assist the speed of adjustment towards the long run equilibrium.

5.2.3.4 Post- Diagnostics tests

We had been conducted different post diagnostics tests using residuals to develop appropriate model by considering all the classical linear assumptions. The diagnostic test results could also be used as indicators of the rationality of using impulse-response functions and variance decomposition investigations.

5.2.3.4.1 Residual Tests for Autocorrelations

The VEC residual portmanteau tests for autocorrelations (appendix 4) depicted that; no autocorrelation is observed from the first to the 11 lags. This implies that, the large p-values infer that, the chi-squared statistics at all lags are confirmed for the acceptance of the null hypothesis 5% critical Values. This means, no residual autocorrelations is observed from lag one up to lag ten at 5 % critical values. In addition to Portmanteau Tests, VEC Residual Serial correlation LM tests and the Breusch-Godfrey Serial Correlation LM test of (appendix 5 and Appendix 13) also showed that, the acceptance of null

hypothesis at 5% critical values. Because, the corresponding Probability of Chi-Square distribution at lag orders one was 30.00 and 41.40 % respectively which were more than five percent. Therefore, no autocorrelation /serial correlation problem is observed for the residuals in both cases during the study period.

5.2.3.4.2 Residual Normality Test

We had been conducted VEC residual normality test by using Cholesky (Lutkepohl) test. By using this test, all the joint component test of skewness, Kurtosis and Jarque-Bera values were 52.28%, 13.12% and 24.23 % respectively. VEC residual normality test result (appendix 6) revealed that, the residuals are normally distributed during the study period. Hence, the joint test confirmed that, the residuals were normally distributed throughout the study period. Moreover (appendix 12) the Jarque-Bera test, p-value is 70.29% percent more than 5% hence also confirmed that the acceptance of null hypothesis, which implies that residuals were normally distributed during the study period. Therefore, this study confirmed that, residuals were normally distributed throughout the study period for both cases.

5.2.3.4.3 Residual Heteroskedasticity Test

We have conducted residual hetroskedasticity test by counting only levels and square terms and cross terms. The results of (appendix 7 and 8) confirmed that the acceptance of the null hypothesis at 5% critical level, which means that residuals have no heteroskedasticity. Therefore, both only levels and square terms and cross terms joint p- values were 24.25 % and 18.27 % respectively. This also confirmed that, the residuals had no heteroscedasticity at 5 % critical level of lag order one. In addition to only level and square terms and cross terms, Appendix 14 also told us, residuals was not ARCH affected. Therefore, the residuals of the model are found to be constant mean or homoscedastic in nature.

Finally, by conducting all this diagnostics checking tests and procedures, we have investigated model appropriateness, which in turns that fulfills classical linear assumption. This implies that, no serial correlation, residuals were normally distributed, residual were homoscedasticity, and the VECM model was stable. So this, in line with the outcomes of the residual diagnostic tests, this study suggests that sound and strong predicted results.

5.2.5 Impulse Response function and variance decomposition

5.2.5.1 Impulse response function

Impulse response functions told us how the real GDP (dependent variables) responds in the VAR system when a shock is put in to the error term. This also identified as the interaction from the dependent to independent variables when we put one standard deviation in the model. For calculating impulse response function ordering of variables is an important. Many methods are given for ordering variables.

Hence, this study has chosen cholesky dof adjusted for the analysis and interpretation of the response of dependent variables.

5.2.5.1.1 Impulse Response of LRGDP

Table (5.10) presents the results of the IRF. In response to one standard deviation shock of LRGDP, LRGDP itself increases by 0.091 in the first year and continues to grow in the long-run reaching 0.104 in 14th period. A one standard deviation disturbance originating from FSD produces a 0.014 increase in GDP in the first year. Its effect continues to grow as the forecast horizon is extended and reaches 0.060 at the 14th year. FSD has a permanent effect on real GDP. However its effect does not die out, rather it continues to grow and reaches 0.060 at the 14th year.

Table 5.10. Impulse Response of LRGDP

Response of LRGDP:					
Period	LRGDP	FSD	LEXPT	LGDS	LPOP
1	0.091140	0.014000	0.012000	0.012000	0.013000
2	0.135493	0.017427	0.041447	0.021258	0.023356
3	0.143698	0.022603	0.064530	0.052947	0.038552
4	0.135772	0.028548	0.059897	0.062116	0.040409
5	0.128023	0.030958	0.045251	0.056876	0.037905
6	0.123886	0.033517	0.030995	0.050728	0.035613
7	0.121618	0.036490	0.018900	0.045968	0.034374
8	0.119637	0.039706	0.007927	0.042580	0.337278
9	0.117368	0.043040	-0.003021	0.039546	0.033149
10	0.114848	0.046394	-0.014305	0.036377	0.032479
11	0.112230	0.049772	-0.025889	0.033030	0.031735
12	0.109586	0.053189	-0.037677	0.029578	0.030961
13	0.106925	0.056653	-0.049622	0.026075	0.030180
14	0.104237	0.060169	-0.061722	0.022533	0.029395

When we had been put one standard deviation shock in the response of financial sector development and population growth were negative to real GDP growth in the short- run and in the long- run which is consistent with the above findings. Whereas gross domestic saving and its own shock of real GDP have been positive response of real GDP in the short- run and in the long- run. But when we put one standard deviation in the error term, the response of export in the short run was positive on real GDP growth. But when we put one standard deviation in the error term, the response of export was negative on real GDP growth in the long- run. The interaction of real GDP for its own (appendix 19 row1 and column 1) in the short was positive. And this interaction for the long run, the response of real GDP for its own becomes positive.

5.2.5.1.2 Impulse Response of FSD

Table (5.11) presents the accumulated response of FSD. In response to one standard deviation shock of FSD, FSD itself increases by 8.22 in the first year and continues to grow in the long-run reaching 9.74 in 14th period. A one standard deviation disturbance originating from LRGDP produces a 2.25 decrease in

FSD in the first year. However its effect continues to grow and reaches -2.98 at the 14th year. Hence, LRGDP has a significant effect on FSD implying that economic growth has a long-run effect on financial sector development.

This study outcome has shown that, an inverse (negative) relationship between financial sector development and real GDP in the short run i.e. from year one to year fourteen). As seen from 1st column and 2nd row of Appendix 19, it is clear that the consequence of one standard deviation shock of financial sector development on real GDP was negative in the short run. Hence this tells us, financial sector development has an oscillation force in the short run.

Table 5.11. Impulse Response of FSD

Response of FSD:					
Period	LRGDP	FSD	LEXPT	LGDS	LPOP
1	-2.259346	8.226524	0.980453	0.004560	0.678456
2	-2.539915	8.561228	1.023091	-2.250694	0.557631
3	-3.083536	9.718084	0.825791	-0.103100	0.469893
4	-3.329128	9.450889	0.348459	-1.349955	0.132881
5	-3.260385	9.369403	0.363864	-1.282482	0.160748
6	-3.176703	9.366779	0.472605	-1.289926	0.144528
7	-3.132665	9.339988	0.605457	-1.237359	0.181539
8	-3.106384	9.314496	0.720889	-1.183238	0.191766
9	-3.091103	9.288826	0.817794	-1.151784	0.200030
10	-3.071996	9.258625	0.913035	-1.125273	0.204213
11	-3.050757	9.229805	1.010447	-1.098014	0.209962
12	-3.027914	9.200107	1.111049	-1.069450	0.216161
13	-3.004809	9.170409	1.213716	-1.039370	0.222956
14	-2.981561	9.740207	1.317844	-1.008842	0.229758

This effect is relatively rational for under developed economies where they have many new emerging financial intermediaries. Hence, these final effects are hindrance for them to compete with in the short run of those more advanced financial intermedieries.

When we had been put one standard deviation shock in the response of real GDP growth and gross domestic saving were negative to financial sector development in the short- run. But when we had been put one standard deviation shock in the response of real GDP growth and gross domestic saving were positive to financial sector development in the long- run which is consistent with the above findings. Whereas population growth and its own shock of financial sector development have been positive response of financial sector development in the short- run and in the long- run. But when we put one standard deviation in the error term, the response of export in the short run was positive on financial sector development. And also when we put one standard deviation in the error term, the response of export was positive on financial sector development in the long- run.

Appendix 19 row 2 and column 2 displayed that, the response of the financial sector development (own response), export and population growth have positive response to financial sector development both in

short and long run. By contrast, gross domestic saving and real GDP growth have negative response to financial sector development in the short run, but they have positive response to financial sector development in the long run. In addition to these, when we put one standard deviation in the error term, the response of gross domestic saving (own response), export and real GDP growth in the short -run and in the long- run was positive on gross domestic saving. Hence, if we put one standard deviation shock (Impulse) innovations then, the response of the endogenous variables are highly significant.

5.2.5.2 Variance Decomposition

Appendix 20 has shown the full variance decomposition in real GDP from the first to 44 period's horizon in line with cholesky decomposition and none standard errors. Table 5.12 have shown, in the short in, i.e. period one, a shock or an innovation on real GDP (own shock) cloud be accounted 100 % in the fluctuations of real GDP. The consequence displayed that, all the fluctuations in real GDP was clarified by the lagged value of the variable itself in the 1st period. However in the 2nd period, in the short run, financial sector development could be accounted 1.02 % in the fluctuation of real GDP. In the 3rd period, in the short run, a shock on financial sector development, a shock on export, a shock on gross domestic saving and a shock on population growth could be accounted 1.37%, 9.91%, 5.48% and 3.42% respectively in the variation of real GDP.

Table 5.12. Variance Decomposition

Period	S.E.	D(LRGDP)	FSD	LEXPT	LGDS	LPOP
1	0.091140	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.172290	89.82969	1.023061	5.787171	1.522404	1.837675
3	0.243511	79.79072	1.373692	9.919394	5.489776	3.426422
4	0.296016	75.03293	1.859671	10.80685	8.118311	4.182198
5	0.334206	73.53891	2.317010	10.31146	9.265197	4.567417
6	0.364646	73.31594	2.791173	9.384201	9.718151	4.790532
7	0.390821	73.50792	3.301575	8.403168	9.843425	4.943911
8	0.414300	73.75132	3.856501	7.514337	9.815660	5.062186
9	0.435825	73.89825	4.460201	6.795202	9.693358	5.152991
10	0.455926	73.87110	5.111059	6.307669	9.494056	5.216119
11	0.475089	73.61240	5.804593	6.106031	9.226972	5.250003
12	0.493762	73.07581	6.534251	6.235191	8.901138	5.253615
13	0.512344	72.22664	7.291587	6.729147	8.526184	5.226437
14	0.531191	71.04309	8.066427	7.610241	8.011852	5.168387

Source author's calculation based eview 9 soft ware

By contrast , in the long run (in period 14) a shock on real GDP, a shock on financial sector development, a shock on export, a shock on gross domestic saving and a shock on population growth could be accounted 71.04%, 8.06%, 7.61%, 8.01% and 5.16% respectively in the fluctuation of real GDP.

Finally (Appendix 20) , in the long run , after 44 years , a shock on real GDP (own shock) , a shock on financial sector development, a shock on export, a shock on gross domestic saving, and a shock on population growth could be contributed to 8.19%, 13.53 % ,74.60 % , 3.05 and 0.60 % respectively in the fluctuation of real GDP. In the long run, a shock on financial sector development could be significantly accounted for variation of real GDP growth

In summary (table 5.12) in period 2, in the short run, a shock on real GDP and on financial sector development could be contributed by 89.82% and 1.02 % respectively in the fluctuation of real GDP. Appendix 20 in the long run, also a shock on real GDP (own shock), and a shock on financial sector development were contributed 8.20%, and 13.53% respectively in the fluctuation of real GDP. Hence this study was investigated that the effect of a shock on real GDP and on financial sector development in the fluctuation of real GDP were highly significant and more substantial. The estimated results from variance decomposition demonstrate the finance-led growth hypothesis is valid. Hence, financial sector development shock is the most important source of shock to real GDP growth.

5.2.6 Granger Causality/Block ExogeneityTest

We had conducted VAR Granger causality /Block Exogeneity test in order to check the joint significance of the variables found from the independent to the dependent variables developed by Granger causality test. Table 5.13 showed that, the joint significance of the variables found from explanatory variables of, financial sector development, export, gross domestic saving and population growth to the regressed Real GDP at 5% critical level. This confirmed the rejection of null hypothesis and the acceptance of alternative hypothesis. Similarly, table 5.13 identified distinct causal relationship found from financial sector development, export, gross domestic saving and population growth to Real GDP at 5% critical level. Table 5.13 also showed that, no separate significance found from population growth to gross domestic saving. By the same taken, no joint and separate significance were found from financial sector development, export, gross domestic saving and real GDP to population growth. In addition to this, there was no distinct causal relationship runs from financial sector development to export. By contrast, there were distinct causal relationships found from real GDP growth, gross domestic saving and population growth to export at 5 % critical level.

Table 5.13 showed that, there were joint causal relationships found from real GDP growth, export, gross domestic saving and population growth to financial sector development at 5% critical level. By the same

token, there were separate and joint causal relationships found from export and gross domestic saving to financial sector development at 5% critical level. By contrast, there were no distinct causal relationships found from real GDP growth and population growth to financial sector development at 5 % critical level.

Table 5.13 Granger Causality/Block ExogeneityTest

Equation Excluded	RGDP	FSD	LEXPT	LGDS	LPOP	Joint (all)
RGDP		0.425420 (0.0451)	8.997177 (0.0027)	0.962522 (0.0266)	4.245310 (0.0394)	18.39297 (0.0010)
FSD	0.499256 (0.4798)		0.197039 (0.0165)	0.283065 (0.0257)	0.119692 (0.7294)	2.259308 (0.0068)
LEXPT	2.148246 (0.0142)	0.003126 (0.9554)		8.423313 (0.0037)	7.460229 (0.0063)	19.37494 (0.0007)
LGDS	0.109742 (0.0074)	0.717285 (0.0039)	0.719634 (0.0396)		0.821522 (0.3647)	2.672705 (0.0064)
LPOP	0.741887 (0.3891)	2.606885 (0.1064)	1.979700 (0.1594)	0.660851 (0.4163)		4.517613 (0.3405)

NB: the values in the parenthesis show the p-values for the corresponding chi-square statistics.

Moreover, the distinct causal relationships found from real GDP, financial sector development and export to gross domestic saving at 5% critical level. Furthermore, table 5.13 portrayed that, mutual causal relationships found from gross domestic saving to financial sector development at 5 % critical level. No separate causal relationships were found from real GDP growth and population growth to financial sector development. This study investigation is suggested that the lagged values of the variables have an important role in describing the present and forth coming values of few additional variables. Hence, the outcome happens in joint and individual significance that runs from the independent to dependent variables. Therefore, because of the vibrant interaction between the variables, it might not be effective to study economic growth (real GDP) in Ethiopia as only endogenous and the other variables as exogenous. This tried to approve the acceptance of the use VAR model and the Johansen Procedures, as contrasting to the single-equation method of Engel and Granger.

CHAPTER SIX: SUMMARY, CONCLUSTION AND POLICY IMPLICATION (RECOMMENDATIONS)

6.1 Summary and Conclusion

In the context of the analysis of the linkages between saving, investment, economic growth and financial sector development undertaken in this paper two interesting questions emerge. The first is whether the growth resurgence in Ethiopia is evidence of saving-led growth or finance-led growth and whether it is sustainable.

The second question then is what it takes to translate rising domestic savings into rising economic growth. The issue is not solely a matter of efficiency of financial intermediation. It also has to do with the nature and source of the rise in domestic saving. In the case of Ethiopia, the rise in domestic savings accrues primarily in the public sector through saving and selling bonds. The question is why rising public savings do not systematically translate into rising economic growth. One possibility is that governments have not used these savings to increase economic growth. Another is that these savings have little spillover effects on domestic financial intermediation, in the sense that they do not stimulate domestic financial intermediaries development of long-term lending instruments. The question of composition of domestic saving has not received much attention in the literature, which has focused on aggregate domestic savings. Yet, understanding the drivers of private and public domestic saving, and the linkages between the two and economic growth is essential for designing appropriate policies for stimulating sustainable growth. Research aimed at shedding light on these issues would add much value to the policy debate.

In the theoretical and empirical literature section, we have discussed the role of financial intermediaries in economic growth intensively. Most theoretical literature in classical and endogenous growth model pays more attention for the role of financial intermediaries in economic growth. In addition to this the empirical literature also showed mixed result between financial sector development and economic growth.

The role of financial intermediaries in economic growth of Ethiopia is presented in this paper by using the time series techniques. The role of financial intermediaries in economic growth is evaluated using real GDP growth as a dependent variable whereas the rest are considered as independent variables and financial sector development is measured by M2/ RGDP (broad money supply as a share of real GDP). The role was to study the role of financial intermediaries in economic growth that provides clear understanding for the status of economic growth in country. Accordingly, this paper examines the role of financial intermediaries in economic growth in Ethiopia over the 1971- 2014 periods. We used the VAR

and VECM approach to determine the long-run and short-run relationship between financial sector development and economic growth.

Together with real GDP growth and financial sector development, we have also used gross domestic saving, export, population growth and regime structural change to capture their effects on economic growth. All these variables are modeled in Vector Autoregressive (VAR) framework.

The Augmented Dickey Fuller (ADF) and Phillips Perron unit root test told us the presence of unit root for all variables under the test equation of intercept, intercept and trend at 5% and 10 % respectively, by offering that, these variables have unit root at level and first differenced. The non-stationary characteristic of variables leads to use Johansen-Juselius cointegration test. The trace and maximal eigenvalue test statistic showed the presence of co-integrating vectors in the long run.

The investigation of VAR was, to evaluate long run relationship between variables. The long run model tells that; financial sector development, gross domestic saving and population growth have positive significant effect on real GDP growth in the long run at 5% critical level. Similarly export has a positive significant effect on real GDP growth in the short run at 5% critical level. But regime structural change has a negative significant effect on real GDP growth in the long run at 5% critical level.

The regression result confirms financial sector development is statistically significant on real GDP growth which means it is a significant factor for the role of financial intermediaries in real GDP growth in Ethiopia. However the analysis of Granger causality test results shows that financial sector development does cause real GDP growth, but real GDP growth does not cause financial sector development. Hence, the unidirectional causality test from financial sector development to real GDP growth is consistent with endogenous finance – growth lead nexus theory. Based on the empirical analysis, it is observed that the financial sector development has a long-run effect on the economic growth of Ethiopia. Since gross domestic saving has an insignificant effect on economic growth of Ethiopia in the short-run, policy makers should focus on long-run policies such as improving the financial markets and promoting behavioral gross domestic saving by expanding branches of modern financial intermediaries more focusing on the rural areas and encourage the private financial intermediary's branch expansion. In the long-run, this policy will have a significant effect on economic growth.

The findings of the study confirm the existence of the long run relationship between financial intermediation and economic growth. It reveals the presence of long run relationship between financial sector developments to real GDP. Financial sector development has far more positive effect on economic growth, but other variable, regime structural change proposed in this study gave contradictory results in line with the policy structural change and growth theory.

According to the result, export is not significant factors on economic growth in the long run. However, they are positively related to the economic growth. Such result clearly shows that the relationship between export and growth is not straightforward and that the growth effect of export (trade) is very difficult to capture empirically. In my perception, there might be three possible reasons behind the mixed result. For the first case, an estimation methodology and equation specification might be responsible for insignificant result. The second reason behind the insignificant result may be associated with the data inconsistency. Third case might be measurement error encountered during data checking system.

In general, finance-growth nexus, financial intermediation is strong for the data set of this study. A strong relationship between financial intermediation and economic growth reflects the efficiency in financial intermediation in the economic growth. In particular, financial sectors (commercial banks) as a leading financial intermediary in Ethiopia allocate significant amount of funds to the public sector (Alemayehu, 2006).

The existence of cointegration vectors also leads to inclusion of VECM framework. The error correction term is negative and less than unity and statistically much significant at 1% critical level, this is denoting that the system returns 9.2% (percent) to its long run equilibrium. Results of short run dynamics are quite in cycle with the relationships rendered by the long run effects.

Export and population growth are positive and statistical significant at 5% critical level in the short run. This implies that export and population growth have a positive significant effect on real GDP growth in the short run. And financial sector development is positive and statistical significant at 10% critical level in the short run. This implies that financial sector development has a positive significant effect on real GDP growth in the short run. But gross domestic saving is positive and statistical insignificant at 5% critical level in the short run. Therefore, gross domestic saving has no significant effect on real GDP growth in the short run. Whereas regime structural change has a positive insignificant effect on real GDP growth in the short runs at 10 % critical value, nevertheless, regime structural change has no significant effect on real GDP growth in the short run.

I had conducted residual normality test, serial correlation Lagrange multiplier (LM) test and hetrosekasticity post diagnostic test to check whether the residuals mean, variance and covariance are constant through time and distance or not. The post diagnostic test revealed that residuals are normally distributed, residuals have no serial correlation and residuals are homoscedastic in nature. Moreover, the cusum and inverse roots of AR characteristics polynomial test shows us model stability at five percent critical level. The Wald coefficient diagnostic test have showed that, the existence of joint significant found from financial sector development, export, gross domestic saving and population growth and with real GDP growth at 5% critical level.

The relationship between financial intermediation and economic growth is explained in a temporal Granger-causal framework. This is accomplished by examining the dynamic relationships among the five variables in a multivariate system. The empirical results indicate the existence of a long-run relationship among the five variables in both Models. The employed tests show that there exists Granger causality in at least one direction. Further, in the short- run, there is causality between financial intermediation and economic growth. But there is no causality between gross domestic saving and economic growth in the short run. In the long- run, there is causality between gross domestic saving and economic growth. This indicates that economic growth is a long term phenomenon. Moreover, in the short- run, financial sector development and export granger caused to economic growth. But, in the long-term this is influenced by financial intermediation development, gross domestic saving and population growth.

The Granger causality test reveals that, joint significance or unidirectional causal relationships have found from financial sector development, export, gross domestic saving and population growth to real GDP growth at 5% critical level. This test also confirmed that, financial sector development, export, gross domestic saving and population growth has a distinct causal relationship with real GDP growth. By contrast, no distinct causal relationship found from real GDP growth and population growth to financial sector development.

Furthermore, the granger causality test is employed to find the direction of causality. In VAR Granger Causality test, there is no bidirectional causality found from real GDP growth to financial sector development, rather it has unidirectional causal relationship found from financial sector development to real GDP growth.

Using the financial sector development indicator FSD, the empirical result shows uni-directional causality from financial sector development to economic growth. This implies that past values of the financial intermediation of Ethiopia are useful when we forecast the economic growth of Ethiopia. This finding is inconsistent with (Patrick, 1966; Robinson 1952) of Demand-following hypothesis which postulates a causal relationship from economic growth to financial sector development.

But this finding is consistent with (Schumpeter, 1911; McKinnon, 1973; Fry, 1980; Levine R. , 2003) and (Roman, 2012) in Ethiopia of Supply-Leading hypothesis which postulates a causal relationship from financial sector development to economic growth. That is, as the financial sector development first expands the economic growth second follows. Further, a finding of the study reveals that financial intermediation promotes economic growth mainly through the productivity growth improvement.

The impulse response function analysis says that, the fluctuation in real GDP growth in the country is described by a shocks, in real GDP (own shock), financial sector development, export, gross domestic saving and population growth. Moreover, the fluctuation in financial sector development can be

described by a shocks, in financial sector development (own shock), export, gross domestic saving, real GDP growth and population growth. The impulse response of real GDP growth has a positive response with gross domestic saving and real GDP (own shock) in the long run, whereas, negative response for financial sector development, export and population growth to the long run time path. Similarly, the impulse response of financial sector development has positive response with real GDP growth, gross domestic saving, export, population growth and financial sector development (own shock) in the long-run. However, it is negative response with real GDP growth and gross domestic saving in the short- run.

Variance Decomposition on real GDP growth could be explained by the fluctuation in financial sector development, export, gross domestic saving and population growth and own fluctuation gross domestic saving and real GDP own shock. The effect of a shock on real GDP, financial sector development and export on real GDP are highly significant and more substantial. The estimated results from variance decomposition demonstrate that the finance -led growth policy system should prevail in the country. Finally, financial sector development shock, export shock and own real GDP shock have a significant source of shock to real GDP growth in Ethiopia during the study period.

6.2 Policy Implication (Recommendations)

The following policy recommendations emerge from the analysis of the thesis. The measures to be taken can be classified into two policy areas these are macroeconomic policy and financial intermediation measures. First, implementing financial intermediation development strategies could be an efficient means to increase the gross domestic saving rate and the economic growth rate of Ethiopia. That is, financial intermediation with a vibrant banking sector that supports both public and private sector of the economy are a key for improving the gross domestic saving rate and economic growth rate of the country. Therefore, more competition on the financial intermediaries could increase saving products through innovation.

From the viewpoint of the development policy, our finding of a bi-directional relationship between savings and growth is important. Saving is not an end itself. It is only a means to achieve high economic growth and improved standards of living. Policies focusing on increasing the saving rates need to be followed, which can lead to higher economic growth rates. Both will, in turn, reinforce the higher saving rate. The magnitude of the effect of saving rate on economic growth is found to be substantially higher than the one of economic growth on saving rate and hence policies to promote savings are very important for promoting economic growth. Gross domestic saving has to be given high emphasis in order to boost economic growth. The country should strive to develop financial intermediaries such as (banks, insurance companies and microfinance) in order to improve to financial services and products, particularly in rural areas, where there may be few financial intermediaries. Furthermore, the country should improve access to banking and financial services.

In terms of policy implications, our findings suggest that the efficiency improvement of financial intermediation has great potential. Policy makers need to focus on long term economic policies on gross domestic saving and financial intermediation to enhance economic growth. Improve access to information to reduce information asymmetries and enhance the effectiveness and efficiency of financial intermediation. Increase domestic savings mobilization and the range of products. Raise public confidence in the sustainability, credibility and reliability of domestic savings and finance access. Banks should develop more pro-poor financial services.

Moreover, leaders of the economy need to create and implement favorable policies that would leads to differentiating the finance-led growth base. In addition, the government should maintain the various recent initiatives to increase gross domestic saving. The recent measures taken include schemes to increase household saving through improved financial intermediaries' accessibility.

REFERENCES

Abu. (2004). On the Determinants of Domestic Saving in Ethiopia. *Paper Prepared for the second international Conference on the economy.* Addis Ababa: Ethiopian Economics association.

Agrawal, P. (2000). *Savings, Investment and Growth in South Asia.* Mumbai: Mimeo.Indira Gandhi Institute of Development Research.

Agrawal, P. (2001). The Relation between Savings and Growth: Cointegration and Causality Evidence from Asia. *Appl. Econ*, 33:499- 513.

Agu, C. (1988). *Nigerian Banking Structure and Performance: the Banking System's contribution to Economic Development.* Nigeria: Africana-Fep publishers Ltd.

Alebel, A. (2016). *The relationship between trade openness and economic growth in Ethiopia.* Gondar: Gondar University.

Alemayehu, G. (2006). The Structure and Performance of Ethiopia's Financial Sector in the Pre- and Post-reform Period with a Special Focus on Banking. *Resaerch paper*, No-2006/112.

Andrew, O., Agbada, & suji, C. (2013). An Empirical Analysis of Trends in Financial Intermediation and Output in Nigeria. *Double Blind Peer Reviewed International Research Journal*, Volume 13 Issue 9 Version 1.0.

Aron, J. &. (2000). *Personal and Corporate Saving in South Africa.* Washington, DC: World Bank Economic Review, 14(3), 509-544.

Arrow, J. (1962). "The Economics Implications of Learning by Doing". *Review of Economic Studies*, 29.

Bencvena, V. (1991). Financial Intermediation and Endogenous Growth. *Review of Economic Studies*, 58,195-209.

Bacha, E. (1990). A Three–Gap Model of Foreign Transfers and the GDP vs Growth Rate in Developing Countries. *J. Dev. Econ*, 32(3):279-296.

Bagehot, W. (1873). *Lombard Street. Richard D. Irwin, Homewood, IL.* England: 1962 Edition.

Barro, J. R. (1997, 2003). "Determinants of Economic Growth: A Cross-Country Empirical Study",. *NBER Working Paper*, No. 5698.

Barro, R. (1991). Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics*, 106, 407-443.

Barro, R., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy* , 100, 223–51.

Barro, R., & Sala-i-Martin, X. (1995). *Economic Growth.New York.* New York:: McGraw-Hill.

Basu, K. (2016). *Global Economic Prospects.* 1818 H Street NW, Washington, DC 20433: International Bank for Reconstruction and Development / The World Bank.

Beck, T., Levine, R., & Loayza, N. (2000). Finance and Sources of Growth. *Journal of Financial Economics*, 58, 261-300.

Bencivenga, V. R. (1989). "Financial Intermediation and Endogenous Growth" (Manuscript).

Bencivenga, Valerie, & Smith, B. (1991). "Financial Intermediation and Endogenous Growth.". *Review of Economic Studies 58, no. 2*, 195-209.

Budha, B. (2012). A multivariate Analysis of Savings, Investment and Growth in Nepal. *MPRA Paper*, No. 43346.Available online at http://mpra.ub.uni-muenchen.de/43346.[accessed on 25th June 2015].

Buffie, E. F. (1984). "Financial Repression, the New Structuralists, and Stabilization Policy in Semi-Industrialized Economies". *Journal of Development Economics*, 14, 305- 22.

Cameron, R. (1967). *Banking in the Early Stages of Industrialization.* New York: Oxford University Press.

Cardenas, M., & Escobar, A. (1998). Saving determinants in Colombia: 1925 & 1994. *Journal of Development Economics*, Vol. 57, pp. 5-44.

Dar Atul, A., & AmirKhalkhali, S. (2002). Government Size, Factor Accumulation and Economic Growth: Evidence fromOECD Countries. *Journal of Policy Modeling*, 24(7/8): 679 - 692.

De Gregorio, J., & Guidotti, P. (2004). "Financial Development and Economic Growth". *World Development 23*, 433-438.

Deaton, A. S., & Paxson, C. H. (1993). Saving, Growth, and Aging in Taiwan. *NBER Working Paper*, No. 4330.

Dfid. (2004). *The Importance of Financial Sector Development for Growth and Poverty reduction.* UK.

Diamond, D. a. (1983). "Bank Runs, Deposit Insurance, and Liquidity". *Journal of Political Economy*, 85, 191-206.

Diaz - Alejandro, C. (1985). "Good-bye Financial Repression, Hello Financial Crash". *Journal of Development Economics*, 19, 1- 24.

Dimitrios, A., & Stephen, G. (2007). Aplied Econometrics modern Apporach. Dimitrios Asteriou and Stephen G. Hall 2006, 2007.

Domar, E. (1946). Capital expansion, rate of growth and employment. *Economic Review*, Vol.14, pp. 137-147.

Domar, E. (1957). *Essays in the theory of Economic Growth.* New York: Oxford University Press.

Dr. Mohamed, J. (2009). *The role of financial markets in economic growth.* Sierra Leone: Sierra Leone stock exchange C/O Bank of Sierra Leone.

Dutkowsky, & Donald, H. (2012). *"The Banking Firm." Lecture Notes for "Money and Banking" course.* Syracuse University.

EEA. (2008). *“Development, Prospects And Challenges of The Energy Sector In Ethiopia”,Report on the Ethiopian Economy (2007/08).* Addis Ababa: Ethiopian Economics Association.

Elbadawi, I. .., & Mwega, F. M. (2012). *Can Africa's Saving Collapse Be Reversed?* Washington, DC: World Bank Economic Review, 14(2), 415-443.

Engle, & Granger. (1987). Cointegration and error corection repesentations,estimations and testing. econometrica volume 55. 251-276.

Fry. M. (1980). Domestic saving and international capital flows. *The Economic Journal*, 90(358), 314-329.

Fantu, B. (2016). *Ethiopia's great run the growth accelerated and how to pace it.* Washington D.C: World Bank Group.

Fei, J. C., & Ranis. (1964). *Development of the Labor Surplus Economy:Theory and Policy.* Homewood, IL: Irwin.

Feyen, L. R. (2012). *Benchmarking Financial Systems around the World.* Washington, D.C: The World Bank.

Fry, M. (1980). Saving, Investment, Growth and the Cost of Financial Repression. *World Development*, 8(1), 317-327.

Galetovic, A., & Fernandez., D. (1994). *"Schumpeter Might Be Right-But Why? Explaining the Relation between Finance, Development, and Growth.".* SAIS: Johns Hopkins University .

Gertler, Mark, & Rose, A. (1991). *Finance, Growth, and Public Policy.* Washington, D.C: World Bank Policy Research Working Paper 814.

Goldsmith, R. (1969). *Financial Structure and Development.* New Haven: CT: Yale University Press.

Greenwood. (1990). "Financial Development, Growth, and the Distribution of Income.". *The Journal of Political Economy 98, no. 5*, 1076-1107.

Gregorio, d., Jose, & Guidotti., P. E. (1995). "Financial Development and Economic Growth.". *World Development 23, no. 3*, 433-448.

Gujarati. (2004). *Basic Econometrics, Fourth Edition.*

Hailay, T. K. (2013). Financial Development and Economic Growth Nexus: Evidence from Ethiopia (Johnson Approach to Co-Integration). *International Journal of Science and Research (IJSR) (Adigrat University Department of Economics)*, ISSN (Online): 2319-7064, Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438.

Haile Kibret, F., & Kassahun, A. (2011). Linkage between Financial market Development and Economic Growth in Ethiopia. *Paper Presented at the 9th International Conference of EEA/EEPRI*.

Hamilton, A. (1781). *Quoted from Hammond, 1991. Banks and Politics in America: From the Revolution to the Civil War.* Princeton, NJ, p. 36: Princeton University Press.

Harrod, R. (1939). An Essay in Dynamic Theory. *Econ. J*, 49:14-33.

Harrod, R. (1948). *Towards a Dynamic Economics.* London: Macmmilan.

Harrod, R. F. (1948). *towards a dynamic economics.* London: Macmillan.

Heer, B., & Suessmuth, B. (2006). The Savings-Inflation Puzzle. *Cesifo Working Paper*, No. 1645.

Hundie, S. (2014). Savings, Investment and Economic Growth in Ethiopia: Evidence from ARDL Approach to Cointegration and TYDL Granger Causality Tests. *J. Econ. Int. Financ*, 6(10):232-248.

IMF . (2010). *Regional economic outlook: sub-Saharan Africa, back to high growth?* Washington: World Economic and Financial Surveys.

IMF. (2012). *Statistics on the Growth of the Global Gross Domestic Product (GDP) from 2003 to 2013.* Washington, D.C: IMF.

IMF. (2013). "The Federal Democratic Republic of Ethiopia: Selected Issues". *IMF Country Report*, no. 13/309.

IMF. (2016). *World Economic and Financial surveys.* Washington, D.C: Regional economic outlook. Sub-Saharan Africa.

IMF. (2016). National Savings- Ethiopia. *World Economic Outlook*.

IMF. (2016). Sub-Saharan African countries Development Strategies. *The role of Bretton woods institutions*, 152-154.

Jangili, R. (2011). Causal Relationship between Saving, Investment and Economic Growth for India. What does the Relation Imply? *Reserve Bank of India Occasional Papers*, 32(1):25-39.

Japelli T, P. M. (1994). Saving, Growth and Liquidity Constraints. *Quart. J. Econ*, 109(1):83-109.

Jappelli, Tulio, & Pagano, M. (1993). "Savings, Growth, and Liquidity Constraints.". *Quarterly Journal of Economics 108*, 93-109.

Jayaratne, Jith, & Strahan, P. E. (August 1996). "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation.". *Quarterly Journal of Economics 111, no. 3*, 639-670.

Kalebe, K. (2015). The Egg or the chicken first? Saving-Growth Nexus in Lesotho. *Int. J Recent Res. in Commer., Econ. Manag.*, 2(1):56-60.

Kalecki, M. (1971). *Selected Essays on the Dynamics of the Capitalist Economy, 1933- 1970.* New York: Cambridge University Press.

Keatinge, T. (2014). *The Role of Public and Private Sector Banking in Ethiopia's Future Economic Growth.* Global Center on Cooperative Security Policy Brief.

Keynes, J. (1936). *The General Theory of Empolyment, Interest, and Money* . London: Macmillan.

Keynes, J. M. (1973). *Macmillan.* London: The Collected Writings of John Maynard Keynes.

Kiyota, ,. K., Peitsch, B., & Stern, R. (2007). *Research Seminar in International Economics: The Case of Financial Sector Liberalization in Ethiopia.* Ann Arbor, Michigan Discussion Paper No. 565: University of Michigan.

Krieckhaus, J. (2002). Reconceptualizing the Developmental State: Public Savings and Economic Growth . *World Development*, Vol. 30, No. 10, pp. 1697-1712.

Léonce, N. (2014). *Savings, Capital Flight, and African Development.* University of Massachusetts, Amherst: Political economy research institute.

Levine, R. &., & Renelt, D. (1992). A sensitivity analysis of cross-country growth regressions. *American Economic Review*, 82(4), 942-963.

Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature*, 35, 688-726.

Levine, R. (1999). *"Law, Finance, and Economic Growth", Journal of Financial Intermediation Vol.8, pp. 36-67.*

Levine, R. (2001). International Financial Liberalization and economic Growth. *Review of International Economics*, 9(4), 688-702.

Levine, R. (2003). *Finance and Growth: Theory and Evidence. Handbook of Economic Growth.*

Levine, R. (2005). *Finance And Growth: Theory And Evidence.*

Levine, R. S. (1998). Stock Markets, Banks, and Economic Growth. *American Economic Review*, 88: 537-558.

Levine, Ross, & King, R. G. (1993). "Finance and Growth: Schumpeter Might Be Right.". *Quarterly Journal of Economics (MIT) 108*, 717-737.

Lewis, A. W. (1954). In A. W. Lewis, *Economic development with unlimited supplies of labor.* (pp. 22, 141-145.). The Manchester School.

Lewis, W. (1955). *The Theory of Economic Growth.* Irwin.

Lewis, W. A. (1954). "Economics development with unlimited supplies of labour.". *"Economics development with unlimited supplies of labour."*, 22 139-91.

Leyla, Y., & Aytan, M. (2015). *Financial intermediation and economic growth.* At the University of Michigan: William Davidson Institute.

Lira, P. (2015). *Savings, investment and economic growth in Lesotho: An empirical analysis.* Lesotho: Department of Economics, National University of Lesotho.

Loayza, N., Schmidt-Hebbel, K., & Servén, L. (2000). Saving in Developing Countries: An Overview. *World Bank Economic Review*, 14(3), 393-414.

Lucas, R. (1988). On the Mechanics of Economic Development. *Journal of Monetary economics*, 22, 3-42.

Mankiw, & McCallum. (1992). 'A contribution to the empirics of economic growth'. *Quarterly Journal of Economics*, 107, 407–37.

Manuela, W. A. (1990). *The Financial Sector and Economic Development:Banking on the Role of Human Capital.* Carleton University: Norman Paterson School of International Affairs.

Martin. (2005). The World Trading system and Development concerns. 1-40.

Martina, W.-P., Dagnew, G., Dr Wolday, A., Rochus, M., Eric, D., & William, S. (2008). *Access to finance in Ethiopia Volume 2.* for the German Technical Cooperation within the Engineering Capacity Building Project, gtz .

McKinnon, R. (1973). *Money and Capital in Economic Development.* Washington, D.C: Brookings Institution.

McKINNON, R. I. (1973). *Money and Capital in Economic Development.* Washington: Brookings institute.

Mckinnon's, S. (1973). *Financial deepening in Economics Development.* London: Oxford; Oxford University Press.

Mehta, S., & Rami, G. (2014). Nexus between Savings, Investment and Economic Growth in India. *Voice Res*, 3(3):37-40.

Melkamu, D. (2015). *The Relationship between Commercial Banks' Development Economic and Growth in Ethiopia.* Addis Ababa: Addis Ababa University.

Michael, P., Todaro, & Stefen, C. S. (2009). *Economic Development.*

Mishra, A., & Jain, M. (2012). Investigating the Causal Relationship between Saving, Investment and Economic Growth for India, Int. J. *Financ. Manag*, 1(2):15-23.

MoFED. (1999). *Ministry of Economic Development and Cooperation (MEDaC), (1999). Survey of the Ethiopian Economy: Review of Post-reform Developments (1992/93-1997/98)* . Addis Ababa, Ethiopia.

MoFED. (2004). *Domestic resource mobilization of Ethiopia.* Addis Ababa: MoFED.

MoFED. (2010). *Domestic resource mobilization of Ethiopia.* Addis Ababa: MoFED.

MoFED. (2013). *"Ethiopia Macroeconomic Performance (2001-2012) final report (Published.* Addis Ababa: MoFED.

Montiel, & J, P. (2003). *Macroeconmics in Emerging Markets. First.* New York: Cambridge University Press.

Motley, B. (1994). *Growth and Inflation: A Cross-Country Study, CEPR Publication No. 395.* Stanford University (March): Center for Economic Policy Research.

NBE (2012/13). (2013). *National Bank of Ethiopia Annual Report (bulletin), 2013/14.* Addis Ababa: NBE.

NBE. (2010). *National Bank of Ethiopia (1980-2010). Annual and Quarterly reports, various issues.* Addis Ababa: NBE.

NBE. (2015). *National Bank of Ethiopia (2015). Annual and Quarterly reports, various issues.* Addis Ababa: NBE.

NBE. (2016). *National Bank of Ethiopia (2015/2016). Annual and Quarterly reports, various issues.* Addis Ababa: NBE.

Ndikumana, & Leonce. (2005). "Financial Development, Financial Structure, and Domestic Investment: International Evidence.". *Journal of International Money and Finance 24*, 651-673.

Ndikumana, L. (2014). *Savings, Capital Flight, and African Development.* University of Massachusetts, Amherst: Political Economy Research Institute.

Ndikumana, L. (2000). Financial determinants of domestic investment in Sub-Saharan Africa:Evidence from Panel Data. *World Development*, 28(2), 381-400.

Ndikumana, L. (2005). "Financial Development, Financial Structure, and Domestic Investment: International Evidence.". *Journal of International Money and Finance 24*, 651- 673.

Ndikumana, L. (2014). *Savings, Capital Flight, and African Development.* University of Massachusetts, Amherst: Political Economy Institute.

Neusser, K., & Kugler, M. (1998). Manufacturing growth and "nancial development: evidence from OECD countries. *Review of Economics and Statistics*, 80, 638- 646.

Obi, B. (2012). Savings, Investment and Economic Growth in Nigeria: An Empirical Analysis. *IUP J. Monetary Econ*, 10(1):16-38.

Odedokun, M. (1998). Financial Intermediation and Economic Growth in Developing Countries. *Journal of Economic Studies*, 25, 203-22.

Omer, M. (2016). *The effect of financial liberalization on economic development in Ethiopia.* Addis Ababa: Addis Ababa University.

Pagano, M. (1993). “Financial Markets and Growth: an Overview”. *European Economic Review*, Vol. 37, 613-622.

Page, J. M. (1994). The East Asian Miracle: An Introduction. *World Development*, Vol. 22, No. 4, pp. 615-625.

Patrick, H. (1966). Financial Development and Economic Growth in Underdeveloped Countries. *Economic Development Cultural Change*, 14: 174-189.

Paul, S. (1992). *"Education, Democracy, and Growth", CEPR discussion paper, 613.* USA.: Cambridge.

Paul, S., Kearney, C., & Chowdhury, K. (1997). Inflation and Economic Growth: A Multi-Country Empirical Analysis. *Applied Economics*, Vol. 29, pp. 1387-1401.

Prescott, E. C. (1987). *"Dynamic Coalitions, Growth, and the Firm", in Prescott, E. C. and Wallace, N. (eds.), Contractual Arrangements for Intertemporal Trade.* Minneapolis: University of Minnesota Press.

prof. Ali I., A. (2000). *Towards a developed and an efficient financial sector in Ethiopia. Presentation paper at Ethiopian Economics Association seminar on financial sector reform in Ethiopia.* Addis Ababa: Ethiopian Economic Association.

Raha, W.(2011). *Financial Intermediation and Economic Growth.* PR China: School of Economics, Wuhan University of Technology, Wuhan.

Rebelo, S. (1987). *"Long Run Policy Analysis and Long Run Growth".* (Manuscript).

Rexiang, W., & Rathanasiri, R. (2011). *Financial Intermediation and Economic Growth: A Lesson from Sri Lanka.* Wuhan, PR China 430070: School of Economics, Wuhan University of Technology.

Robinson, & Joan. (1952). *"The Generalization of the General Theory." In The Rate of Interest and Other Essays.* London: MacMillon.

Rodrik, D. (2000). *Saving Transitions.* Washington, DC: World Bank Economic Review.

Roman, T. (2012). *The Link Between Financial Development and Economic Growth in Ethiopia.* Addis Ababa: Addis Ababa University.

Romer, D. (2006). *Advanced Macroeconomics.* New York: McGraw-Hill.

Romer, P. (1994). The Origins of Endogenous Growth. *Journal of Economic Perspectives*, 8:1, pp. 3-22.

Romer, P. M. (1986). "Increasing Returns and Long-Run Growth", Journal of Political Economy. *Journal of Political Economy*, 94, 1002-37.

Romer, P. M. (1987). *"Crazy Explanations for the Productivity Slowdown" in NBER Macroeconomics Annual.* Cambridge: MIT Press.

Romer, P. M. (1990). *"Endogenous Technological Change," Journal of Political Economy.* University of Chicago Press,vol. 98(5), pages S71-102, October.

Rosegrant, M. W., & Evenson, R. E. (1992). Agricultural Productivity and Sources of Growth in South Asia. *American Journal of Agricultural Economics*, Vol. 74, No. 3 , pp. 757-761.

Ross, L., Norman, L., & Thorsten, B. (1999). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, 46 (2000) 31-77.

Rostow, W. W. (1960). *The Stages of Economic Growth: A Non-Communist Manifesto.* Cambridge: Cambridge University Press.

Rousseau, P., & Wachtel, P. (1998). Financial intermediation and economic performance: historical evidence from "ve industrial countries. *Journal of Money, Credit, and Banking*, 30, 657- 678.

Rym, A., & Emrah, A. (March 2013). *Financial Development, Bank Efficiency and Economic Growth across the Mediterranean.* European: European Commission's Seventh Framework Research Programme.

Sab, R. C., Goyal, S., Mobarak, R., & A., M. (2004). *Financial Sector Development in the Middle East and North Africa.* IMF.

Sala-i-Martin, X., & N., R. (1992). Financial Repression and Economic Growth. *Journal of Development Economics*, 39: 5-30.

Sanusi, J. O. (2002). The importance of Financial Intermediation in Sustaining Economic Growth and Development. *The banking Sector Review*.

Schumpeter, J. (1911). *"The Theory of Economic Development: An inquiry into profits, capital, credit, interest and the business cycle." .* London Oxford: Oxford University Press.

Seid, M. (2000). *"Determinants of economic growth in Ethiopia".* Addis Ababa University: Unpublished Master Thesis.

Selina. (2013). *"Financial Intermediation, Growth, and Microfinance in Turkey.* Turkey: Maxwell School of Citizenship and Public Affairs, Syracuse University.

Shaw, E. (1973). *Financial Deepening in Economic Development.* New York: Oxford University Press.

Shaw, G. K. (1992). "Policy implications of endogenous growth theory.". *Economic Journal 102*, 611-621.

Sidrauski, M. (1967). Inflation and Economic Growth. *The Journal of Political Economy*, Vol. 75, No. 6, Dec. 1967, pp. 796-810.

Smith, A. (1776). *An Inquiry into the Nature and Causes of The Wealth Of Nations .* London SE12 8AJ: UK: 20 Cambridge Drive.

Solow, R. (1956). "A Contribution to the Theory of Economic Growth.". *Quarterly Journal of Economics*, 70 65-94.

Solow, R. (1956). 'A contribution to the theory of economic growth'. *Quarterly Journal of Economics*, 70, 65–94.

Solow, R. (1994). "Perspectives on growth theory.". *Journal of Economic Perspectives 8* , 45-54.

Solow, R. M. (1962). "Technical Progress, Capital Formation and Economic Growth". *American Economic Review*, Vol. 25.

Stiglitz, J. E. (1994). The role of the state in financial markets', in Bruno M. and Pleskovic B. (eds). Proceeding of the World Bank Annual Conference on Development Economics. *World Bank Economic Review and the World Bank Research Observer*, 19–61.

Swan, T. W. (1956). "Economic Growth and Capital Accumulation.". *Economic Record 32*, 334-61.

Taylor, L. (1980). *"IS/LM in the Tropics: Diagrammatics of the New Structuralist Macro Critique", in Weintraub, S. and Cline, W. R. (eds.), Economic Stabilization in Developing Countries.* Washington: Brookings Institution.

Tewodros, G. (2015). *The Determinants of Economic Growth in Ethiopia: A Time Series Analysis.* Addis Ababa, Ethiopia: Addis Ababa University.

Thorsten, B., Demirgüç, Kunt, & Levine. (1999). *Impediments to the Development and Efficiency of Financial Intermediation in Brazil.* Brazil: World Bank.

Todaro, M., & Smith, S. (2005). *Economic Development.* Boston: Pearson Education Inc.

Tsegabirhan, W. A. (2010). *Domestic Resource Mobilization in Sub- Saharan Africa: The case of Ethiopia.* Adiss Ababa, Ethiopia: University of Adiss Ababa.

UNCTAD. (2015). *World Economic Situation and Prospects.* New York: United Nations.

UNDP. (2014). United Nation Development Program, "Economic Brief to Ethiopia". *Analysis Issue*, No. 1/Feb.2014.

Vaibhav, C., Brajesh, K., & Ravindra, H. D. (2009). INTER-RELATIONSHIP BETWEEN ECONOMIC GROWTH, SAVINGS AND INFLATION IN ASIA. *Journal of International Economic Studies; The Institute of Comparative Economic Studies, Hosei University*, No.23, 1–22.

Verma, R. (2007). Savings, Investment and Growth in India: An Application of the ARDL Bounds Testing Approach. *South Asia Econ*, J. 8(1):87-98.

Verma, R., & Wilson, E. (2005). *Savings,Investment,Foreign Inflows and Economic Growth of the Indian Economy 1950-2001.Economic Working Paper Series.* University of Wollongong.

Wakiaga, J., Kibret, H., & Mamuye, R. (2014). *Country Economic Brief Analysis Issue No. 1.* ETHIOPIA: ETHIOPIA UNITED NATIONS DEVELOPMENT PROGRAMME.

Wijnbergen, V. S. (1984). "Stagflationary Effects of Monetary Stabilization Policies: A Quantitative Analysis of South Korea". *Journal of Development Economics*, 10, 133- 69.

Wondaferahu, M. (2010). *The Structure and Development of Ethiopia's Financial Sector.* Andhra University.

World Bank. (2013). *rethinking the role of state in finance.* Washington D.c: World Bank.

World Bank. (2004). *World Bank's Investment Climate Assessment Report, Determinants of Private Sector Growth in Ethiopia's Urban Industry: The Role of Investment Climate. The .* Washington, D.C.: World Bank.

Yohannes, G. A. (2014). *An Empirical Time Series Analysis on the Determinants of Gross National Saving in Ethiopia.* Addis Ababa: Addis Ababa University.

8 APPENDICIES

Appendix 1: VAR Granger Causality /Block Exogenity test

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 09/24/16 Time: 00:29
Sample: 1971 2014
Included observations: 42

Dependent variable: D(LRGDP)

Excluded	Chi-sq	df	Prob.
D(FSD)	0.425420	1	0.0154
D(LEXPT)	8.997177	1	0.0027
D(LGDS)	0.962522	1	0.0266
D(LPOP)	4.245310	1	0.0394
All	18.39297	4	0.0010

Dependent variable: D(FSD)

Excluded	Chi-sq	df	Prob.
D(LRGDP)	0.499256	1	0.4798
D(LEXPT)	0.197039	1	0.0165
D(LGDS)	1.283065	1	0.0257
D(LPOP)	0.119692	1	0.7294
All	2.259308	4	0.0068

Dependent variable: D(LEXPT)

Excluded	Chi-sq	df	Prob.
D(LRGDP)	2.148246	1	0.0142
D(FSD)	0.003126	1	0.9554
D(LGDS)	8.423313	1	0.0037
D(LPOP)	7.460229	1	0.0063
All	19.37494	4	0.0007

Dependent variable: D(LGDS)

Excluded	Chi-sq	df	Prob.
D(LRGDP)	0.109742	1	0.0074
D(FSD)	0.717285	1	0.0039
D(LEXPT)	0.719634	1	0.0396
D(LPOP)	0.821522	1	0.3647
All	2.672705	4	0.0064

Dependent variable: D(LPOP)

Excluded	Chi-sq	df	Prob.
D(LRGDP)	0.741887	1	0.3891
D(FSD)	2.606885	1	0.1064
D(LEXPT)	1.979700	1	0.1594
D(LGDS)	0.660851	1	0.4163
All	4.517613	4	0.3405

Appendix 2: Johnson co-integrations test

Date: 09/24/16 Time: 01:01
Sample (adjusted): 1973 2014
Included observations: 42 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: LRGDP FSD LEXPT LGDS LPOP DUM
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.794763	135.7477	103.8473	0.0001
At most 1	0.500764	69.23704	76.97277	0.1680
At most 2	0.345732	40.06062	54.07904	0.4674
At most 3	0.258475	22.24262	35.19275	0.5791
At most 4	0.129866	9.682649	20.26184	0.6709
At most 5	0.087375	3.840092	9.164546	0.4364

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.794763	66.51068	40.95680	0.0000
At most 1	0.500764	29.17642	34.80587	0.2015
At most 2	0.345732	17.81799	28.58808	0.5912
At most 3	0.258475	12.55997	22.29962	0.5998
At most 4	0.129866	5.842557	15.89210	0.8053
At most 5	0.087375	3.840092	9.164546	0.4364

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LRGDP	FSD	LEXPT	LGDS	LPOP	DUM	C
-0.067015	-0.132939	-0.934839	0.795005	-4.169853	2.184261	49.14572
-3.422376	-0.108110	4.934429	-1.022788	1.934902	-0.459640	-13.68666
2.989740	-0.004623	2.201013	-0.855788	-11.49845	5.817327	86.68557
4.541816	0.013333	-6.785782	-0.361563	12.03870	-4.340996	-115.5896
0.966658	-0.001539	-0.159180	0.227056	-1.666029	-0.427092	3.530468
1.056720	-0.012056	1.254500	-0.522764	-8.856634	3.011520	78.60083

Unrestricted Adjustment Coefficients (alpha):

D(LRGDP)	-0.013561	0.021827	-0.025490	-0.002950	-0.007679	-0.015580
D(FSD)	8.330694	4.331087	2.463144	1.479127	-0.108894	0.181945
D(LEXPT)	0.048905	-0.027165	-0.006846	0.013283	-0.033098	-0.015190
D(LGDS)	-0.121895	-0.008769	0.218115	-0.053462	-0.023202	-0.088501
D(LPOP)	0.000790	0.000273	0.001665	-0.002814	-0.002085	0.000934
D(DUM)	-0.027555	0.003745	-0.021677	0.049594	0.029905	-0.012990

1 Cointegrating Equation(s): Log likelihood 151.9385

Normalized cointegrating coefficients (standard error in parentheses)

LRGDP	FSD	LEXPT	LGDS	LPOP	DUM	C
1.000000	1.983735	13.94978	11.86316	62.22303	-32.59379	-733.3582
	(0.20592)	(8.27889)	(2.69652)	(25.7128)	(10.6334)	(224.986)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	0.000909
	(0.00089)
D(FSD)	-0.558278
	(0.10249)
D(LEXPT)	-0.003277
	(0.00134)
D(LGDS)	0.008169
	(0.00562)
D(LPOP)	-5.30E-05
	(0.00010)
D(DUM)	0.001847
	(0.00160)

2 Cointegrating Equation(s): Log likelihood 166.5267

Normalized cointegrating coefficients (standard error in parentheses)

LRGDP	FSD	LEXPT	LGDS	LPOP	DUM	C
1.000000	0.000000	-1.690877	0.495656	-1.581393	0.663901	15.93089
		(0.34670)	(0.11396)	(1.06532)	(0.43179)	(9.24064)
0.000000	1.000000	7.884446	-6.230075	32.16378	-16.76519	-377.7163
		(4.20033)	(1.38069)	(12.9067)	(5.23130)	(111.953)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	-0.073792	-0.000557
	(0.04356)	(0.00218)
D(FSD)	-15.38088	-1.575709
	(4.59634)	(0.23008)
D(LEXPT)	0.089690	-0.003565
	(0.06660)	(0.00333)
D(LGDS)	0.038181	0.017153
	(0.28719)	(0.01438)
D(LPOP)	-0.000986	-0.000135
	(0.00525)	(0.00026)
D(DUM)	-0.010969	0.003258
	(0.08163)	(0.00409)

3 Cointegrating Equation(s): Log likelihood 175.4357

Normalized cointegrating coefficients (standard error in parentheses)

LRGDP	FSD	LEXPT	LGDS	LPOP	DUM	C
1.000000	0.000000	0.000000	-0.053028	-3.116712	1.534512	24.58158
			(0.10702)	(0.64553)	(0.27551)	(6.22084)
0.000000	1.000000	0.000000	-3.671601	39.32287	-20.82479	-418.0539
			(1.23932)	(7.47513)	(3.19037)	(72.0357)
0.000000	0.000000	1.000000	-0.324496	-0.908002	0.514887	5.116097
			(0.07403)	(0.44655)	(0.19059)	(4.30325)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	-0.150001	-0.000439	0.064279
	(0.05442)	(0.00205)	(0.06566)
D(FSD)	-8.016723	-1.587095	19.00499
	(5.80191)	(0.21882)	(6.99997)
D(LEXPT)	0.069221	-0.003533	-0.194830
	(0.08826)	(0.00333)	(0.10649)
D(LGDS)	0.690289	0.016144	0.550754
	(0.34252)	(0.01292)	(0.41324)
D(LPOP)	0.003991	-0.000142	0.004271
	(0.00685)	(0.00026)	(0.00827)
D(DUM)	-0.075778	0.003358	-0.003475
	(0.10709)	(0.00404)	(0.12920)

4 Cointegrating Equation(s): Log likelihood 181.7157

Normalized cointegrating coefficients (standard error in parentheses)

LRGDP	FSD	LEXPT	LGDS	LPOP	DUM	C
1.000000	0.000000	0.000000	0.000000	-3.571685	1.710333	28.94146
				(0.44844)	(0.28579)	(4.62468)
0.000000	1.000000	0.000000	0.000000	7.820822	-8.651042	-116.1784
				(6.34753)	(4.04529)	(65.4606)
0.000000	0.000000	1.000000	0.000000	-3.692157	1.590804	31.79588
				(0.41795)	(0.26636)	(4.31027)
0.000000	0.000000	0.000000	1.000000	-8.579923	3.315650	82.21903
				(1.22030)	(0.77770)	(12.5847)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	-0.163397	-0.000478	0.084294	-0.010225
	(0.07687)	(0.00206)	(0.10437)	(0.01907)
D(FSD)	-1.298803	-1.567373	8.967961	-0.449563
	(8.04355)	(0.21523)	(10.9217)	(1.99563)
D(LEXPT)	0.129552	-0.003356	-0.284968	0.067720
	(0.12395)	(0.00332)	(0.16830)	(0.03075)
D(LGDS)	0.447476	0.015432	0.913534	-0.255268
	(0.48074)	(0.01286)	(0.65275)	(0.11927)
D(LPOP)	-0.008791	-0.000180	0.023367	-5.78E-05
	(0.00919)	(0.00025)	(0.01248)	(0.00228)
D(DUM)	0.149468	0.004020	-0.340009	-0.025116
	(0.14149)	(0.00379)	(0.19212)	(0.03510)

5 Cointegrating Equation(s): Log likelihood 184.6370

Normalized cointegrating coefficients (standard error in parentheses)

LRGDP	FSD	LEXPT	LGDS	LPOP	DUM	C
1.000000	0.000000	0.000000	0.000000	0.000000	-1.221773	-14.28482
					(1.07173)	(3.10736)
0.000000	1.000000	0.000000	0.000000	0.000000	-2.230690	-21.52703
					(3.03212)	(8.79131)
0.000000	0.000000	1.000000	0.000000	0.000000	-1.440201	-12.88840
					(1.10945)	(3.21673)
0.000000	0.000000	0.000000	1.000000	0.000000	-3.727871	-21.61938
					(2.58443)	(7.49329)
0.000000	0.000000	0.000000	0.000000	1.000000	-0.820931	-12.10249
					(0.30316)	(0.87898)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	-0.170820	-0.000467	0.085517	-0.011969	0.369160
	(0.07727)	(0.00204)	(0.10377)	(0.01915)	(0.20635)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	-0.170820	-0.000467	0.085517	-0.011969	0.369160
	(0.07727)	(0.00204)	(0.10377)	(0.01915)	(0.20635)
D(FSD)	-1.404066	-1.567206	8.985295	-0.474288	-36.69171
	(8.13319)	(0.21522)	(10.9223)	(2.01555)	(21.7186)
D(LEXPT)	0.097558	-0.003305	-0.279700	0.060205	0.037292
	(0.11995)	(0.00317)	(0.16109)	(0.02973)	(0.32032)
D(LGDS)	0.425048	0.015467	0.917227	-0.260536	-2.621629
	(0.48548)	(0.01285)	(0.65196)	(0.12031)	(1.29640)
D(LPOP)	-0.010806	-0.000177	0.023699	-0.000531	-0.052314
	(0.00901)	(0.00024)	(0.01210)	(0.00223)	(0.02406)
D(DUM)	0.178376	0.003974	-0.344769	-0.018326	0.918623
	(0.13926)	(0.00369)	(0.18702)	(0.03451)	(0.37189)

Appendix 3: roots of characteristics of polynomial

Roots of Characteristic Polynomial
Endogenous variables: LRGDP FSD LEXPT LGDS ...
Exogenous variables: DUM
Lag specification: 1 1
Date: 09/16/16 Time: 11:54

Root	Modulus
1.014098	1.014098
1.000000	1.000000
1.000000	1.000000
1.000000	1.000000
1.000000	1.000000
0.282278 - 0.376664i	0.470698
0.282278 + 0.376664i	0.470698
-0.434473	0.434473
-0.259102 - 0.202297i	0.328722
-0.259102 + 0.202297i	0.328722

VEC specification imposes 4 unit root(s).

Appendix 4: VEC Residual Portmanteau Tests for Autocorrelations

VEC Residual Portmanteau Tests for Autocorrelations
Null Hypothesis: no residual autocorrelations up to lag h
Date: 09/24/16 Time: 01:42
Sample: 1971 2014
Included observations: 42

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	17.21973	NA*	17.63973	NA*	NA*
2	45.22772	0.5045	47.04811	0.4294	46
3	60.49707	0.8085	63.49203	0.7248	71
4	84.85847	0.7849	90.41778	0.6415	96
5	110.3672	0.7458	119.3736	0.5248	121
6	136.4859	0.7020	149.8455	0.3966	146
7	160.3331	0.7099	178.4621	0.3322	171
8	177.8710	0.8190	200.1266	0.4049	196
9	188.2928	0.9461	213.3907	0.6309	221
10	212.4363	0.9403	245.0790	0.5046	246
11	232.8668	0.9548	272.7590	0.4586	271
12	254.8961	0.9597	303.6000	0.3680	296
13	278.0871	0.9599	337.1870	0.2564	321
14	306.2097	0.9393	379.3709	0.1047	346

*The test is valid only for lags larger than the VAR lag order.
df is degrees of freedom for (approximate) chi-square distribution
*df and Prob. may not be valid for models with exogenous variables

Appendix 5: VEC Residual Serial correlation LM tests

VEC Residual Serial Correlation LM T...
Null Hypothesis: no serial correlation a...
Date: 09/24/16 Time: 02:05
Sample: 1971 2014
Included observations: 42

Lags	LM-Stat	Prob
1	56.79751	0.3000

Probs from chi-square with 25 df.

VEC Residual Serial Correlation LM T...
Null Hypothesis: no serial correlation a...
Date: 09/24/16 Time: 02:09
Sample: 1971 2014
Included observations: 42

Lags	LM-Stat	Prob
1	56.79751	0.3000
2	38.48558	0.4140

Probs from chi-square with 25 df.

VEC Residual Serial Correlation LM T...
Null Hypothesis: no serial correlation a...
Date: 09/24/16 Time: 01:57
Sample: 1971 2014
Included observations: 42

Lags	LM-Stat	Prob
1	56.79751	0.3000
2	38.48558	0.4140
3	16.20731	0.9085
4	26.20190	0.3969
5	27.63138	0.3251
6	26.95561	0.3581
7	30.03027	0.2232
8	19.91125	0.7515
9	11.36680	0.9910
10	30.94003	0.1910
11	33.22086	0.1256
12	33.57667	0.1173
13	33.81367	0.1120
14	37.83888	0.4080
15	15.17857	0.9371
16	41.34988	0.2011

Probs from chi-square with 25 df.

Appendix 6: VEC Residual Normality Tests

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 09/16/16 Time: 11:48
Sample: 1971 2014
Included observations: 42

Component	Skewness	Chi-sq	df	Prob.
1	-0.083185	0.048439	1	0.8258
2	-0.120017	0.100829	1	0.7508
3	-0.153229	0.164353	1	0.6852
4	-0.174300	0.212663	1	0.6447
5	-0.723148	3.660604	1	0.0557
Joint		4.186888	5	0.5228

Component	Kurtosis	Chi-sq	df	Prob.
1	2.387460	0.656610	1	0.4178
2	2.943815	0.005524	1	0.9408
3	2.290414	0.881148	1	0.3479
4	3.204055	0.072867	1	0.7872
5	4.981868	6.873651	1	0.0087
Joint		8.489800	5	0.1312

Component	Jarque-Bera	df	Prob.
1	0.705049	2	0.7029
2	0.106353	2	0.9482
3	1.045501	2	0.5929
4	0.285530	2	0.8670
5	10.53426	2	0.0052
Joint	12.67669	10	0.2423

Appendix7: VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares) squares)

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)
Date: 09/16/16 Time: 11:49
Sample: 1971 2014
Included observations: 42

Joint test:

Chi-sq	df	Prob.
208.4242	195	0.2425

Individual components:

Dependent	R-squared	F(13,28)	Prob.	Chi-sq(13)	Prob.
res1*res1	0.330369	1.062619	0.4266	13.87548	0.3827
res2*res2	0.529020	2.419274	0.0244	22.21886	0.0521
res3*res3	0.474920	1.948089	0.0680	19.94662	0.0965
res4*res4	0.315086	0.990852	0.4844	13.23363	0.4299
res5*res5	0.701865	5.070562	0.0002	29.47835	0.0056
res2*res1	0.325937	1.041474	0.4431	13.68936	0.3961
res3*res1	0.376207	1.298978	0.2708	15.80071	0.2601
res3*res2	0.307378	0.955853	0.5141	12.90987	0.4548
res4*res1	0.164650	0.424530	0.9471	6.915310	0.9065
res4*res2	0.322478	1.025158	0.4562	13.54406	0.4067
res4*res3	0.256720	0.743912	0.7072	10.78223	0.6291
res5*res1	0.437241	1.673449	0.1234	18.36410	0.1442
res5*res2	0.326373	1.043539	0.4415	13.70765	0.3947
res5*res3	0.548114	2.612505	0.0162	23.02080	0.0414
res5*res4	0.478553	1.976672	0.0639	20.09923	0.0928

Appendix 8: VEC residual hetrosekasticity tests: includes cross terms

VEC Residual Heteroskedasticity Tests: Includes Cross Terms
Date: 09/16/16 Time: 11:50
Sample: 1971 2014
Included observations: 42

Joint test:

Chi-sq	df	Prob.
538.7649	510	0.1827

Individual components:

Dependent	R-squared	F(34,7)	Prob.	Chi-sq(34)	Prob.
res1*res1	0.920695	2.390206	0.1159	38.66920	0.2669
res2*res2	0.950297	3.936376	0.0327	39.91248	0.2239
res3*res3	0.947215	3.694538	0.0388	39.78304	0.2282
res4*res4	0.839572	1.077453	0.5024	35.26204	0.4083
res5*res5	0.997263	75.02586	0.0000	41.88506	0.1659
res2*res1	0.905659	1.976440	0.1765	38.03768	0.2906
res3*res1	0.894193	1.739952	0.2287	37.55612	0.3095
res3*res2	0.784784	0.750751	0.7342	32.96095	0.5184
res4*res1	0.666498	0.411451	0.9607	27.99290	0.7562
res4*res2	0.916158	2.249730	0.1331	38.47865	0.2739
res4*res3	0.893614	1.729360	0.2315	37.53180	0.3104
res5*res1	0.877249	1.471348	0.3120	36.84444	0.3386
res5*res2	0.929011	2.694328	0.0873	39.01847	0.2543
res5*res3	0.941045	3.286294	0.0529	39.52388	0.2368
res5*res4	0.952151	4.096910	0.0293	39.99036	0.2214

Appendix 9: Vector Error Correction Estimates

Vector Error Correction Estimates
Date: 09/25/16 Time: 12:10
Sample (adjusted): 1973 2014
Included observations: 42 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LRGDP(-1)	1.000000
FSD(-1)	0.132579 (0.09199) [1.44116]
LEXPT(-1)	-15.99094 (3.41400) [-4.68393]
LGDS(-1)	0.931079 (1.28525) [0.72443]
LPOP(-1)	56.24054 (11.1782) [5.03125]
C	-488.1405 (100.076) [-4.87768]

Error Correction:	D(LRGDP)	D(FSD)	D(LEXPT)	D(LGDS)	D(LPOP)
CointEq1	-0.092741 (0.02040) [-4.54612]	-0.119276 (0.35332) [-0.33759]	-0.006421 (0.00436) [-1.47137]	0.012823 (0.01425) [0.90000]	0.001779 (0.00021) [8.51682]
D(LRGDP(-1))	0.393931 (0.12719) [3.09712]	-13.23133 (18.7258) [-0.70658]	-0.339002 (0.23129) [-1.46569]	0.250163 (0.75516) [0.33127]	-0.009534 (0.01107) [-0.86133]
D(FSD(-1))	0.000681 (0.00104) [0.65224]	-0.372820 (0.15381) [-2.42393]	0.000106 (0.00190) [0.05591]	0.005253 (0.00620) [0.84693]	-0.000147 (9.1E-05) [-1.61459]
D(LEXPT(-1))	0.242696 (0.08091) [2.99953]	5.287680 (11.9121) [0.44389]	0.172597 (0.14713) [1.17307]	-0.407512 (0.48038) [-0.84831]	0.009907 (0.00704) [1.40702]
D(LGDS(-1))	0.026136 (0.02664) [0.98108]	-4.442562 (3.92201) [-1.13272]	0.140595 (0.04844) [2.90229]	-0.328457 (0.15816) [-2.07670]	0.001885 (0.00232) [0.81293]
D(LPOP(-1))	3.582204 (1.73858) [2.06041]	88.55386 (255.962) [0.34596]	8.635169 (3.16151) [2.73134]	-9.355791 (10.3222) [-0.90638]	-0.435372 (0.15130) [-2.87757]
DUM	0.040086 (0.06923) [0.57901]	4.813388 (10.1925) [0.47225]	0.118989 (0.12589) [0.94516]	-0.000258 (0.41103) [-0.00063]	-0.042422 (0.00602) [-7.04125]

R-squared	0.620976	0.177217	0.410795	0.196478	0.471973
Adj. R-squared	0.338857	0.036169	0.309789	0.058732	0.381454
Sum sq. resids	0.290730	6301.589	0.961365	10.24804	0.002202
S.E. equation	0.091140	13.41810	0.165733	0.541111	0.007931
F-statistic	6.344194	1.256428	4.067021	1.426374	5.214072
Log likelihood	44.83821	-164.8241	19.72307	-29.97317	147.3842
Akaike AIC	-1.801819	8.182098	-0.605860	1.760627	-6.684961
Schwarz SC	-1.512208	8.471710	-0.316249	2.050239	-6.395350
Mean dependent	0.067439	0.120962	0.073123	0.136822	0.026262
S.D. dependent	0.121667	13.66755	0.199489	0.557737	0.010085

Determinant resid covariance (dof adj.)	4.21E-07
Determinant resid covariance	1.69E-07
Log likelihood	29.48105
Akaike information criterion	0.548521
Schwarz criterion	2.244818

Appendix 10: system equation

Dependent Variable: D(LRGDP)
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 09/25/16 Time: 13:02
Sample (adjusted): 1973 2014
Included observations: 42 after adjustments
D(LRGDP) = C(1)*(LRGDP(-1) + 0.132579119789*FSD(-1) -
15.9909435822*LEXPT(-1) + 0.931079096465*LGDS(-1) +
56.2405381617*LPOP(-1) - 488.14047484) + C(2)*D(LRGDP(-1)) +
C(3)*D(FSD(-1)) + C(4)*D(LEXPT(-1)) + C(5)*D(LGDS(-1)) + C(6)
*D(LPOP(-1)) + C(7)*DUM

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.092741	0.020400	-4.546122	0.0022
C(2)	0.393931	0.127192	3.097125	0.0038
C(3)	0.000681	0.001045	0.652242	0.0518
C(4)	0.242696	0.080911	2.999529	0.0050
C(5)	0.026136	0.026640	0.981082	0.3333
C(6)	3.582204	1.738584	2.060415	0.0469
C(7)	0.040086	0.069231	0.579014	0.5663

R-squared	0.620976	Mean dependent var	0.067439
Adjusted R-squared	0.338857	S.D. dependent var	0.121667
S.E. of regression	0.091140	Akaike info criterion	-1.801819
Sum squared resid	0.290730	Schwarz criterion	-1.512208
Log likelihood	44.83821	Hannan-Quinn criter.	-1.695665
Durbin-Watson stat	1.682927		

Appendix 11: Wald test for joint significance

Wald Test:
Equation: Untitled

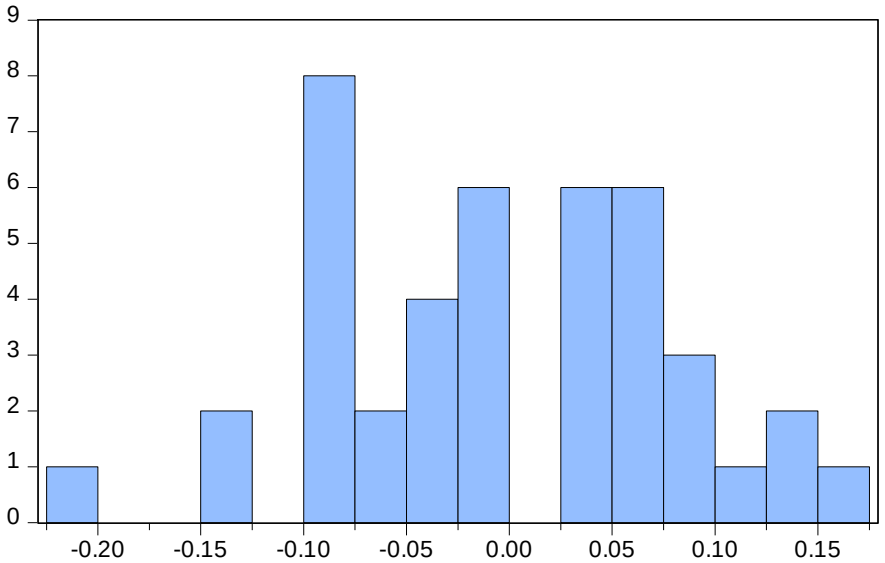
Test Statistic	Value	df	Probability
F-statistic	7.584326	(5, 35)	0.0001
Chi-square	37.92163	5	0.0000

Null Hypothesis: C(2)=C(3)=C(4)=C(5)=C(6)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	0.393931	0.127192
C(3)	0.000681	0.001045
C(4)	0.242696	0.080911
C(5)	0.026136	0.026640
C(6)	3.582204	1.738584

Restrictions are linear in coefficients.

Appendix 12: residual normality test



Series: Residuals
Sample 1973 2014
Observations 42

Mean	-0.002507
Median	-0.007046
Maximum	0.170463
Minimum	-0.201071
Std. Dev.	0.084170
Skewness	-0.083185
Kurtosis	2.387460
Jarque-Bera	0.705049
Probability	0.702911

Appendix 13: Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.697368	Prob. F(1,34)	0.2014
Obs*R-squared	1.997051	Prob. Chi-Square(1)	0.1576

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 09/16/16 Time: 12:12
Sample: 1973 2014
Included observations: 42
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.000109	0.002378	0.045722	0.9638
C(2)	-0.144052	0.167593	-0.859537	0.3961
C(3)	0.000126	0.001039	0.121277	0.9042
C(4)	-0.017083	0.081183	-0.210426	0.8346
C(5)	-0.007488	0.026997	-0.277364	0.7832
C(6)	0.393222	1.747776	0.224985	0.8233
C(7)	-0.004921	0.068656	-0.071670	0.9433
RESID(-1)	0.331113	0.254149	1.302831	0.2014

R-squared	0.046684	Mean dependent var	-0.002507
Adjusted R-squared	-0.149588	S.D. dependent var	0.084170
S.E. of regression	0.090246	Akaike info criterion	-1.802917
Sum squared resid	0.276906	Schwarz criterion	-1.471932
Log likelihood	45.86125	Hannan-Quinn criter.	-1.681598
Durbin-Watson stat	1.817596		

Appendix 14: Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.001779	Prob. F(1,39)	0.9666
Obs*R-squared	0.001870	Prob. Chi-Square(1)	0.9655

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/25/16 Time: 13:48
Sample (adjusted): 1974 2014
Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.007096	0.001720	4.125032	0.0002
RESID^2(-1)	-0.006720	0.159333	-0.042173	0.9666

R-squared	0.000046	Mean dependent var	0.007049
Adjusted R-squared	-0.025594	S.D. dependent var	0.008347
S.E. of regression	0.008453	Akaike info criterion	-6.661022
Sum squared resid	0.002787	Schwarz criterion	-6.577433
Log likelihood	138.5510	Hannan-Quinn criter.	-6.630584
F-statistic	0.001779	Durbin-Watson stat	2.008842
Prob(F-statistic)	0.966576		

Appendix 15: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

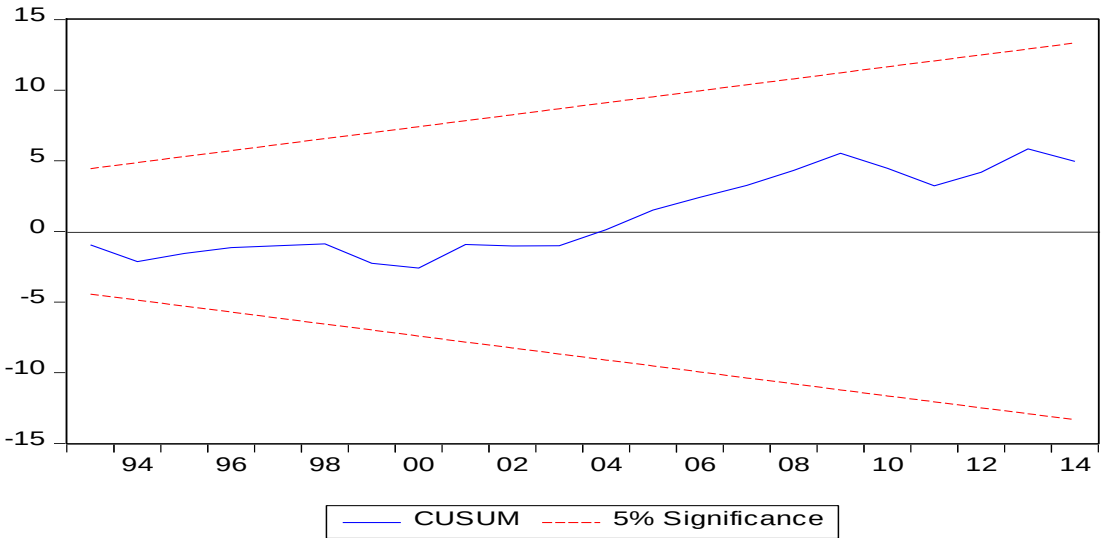
F-statistic	0.900003	Prob. F(11,30)	0.5514
Obs*R-squared	10.42108	Prob. Chi-Square(11)	0.4930
Scaled explained SS	5.060665	Prob. Chi-Square(11)	0.9282

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/16/16 Time: 12:14
Sample: 1973 2014
Included observations: 42

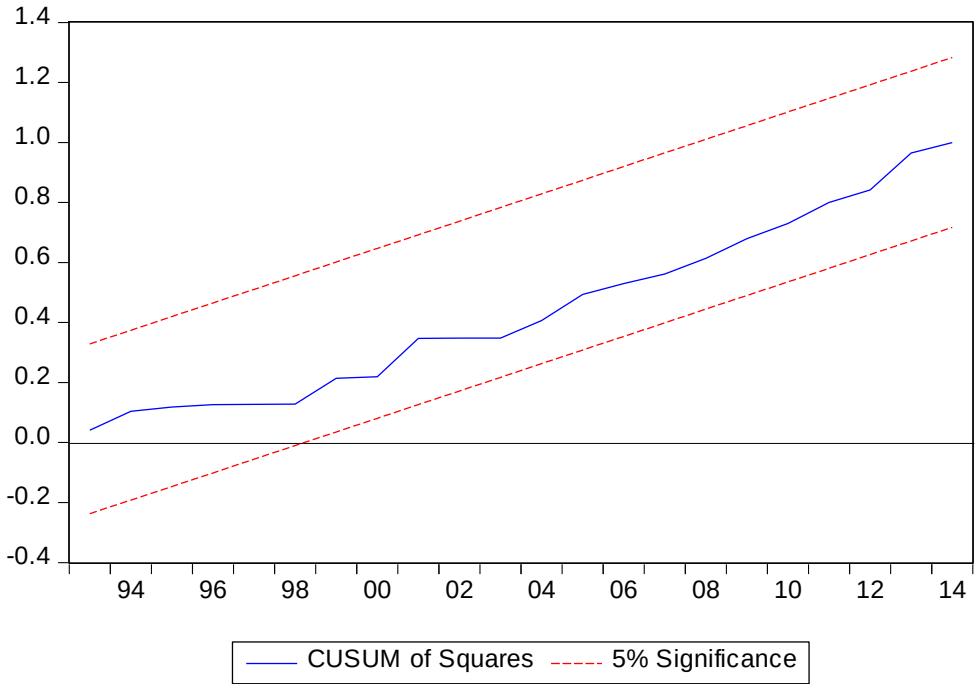
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.299693	0.206650	1.450243	0.1574
LRGDP(-1)	-0.007983	0.018627	-0.428589	0.6713
FSD(-1)	-7.68E-05	0.000154	-0.498003	0.6221
LEXPT(-1)	0.010732	0.010336	1.038334	0.3074
LGDS(-1)	0.003861	0.002786	1.385914	0.1760
LPOP(-1)	-0.082303	0.154904	-0.531319	0.5991
LRGDP(-2)	0.003190	0.015608	0.204419	0.8394
FSD(-2)	-3.47E-05	0.000145	-0.239814	0.8121
LEXPT(-2)	0.001219	0.008941	0.136351	0.8925
LGDS(-2)	-0.001433	0.003189	-0.449451	0.6563
LPOP(-2)	0.049842	0.162832	0.306098	0.7616
DUM	0.012402	0.009078	1.366149	0.1820

R-squared	0.248121	Mean dependent var	0.006922
Adjusted R-squared	-0.027568	S.D. dependent var	0.008285
S.E. of regression	0.008399	Akaike info criterion	-6.486476
Sum squared resid	0.002116	Schwarz criterion	-5.989999
Log likelihood	148.2160	Hannan-Quinn criter.	-6.304497
F-statistic	0.900003	Durbin-Watson stat	2.399401
Prob(F-statistic)	0.551393		

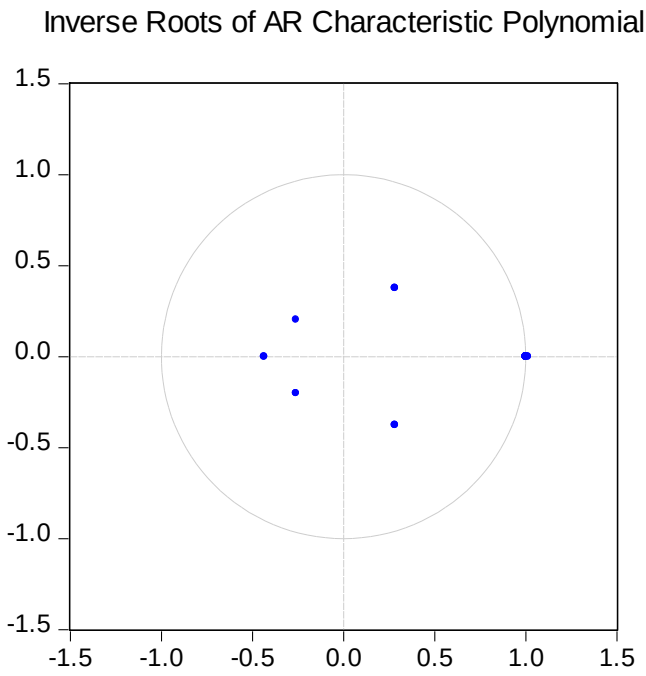
Appendix 16: Cusum test for model stability



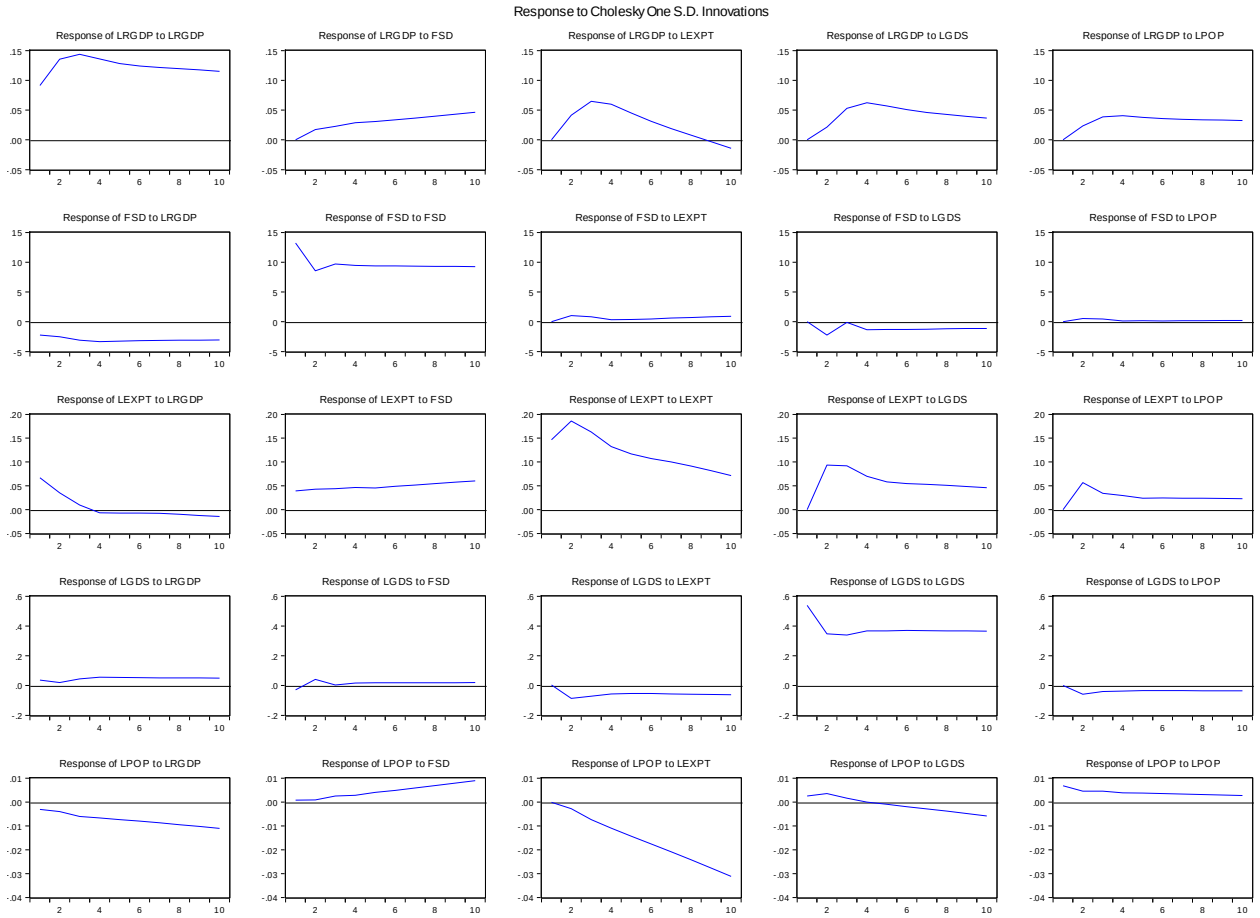
Appendix 17: Cusum of squares test for model stability



Appendix 18: Inverse root of AR characteristics polynomial



Appendix 19: Impulse response function graph



Appendix 20: Variance Decomposition table

Variance Decomposition of LRGDP:

Period	S.E.	LRGDP	FSD	LEXPT	LGDS	LPOP
1	0.091140	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.172290	89.82969	1.023061	5.787171	1.522404	1.837675
3	0.243511	79.79072	1.373692	9.919394	5.489776	3.426422
4	0.296016	75.03293	1.859671	10.80685	8.118351	4.182198
5	0.334206	73.53891	2.317010	10.31146	9.265197	4.567417
6	0.364646	73.31594	2.791173	9.384201	9.718151	4.790532
7	0.390821	73.50792	3.301575	8.403168	9.843425	4.943911
8	0.414300	73.75132	3.856501	7.514337	9.815660	5.062186
9	0.435825	73.89825	4.460201	6.795202	9.693358	5.152991
10	0.455926	73.87110	5.111059	6.307669	9.494056	5.216119
11	0.475089	73.61240	5.804593	6.106031	9.226972	5.250003
12	0.493762	73.07581	6.534251	6.235191	8.901138	5.253615
13	0.512344	72.22664	7.291587	6.729147	8.526184	5.226437
14	0.531191	71.04309	8.066427	7.610241	8.111852	5.168387
15	0.550619	69.51686	8.847117	8.888162	7.667938	5.079921
16	0.570915	67.65344	9.621045	10.55891	7.204393	4.962215
17	0.592338	65.47173	10.37532	12.60443	6.731262	4.817260
18	0.615116	63.00288	11.09751	14.99335	6.258417	4.647852
19	0.639455	60.28821	11.77633	17.68280	5.795191	4.457474
20	0.665530	57.37648	12.40223	20.62118	5.349997	4.250119
21	0.693493	54.32071	12.96783	23.75140	4.930006	4.030058
22	0.723472	51.17504	13.46812	27.01429	4.540924	3.801620
23	0.755570	47.99184	13.90049	30.35181	4.186890	3.568972
24	0.789873	44.81929	14.26454	33.70972	3.870495	3.335944
25	0.826445	41.69969	14.56187	37.03965	3.592885	3.105904
26	0.865335	38.66843	14.79562	40.30031	3.353959	2.881679
27	0.906580	35.75367	14.97011	43.45810	3.152588	2.665529
28	0.950204	32.97642	15.09046	46.48710	2.986861	2.459163
29	0.996222	30.35113	15.16221	49.36857	2.854313	2.263773
30	1.044642	27.88649	15.19106	52.09021	2.752138	2.080104
31	1.095466	25.58628	15.18259	54.64526	2.677360	1.908516
32	1.148692	23.45033	15.14215	57.03149	2.626972	1.749058
33	1.204315	21.47539	15.07471	59.25032	2.598044	1.601536
34	1.262329	19.65593	14.98480	61.30590	2.587792	1.465577
35	1.322727	17.98479	14.87649	63.20441	2.593628	1.340673
36	1.385500	16.45377	14.75338	64.95343	2.613185	1.226234
37	1.450641	15.05406	14.61860	66.56139	2.644330	1.121618
38	1.518143	13.77662	14.47487	68.03719	2.685159	1.026160
39	1.587999	12.61242	14.32451	69.38988	2.733993	0.939194
40	1.660205	11.55265	14.16951	70.62842	2.789359	0.860064
41	1.734757	10.58883	14.01151	71.76153	2.849978	0.788141
42	1.811652	9.712953	13.85192	72.79756	2.914744	0.722826
43	1.890890	8.917465	13.69187	73.74440	2.982707	0.663555
44	1.972470	8.195344	13.53232	74.60948	3.053055	0.609802

Appendix 21 VAR model

Vector Autoregression Estimates
Date: 09/25/16 Time: 14:14
Sample (adjusted): 1972 2014
Included observations: 43 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LRGDP	FSD	LEXPT	LGDS	LPOP
LRGDP(-1)	0.752208	-11.99969	-0.156305	0.405449	0.003000
	(0.06183)	(6.87931)	(0.11444)	(0.35199)	(0.00600)
	[12.1649]	[-1.74431]	[-1.36584]	[1.15188]	[0.49988]
FSD(-1)	0.018100	-0.073187	0.000600	0.013128	7.45E-05
	(0.00151)	(0.16844)	(0.00280)	(0.00862)	(0.00015)
	[11.9867]	[-0.43451]	[0.21418]	[1.52328]	[0.50695]
LEXPT(-1)	0.230727	11.00435	0.742221	0.164691	-0.021191
	(0.06698)	(7.45219)	(0.12397)	(0.38130)	(0.00650)
	[3.44453]	[1.47666]	[5.98715]	[0.43192]	[-3.25972]
LGDS(-1)	0.002417	-0.102503	0.113536	0.724058	0.002510
	(0.02195)	(2.44162)	(0.04062)	(0.12493)	(0.00213)
	[0.11011]	[-0.04198]	[2.79527]	[5.79577]	[1.17855]
LPOP(-1)	0.711837	-8.411428	0.788954	0.184000	1.061981
	(0.21537)	(23.9608)	(0.39859)	(1.22598)	(0.02090)
	[3.30518]	[-0.35105]	[1.97934]	[0.15008]	[50.8071]
C	-1.098303	140.5703	-6.055390	-4.875839	-0.536800
	(1.93590)	(215.376)	(3.58284)	(11.0200)	(0.18788)
	[-0.56733]	[0.65267]	[-1.69011]	[-0.44245]	[-2.85708]
DUM	-0.100571	9.152808	-0.367020	0.283421	-0.028458
	(0.08254)	(9.18255)	(0.15275)	(0.46984)	(0.00801)
	[-1.21850]	[0.99676]	[-2.40268]	[0.60323]	[-3.55257]
R-squared	0.983876	0.113712	0.955732	0.920799	0.999410
Adj. R-squared	0.981189	-0.034002	0.948354	0.907599	0.999311
Sum sq. resids	0.301092	3726.727	1.031304	9.756517	0.002836
S.E. equation	0.091453	10.17449	0.169255	0.520590	0.008876
F-statistic	366.1193	0.769810	129.5389	69.75645	10158.69
Log likelihood	45.65875	-156.9492	19.18873	-29.12417	145.9565
Akaike AIC	-1.798082	7.625544	-0.566918	1.680194	-6.463094
Schwarz SC	-1.511375	7.912251	-0.280211	1.966901	-6.176387
Mean dependent	9.109445	18.30382	6.892141	8.026640	10.91030
S.D. dependent	0.666792	10.00580	0.744775	1.712604	0.338222

Determinant resid covariance (dof adj.)	2.74E-07
Determinant resid covariance	1.13E-07
Log likelihood	38.91811
Akaike information criterion	-0.182238
Schwarz criterion	1.251297

Date November 14, 2016

Adama Science and Technology University

School of Graduate Studies and college of Business and Economics

Adama

Subject: Testimonys

This is to inform you that a student named, ALEHEGN ANTENEH AMOGNE; who is a post graduate student in the department of development economics has been writing his MSc research thesis entitled, ‘THE ROLE OF FINANCIAL INTERMEDIARIES IN ECONOMIC GROWTH IN ETHIOPIA. Under my guidance. As he has finalized the research thesis write up, please kindly allow him to submit the thesis for presentation.

Sincerely

Moges Shiferaw (PhD)

Approval sheet

A. Candidate

Name: Signature date

_____ _____ _____

_____

B. Approved by

_____ _____

_____

Advisor

_____ _____

_____

Co-advisor

_____ _____

_____

Department head

_____ _____

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School dean

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Associated form Pg program Signature date