

BANKING SECTORS DEVELOPMENT AND ECONOMIC GROWTH IN ETHIOPIA: TIME SERIES ANALYSIS

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Declaration

I, SAMUEL MEKANGO, do hereby declare that this thesis entitled: BANKING SECTORS DEVELOPMENT AND ECONOMIC GROWTH IN ETHIOPIA: TIME SERIES ANALYSIS is entirely my own original work and has not been presented for higher degree at any other University or institute anywhere for the award of any academic degree, diploma or certificate. All references made to works of other persons have been duly acknowledged.

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Abstract

The purpose of this thesis is to investigate the effect of banking development on economic growth for Ethiopia. Using Autoregressive distributed lag, the relationship between banking development and economic growth is investigated. The banking sector indicator used in this study includes bank credit to private sector (PSC), bank credit to deposit ratio (CDR) and banking size (BS). Also, some macroeconomic control variable such as private consumption (Pcons) and Trade openness (TO) were used. The investigation of the principal indicator of banking development indicator have shown little differences. Results from ARDL model confirms that in the presence of other macroeconomic control variables, banking development indicator such as CDR and PSC are positively significantly determining economic growth. However, when banking sector development indicators entered to the model individually, only PSC is found to have positively and significantly determining economic growth after its first lag. Overall, although the effect is dependent on the banking indicator used, the evidence suggest that banking sector development is contributing positively to Ethiopian economic growth and. Hence, policies to encourage further development in banking sector is useful in improving Ethiopian economy.

Key words: *ARDL, banking sector, economic growth, Data standardize*

Contents

Declaration	i
Acknowledgment	ii
Abstract	iii
List of Figures	vii
List of Tables	vii
1 Introduction	1
1.1 Background of the Study	1
1.2 Statement of the problem	2
1.3 Objective of the Study	4
1.4 Significance of the study	4
1.5 Organization of the Study	5
2 LITERATURE REVIEW	5
2.1 Theoretical Literature	6
2.2 Empirical Literature	7
3 Data and Methods	11
3.1 Data Source	11
3.2 Description of Study Variables	11
3.3 The Model Specification	13
3.4 The Estimation Strategy	14

4	Result and Discussion	15
4.1	Result	15
4.1.1	Stationarity Test	15
4.1.2	Model Estimation	17
4.1.3	Model checking (Diagnosis)	20
4.2	Discussion	21
5	Conclusion and Recommendation	23
5.1	Conclusion	23
5.2	Recommendation	24
	References	25
	Appendix	27

List of Figures

1	Cumulative Sum Bound test when only PSC is included to the model	27
2	Cumulative Sum Bound test when only BS is included to the model	28
3	Cumulative Sum Bound test when only CDR is included to the model	29
4	Cumulative Sum Bound test when PSC, BS and CDR are included to the model	30

List of Tables

1	Augmented Dickey-Fuller tests for unit roots	16
2	Results for Estimated Model	19
3	Peseran, Shin, and Smith(2001) bound test	20

ACRONYMS

PSC...Credit to Private Sector

CDR...Credit to Deposit Ratio

RGDP...Real Gross Domestic Product

NBE...National Bank of Ethiopia

WB...World Bank

IMF...International Monetary Fund

SSA...Sub-Sahara Africa

TO...Trade Openness

ARDL...Autoregressive Distributed Lag Model

BS...Banking Size

1 Introduction

1.1 Background of the Study

The need to stimulate and manage economic growth is a global topic of up most importance in many countries. While the subject is not new, given the continued population growth in many less developed countries and the changing demographics, widening income disparities, changing technology, change in the banking system have taken on increased importance. Particularly, there has been a growing interest in the critical role played by financial sector in facilitating economy growth, by mobilizing savings, facilitating payments and trade of goods and services, and promoting efficient allocation of resources (ADB, 2009).

However, existing empirical and theoretical literature has not yet concluded a direct association between financial development aka banking development and improvement in economic growth. For example, Rym et al (2013) have shown that credit to the private sector and bank deposits which were assumed to be the indicators for banking development according to their research were found to have negative relationship with economic growth, which they suggested that it happened due to deficiencies in credit allocation in the Mediterranean region, while Honahan and King (2012) showed that the use of formal banking services is associated with an increase in individual monthly income which contributes to aggregate economy. On the other hand, Sy H (2017) has showed that the relationship between bank based financial development and economic growth is sensitive to the proxy used to measure the banking sector development.

Besides, some literature were focused on the causality direction between banking sector development and economic growth (Sy H, 2017; Ali A, 2012, Khalil M

et al, 2017; and Abugamea G, 2016), but found inconsistent result. specifically, in the theoretical challenge of separating the direct causality of banking development, Robinson (1952) has found that, "economic development creates demand for financial services, and the financial system responds to this demand." This is clearly indicating as the causality run from economic growth to financial development.

Given the locally specific nature of both banking sector and economic growth, evidence is difficult to compare across cases, and there is no agreement regarding the effect and the causal direction of banking sector development on economic growth as mentioned above. The issues of estimation, the use of unstandardised observation, the problem of endogeneity problems, the time it takes to see the effect are some of the problems expected to be the main reason for the differential of the results in the literature.

This thesis is designed to contribute to the differential in the literature on the effect of banking development, as measured by different indicators, on economic growth in Ethiopia. In this study the potential expected estimation problems were addressed through autoregressive distributed lag (ARDL) model; and the analysis draws on time series data from different sources and the soundness of the association presented by this paper relied significantly on the analysis of the effect using standardized observation in the study variables.

1.2 Statement of the problem

The facilitation of capital for private investment requires the availability of domestic savings and in some instances foreign assistance through aid and borrowings. Nevertheless this assertion, Ethiopia was classified, as a lower income country by

the World Bank (IMF, 2017). This classification entailed that the country was qualified as a recipient of foreign aid from the World Bank. However, Ethiopia with its 110 million people, foreign aid will no longer satisfy its demand and as such the country had to heavily depend on the domestic financial system to play the critical role of financial intermediation to provide funds for investment. This, has more than ever, increased the important role that commercial banks had to play in attracting funds from savers for lending purposes.

Despite the important role that the banking sector has to play in the Ethiopian economy, the actual impact that the banking sector has on economic growth has not been systematically questioned. As such, while the total outstanding credit of the Ethiopian banking system increased by 20.4 percent and passed Birr 1.0 trillion mark at the end of June, 2020, and the sector has also been fairly stable and efficient (National Bank of Ethiopia, 2020), the Ethiopian economy has only grown at an average rate of 6.1 percent over the same period. This growth rate is below the targeted annual growth rate of 11 percent, which the government deems appropriate to achieve its vision; a long-term national economic objective, in order to reduce the rate of unemployment and income inequality (National Bank of Ethiopia, 2020). Furthermore, the economic growth rate has even expected to face pronounce economic slowdown in 2021 due to COVID-19 (IMF, 2021).

Moreover, while the government has specifically targeted savings and investments as an important factors to attain the targeted economic growth rate of 11 percent, the banking sector through which these factors are mainly channelled has demonstrated several weaknesses. As such, the Ethiopian banking system is considered to be highly collateral and lacks accessibility to all stakeholders (Tekeste et al, 2019). In addition, banks are profit-driven and would most likely finance

activities that increase their profits with minimal consideration of its impact on the economy; one would wonder whether the commercial banks credit has been channelled to the right sectors of the economy that can propel economic growth.

The problem highlighted above, therefore, necessitates the conduct of this study, which will contribute to the literature with regard to the actual impact that banks development has on economic growth. In this regard, depending on the outcome of the research, this study will contribute to policy initiatives that can bring reform in the banking sector so that banks are given incentives to lend to the sectors of the economy that are productive in order to effectively promote economic growth of the country.

1.3 Objective of the Study

The general objective of this study is:

- to investigate the contribution of banking development on economic growth in Ethiopia.

The Specific objectives are:-

- to investigate the effect of bank sector developments on economic growth.
- to see whether the effect of banking sector development on economic growth depend on the banking development indicators.

1.4 Significance of the study

Ethiopian economy continues to rely on banking resources to meet its financing needs as articulated in the government plan and the policy document pronounced

annually (i.e. the Budget speeches).As stated above an efficient financial system specially banking sector is important to mobilize saving and allocate this resource to investment. Therefore, the finding of this research is expected to provide a comprehensive approach to understand the influence of banking sector development on Ethiopian economy. Furthermore, the result of this study could be used as base for designing proper policy that ensure the contribution of banking sector to the growth of national economy. On the other hand, the study will helps other researchers as a source of reference and as a stepping stone for those who want to make further study on similar area.

1.5 Organization of the Study

The remainder of the article is organized as follows: Section 2 reviews the literature. Section 3 provides the empirical model, and discusses how various hypotheses are tested. Section 4 discusses and analyses the models. Section 5 concludes the paper. Having provided an organization for this article, we proceed to the literature review.

2 LITERATURE REVIEW

The change in banking sector has been believed to be the facilitator of economic growth in developing countries in general terms. Of the greatest concern is whether this argument has significantly reversed. The purpose of this review is to ascertain if there is compelling evidence that demonstrates the differences in the effect of banking development on economic growth. In this section, both theoretical and empirical literature is reviewed.

2.1 Theoretical Literature

This section provides an account of the development of literature on the importance of banking development in promoting economic growth. Most economic growth and banking development linkage studies have focused on the financial repression hypothesis proposed by McKinnon (1973) and Shaw (1973) to explore the pivotal role that financial institutions play in fostering economic growth arguing that the variety in economic growth can be explained by the quantity and quality of service that financial institutions provide in the economy.

The McKinnon (1973) and Shaw (1973) hypothesis argue that if an economy has an efficient financial system, then growth and development can be achieved through efficient allocation of capital. They further argue that, historically, most countries both developed and more especially developing, suppressed competition in their financial sectors through government interventions such as interest rate ceilings, high reserve requirements, and directed credit programs and regulations leading to low levels of economic growth. They believed this to be the case based on the notion that an uncompetitive financial sector leads to lower levels of savings and investments than the levels that could otherwise be achieved in a competitive market.

The other theory on the importance of financial development in promoting economic growth is explained by Schumpeter (1934). Schumpeter (1934) argued that economic development cannot take place naturally but would require an entrepreneur to initiate innovation to replace the old technologies, which he termed as creative destruction. As such, for the entrepreneur to carry out his function and induce economic growth, he would require technical knowledge and banking credit

to purchase goods that he will use to conduct experiments, therefore, leading to innovations and eventually growth.

The endogenous growth model which entails that economic growth is determined by endogenous factors rather than by external forces has two folds, one that considers economic growth to be significantly determined by investments in innovation, knowledge and human capital and the second one that focuses on externalities and positive spillover effects that can lead to economic growth. The role that financial intermediation plays with regard to achieving economic growth have incorporated by several authors such as Levine (1997) and Saint-Paul (1992) in the endogenous growth model, the role of the financial system in determining economic growth.

In sum, the financial repression hypothesis, the Schumpeter model and Endogenous Growth Models have recognized the role of financial development in facilitating economic growth either directly or indirectly; though, there are extensive doubts on the magnitude of the effects and the causal direction between financial (banking) development and economic growth. Having discussed the theoretical background, we will turn to the contemporary empirical debates on the relation between banking sector development and economic growth.

2.2 Empirical Literature

Several studies tend to focus on the causality among financial development and economic growth, with the objective of testing whether financial development is causing economic growth or vice versa (Mohsin S. and Abdelhak S. 2000; Saovanee C, 2006; Ali A, 2012; Sin You, 2013; Rym A 2013; SY H, 2013; Athenia B and

Alfred B, 2014; Abugamea, 2016; Khalil M. et al, 2017;). However, there has been relatively little empirical work evaluating the direct effect of banking sector development on economic growth.

Studies from different countries on the relationship between banking development and economic growth provide an important understanding of this section. A common finding is that the effect of financial development on economic growth is positive, although the size of the effect varies with different indicators of financial development, estimation method, data frequency, and the functional form of the relationship (Mohsin S. et al., 2000; Juzhong Z et al., 2009; Gemma E, 2010; Naima P, 2011; Janice T and Serge M (2017); Biplab K. (2018) and Yohannes A. et al., 2020).

Study by Mohsin S. (2000) has overview the relationship between financial development and economic growth using a range of literature as well as new empirical evidence for large sample of countries. He found that, the effect of financial development on growth is positive, although the size of the effect varies with different indicators of financial development, estimation method, data frequency, and the functional form of the relationship. This argument is also supported by Sy H.(2017).

Likewise, Juzhong Z et al. (2009) reviewed the theoretical and empirical literature on the role of financial sector development, with a view to deepening understanding of the rationale of development assistance to the financial sector of developing countries, and concluded that there are convincing arguments that financial sector development plays a vital role in facilitating economic growth and poverty reduction. Juzhong Z et al. (2009) has clearly mentioned as the effect was supported by overwhelming empirical evidence from both cross-country and

country specific studies.

Gemma E (2010) studied financial development and economic growth in developing Asia using fixed effect panel model approach to account for the unobserved heterogeneity of the countries in the sample and supported the notion that further development of the financial sector matters for sustaining developing Asia growth in the post crisis period. However, the study indicated that the primary role of financial sector development in growth is likely to shift away from mobilizing savings, thus augmenting the quantity of investment toward improving the efficiency of investment, and thereby contributing to higher economy wide productivity.

Moreover, Janice T and Serge M (2017) investigated the impact of financial development on Economic growth using time series data and autoregressive distributed lag model in Cameroon. Having used broad money, deposit/GDP and domestic credit to private sector as indicators for financial development, they confirmed the existence of a positive and long-term impact of financial development on economic growth. Similarly, Naima P (2011) examined the impact of banking sector development in economic sector in developing countries focusing on India using state level panel data for 1999-2008 through fixed effect panel model and Generalized Method of Moment. Naima P (2011) found that there exists strong evidence of banking development-led growth effects. Specifically, she found that, deposits of commercial banks positively affect growth in industry but do not significantly affect growth in agriculture.

Biplab K and Inder S (2018) examined the relationship between financial development and economic growth for five major emerging economies: Brazil, Russia, India, China and South Africa (BRICS) during 1993 to 2014 using banking sector, stock market development; and using a methods called generalized method of

moment system estimation. They found considerable different results between the selected economies, and confirmed that in the presence of turnover ratio, all the selected banking development indicators such as size of financial intermediaries, credit to deposit ratio and credit to private sectors are positively significantly determining economic growth. In the same way Yohannes A. et al. (2020) claimed that financial sector development has played a key role in Ethiopias economic development, particularly since the launching of the first Five-year Growth and Transformation Plan in 2010.

In general, it seems reasonable to hold the view that has supported the sensitivity of the effect of financial (banking) development on economic growth to the indicators banking development, estimation method, data frequency, and the functional form of the relationship. In fact, all of the works discussed so far add greatly to the body of literature in this area and represent some of the most investigation of the effect of financial (banking) development on economic growth. However, each works Mohsin S. et al. (2000), Juzhong Z et al. (2009), Gemma E (2010), Naima P (2011), Janice T and Serge M (2017); Biplab K. (2018) and Yohannes A. et al. (2020) have their own limitation. First, the approaches to measure the bank sector development differ in each research, and each country. Second they have neither mentioned nor used standardized data at all, which may have contributed to the differential in the literature. Other variables included in the models were also different in each research. This leads to different significance level which made it no easy to generalize the effect. Failure to address such problems may lead to biased and inconsistent results of estimation (Angrist and Pischke, 2008). While it is difficult to clearly control all of the problems, this paper will add to the literature by attempting to address them using more general variables to measure the

banking development and using standardized data.

3 Data and Methods

3.1 Data Source

Time series datasets collected from National Bank of Ethiopia (NBE) and World Bank (WB) have been used in this study. These dataset contain the information on prices, monetary variables, fiscal variables, external economic variables and other variables that cover over the period of 1990Q1 to 2020Q4. The main advantage of these datasets is on their abilities to make generalization because of the long periods of temporal ordering and inclusion of the numbers of variables. In this study, only important variables were extracted. While there is no missing observation, only the variables BS (bank size) which measure banks size is started from 2008Q1. Hence, the total observation used in this study for all variables except bank size is 120.

3.2 Description of Study Variables

This study used several variables to find out the effect of banking sector development on economic growth based on plenty of literature. Namely: Gross domestic product (GDP) measure of domestic economy; ratio of credit to private sector to GDP (PSC) measure of financial depth; total credit to deposit ratio (CDR) measure of financial stability; total bank asset to GDP ratio (BS) measure of bank size; trade openness (TO) measure of external economic performances; and the total consumption. The importances of including these variables were briefly described

as follows.

Gross Domestic Product (GDP), which is a measure of a nation economic performance or economic growth in this instance, is used as a dependent variable. The indicators of banking sector development variables such as PSC, BS and CDR are used as core independent variables, where TO and Pcons are used as other control variables. The ratio of bank credit to private sector to GDP (PSC) refers the financial resources provided to the private sector by bank, through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. This measure isolates the impact of the banking sector and represents the financial depth (Saci et al., 2009; Adusei, 2013). It is expected to affect the economic growth positively.

Total credit to deposit ratio (CDR), measure the financial health or bank's liquidity, indicates how much of a banks core funds are being used for lending which is the main banking activity. A higher CDR indicates that the loans disbursed are more than the deposits and vice-versa. This variable is also expected to have moderately positive effect on economic growth. Total bank asset to GDP ratio (BS), another banking development indicator, measure the banking size. Improvement in bank size, will improve credit and then improve the income and it is expected to affect economic growth positively. These three indicators are commonly referred and used in the literature (e.g. Levine, 1997; Biplab and Inder, 2018).

The other control variable are trade openness (TO) and private consumption (Pcons) Trade openness is the sum of import and export divided by GDP. This measures the level of country's openness to international trade and expected to affect economic growth either positively or negatively (Sabina S and Eldin M, 2018). Private consumption, which measures consumer spending on goods and

services, is another important control variable in determining economic growth (Kimberly A, 2020).

3.3 The Model Specification

Following the general approach in the literature, this study applies econometric techniques to examine the relationship between financial development and economic growth. The basic structure of the econometric model, Autoregressive Distributed lag (ARDL) model, closely follows empirical models tested in the literature (for example, King and Levine 1993):

$$\phi(L)Y_t = \alpha + \theta(L)X_t + \lambda(L)Other_t + \epsilon_t \quad (1)$$

Where a number of financial sector development [X] indicators and a number of non financial control variables [Other] are assumed to affect economic growth (Y). Where:

- Y_t is Gross domestic product (measure of economic growth and dependent variable),
- X_t - number of financial sector development indicators.
- $Other_t$ - a number of nonfinancial control variables.
- $\phi(L) = 1 - \phi_1(L) - \dots - \phi_p L^p$ and $\theta(L) = 1 - \theta_1(L) - \dots - \theta_q L^q$,
- ϵ - is the residual term

3.4 The Estimation Strategy

The aim of this study is to investigate the effect of banking sector development and economic growth in Ethiopian. We focused on GDP as an outcome. A natural starting point would be to estimate a model in which the outcome of interest is assumed to depend on expected factors (banking sector development indicators such as CDR, PSC, or BS after controlling for other variables such as Pcons, and TO using conventional ordinary least square. One of the key problem in interpreting such estimates, ignoring the time series nature of data is that, the data on most macroeconomic variables are unstable (non-stationary), and observation may be correlated over time. The order of integration may not be the same as well. Such problems may create serial correlation which leads to spurious or inconsistent estimate (Greene, W. H. 2000). To take into account such effects, the statistical properties of time series data should be examined first and then appropriate model should be used. For this reason, we examined possible indication of non-stationarity of variables using Augmented Dickey Fuller (ADF) test.

Another key problem is comparing observation with different units. Comparing observation of different units may overestimate or underestimate the parameters. Data standardization removes any units from the data (e.g. litres or tones). To ensure that internal data is consistent; each data type needs to have the same content, the same format which we call data standardization. This makes the data easier to track and analyse and to compare. Data is standardized by subtracting mean from each observation and dividing by their standard deviations. The mean of standardized data is 0 and the standard deviation is 1 (Michal and Daniel, 2019). Hence, in this study all variables were standardized and used in the ARDL

model estimation.

Another key problem is that the variables such as CDR, PSC, and BS may take some years to affect the economy. Their effect may not immediate and distributed over some years (Mankiw, 2007). A dynamic single model such as ARDL model is recommended to overcome such problem (Nkoro and Kelvin, 2016). The ARDL model is estimated using maximum likelihood function.

4 Result and Discussion

4.1 Result

Under this section, we present results and discussions. First, data were explored using ADF test statistics and, then models were estimated using ARDL, and finally the estimated coefficients were discussed.

4.1.1 Stationarity Test

Table 1 explores the first steps to identify and to describe the underlying characteristics of observations over time; and whether the means are constant and variances are only dependent on the time lag. We used ADF test at level with intercept and again differenced variables with intercept to show whether such principles hold. The test shows that some variables are stationary at level or in other words some variables are integrating of order 0 or $I(0)$. It means that, these variables have constant mean, and the variances only depend on the time lag without making any transformation only for some variables. The CDR was stationary without differencing at 5 percent significance level. Other variables are found to be stationary

after first difference is applied with intercept, hence, $I(1)$. Therefore, according to this test result, the order of integration is a mixture of $I(0)$ and $I(1)$.

Hence, we can use these variables in ARDL regression model by selecting optimum lag length for the econometric model. After stationarity of the variables were tested, some variables were found non-stationary as mentioned above. To find out whether the none stationary series have long run common trend, Pesaran, Shin, and Smith (2001) bounds test were applied in each models. The result shows that, based on F-test, there is level relationship among non stationary variables (Table 3) which provided us a confidence to make about long run inference.

Table 1: Augmented Dickey-Fuller tests for unit roots

Variables ¹	t-ADF	Lags	Variable	t-ADF	Lags
RGDP	3.02	1.0	Δ RGDP	-12.97***	1.0
PSC	4.5	1.0	Δ PSC	-10.92***	1.0
BS	1.26	1.0	Δ BS	-7.64***	1.0
CRD	-3.1*	1.0	Δ CRD	-4.63***	1.0
TO	-0.65	1.0	Δ TO	-14.73***	1.0
Pcons	11.46	1.0	Δ Pcons	-11.13***	1.0

¹ Note: * Indicates significance at 10 percent, ** indicates significance at 5 percent and *** at 1 percent level.

4.1.2 Model Estimation

Table 4¹ presents our empirical results. For the outcomes 6+7 we present a set of estimates following the strategy outlined under the methods. In the Table 2, we reported the effect of banking development indicators and other control variables on economic growth. The optimum lags length used to estimate the models have been automatically selected and reported under the table 2 foot notes. Moreover, the estimated models were tested for robustness such as misspecification, serial correlation, heteroscedastic and model stability as shown at the end parts of Table 2. For simplicity of interpretation, we present results based on level ARDL model estimation which provides practically significant results.

To explore our results, first we begin with the model (1) in Table 2. This model includes only credit to private sector (PSC) as an indicator for banking development, the other control variables and the lags of PSC and the lags of other control variables. The findings shows that, the first and second lags of GDP, the first lag of private consumption, the PSC and its first and second lags were significantly determining economic growth. Second, the model (2) includes only bank size (BS) among banking development indicators, other control variables and their lags. The findings show that bank size is insignificantly determining economic growth. Among control variables, trade openness, first lag of trade openness,

¹Table 2 reports estimates of the variable used and the model diagnosis tests. The first part shows the estimates and the second part of the table shows diagnosis tests. The response variables for the models are RGDP. These were indicated by column (1), (2), (3) and (4) respectively. The appropriate lag order is ARDL (3 0 3 2) for model (1), ARDL (1 1 3 0) for model (2), ARDL (2 2 3 3) for model (3) and ARDL (2 3 2 2 1 3) for model (4). The second part of a Table shows the diagnostic tests. These are Durbin Watson, Breusch Godfrey LM test for serial correlation, Cameron and Trivedi's decomposition of IM test for Heteroscedastic. Others tests such as Likelihood ratio and Akaike Information criteria were also reported. Cumulative sum test for structural break or parameter stability were also performed for each models and reported graphically in the annex.

and second lag of private consumptions were significantly determining economic growth. Third, the model (3) includes bank credit to deposit ratio (CDR) among banking development indicators, other control variables and their lags. The result indicates that the lag of RGDP, the trade openness and its first and second lags, the first and second lags of private consumption were significantly determining economic growth.

Finally, model(4) includes all indicators of banking development and their lags, other control variables and the lags of other control variables. The findings of this model concludes all results found by each model, model(1), model(2), and model(3). Although, the amount of the effect in model (4) slightly differs from each individual model, the direction and significance levels were almost the same. Hence, model(4) is more or less the final model to be discussed.

Table 2: Results for Estimated Model

Variables ¹	RGDP (1)	RGDP (2)	RGDP (3)	RGDP (4)
RGDP(-1)	0.66***(0.10)	0.94***(0.08)	0.80***(0.12)	0.47***(0.13)
RGDP(-2)	0.500***(0.10)	—	0.12(0.12)	0.46**(0.14)
RGDP(-3)	-0.09(0.072)	—	—	—
PSC	-0.50***(0.05)	—	—	-0.33***(0.08)
PSC(-1)	0.173*(0.08)	—	—	-0.05 (0.10)
PSC(-2)	0.31***(0.06)	—	—	0.25*(0.09)
BS	—	0.09 (0.05)	—	0.08(0.04)
BS(-1)	—	—	—	0.18***(0.04)
CDR	—	—	0.002 (0.01)	0.05*(0.02)
CDR(-1)	—	—	-0.005(0.01)	0.04(0.022)
CDR(-2)	—	—	0.004(0.011)	-0.03(0.02)
CDR(-3)	—	—	—	-0.04 (0.02)
TO	-0.0126(0.02)	-0.21***(0.06)	-0.17***(0.04)	-0.14**(0.04)
TO(-1)	—	0.23***(0.05)	0.16**(0.05)	0.07(0.05)
TO(-2)	—	—	0.08*(0.04)	0.03 (0.04)
TO(-3)	—	—	—	0.104**(0.03)
Pcons	-0.051(0.04)	0.05(0.095)	0.07(0.06)	-0.13(0.05)
Pcons(-1)	-0.09(0.05)	0.02825	-0.22** (0.08)	-0.07(0.06)
Pcons(-2)	0.15**(0.06)	0.23*(0.113)	0.20*(0.08)	0.15**(0.05)
Pcons(-3)	0.03(0.05)	-0.07(0.10)	0.01(0.07)	
Constant	0.078***(0.007)	0.13**(0.04)	0.04***(0.008)	0.27***(0.04)
N	118	49	118	48
r2	0.999	0.992	0.998	0.999
dwatson	1.86	2.16	2.08	1.98
imtest (Chi2(75))	105(0.11)	1.96(0.16)	117(0.12)	48(0.43)
bgodfrey	2.5(0.11)	1.96(0.16)	117(0.12)	0.00(0.99)
sbcusum (Recurs)	0.62(0.85)	0.23(0.85)	0.70(0.85)	0.52(0.85)
likelihoodRatioTest	241.6	64.94	194.7	106.3
AIC	-459.1	-111.9	-363.4	-174.6

¹ NB:Standard errors were in the parentheses and * indicates significant variables at 5 percent level or when $p < 0.05$, ** indicates significant variables at 1 percent $p < 0.01$, *** indicates significant variables at 0.1 percent $p < 0.001$

Table 3: Peseran, Shin, and Smith(2001) bound test

Model ¹	F-test	Critical value				p-value
		1%		5%		
		I(0)	I(1)	I(0)	I(1)	
RGDP by PSC	38.78	4.42	5.81	3.25	4.46	0.00
RGDP by BS	21.38	4.89	6.58	3.45	4.8	0.00
RGDP by CDR	59.39	4.42	5.80	3.25	4.45	0.00
RGDP by PSC, BS and CDR	22.67	4.08	6.14	2.88	4.48	0.00

¹ Note: * Ho: No level relationship.

4.1.3 Model checking (Diagnosis)

The model robustness was checked by testing the estimated model for possible serial correlation, existence of Heteroscedastic, and parameter stability. Existence of significant serial correlation may shows dependency of model residual observations which may invalidate the results. The result from Breusch Godfrey LM (bgodfrey) test for serial correlation does not indicate this issue. Moreover, we have checked for existence of Heteroscedasticity using Cameron and Trivedi's decomposition of IM test. Existence of significant Heteroscedasticity may show non-constancy of error variance over time which may invalidate the results as well. The output from Cameron and Trivedi's decomposition of IM (imtest) test does not indicate this problem. Finally, we have checked for possible existence of structural breaks using cumulative sum test graphically. Existence of structural breaks shows instability in the estimated model. The 95 percent cumulative bands around zero for recursive cumulative sum for each models demonstrates no existence of structural break. Hence, the model is stable. In all cases, we found nothing to change our results.

4.2 Discussion

For the interpretation of the estimated coefficients we relayed on the results in Table 4. In the Table 4, the model (4) fitted the results of RGDP. Since all variables were standardized the coefficients can be interpreted as a one unit change in the predictor variable, the RGDP is expected to change by the value of the regression coefficients. For every one unit increase in units of the significant variables, the RGDP is expected to increase or decrease by approximately the corresponding coefficients. The variables whose p-value < 0.05 were considered statistically significant as noted under the Table. The discussion of the findings are summarized in the following three points.

First, **the lags of RGDP**. Estimate using level ARDL for RGDP show that the first and second lag of the RGDP is positively and statistically significantly (Coefficient= 0.47, 0.46 respectively) determining economic growth even at 0.1% percent significance level, which is very strong. The magnitude of the effect is large in both lags. This generally indicates that the past economic growth influences the current economic status in Ethiopia. A unit change in the first lags of RGDP will likely have a 0.47 point increase in the RGDP, *ceteris paribus*. This finding is consistent to the result of a study in Ethiopia by Ayalew et al. (2010), where it was shown that the lags of economic growth is the main determinants of economic growth. Although the second lag of RGDP is positively and significantly determining the economic growth, its magnitudes and statistical significance is not significantly different from the first lag.

Second, **The banking development**. The banking development is indicated by variables such as PSC, BS and CDR. The credit to private sector (PSC) mea-

asures the banking (financial) depth. This variable is found to have negatively and significantly determining the economic growth. This is expected because it takes time until the received credit is used for the purpose of which its credited for to the production stage. This argument is confirmed by the coefficient by the second lag of PSC (coefficient=0.25) which is positively and significantly determine economic growth. A unit change in the second lags of PSC will likely have a 0.25 point increase in the RGDP, *ceteris peribus*. The other indicator of banking development is bank size (BS). This variable measure the bank assets in determining economic growth. This variables is found to have no significant effect on economic growth as indicated by coefficient 0.08. The final indicator used for banking sector development is credit to deposit ratio (CDR). The CDR (coefficient=0.05) is found to have positively and statistically significantly determining economic growth at 5 percent significance level. A unit change in the CDR will likely have a 0.05 point increase in the RGDP, *ceteris peribus*. This finding is also supported by Mohsin S. (2000), Gemma E (2010), Janice T and Serge M (2017), Biplab K and Inder S (2018).

Finally, **The other control variables.** The trade openness (TO) and private consumption (Pcons) were entered to the model to control for the effect other than the lags of economic growth and banking indicators. The trade openness (TO=-0.14) is negatively and statistically significantly determining economic growth. Since openness composed of import and export, measure the country levels of trading with abroad, it is critical in determining economic growth. The negative effect seen here is due to large import compared to export in Ethiopia. A unit change in the trade openness will likely have a 0.14 point decreases in the RGDP, *ceteris peribus*. The third lag of trade openness is positively and statis-

tically significantly determining economic growth. This is because it takes time imported raw material to use for production and see its value added. Another control variable private consumption ($P_{cons}=0.15$) is found to have positively and statistically significantly determining economic growth at 1 percent significance level. This variable is also very important in determining economic growth. A unit change in the private consumption will likely have a 0.15 point decreases in the RGDP, *ceteris paribus*.

5 Conclusion and Recommendation

5.1 Conclusion

The purpose of this paper was to see the effect of banking development on economic growth in Ethiopia. We explored this issue using data from National Bank of Ethiopia. First the effect was estimated using banking development indicators entered into the models individually and then together using level Auto-regressive distributed lag model (ARDL).

Our key findings are threefold. Firstly, the banking development indicator such as credit to private sector and bank credit to deposit ratio were significantly determining economic growth in Ethiopia. Secondly, banking sector development indicators, credit to private sector, and credit to deposit ratio, were not consistently, statistically significantly determining economic growth. This means they took different times to positively affect the economic growth. For instance credit to the private sector and bank size takes one to two years to affect RGDP in Ethiopia whereas the effect of credit to deposit ratio on RGDP is an immediate, which gen-

erally indicate that, the effect of banking development on economic growth depend on the banking sector development indicators.

It is worth asking if our results are specific only to the case of Ethiopia, or if they have broader application. We hope that the context under investigation is characteristic of the majority of the developing countries. The majority of developing countries experiences the challenges in banking sector. Whatsoever banking development contributes positively to economic growth, although the magnitude of significance depends on the the banking development measures. So, this study area may serves as a case of how banking development can contributed to economic growth.

Due to the paucity of data in the developing countries context, it would be beneficial to pursue additional research in Ethiopia in order to set the most appropriate policies; much remains to be understood about the effect of banking development using some intervention. A drawback here is the lack of dis-aggregated longitudinal data in Ethiopia, which would allow us to see banking development over time and to study how change in access to bank could changed several years after some intervention has been made. Openly, more complete data would be recommended in order to further analyses the effect of different factors on aggregate economy.

5.2 Recommendation

The findings of this study clearly shows that development in banking sector have positive effect on Ethiopian economy. Particularly, the credit to private sector (measure of financial depth) took some years to affect the economy positively, while banking health as measured by CDR took an immediate effect, which provides

message that improvement in banking sector is facilitating economic growth in Ethiopia . Hence, a policies to encourage further development in banking sector is useful in improving to Ethiopian economy.

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Appendix

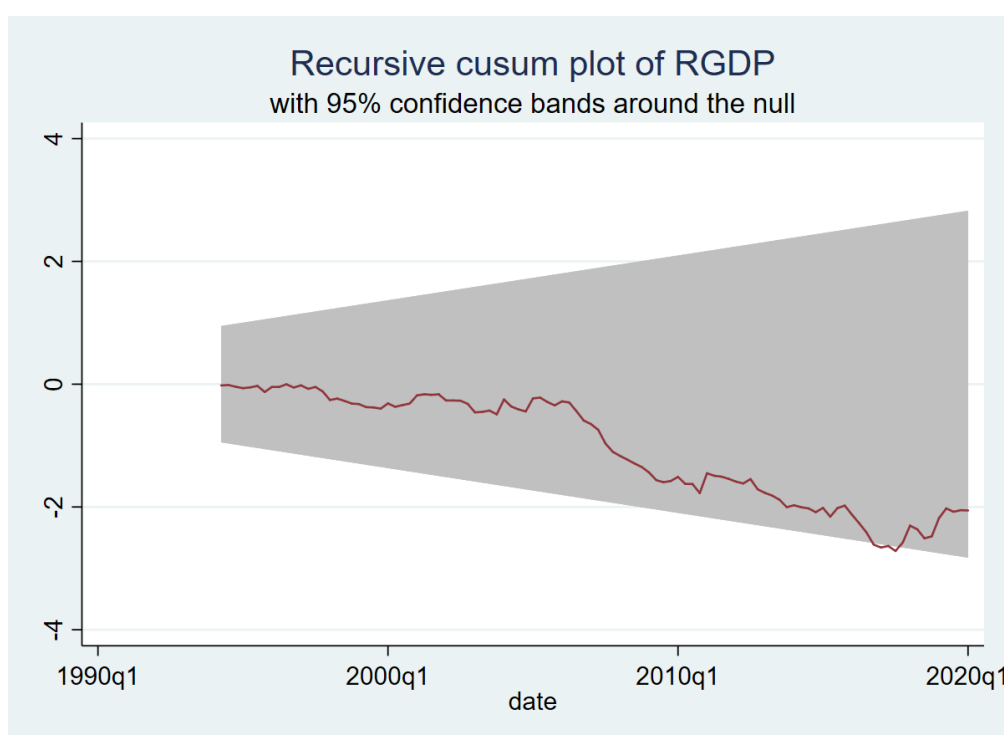


Figure 1: Cumulative Sum Bound test when only PSC is included to the model

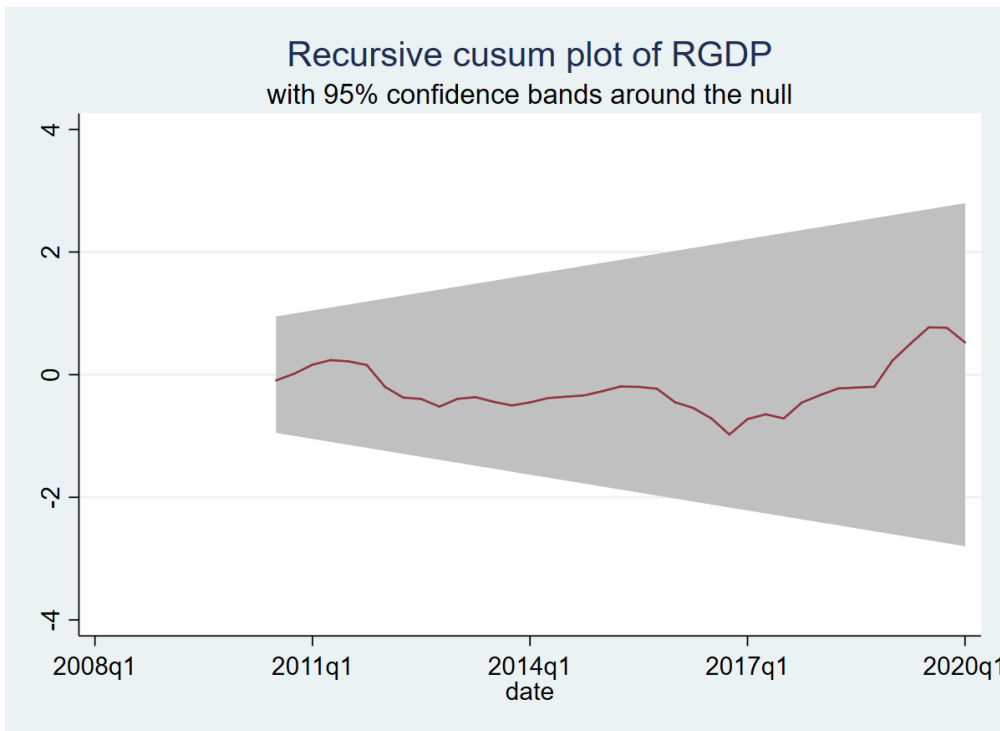


Figure 2: Cumulative Sum Bound test when only BS is included to the model

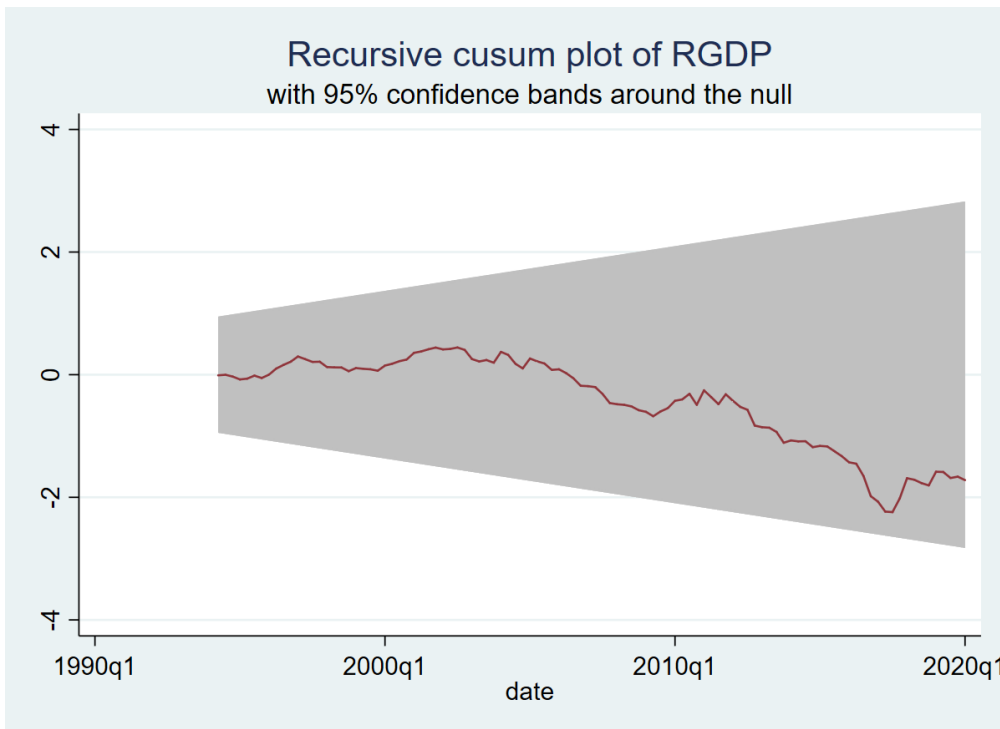


Figure 3: Cumulative Sum Bound test when only CDR is included to the model

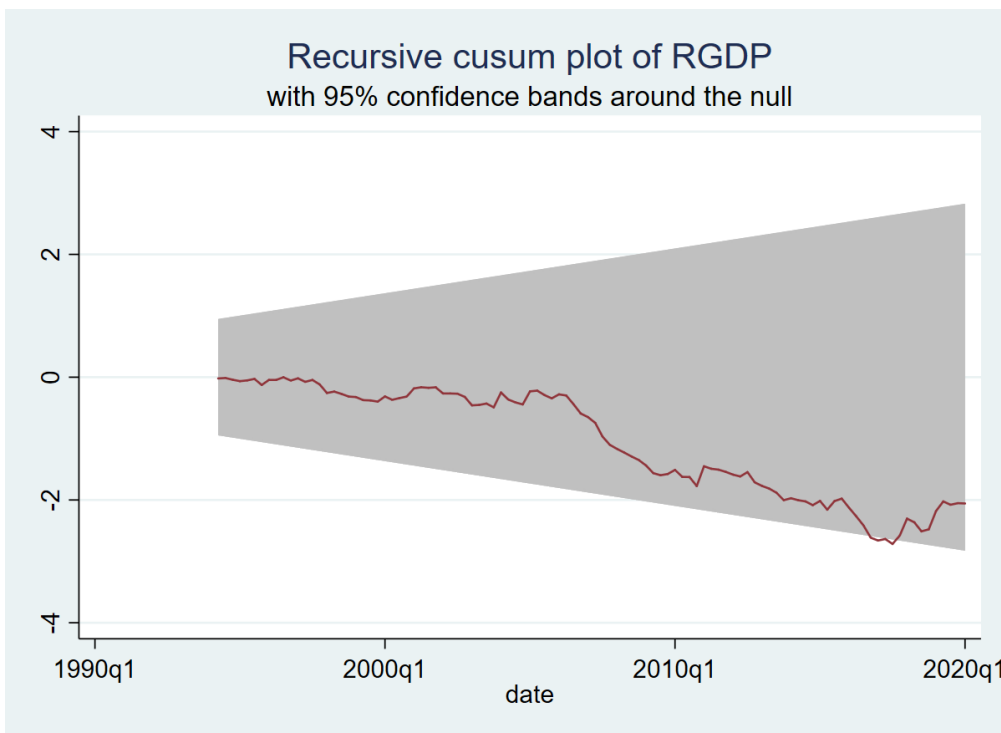


Figure 4: Cumulative Sum Bound test when PSC, BS and CDR are included to the model