



**EFFECTIVENESS OF MONETARY POLICY ON ECONOMIC
GROWTH IN ETHIOPIA**

BY

TILAHUN BINALF

ADVISOR: SISAY DEBEBE (PhD)

June, 2022

ADDIS ABABA UNIVERSITY, ADDIS ABABA

Effectiveness of Monetary Policy on Economic Growth in Ethiopia

**A Thesis Submitted to Post Graduate Studies, Department of
Development Economics, ADDIS ABABA UNIVERSITY, in Partial
Fulfilment of the Requirement for the Degree of MASTERS OF
SCIENCE IN DEVELOPMENT ECONOMICS**

By: Tilahun Binalf

June, 2022

ADDIS ABABA UNIVERSITY, ADDIS ABABA

DECLARATION

I, the undersigned, declare that this Project is my original work and has not been presented for a Master's degree in any other University, and that all sources of material used for this thesis have been duly acknowledged.

Declared By:

Name: Tilahun Binalf

ID: GSE/7441/12

Signature: _____

Date: _____

Confirmed by (Advisor)

Name: Sisay Debebe (PhD)

Signature: _____

Date: _____

Place and date of Submission: _____

STATEMENT OF CERTIFICATION

This is to certify that the Project prepared by Tilahun Binalf entitled “Effectiveness of Monetary Policy on Economic Growth in Ethiopia” and submitted in Partial fulfilment of the requirements for the degree of Master of Science in Development Economics with the regulations of the university and meets the accepted standards with respect to originality and quality.

Advisor: _____ Signature: _____ Date: _____

Examiner: _____ Signature: _____ Date: _____

Examiner: _____ Signature: _____ Date: _____

ACKNOWLEDGEMENT

Above all, I would like to thank almighty God for giving me strength and patient to complete this thesis. I am greatly indebted to my adviser Dr. Sisay Debebe for his professional advice and guidance offered to me throughout preparation of this thesis. I would also like to thank Ato Muluaem Eshete from National Bank of Ethiopia for his valuable comment and support. Finally, my eternal gratitude goes to my family for their unconditional and sustained support.

LIST OF ACRONYMS AND ABBREVIATIONS

ARDL	Auto Regressive Distributed Lag
CPI	Consumer Price Index
ECM	Error Correction Model
GDP	Gross Domestic Product
IMF	International Monetary Fund
NBE	National Bank of Ethiopia
QTM	Quantity Theory of Money
REER	Real Effective Exchange Rate
VAR	Vector auto Regression
WB	World Bank

TABLE OF CONTENT

.....	i
DECLARATION	ii
STATEMENT OF CERTIFICATION.....	iii
ACKNOWLEDGEMENT	iv
LIST OF ACRONYMS AND ABBREVIATIONS.....	v
LIST OF TABLES	viii
LIST OF FIGURES.....	viii
<i>ABSTRACT</i>	ix
CHAPTER ONE	1
1. INTRODUCTION.....	1
1.1. Background of the Study.....	1
1.2. Statement of the Problem	3
1.3. Objectives of the Study	5
1.4. Research Question.....	6
1.5. Scope and Limitation of the Study	6
1.6. Organization of the Study	6
CHAPTER TWO	7
2. LITERATURE REVIEW.....	7
2.1. Definition of Basic Terms	7
2.2. Theoretical Literature Review.....	8
2.3. Empirical Evidence	10
2.4. Conceptual Framework	13
CHAPTER THREE.....	15
3. RESEARCH METHODOLOGY	15
3.1. Research Design.....	15
3.2. Data Types, Source and Method	15
3.3. Method of Data Analysis.....	15
3.4. Model Specification	16
3.5. Model Estimation Procedures	18
3.5.1. Unit Root Test (Stationarity Test).....	18
3.5.2. Selecting Optimal Lag Length	18
3.5.3. Diagnostic Tests	19
3.5.4. Co-integration Test.....	19

3.6.	Definition of variables, Measurement and Hypothesis	20
3.6.1.	Definition of variables and their Measurement	20
3.6.2.	Hypothesis.....	23
CHAPTER FOUR.....		24
4.	RESULT AND DISCUSSIONS	24
4.1.	Descriptive Statistics Results	24
4.1.1.	Ethiopian Economy & Monetary Developments	24
	Source: Own Computation.....	28
4.2.	Econometric Results.....	29
4.2.1.	Pre-Estimation Test.....	29
4.3.	ARDL Long Run and short run (ECM) Dynamics	34
4.3.1.	Long Run Estimates	34
4.3.2.	Analysis of Short–Run Relationships and Error Correction Model (ECM).....	36
4.4.	Post-Estimation Diagnostic Test	37
CHAPTER FIVE.....		39
5.	CONCLUSION AND RECOMMENDATIONS	39
5.3.	Conclusion.....	39
5.4.	Policy Recommendations	40
REFERENCES.....		42
Appendices.....		44

LIST OF TABLES

Table 1: Summary of Determinants of Economic Growth and their expected sign-----	22
Table 2: Descriptive statistics-----	28
Table 3: Unit root test result-----	30
Table 4: The results of standard VAR model-----	31
Table 5: The results of ARDL model-----	32
Table 6: ARDL Bound Test-----	33
Table 7: ARDL long run effect-----	34
Table 8: Short-run relationships and error-correction results-----	36
Table 9 : Breusch-Godfrey Serial Correlation LM Test-----	37

LIST OF FIGURES

Figure 4: Conceptual framework-----	14
Figure 2: trend of real GDP growth rate in Ethiopia-----	25
Figure 2: Trend of contribution of domestic credit to Broad Money-----	27
Figure 3: trend of growth rate of Narrow money, quasi money and broad money-----	27
Figure 6: CUSUM stability test-----	38
Figure 7: CUSUM square stability test-----	38
Figure 8: Normality test-----	38

ABSTRACT

This study examines the effectiveness of Monetary policy on economic growth in Ethiopia using time series data collected from 1990/92-2020/21. To analyse the data both descriptive statistics and econometrics model such as using Autoregressive Distributive lag (ARDL) model were applied. The main findings of the model attested that money supply contributes positively and significantly to economic growth in the short run, while in the long run the opposite is the case. Other independent variables such as gross capital formation and human capital have significant positive impact on economic growth in the short run. Whereas, terms of trade and trade openness have significant negative impact on real GDP in the short run; and insignificant negative impact in the long run. Also, real effective exchange rate, labour force, capital formation, human capital and inflation have positive impact. Total factor productivity, terms of trade and trade openness have negatively affected output in the short run. Besides, The ECM has the expected negative sign with significant coefficient, showing the possibilities of adjustment of 60% of disequilibrium in the subsequent period. The study recommends that the NBE should ensure that the level of money supply growth is consistent with the inflation target and implements a prudent market- driven interest rate policy. And also the Bank should stabilize foreign exchange market and well-functioning money and financial markets should be also developed in the country.

Keywords: Monetary Policy, Economic Growth, Money supply, ARDL, ECM

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

A vital issue to Policy Makers and economist is the special role of money in the economy, due to its stupendous importance as a change in its amount can have a significant effect on the major macroeconomic indicators. Inflation, unemployment, economic growth, exchange rates and vice versa , Ifionu, Ebele & Akinpelumi, Omotayo F.(2015). The convergence between money supply and various Macroeconomic variables has been receiving increasing attention in the field of monetary and financial economics in recent years as Economist and finance scholars differ on the relationship between money supply and various economic variables (Owolabi and Adegbite, 2014).

Money supply is a very sensitive variable - the size and velocity of money supply determines the pace of any economic activity. Apart from being a powerful instrument of monetary policy, its expansion or contraction dictates the growth in investment and output of any economy. The changes in the size of money supply have a number of implications on the macroeconomics variables like inflation and economic growth (George, et al., 2018). The control of money supply is an important policy tool in conducting monetary policy. The success of monetary policy depends on the degree of predictability, measurability and controllability that the monetary authority has over money supply.

The classical monetary theory is the first renowned theory of monetary policy and is enshrined in the Irving Fisher QTM/Quantity Theory of Money, which lays the foundation for the link between monetary policy (money) and economic variables. In this theory, both velocity of money and output are assumed as constant, thus any increase in the quantity of money will only eventually increase prices proportionally. The long run growth was only affected by real factors, and money supply has both short run and long run neutrality (Gali, 2008; Mankiw and Taylor, 2007).

However, viewpoints about the relations between macroeconomic variables as well as effects of money on these variables were changed by Keynes's Revolution (Taher et al., 2015). The Keynesians and Monetarists argue that the money supply has positive relationship with the economic growth. Changes in the money supply, according to the monetarist theory, are the

most essential determining factor of the rate of economic growth and the behaviour of the business progression (Kenton, 2018).

i) Monetary Policy Framework of National Bank of Ethiopia

With regard to monetary policies, NBE has the responsibility of managing the monetary policy of the country. As per NBE's monetary policy framework (2009), the objectives of Ethiopian monetary policies are:

- To foster monetary, credit and financial conditions conducive to balanced and sustained economic growth and development,
- To preserve the purchasing power of the national currency, encourage the mobilization of domestic and foreign savings and their efficient allocation for productive economic activities through the implementation of a prudent market-driven interest rate policy and;
- To facilitate the emergence of financial and capital markets that are capable of responding to the needs of the economy through appropriate policy measures.

To attain its objectives, NBE is operating with the reserve money as operating target and broad money as an intermediate target and both direct monetary policy instruments (credit ceiling and interest rate) and indirect policy instruments (reserve requirement, treasury bills, intervention in the foreign exchange market) are used. Indirect or market-based monetary policy instruments have been advocated to control or influence the supply of and demand for money.

However, the NBE's Monetary Policy and monetary policy implementation is complicated by multiple and sometimes conflicting objectives of the monetary policy framework. The framework comprises monetary aggregate targeting, with a ceiling on reserve money as the operating target. Pricing in the market is determined by a range of administered interest rates, which in no way reflects liquidity conditions in the money market or liquidity and risk premiums. The minimum deposit rate acts as the de facto policy rate, but it is not clear how this rate is determined. Moreover, efforts to channel resources to priority sectors and the government through artificially low interest rates, including through the NBE overdraft facility, "27 percent rule" and regular provision of liquidity to state-owned banks have contributed to faster money growth and high inflation, complicating the achievement of monetary objectives. While there have been caps on bank lending rates in the past, currently banks have the discretion to determine the lending rate on loans and advances and can therefore pass the cost

impact of the “27 per cent rule” and the mandatory minimum reserve requirement rate on to their private sector borrowers. *WB(2019)*

It is self-evident that monetary policy plays an important role in the performance of an economy. The principal objective of the monetary policy of the National Bank of Ethiopia is to maintain price & exchange rate stability and support sustainable economic growth of Ethiopia. Price stability is a proxy for macroeconomic stability which is vital in private sector economic decision on investment, consumption, international trade and saving. Finally, macroeconomic stability fosters employment and economic growth.

Therefore, the aim of this study is to analyse the effectiveness of monetary policy on real GDP in Ethiopia using time series analysis method ranging from 1990/91 to 2020/21.

1.2. Statement of the Problem

While emerging economies are increasingly integrated with the world economy through trade and financial flows, there are unique policy challenges in monetary policy primarily owing to underdeveloped financial markets and institutions. With a well-functioning financial system, changes in the policy rate have a substantial influence upon aggregate demand and thus on the price level, Ila Patnaik, Ajay Shah, and Rudrani Bhattacharya (2011)

The relationship between money supply, output and prices was established by the Pigouvian Cash Balance Equation ‘ $M = k.P.Y$ ’ of Quantity Theory of Money (QTM) in the classical era. Since the classical period, several researches and debates among professionals pertaining to this relationship have revealed the pure complexity association between money, output and prices. Some of the divergent views include Keynes and monetarist economists like Friedman. In contrast to the case with the classical economists, Keynes argues that money creates real impact when idle capacities are available in the economy. He claimed that any additional money balance reduces the rate of interest while enhances investment, and hence output growth.

According to Monetarists’ view, changes in money supply are the most significant determinants of economic growth and the behaviour of business cycle. Therefore, central banks, which control the levers of monetary policy, can exert much power on economic growth, Will K. (2021). Therefore, this shows that there is a theoretical controversy over the impact of monetary policy on output growth.

Numbers of cross country and country specific empirical studies have been conducted in investigating the interaction among monetary policy and economic growth in various countries in attempt to validate the different theoretical stands on money supply and economic growth. However, the studies yielded different results across countries and within a country. For instance, Twinoburyo (2018), David (2020), Ibrahim (2018), Amedero (2019), Thi (2019) , Okoroafor (2020), Montiel (2012) and Buigut (2009) investigated the effect of monetary policy on economic growth and concluded that monetary policy has insignificant or no impact on economic growth. However, Jordan (2020), Chinuba, Akhor, & Akwaden (2015), Tamirat & Singh (2019), Marshal (2017) and Ahmad (2016) revealed that a positive and significant impact of monetary policy on economic growth.

In the case of Ethiopia, studies conducted by Tekilu & Tesfaye (2019), Zerayehu (2014), Tamirat & Singh (2019), Nuru (2013) showed that monetary policy has positive and significant effect on output growth of the country. In contrary, Yeshiwas (2021) and Tewoldebrehane (2010) found empirical evidence suggesting the absence of long run effect of monetary policy on output growth in Ethiopia. Girma (2020), on the other hand, revealed that monetary policy has mixed result: in the long run money supply and unemployment rate have positively affected real GDP growth rate, while domestic credit, interest rate and inflation have negatively affected the growth. Hence, this shows the existence of theoretical and empirical inconclusiveness on the subject matter.

In addition to the theoretical and empirical inconclusiveness on the subject matter, the other main driving factors to study the effect of monetary policy on economic growth in Ethiopia are: *Firstly*, the earlier empirical studies examining the effectiveness of monetary policy in Ethiopia in different periods employed broad money (M2) as a proxy variable representing monetary policy. However, NBE's monetary policy framework (2009) states that broad money (M2) in Ethiopia cannot be directly controlled or influenced by the monetary authority (NBE). This implies that M2 cannot capture the exact impact or effect of monetary policy action of the NBE. According to the framework of the Bank, the economic variable that the NBE influences/controls on a day to day basis through its monetary policy instrument (i.e, via base money or reserve money) is the domestic credit of the banking system. This has also been suggested by other researchers such as Zerayehu (2014) and Mengesha (2015). In his studies, Zerayehu examined monetary policy and macroeconomic shocks in Ethiopia and considered domestic credit as the most appropriate indicator of monetary policy performance. The most determinant of broad money (M2): *domestic credit (DC) and net foreign asset (NFA)* are

preferable instead of broad money, but, according to the researcher, the net foreign asset is not under the fully control of Ethiopian Monetary authority and hence, to measure the effectiveness of monetary policy action of NBE, this study has used data of domestic credit for broad money supply since more than 95 percent contribution to broad Money (M2) comes from its main component: domestic credit, *NBE (2021)*. Therefore, this study takes data of domestic credit and denotes it as broad money (M2).

Secondly, previous studies¹ that have been conducted in both in Ethiopia and other countries used only monetary variables (money supply, exchange rate, reserve requirement, interest rate and inflation rate) as independent variables influencing the economic growth in Ethiopia. Other relevant economic variables that can affect the growth of aggregate output (GDP) are not considered. In this study, relevant and potential variables such as capital investment, total labour force, human capital, real effective exchange rate, trade openness, and terms of trade, total factor productivity will be considered.

Therefore, this study attempts to fill these gaps by capturing more economic variables that have potential influence on GDP growth and measuring the effectiveness of NBE's monetary policy action on GDP using domestic credit of the banking sector as a proxy variable of money supply.

1.3. Objectives of the Study

➤ General Objective

The overall objective of the study is to analyse the long run and short run effectiveness of monetary policy on economic growth in Ethiopia.

➤ Specific Objectives :

- To assess the relationship between growth of money and real GDP in Ethiopia
- To show how national Bank of Ethiopia affects the economy through domestic credit

¹ Jordan (2020), Tamirat & Singh (2019), Marshal (2017) and Ahmad (2016) Twinoburyo (2018), David (2020), Ibrahim (2018), Amedero (2019), Thi (2019) , Okoroafor (2020), Montiel (2012), and Buigut (2009) , Mehare (2021), Yeshiwas (2021), Tadesse & Melaku (2019), Tamrat & Singh (2019), Tesfaye (2018), Girma (2020), and Alemayehu (2015) , Temsgen (2014)

1.4. Research Question

- Is the effectiveness of monetary policy significant on economic growth in Ethiopia?

1.5. Scope and Limitation of the Study

The study is confined to the effectiveness of monetary policy on economic growth in Ethiopia. It covers 31 years annual data period from 1990/91 – 2020/21. The variables that treated in the study are: Real gross domestic product as dependant variable and capital investment, total labour force, human capital, Broad money (M2) or Domestic credit, consumer price index, real effective exchange rate, trade openness, terms of trade and total factor productivity as independent variables. Inconsistencies of data of the same variable collected from different institution may affect the quality of the study.

1.6. Organization of the Study

The main study is structured as follows: chapter one provides the introduction part: research background, research objectives, and significance of the study, scope, and the limitations of the study. The second chapter presents both theoretical literature and empirical evidences on the relationship between monetary policy and economic growth. Chapter three describes the methodology employed and data description and sources. The empirical findings and empirical analysis is discussed in chapter four. The last chapter attempts to conclude and recommend relevant policy remarks.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Definition of Basic Terms

By its very nature the concept of economic growth and economic policy is complex and broad. For clear understanding about them, it is important to explain some concepts of main macro variables.

Real Gross Domestic Product (RGDP): it is aggregate measure of the size of an economy adjusted for price changes. Gross domestic product (GDP) is the value of all final goods and services produced in the country for a given period of time measured in local currency. The market value of GDP depends on the actual quantity of goods and service produced and their price

Money supply: it is defined from its narrow and broader sense. In general, money supply is defined as to the total volume of money in the economy at a particular point in time and it includes actual notes and coins, and any deposit which can be quickly converted into cash. The IMF's monetary and financial statistics manual (2000) indicated that money supply is measured as the combined deposit liabilities of the banking system and the currency liabilities of the central bank, both held by households, firms, nonprofit institutions and all public sector entities outside of the central government. In this official or standard representation of money supply, there are three monetary aggregates delineated: Base money, narrow money and broad money.

According to the monetary policy framework of Ethiopia published in 2009, NBE takes the broader definition of money or M2 as money supply.

Broad money: Broad money supply (M2) is, as stated in the monetary policy framework of Ethiopia, a measure of domestic money supply that includes M1 (Narrow money) plus quasi-money, oversight purchase agreement, and personal balances in money market account. Factors influencing broad money are domestic credit (claims on central government and claims on non-central government: financial & non-financial intuitions) and net external assets. And domestic credit is the major determinant of monetary expansion in Ethiopia.

Narrow money: is a measure of money stock intended primarily for use in transaction. It consists of currency held by the public, traveler's checks, demand deposits and other checkable deposit.

Quasi money: According to World Bank country economist's definition, quasi money is the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings and foreign currency deposits of resident sectors other than the central government.

Velocity of money: The velocity of money is number of times per unit of time; such as a year, the typical piece of money turns over' (Robert J. Barro, 106)

Domestic credit: Domestic credit refers to financial resources provided to the government & through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment (Knoema, world data atlas, 2008). It is a financial loan (claim) provided to the central government and non-central government (financial institutions), NBE (2009). Domestic credit is the most appropriate indicator of monetary policy performance in Ethiopia as M2 is not fully under the control of the central Bank (Zerayehu, 2014).

2.2. Theoretical Literature Review

There are various theoretical thoughts relating to the nexus between money supply and economic growth. The major theories are discussed below:

➤ **The classical quantity theory of money** associated with early economists such as Fisher and Say, assumes that money supply is exogenously determined so that the causation between money supply and price is only in one direction. This theory believes that real variables of the economy do not depend on the quantity of money in circulation. Therefore, money does not play any role in the determination of output, employment, and income of an economy. This implies that the quantity of money is the main determinant of the price level. Any change in the quantity of money produces an exactly proportionate change in the price level. The Fisher's equation of exchange positions that the quantity of money multiplied by the velocity of money is equal to the price level multiplied by the number of goods sold. It is often simulated as $MV = PQ$, M is defined as the quantity of money, V is the velocity of money (the number of times in a year that a currency goes around to generate a currency worth of income), P represents the price level and Q is the real output (Gatawa et al., 2017).

- **The Cambridge School of Economic Thought**, based on the cash balance approach, argued that the money supply is equal to the fraction of income in cash form together with the price level (P) and real output (Q). Thus, the money supply model is expressed as; $M=k.PQ$. If money increases people will accumulate excess balance, spends more, and as a result increase in the price level given the output. Neo-classical economists examine the role of money in economic activity. Solow's model uses a production function approach to measure the role of money. Output in this model is a function of capital stock, labor force, and technology. The model concludes that in the long-run output growth depends on capital available per worker and thus, an increase in saving mobilization increases capital per capita and hence output and income in the economy. Therefore, Solow's model says that money is not relevant in economic growth because the output does not depend on monetary growth rather it depends on per capita capital. So, money is neutral.
- **Patinkin's Real Balance Theory**, unlike previous theories, argues that change in money supply leads to change in price level and output and employment; money has a neutral role in the economy. **Keynes** also disagrees with the older quantity theorists on their conclusion that there is a direct and proportional relationship between the quantity of money and prices. He made it clear that the effect of change in the quantity of money on prices is indirect and non-proportional and changes in the money supply affect only the absolute price level but exercise no impact on the relative price level. Keynes believes that so long as there is unemployment, the output will change in the same proportion as the quantity of money and there will be no change in prices; and when there is full employment, prices will change in the same proportion as the quantity of money (Paul, 2015).
- **The Monetarist**: led by Milton Friedman claim that in the long run, the effect of expansion in money supply is primarily on the price level and other nominal variables. The level of economic activity in the real term that is level of employment and real output is determined by a real factor such as capital stock, state of technology, size, and quality of labor force. However, in the short-run change in money is the dominant factor causing cyclical fluctuations in output and employment. An increase in money supply in the short-run is divided into between the rise in price level and increase in real income depending on the elasticity of the short-run aggregative supply curve (Ahuja, 2017).

Therefore, since the objective of this study is to analyse the long run and short run effect of monetary policy on economic growth in Ethiopia, the theoretical basis of monetarists' view is applied. According to the monetarist view, money supply is the driver of economic growth, there is a direct link between money supply and economic growth (Khabo, 2002).

2.3. Empirical Evidence

Monetary policy has a great role in bringing macroeconomic stability and hence various researchers have tried to see those roles as well as the linkage between monetary policy and economic growth. Extensive works have been done in an attempt to examine the impact of monetary policy on economic growth, yet with little consensus among studies.

➤ Cross Countries Empirical Review

Twinoburyo (2018) applying auto regressive distributed lag (ARDL) bonds-testing approach on time series data ranging from 1975 to 2013 investigated the impact of monetary policy on economic growth in Tanzania. The study used two proxies of monetary policy, namely, money supply and interest rate, to examine this linkage. The empirical results of this study revealed no impact of monetary policy on economic growth in the long term. The same result was corroborated by Montiel (2012) who estimated the Monetary Transmission Mechanisms in Tanzania covering the period 2002m1–2010m9 using both recursive and structural VAR.

David (2020) studied the influence of monetary indicators on domestic investments and growth of Nigerian economy from 1970-2018 using ARDL Model. The result reveals that monetary policy variables such as the Naira Dollar Rate, Commercial Bank Lending Rate and economic growth rate did not have any significant impact on Nigeria's private domestic investment. In contrary, Marshal (2017) studied the link between money supply and economic growth in Nigeria by applying VAR modelling mechanism in a simple regression framework. The finding of the study showed that money supply (M2) has a short and long run positive and significant link on real gross domestic product in Nigeria. Sulaiman, Migiro and S.O. (2014) conducted a study on 'the nexus between monetary policy and economic growth in Nigeria suing the time series data from 1981 to 2012. The study revealed monetary policy has a noticeable influence on the growth of the economy. Similarly, Chuku,(2009) measured the effects of monetary policy innovations in Nigeria using a structural vector auto regression (SVAR) model. The finding showed that monetary policy innovations carried out on the quantity-based nominal anchor (M2) has modest effects on output and prices with a very fast speed of adjustment. In contrary, Omedero (2019) analysed the joint and individual influences of money supply mechanisms on economic growth in Nigeria and Ghana by employing data from 2009 to 2018 using OLS regression techniques and the findings reveal that broad money (M2) has an insignificant negative influence on real GDP of Nigeria. But in Ghana the impact is significant and positive.

Buigut (2009), using recursive vector autoregression (VAR) on annual data from 1984 to 2005, examined monetary transmission mechanisms in Uganda, Kenya, and Tanzania. The results revealed that an interest rate (monetary policy variable) shock has no effect on inflation and economic growth in all three countries. Ibrahim (2018) also found that central bank rate does not have a significant impact on the Kenyan economy. The study also established a significant and negative correlation between open market operation and real GDP.

Manpreet Kaur, Sunanda (2020) analysed the impact of monetary policy on Indian economy using ten years data. In this study GDP was dependant variable and inflation, FDI, unemployment rate and policy rate are considered as independent variables and the study revealed that monetary policy matters for Indian economy both in the short run and long run. N. M.Gatawa , Akinola Abdulgafar, Muftau O. Olarinde (2017) examined the impact of money supply, inflation, and interest rate on Economic Growth in Nigeria using time series data from 1973-2013. VAR Model and Granger Causality test within error correction framework were used. The results of the VEC model provides an evidence in support of a positive impact of broad money supply while inflation and interest rate exhibits a negative impact on growth most especially in the long run. The short run parsimonious results revealed that with the exception of inflation, broad money supply and interest rate were negatively related to economic growth.

Ichiro Iwasaki (2020) applied a meta-analysis using 45 studies conducted between 2001 and 2014 to investigate the output effects of monetary policy in 32 emerging and developing Countries. The outcomes revealed that monetary policy has a negative real effect on output. Twinoburyo & Odhiambo (2018) explored both theoretical and empirical literature on the relationship between monetary policy and economic grow. The findings of this paper show that the relationship tends to be weaker in developing economies with underdeveloped financial markets and weakly integrated into global markets. The study has also revealed that the relationship between monetary policy and economic growth is largely explained by; inter alia, the size of and competition within the financial sector, the monetary and exchange rate regimes, and the degree of openness. This paper concludes that monetary policy matters for growth both in the short-run and long-run despite the prevailing ambiguous relationship.

Mahara (2021) investigated the association between money supply, inflation, capital expenditure and economic growth in Nepal by applying ARDL approach to co-integration to check the relationship between the above variables. The result showed there is a significant long-run positive relationship between money supply, capital expenditure, and growth. The findings also revealed that there is a unidirectional causation from money supply and capital

expenditure to real economic growth in Nepal. Jordan (2020) adopted multivariate econometric method to test the impacts of money supply on economic growth of Sri Lanka. According to the analytical results, money supply has kept positive impact on the economic growth of Sri Lanka.

Ahmad (2016) examined the impact of monetary policy on the economic growth of Pakistan using annual time series data from 1973 to 2014. The study used ARDL co-integration approach and concluded that there is a positive long-run effect of money supply on economic growth. Chinuba, Akhor, & Akwaden (2015) used time series data to study the impact of money supply on economic growth covering 1981-2008 with simple OLS on the Nigeria economy, the results showed that money supply exerted a considerable positive impact on economic growth

➤ **Empirical Reviews on Monetary Policy & Economic Growth Ethiopia**

Yeshiwas (2021) examines the impact of money supply on Real GDP of Ethiopia using a time series data from 2002-2017 by employing Vector Autoregressive model. The study revealed that broader money supply has positive significant effect on real GDP and statically significant at 5 percent level.

As Desta, (2009) stated that, there was an increase in broad money supply in Ethiopia and bank credit has been increased. From 2002 to 2006, Ethiopia's real GDP increased by 6.8 percent. Rather than adjusting the money stock with the change of GDP, the country's money supply grown by about 18 percent, contributing to an average 12 percent increase in the rate of inflation. He also argues that if a nation achieves full employment, it is possible to assume that economic growth is likely to precipitate an inflationary situation.

Tamirat & Singh (2019) applied ARDL model to see the Effectiveness of Monetary Policy on industrial growth of Ethiopia using annual data ranging from 1974-75 to 2016-17. The study revealed that, in the long-run, the growth in money supply, domestic inflation and the logarithm of nominal exchange rate determines the growth of Ethiopian industry.

Zerayehu (2014) analysed the monetary policy and macro-economic shocks in Ethiopia using Vector Autoregressive Error Correction (VECM) co-integration VAR model and concluded that both net foreign asset and GDP are statistically significant and positively influence domestic credit in the long run dynamics model.

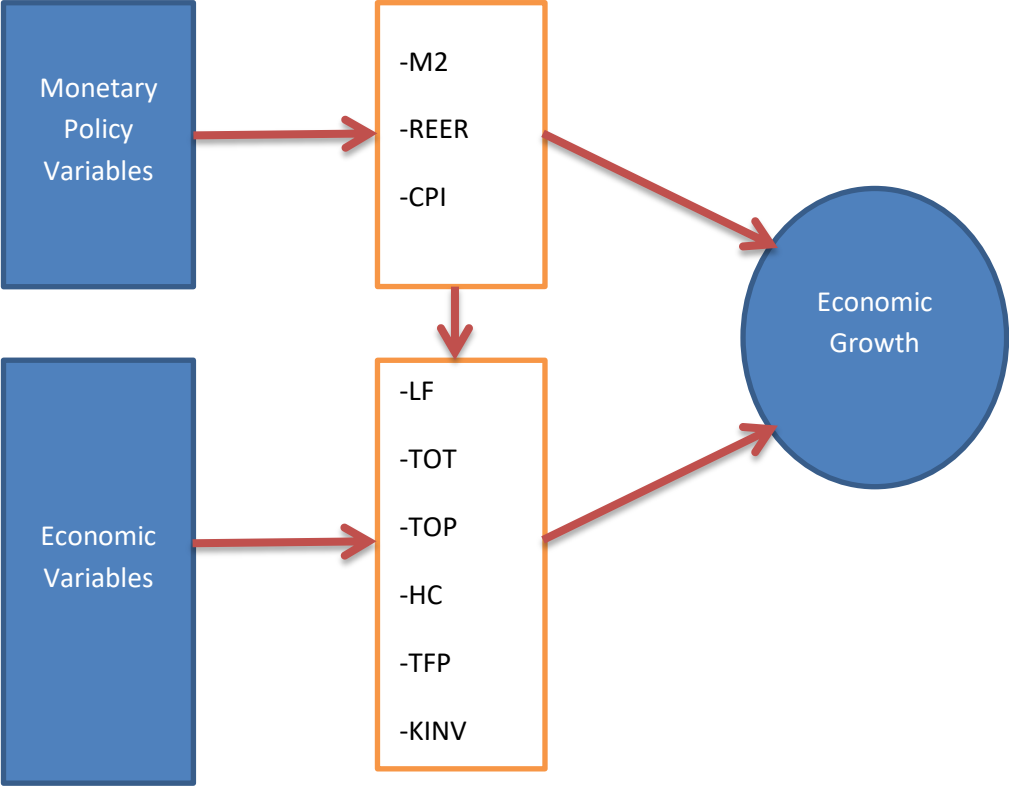
Tadesse & Melaku (2019) analysed the relative impact of monetary and fiscal policies on economic growth in Ethiopia, using ARDL approach to co-integration the time spanning from 1975 to 2017. The study indicated that that fiscal policy is more effective than monetary policy in influencing Real GDP in the long-run. However, in the short run, the fiscal policy is effective while that of the monetary policy proxy by money supply is ineffective in affecting output growth in Ethiopia.

Alemayehu (2015) structural vector auto regression (SVAR) approach was used to empirically investigate the effects of monetary policy shocks on output and prices in Ethiopia. The result showed that price-based nominal anchors (Interest rate and REER) have an effect on real output, a modest effect of the lending rate while a significant effect of REER is documented, with a slightly faster speed of adjustment. Similarly, innovation in the quantity based nominal anchor (M2) affects economic activities significantly. In contrary, Girma (2020) examined the effect of monetary policy in Ethiopia during the period from 1970 to 2011 using Autoregressive Distributive lag (ARDL). The main findings of the model attested that money supply and unemployment rate have become significant and positively affecting real GDP growth, while domestic credit, interest rate and inflation are found significant and negative impact on GDP growth in the long run. Besides, the ECM model result shows that money supply emerged statistically significant and negatively related to the real GDP growth rate.

2.4. Conceptual Framework

The conceptual framework is intended to develop how the monetary policy would affect economic growth in Ethiopia. Awareness Creation and understanding of the situation under scrutiny is very important to ease communication on effect transmission mechanism. In other words, conceptual framework involves forming ideas about relationships between variables in the study. Hence, the conclusion is drawn depending on existing relationship between variables identified. This study adopts the conceptual framework shown in as shown below in diagram.

Figure 1: Conceptual Framework



CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Research Design

The study uses quantitative research approach to investigate the effect of monetary policy on economic growth. Autoregressive Distributed Lag (ARDL) approach to cointegration developed by Pesaran (1997) and subsequently redeveloped bounds testing approach by Pesaran, Shin, & Smith (1999, 2001) is adopted. The ARDL approach is chosen due to its comparative advantages over other co-integration approaches such as the Engle & Granger (1987), Johansen & Juselius (1990, 1992) and Johansen (1995). While these approaches require variables to be integrated at first difference order, $I(1)$ and must assume equal lag length in the model, ARDL method was developed to avoid these requirements due to the unreliability of the existing unit roots tests use in determining the integration order of the variables (Duasa, 2007). ARDL approach has been proven to be robust in small sample, estimating and testing hypothesis of long run coefficients of underlying variables irrespective of whether they are all integrated at level, $I(0)$, at first difference, $I(1)$ or mixed (Pesaran, 1997), it therefore devoid of pretesting problem. It is applicable to small sample size ranging from 30 to 80 observations (Narayan, 2004 & 2005) and (Wolde-Rufael, 2010). The approach, therefore, becomes suitable to my study considering a sample size of 31 observations.

3.2. Data Types, Source and Method

Annual time series data were collected on the identified variables such as Real Gross Domestic Product (RGDP), broad money (M2), gross capital formation, labour force, consumer price index, real effective exchange rate index, total factor productivity, human capital, terms of trade and trade openness ranging from 1990/91 to 2020/21 from National Bank of Ethiopia, Ministry of Planning & Development, Ministry of Labour and Skill and World Bank.

3.3. Method of Data Analysis

Both descriptive and econometric analyses of estimation technique are employed in this study to determine the effectiveness of monetary policy on the economic growth of Ethiopia. The descriptive analysis depicts the graphical visual of relations between variables. Whereas, the econometric analysis shows the statistical relationship, effects or impacts of independent variables on the dependant variable considered in the study.

3.4. Model Specification

The aim of the model is to capture the effectiveness of monetary policy on economic growth indicating variable (real GDP) which is stated below with the independent variables *broad money supply, gross capital formation, labour force, consumer price index, real effective exchange rate index, human capital, total factor productivity, terms of trade and trade openness* using **standard growth function**:

$$Y = f(k, l) \dots\dots\dots(3.1)$$

Since the growth function consists only of physical capital and labour and does not include human capital and other important variables that affect output. This study includes those missing economic variables and hence, the ARDL bounce test approach of Pesaran, Shine & Smith (2001) has been employed in an attempt to establish the effectiveness of monetary policy on economic growth in Ethiopia. After incorporating the relevant variables in the above equation (3.1), the following mathematical model is constructed for analysis:

$$\lnrgdp_t = \beta_0 + \beta_1 \lnreeri + \beta_2 \lnm2 + \beta_3 \lnlf + \beta_4 \lnkinv + \beta_5 \lnhc + \beta_6 \ln cpi + \beta_7 \ln tfp + \beta_8 \ln top + \beta_9 \ln tot + \varepsilon \dots\dots\dots (3.2)$$

Where, *rgdp* is real gross domestic product, *reeri* is real effective exchange rate index, *M2* is broad money supply, *lf* is labor force, *kinv* is gross capital formation, *hc* is human capital, *cpi* is consumer price index, *tfp* is total factor productivity, *tot* is terms of trade and *top* is trade openness. β_s , ε and *ln* denote coefficients of variables, stochastic error term, the natural logarithm of the corresponding variables respectively.

Since, the study employs an Autoregressive Distributed Lag Model (ARDL) approach to cointegration to estimate the model stated in equation (3.2). The ARDL model is specified as:

$$\begin{aligned} \Delta \lnrgdp = & c + \beta_1 \lnrgdp_{t-1} + \beta_2 \lnreeri_{t-1} + \beta_3 \lnm2_{t-1} + \beta_4 \lnlf_{t-1} + \beta_5 \lnkinv_{t-1} + \\ & \beta_6 \lnhc_{t-1} + \beta_7 \ln cpi_{t-1} + \beta_8 \ln tfp_{t-1} + \beta_9 \ln top_{t-1} + \beta_{10} \ln tot_{t-1} + \sum_{i=1}^p \alpha_{1i} \Delta \lnrgdp_{t-1} + \\ & \sum_{i=1}^p \alpha_{2i} \Delta \lnreeri_{t-1} + \sum_{i=1}^p \alpha_{3i} \Delta \lnm2_{t-1} + \sum_{i=1}^p \alpha_{4i} \Delta \lnlf_{t-1} + \sum_{i=1}^p \alpha_{5i} \Delta \lnkinv_{t-1} + \\ & \sum_{i=1}^p \alpha_{6i} \Delta \lnhc_{t-1} + \sum_{i=1}^p \alpha_{7i} \Delta \ln cpi_{t-1} + \sum_{i=1}^p \alpha_{8i} \Delta \ln tfp_{t-1} + \sum_{i=1}^p \alpha_{9i} \Delta \ln top_{t-1} + \\ & \sum_{i=1}^p \alpha_{10i} \Delta \ln tot_{t-1} + \varepsilon_t \dots\dots\dots (3.3) \end{aligned}$$

. Where,

c = constant term, *p*= optimum lag length, *t-1*= the lag length of the variables, Δ =difference operator, β = is coefficients of long run variables, α = coefficient of short run variables

At first, equation (3.3) is estimated to compute F-statistic that will be compared with two sets of critical F-statistic called lower bound I(0) and upper bound I(1). The null and alternative hypothesis related to the cointegration test is: $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = 0$ indicating no cointegration among the variables and the alternative hypothesis is: $H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq \beta_9 \neq \beta_{10} \neq 0$ indicating cointegration among the variables.

If the F-statistics exceeds the upper critical values, the null hypothesis indicating no long run relationship can be rejected, whereas if the test statistics falls below the lower bound of critical values, the null hypothesis cannot be rejected indicating no long run relationship among the variables. If the calculated value lies between lower and upper bounds, the decision about the cointegration becomes inconclusive (Pesaran et al., 2001). Upon having favourable results from the cointegration test, the following **long run or level form equation** is estimated:

$$\begin{aligned} \Delta \ln \text{rgdp}_t = & \theta_1 + \sum_{i=1}^n \lambda_{2i} \ln \text{reeri}_{t-1} + \sum_{i=1}^n \lambda_{3i} \ln \text{m2}_{t-1} + \sum_{i=1}^n \lambda_{4i} \ln \text{lf}_{t-1} + \sum_{i=1}^n \lambda_{5i} \ln \text{kinv}_{t-1} + \\ & \sum_{i=1}^n \lambda_{6i} \ln \text{hc}_{t-1} + \sum_{i=1}^n \lambda_{7i} \ln \text{ncpi}_{t-1} + \sum_{i=1}^n \lambda_{8i} \ln \text{tfp}_{t-1} + \sum_{i=1}^n \lambda_{9i} \ln \text{top}_{t-1} + \\ & \sum_{i=1}^n \lambda_{10i} \ln \text{tot}_{t-1} + \gamma_{2i} \text{-----} \quad (3.4) \end{aligned}$$

After estimating the long run coefficients based on the above equation (3.4), we need to extract the residuals (ecm) from the outcome of the long run estimates and estimate the error correction model. Therefore, the Error Correction Model (ECM) or the short run dynamics is specified as:

$$\begin{aligned} \Delta \ln \text{rgdp}_t = & \mu_1 + \sum_{i=1}^n \sigma_i \Delta \ln \text{rgdp}_{t-1} + \sum_{i=1}^n \delta_{1i} \Delta \ln \text{reeri}_{t-1} + \sum_{i=1}^n \delta_{2i} \Delta \ln \text{m2}_{t-1} + \sum_{i=1}^n \delta_{3i} \Delta \ln \text{lf}_{t-1} + \\ & \sum_{i=1}^n \delta_{4i} \Delta \ln \text{kinv}_{t-1} + \sum_{i=1}^n \delta_{5i} \Delta \ln \text{hc}_{t-1} + \sum_{i=1}^n \delta_{6i} \Delta \ln \text{dc}_{t-1} + \sum_{i=1}^n \delta_{7i} \Delta \ln \text{ncpi}_{t-1} + \sum_{i=1}^n \delta_{8i} \Delta \ln \text{top}_{t-1} + \\ & \sum_{i=1}^n \delta_{9i} \Delta \ln \text{tot}_{t-1} + \phi \text{ECM}_{t-1} + v_{3i} \text{-----} \quad (3.5) \end{aligned}$$

Here, the coefficient of error-correction term (ECM) denotes speed of adjustment. That is, it shows how much of the disequilibrium from the previous period gets corrected in each period to make the model converge to the long run equilibrium. The estimated coefficient on ECM must be negative.

3.5. Model Estimation Procedures

3.5.1. Unit Root Test (Stationarity Test)

To check whether the variables being considered in the model are not order two, I(2), is the necessary condition to be addressed for testing unit root test. Therefore, before running a regression analysis, this study is testing unit root or stationarity of the variables.

A stochastic process is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time 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. If a time series is not stationary in the sense just defined, it is called a nonstationary time series. In other words, a nonstationary time series will have a time varying mean or a time varying variance or both (Gujarati, 2004).

This study applied the ADF test to determine the existence of a unit root for its reliability, accuracy and resourcefulness. The testing procedure for the ADF unit root test is specified as follows:

$$Y_t = \beta + \delta_t + \rho Y_{t-1} + \alpha \sum_{i=0}^n \lambda \Delta X_{t-1} + \varepsilon_t \text{ ----- (iv)}$$

Where, X_t a time series variables included in this model at time t, t is the time trend, Δ is the difference operator ρ is the error term and ε_t is the white noise and n is the optimal length of each variable. The null (H_0) and alternative hypothesis (H_1) are expressed as:

$$H_0: \rho = 0; H_1: \rho \neq 0 \text{ ----- (v)}$$

Decision rule: if the t-statistics is less than 0.05, the null hypothesis is rejected and the conclusion is that the series is stationary. Conversely, if the t-value is more than 0.05, the null hypothesis is accepted and the conclusion is that the series is non-stationary. Failure to reject H_0 of the unit root test leads to take the test on the difference of the time series to come up out with stationary variable for analysis.

3.5.2. Selecting Optimal Lag Length

The optimal lag length of time series data should be taken into account during modeling the data. Economists suggest the use of information criteria such as Akaike Information Criteria, Schwarz Bayesian Criteria and Hanan-Quinn Criteria (HQC) are used to determine the optimal lag length.

3.5.3. Diagnostic Tests

In order to select appropriate model, we must go through certain steps such as Pre-estimation test including Unit root test using Augmented Dickey Fuller Test and other tests, maximum lag length, etc and Post estimation test which include stability test (Ramsey's Reset Test as well as recursive test) residual and coefficient diagnostic test. The residual diagnostic test includes normality, serial correlation and heteroscedasticity. To identify the long run relationship between variables coefficient diagnostic test such as Bound Test, ARDL co integrating and long run or error correction model would be conducted.

3.5.4. Co-integration Test

The credible means of avoiding spurious regression is to use cointegration technique which allows the estimation of correct regression with non-stationary data. Any equilibrium relationship among a set of non-stationary variables implies that their stochastic trends must be linked. After all, the equilibrium relationship means that the variables can't move independently of each other. This linkage among the stochastic trends necessitates that the variables are to be cointegrated (Brooks, 2002). The co integration technique is based on the assumption of an equilibrium relationship among the variables, which implies that two or more variables that are individually non-stationary but are integrated of the same order possess a linear combination of a one-degree lower order of integration. Therefore, if all the variables are $I(1)$ and are cointegrated, then their co integrating equation would yield a composite variable of order $I(0)$, i.e. it would be stationary (Handa, 2009). Thus, Cointegration among the variables reflects the presence of long run relationship in the system. Therefore, there is a need to test for Cointegration because differencing the variables to attain stationarity generates a model that does not show the long run behaviour of the variables. It gives only the short run dynamics, in which case valuable information concerning the long run equilibrium properties of the data could be lost (Kennedy, 1992). Hence, testing for Cointegration is the same as testing for long-run relationship carried out. In general, if variables that are integrated of order 'n' produce a linear combination which is integrated of order less than 'n' then the variables are co-integrated and hence have stable long run equilibrium relationship (Gujarati, 1995).

3.6. Definition of variables, Measurement and Hypothesis

3.6.1. Definition of variables and their Measurement

- Real Gross Domestic Product (RGDP):-It is the market value of all the final goods and services produced within the domestic territory of a country at constant price. This study is used real Domestic Product Growth Rate as a measure of economic growth rate of Ethiopia. Factors such as the accumulation of physical capital (investment) and human capital stock, on the one hand, and productivity factors (technological growth) on the other, are important macroeconomic determinants of economic growth in almost any country (Solow 1956; Frankel 1962; Romer 1986, 1990; Lucas 1988; Mankiw, Romer, and Weil 1992; Aghion and Howitt 1991; Grossman and Helpman 1992). There are various unknown factors that affect the GDP but the monetary policy or growth in money supply has a huge effect, (Gang, 2018).
- Broad Money Supply (M2): Factors influencing broad money or M2 in Ethiopia are net factor account, domestic credit and other items, NBE (2021). Of which, domestic credit is not only the major determinant of the growth of money supply in Ethiopia, but also it can, according to NBE's monetary policy framework (2009), be directly controlled by National Bank of Ethiopia through its monetary policy instrument (base money or reserve money). Hence, domestic credit of the banking system is the appropriate proxy measure of monetary policy action of NBE. Zerayehu (2014) cited by Mengesha (2016). Monetary policy can stimulate output and stabilize price through credit of banking system instruments, Hasan (2015).
- Consumer price index (CPI): is a measure that examines the weighted average of prices of a basket of consumer goods and services. It is computed as dividing the cost of the same market basket in the base year. Fisher (1993) investigated the role of macroeconomic factors, such as inflation on growth using a panel data of 93 countries. He found that economic growth is negatively associated with inflation and that inflation reduces economic growth by reducing the growth in productivity and investment. Furthermore, by analysing obvious outlier countries, he found that high inflation is not consistent with sustained economic growth.
- Total labour force (TLF): it represents the relative amount of labour resources available for the production of goods and services. Change in the size of working age population can impact significantly the economy. A shrinking working age population can create challenges for economic growth, competitiveness, population dependency and vice versa.

- Human capital (HC): According to Schultz (1979) human capital involves increase investment in education and training of the individuals. Individual's abilities can be enhanced through education and training that bring about effective change in the performance of jobs. Marshal (1998) postulates that human capital amounts to investment on education and training which can be undertaken by individual or group of individual workers of any institution or organization. Similarly, economists regard expenditures on education, training, medical care, and so on as investment in human capital, (Becker, 2011). Therefore, in this study, public expenditure on education and health are used to measure the human capital variable.
- Real effective exchange rate (REER): the weighted average of a country's currency in relation to an index or basket of other major currencies. The weights are determined by comparing relative trade balance of a country's currency against that of each country in the index. This economic variable affects GDP by trade balance of a country.
Real exchange rate misalignments may affect growth and welfare. Maintaining the real effective exchange rate (REER) at the wrong level may create distortions in the relative price of traded to non-traded goods, which can generate incorrect signals to economic agents and result in greater economic instability. This essentially results in the suboptimal allocation of resources across the various sectors of the economy, *Edwards (1989)*.
- Share of Gross capital formation to GDP: According to the World Bank, Gross capital formation consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Investment is the driving force of growth. An increase in saving directly leads to an increase in investment and hence growth (Domar 1946). Hence, in this study it is measured by the gross domestic investment of the country in a given period of time. Therefore, the share of gross capital formation to GDP is computed as: values of domestic gross investment divided by GDP multiplied by hundred.
- Trade Openness (TOP): it is measured as the sum of the country's export and import as a share of that country's GDP in %. Openness can have an important influence on economic growth through a multitude of different channels like through technological transfers, competitiveness advantage and increase in economies of scale (Chang et al. 2009). Edward (1992) showed that trade openness has a favourable effect on real GDP and that trade liberalization will accelerate economic growth and countries will be capable to enter more easily foreign markets.

- Terms of Trade (ToT): it refers to the relationship between how much money a country pays for its imports and how much it brings in from export. According to Laursen and Metzler (1950) and Harberger (1950) terms of trade (ToT) shock leads to greater instability of national income and aggregate savings. i.e., an adverse shock on ToT causes a rise in spending, a decline in savings, and a deficit in current account.
- Total factor productivity (TFP) is a measure of productivity calculated by dividing economy-wide total production by the weighted average of inputs i.e. labor and capital. It represents growth in real output which is in excess of the growth in inputs such as labor and capital. The measurement of TFP evolution from Solow's (1957) work is obtained from a the CobbDouglas type production function: $Y = AL^\alpha K^\beta$

Where, Y is the total product and the product of L^α and K^β is the weighted average of inputs and the total factor productivity is computed as:

$$TFP = \frac{\text{Total Product}}{\text{Weighted Average of Inputs}} = \frac{Y}{L^\alpha + K^\beta}$$

Table 1: Summary of Determinants of Economic Growth and their expected sign

Variables	Proxies/unit of measurement	Expected sign (short run/long run)
Broad Money Supply (M2)	The amount of Domestic credit dispersed to financial and non-financial sectors by National Bank of Ethiopia	+/-
Inflation Rate	Consumer price Index (CPI): the weighted average of prices of a basket of consumer goods and services	+/-
Total labour force (TLF)	Number of people who are currently employed plus the number of people who are unemployed and seeking employment.	+/+
Human capital (HC)	Total amount of public expenditure on education and health in a given year	+/+
Real effective exchange rate (REER)	REER is computed as Nominal exchange rate is divided by the price deflator or index of costs	+/+
Gross capital	values of domestic gross investment divided by GDP	+/+

Variables	Proxies/unit of measurement	Expected sign (short run/long run)
formation (KINV)	multiplied by hundred	
Trade Openness (TOP)	It is measured as the sum of the country's export and import as a share of that country's GDP in %	+/+
Terms of Trade (ToT)	The terms of trade is measured by dividing by the price of exports by the price of imports and multiplying the result by 100.	+/+
Total factor productivity (TFP)	Total factor productivity is measured by dividing total output produced in a given year by weighted average inputs	+/+

3.6.2. Hypothesis

The null as well as the alternative hypothesis denoted by H_0 and H_1 respectively are presented as follows:

H_0 Monetary policy /Broad money supply has negative and insignificant effect on Real GDP

H_1 Monetary policy /Broad money supply has positive and significant effect on Real GDP

CHAPTER FOUR

4. RESULT AND DISCUSSIONS

4.1. Descriptive Statistics Results

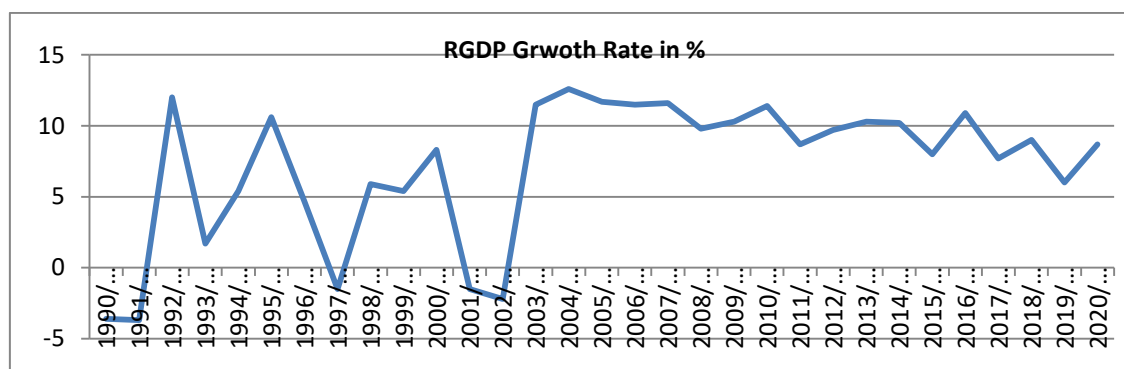
4.1.1. Ethiopian Economy & Monetary Developments

i) Real Gross Domestic Product Growth

The Ethiopian economy has been experiencing the different political regime that result in economic reforms and structural changes. In the pre-1990/91 period was characterized by central planning for mobilizing and allocation of resources and state control of almost all economic sectors in the country. Regarding the financial sector, all financial institutions were publically owned and bank credit was administratively allocated mainly to the socialized sector. National Bank of Ethiopia set lending rate depending on the type of ownership and sector and interest rate on loans to different economic and social sectors were administratively fixed, Gebrehiwot A. (1999). During the period mentioned, the economy performed poorly and growth was merely averaged at 2.1 percent per annum during the 1980s, NBE, (2021).

After change in government in 1991, the government of Ethiopia took extensive reforms towards market economy by adopting Structural Adjustment Program (SAP) under the support of international financial institutions (WB & IMF). The reform package was formulated with regard to the complementary between trade liberalization and macroeconomic management in shaping the reform outcome. As a result of the reform, the economy started to recover and Ethiopia experienced the fastest per capita economic growth in Africa, averaging around 6 percent each year. Much of this growth stemmed from investments in massive infrastructure projects aimed at jump-starting the country's structural transformation from traditional, rural, farming activities to a modern, urban, industrial economy. Figure 1 below depicts the real GDP growth rate of Ethiopia from 1990/91 to 2020/21.

Figure 2: trend development of real GDP growth rate in Ethiopia



Source: NBE & own computation

As can be seen in the figure, in the 1990s, GDP growth in Ethiopia was highly volatile, with both high positive and negative growth rates throughout the decade. The outcome reflected a combination of factors including recovery from a lengthy civil war, war with Eritrea and volatile weather combined with heavy reliance of Ethiopian agriculture on rainfall and its very large contribution to total GDP. Since early 2000s, on the contrary, Ethiopia has enjoyed accelerated and sustained economic growth for more than a decade now, where growth rates exceeded global averages. Indeed, it has become one of the fastest growing countries in the world along with some Asian countries. Even during the global economic recession that began around 2008, Ethiopia continued to grow steadily. In addition to favourable weather conditions for agriculture, a set of factors has contributed to the economic growth in Ethiopia. Conducive government policies, including large market reforms in the 1990s, are a vital and defining element of this set. Improvements in access to basic services (such as health and education) and heavy investment in infrastructure (such as roads and telecommunications) have also significantly helped by addressing critical bottlenecks. Overall growth has also been symbiotically accompanied by greater commercialization of agriculture and private sector development, more broadly. An important attribute of this high growth episode is that it has been resilient to various shocks such as drought and international economic crisis. This is contrary to the historical susceptibility of the economy to such shocks: war in the 1990s and very early 2000s and drought in 1975, 1985, 1997, and 2003 have had adverse effects on the Ethiopian economy, *Yared, Alemayehu and Seid (2016)*. During 2004/05 to 2016/17, Ethiopian economy registered strong and broad based real GDP growth averaging 9 percent, albeit growth slowed down to 6.1 percent in 2019/20 due to the impact of COVID-19 pandemic and political instability in the country, NBE (2021).

Furthermore, the current government that has taken control of power in 2018/19 announced a Home Grown Economic Reform Plan, consisting of a mix of macroeconomic, structural and sectoral policies, to address vulnerabilities and tackle structural bottlenecks inhibiting private sector activity. The plan has given due attention to Strengthening the monetary policy framework and financial regulations. Monetary policy will be strengthened to address inflation and support the transition to a private sector led growth and the transition to a flexible FX market will be accompanied by a strong commitment by the NBE to tighten monetary policy as needed. Monetary policy under the home-grown reform aims to address elevated domestic inflation while complementing efforts to address forex shortages and reduce real overvaluation.

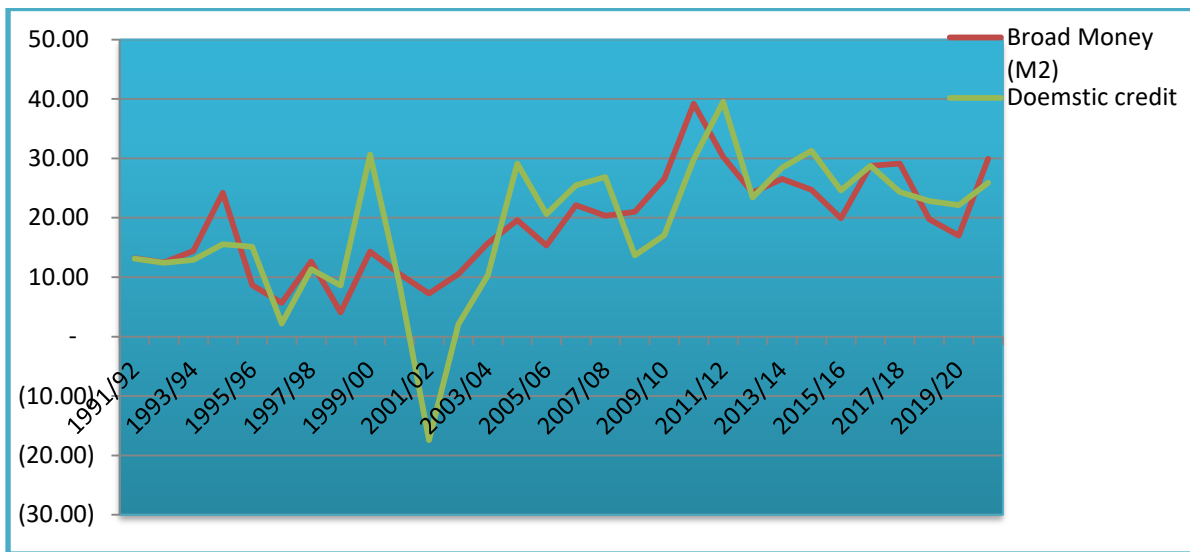
ii) Monetary Developments

a) Broad Money Supply

Broad Money can be determined by net foreign assets, domestic credit and net other items where domestic credit consists of claims on central government and other financial institutions in the review period. The significant share of claims on central government over on other financial institutions emphasized the significant role of domestic credit in the determination of Broad money comparing with net foreign assets. Through the review period, all the determinants are increased overtime but the increase in domestic credit overwhelm the other determinant. This implies a revival in the private sectors 'appetite for bank credit comparing with the preceding year. The considerable growth in net foreign assets also was partly attributed to improved performance in export, and foreign aid (Zerayehu, 2006).

In 1990/91, broad money supply (M2) stood at Birr 8.2 billion and at the end of 2020/21, broad it raised to Birr 1.3 trillion, showing on average a 25.6 percent annual growth rate owing to high surge in domestic credit which offsets contraction in external asset. Domestic credit dispersed to financial and non-financial institutions by National Bank of Ethiopia was Birr 8.6 billion during 2008/09 and it stood at Birr 1.4 trillion at the end of 2020/21FY. Trend of contribution of the determinants of money supply is presented in graph below.

Figure 3: Trend of contribution of Domestic credit to Broad Money (in million Birr)

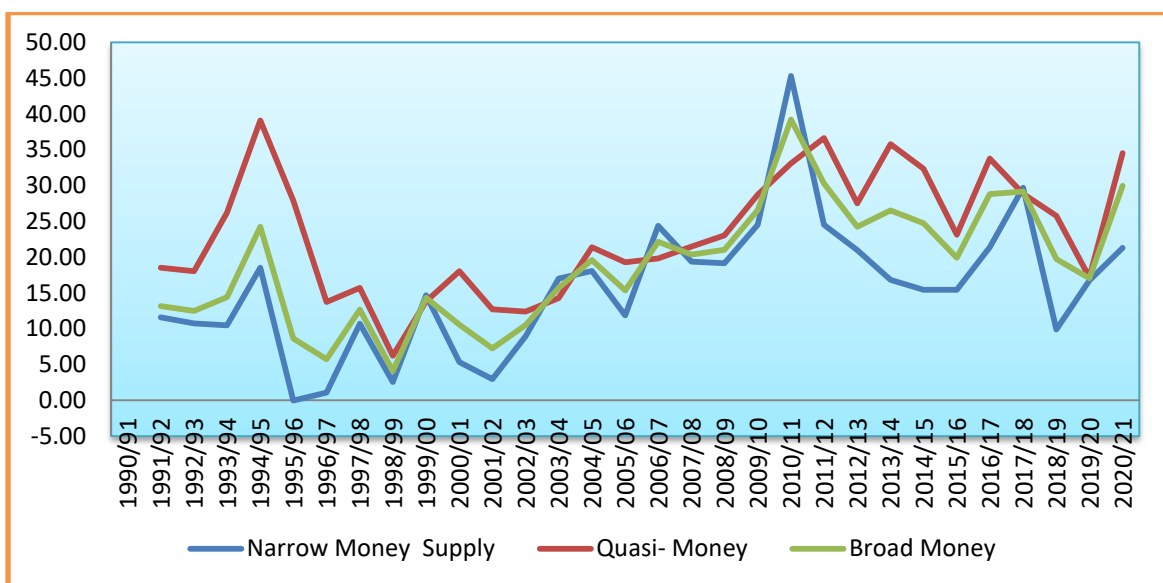


Source: NBE & Own computation

b) Components of Broad Money Supply

Narrow money (*Currency outside the bank & net demand deposit*) and quasi money are the major components of broad money supply. As shown in the above the table below, for the last 30 years, Quasi-money supply showed 23.3 percent annual growth while narrow money showed a 15.6 percent annual growth. The annual contribution of narrow money and quasi-money to broad money is 53 percent and 47 percent respectively.

Figure 4: trend of growth rate of Narrow money, quasi money and broad money



Source: NBE

Table 2 below interprets the average of LNGDP, LNREERI, LNM2, LNLF, LNKINV, LNHC, LNCPI, LNTFP, LNTOP, and LNTOT as 8.703, 2.156, 4.840, 7.531, 4.797, 6.994, 1.757, 0.531, 1.410, and 2.083 respectively. While standard deviation as 0.397, 0.152, 0.677, 0.135, 0.755, 0.771, 0.336, 0.266, 0.150, and 0.060. The descriptive statistics shows that maximum value of LNGDP, value of during sample period was 9.235 in 2018 and minimum value of LNGDP was 8.098 in 1991. Maximum value of LNM2 during sample period was 6.000 in 2021 and minimum value of LNM2 was 3.901 in 1991.

Maximum value of exchange rate during sample period was 2.475 in 2000 and minimum value of exchange rate was 1.958 in 2010. Maximum value of LNLF during sample period was 7.718 in 2018 and minimum value of LNLF was 7.316 in 2003. Similarly, the descriptive statistics points out maximum values of LNKINV, LNHC, LNCPI, LNTFP, LNTOP, and LNTOT during sample period were 5.876, 8.305, 2.340, 0.979, 1.591 and 1.961 respectively.

All the variables except LNREERI & LNM2 are negatively skewed as indicated by the negative skewness coefficients and normality of the variables are mentioned in the values of Jarque-Bera.

Table 2: Descriptive statistics

	<i>LNRGDP</i>	<i>LNREERI</i>	<i>LNM2</i>	<i>LNLF</i>	<i>LNKINV</i>	<i>LNHC</i>	<i>LNCPI</i>	<i>LNTFP</i>	<i>LNTOP</i>	<i>LNTOT</i>
Mean	8.703	2.156	4.840	7.531	4.797	6.994	1.757	0.531	1.410	2.083
Median	8.738	2.132	4.666	7.538	4.622	6.816	1.599	0.576	1.415	2.079
Maximum	9.235	2.475	6.000	7.718	5.876	8.305	2.340	0.979	1.591	2.179
Minimum	8.098	1.958	3.901	7.316	3.566	5.354	1.246	0.049	0.903	1.961
Std. Dev.	0.397	0.152	0.677	0.135	0.755	0.771	0.336	0.266	0.150	0.060
Skewness	-0.225	0.542	0.384	-0.075	0.181	-0.218	0.378	-0.184	-1.617	-0.267
Kurtosis	1.626	2.114	1.783	1.673	1.653	2.524	1.724	2.115	6.002	2.256
Jarque-Bera	2.700	2.533	2.674	2.303	2.512	0.537	2.840	1.186	25.155	1.084
Probability	0.259	0.282	0.263	0.316	0.285	0.765	0.242	0.553	0.000	0.582
Sum	269.788	66.834	150.038	233.472	148.6	216.805	54.455	16.459	43.704	64.561
Sum Sq. Dev.	4.734	0.691	13.760	0.548	17.1	17.827	3.385	2.123	0.671	0.109
Observations	31	31	31	31	31	31	31	31	31	31

Source: Own Computation

4.2. Econometric Results

Numbers of diagnostic tests have been conducted for Stationarity (unit root), normality of data, autocorrelation between error terms, omitted variables or functional forms, as well as the stability between dependent and independent variables. Under this sub section, both pre estimation and post estimation tests have been presented as follows:

4.2.1. Pre-Estimation Test

4.2.1.1. Unit Root Test

In time series analysis, variables must be tested for stationarity because using non stationary time series data may lead to a high likelihood of spurious regression result for which no inferences can be made since the standard statistical tests are invalid. As a result, the conventional econometric regression model necessitate that all the time series variables to be included in a regression model should be stationary and the disturbance term is assumed to have zero mean and constant variance.

The Auto-Regressive Distributed Lag (ARDL) bound test approach to co-integration does not require all the variables to be in the same order. Unit root test might be still necessary to ensure that all the variables satisfy the underlying assumptions for the variables are $I(0)$ or $I(1)$ since ARDL cointegration can't be used for $I(2)$ time series variables. So, the objective is to ensure that the variables are not $I(2)$ so as to avoid spurious results. In the presence of variables integrated of order two, we cannot interpret the values of F statistics provided by Pesaran et al. (2001). Therefore, the standard Augmented Dickey fuller (ADF) procedure is used to examine the time series property of the variables prior to testing the cointegration relationship among the variables. The ADF test assumes that the null hypothesis of non-stationary of a series against the alternative stationary and is rejected only when there is overwhelming evidence against it at the conventional level of significance. The ADF unit root test results are presented in table 2 below.

Table 3: Unit root test result

Variables	Level						First Difference						Order of Integration
	With intercept	P-value	With intercept & trend	p-value	Without int. & trend	p-value	With intercept	P-value	With intercept & trend	p-value	Without int. & trend	p-value	
<i>Lnr_{gdp}</i>	-0.9953	0.742	-1.4584	0.8215	3.2567	0.9994	-4.8362	0.0005	-3.6173	0.0471	-3.7066	0.0006	I(1)
<i>Lnr_{eri}</i>	-1.6655	0.4379	-1.7346	0.7105	-0.5527	0.5103	-4.8411	0.0005	-4.8036	0.0031	-3.7066	0.0006	I(1)
<i>lnM₂</i>	0.2038	0.9681	-3.6256	0.0487	1.9973	0.9869	-2.2889	0.182	-2.2411	0.4507	-0.9936	0.2798	I(0)
<i>Ln_{lf}</i>	-0.6923	0.8329	-5.1877	0.0012	3.0301	0.9989	-0.9853	0.762	-1.1805	0.7712	-1.1501	0.7112	I(0)
<i>Ln_{kinv}</i>	-1.1135	0.6924	-4.1413	0.0165	2.4166	0.9944	-3.3608	0.0236	-2.5879	0.2882	-1.4491	0.1344	I(0)
<i>Ln_{hc}</i>	-1.3771	0.5789	-3.1995	0.1049	2.7419	0.9977	-4.7143	0.0008	-4.7049	0.0041	-2.2452	0.0265	I(1)
<i>Ln_{cpi}</i>	-1.1905	0.6612	-3.1159	0.1174	2.0348	0.988	-4.133	0.0033	-1.0884	0.9093	-1.5319	0.1154	I(1)
<i>Ln_{tfp}</i>	-4.3262	0.0019	-4.3468	0.0089	-0.8454	0.3404	-5.4875	0.0001	-5.3456	0.0010	-5.5885	0.0000	I(1)
<i>Ln_{top}</i>	-6.3366	0.0000	-1.6109	0.7645	0.4846	0.8139	-5.7543	0.0000	-4.0431	0.0217	-5.5683	0.0000	I(0)
<i>Ln_{tot}</i>	-2.1849	0.2159	-2.2577	0.4411	0.1508	0.7221	-5.3500	0.0002	-5.2729	0.0011	-5.4560	0.0000	I(1)

Source: Own computation using Eviews

Table 3 reveals that the time series variables incorporated in this study accept the null hypothesis that the variables: $\ln M2$, $\ln l_f$, $\ln \text{kinv}$, $\ln \text{tfp}$ and $\ln \text{top}$ are stationary at level, $I(0)$, whereas $\ln \text{rgdp}$, $\ln \text{reeri}$, $\ln \text{hc}$, $\ln \text{cpi}$ and $\ln \text{tot}$ are stationary at first difference, $I(0)$. This implies that the some series are consistent in distribution pattern and randomly distributed at level and others at first difference.

ARDL cointegration technique is preferable when dealing with variables that are integrated of different order, $I(0)$, $I(1)$ or combination of the both and, robust when there is a single long run relationship between the underlying variables in a small sample size. However, this technique will crash in the presence of integrated stochastic trend of $I(2)$, E.Nkoro and A. Kelvin Uko (2016). And hence, since the test result shows the variables are stationary at a combination of both $I(0)$ & $I(1)$, Autoregressive Distributive Lag (ARDL) model is applicable for the estimation of the effectiveness of monetary policy on real GDP of Ethiopia.

4.2.1.2. Optimal Lag Selection

Cointegration test is usually preceded by a test of appropriate lag length selection due to the fact that the test is affected by the number of lags included in the VAR model. The major tests used to choose appropriate lag length are Akaike information criteria (AIC), Schwarz information criteria (SIC) and Harman-Quinn information criteria (HQ).

In selecting the optimal lag length of a model, we have to consider the results of these criteria. Empirical literature often suggests the use of the Hannan-Quinn criterion (HQC), Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC) to select the lag length of the VAR system especially for small sample size i.e up to 60 or less (Asghar and Abid 2005). The maximum lag length of the variables used in this study has been presented in the following table.

Table 4: The results of standard VAR model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	43.42196	NA	0.005110	-2.475701	-1.995761	-2.332990
1	48.42150	5.925383*	0.003850*	-2.771963*	-2.244030*	-2.614981*
2	48.43500	0.015002	0.004211	-2.698889	-2.122962	-2.527636
3	49.63867	1.248249	0.004232	-2.713976	-2.090054	-2.528451
4	49.94858	0.298433	0.004566	-2.662858	-1.990943	-2.463062

* indicates lag order selected by the criterion

As indicated in the above table, the optimal lag length according to the VAR lag order selection criteria is 1 and hence the ARDL estimated selected based on AIC is presented below.

Table 5: The results of ARDL (1, 1, 1, 1, 1, 1, 1, 1, 1, 1) model

<i>Dependent Variable: LNRGDP</i>				
Repressors	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP(-1)	0.396	0.207	1.909	0.0853*
LNREERI	0.398	0.124	3.199	0.0095***
LNREERI(-1)	-0.209	0.096	-2.175	0.0547**
LNLM2	2.273	0.375	6.045	0.0001***
LNLM2(-1)	-2.394	0.457	-5.236	0.0004***
LNLF	0.205	0.201	1.019	0.3318
LNLF(-1)	0.208	0.203	1.023	0.3302
LNKINV	0.467	0.184	2.537	0.0295**
LNKINV(-1)	-0.226	0.190	-1.190	0.2613
LNHC	0.090	0.058	1.547	0.1529
LNHC(-1)	0.062	0.042	1.457	0.1756
LNCPI	0.212	0.179	1.179	0.2654
LNCPI(-1)	-0.279	0.123	-2.261	0.0473**
LNTFP	-0.036	0.020	-1.816	0.0993*
LNTFP(-1)	-0.043	0.024	-1.760	0.1088
LNTOP	-0.542	0.142	-3.808	0.0034***
LNTOP(-1)	0.526	0.154	3.404	0.0067***
LNTOT	-1.266	0.174	-7.268	0.0000***
LNTOT(-1)	-0.569	0.246	-2.307	0.0437**
C	3.925	2.222	1.766	0.1078
<i>R-squared</i>	<i>0.998550</i>	<i>Mean dependent var</i>		<i>8.722663</i>
<i>Adjusted R-squared</i>	<i>0.995796</i>	<i>S.D. dependent var</i>		<i>0.388127</i>
<i>S.E. of regression</i>	<i>0.025165</i>	<i>Akaike info criterion</i>		<i>-4.292008</i>
<i>Sum squared resid</i>	<i>0.006333</i>	<i>Schwarz criterion</i>		<i>-3.357877</i>
<i>Log likelihood</i>	<i>84.38012</i>	<i>Hannan-Quinn criter.</i>		<i>-3.993172</i>
<i>F-statistic</i>	<i>362.5516</i>	<i>Durbin-Watson stat</i>		<i>2.361451</i>
<i>Prob(F-statistic)</i>	<i>0.000000</i>			

*Note: *** significant at 0.01, ** significant at 0.05, * significant at 0.1*

As shown in table 5, the variables have both positive and negative impacts on economic growth and there are significant effects of the lags of some of the variables on real GDP. Accordingly, we have a highly significant effect of the current and first lags of broad money supply, real effective exchange rate, terms of trade and trade openness. On the other hand, labour force, capital investment and human capital have insignificant impact on real GDP of Ethiopia. The value of F-statistics is significant at 1% level of significance which implies the model is good fit as a whole.

4.2.1.3. Long Run Cointegration Test (ARDL Bound Test)

To test for the presence of co-integration for long run form, bound test is a useful instrument of testing statistics. The issue of checking the existence of long-run relationships among the variables has to proceed following the non-stationarity in the series at their levels, which could be handled using the bound testing approach (Pesaran et al., 2001). The F-statistics value is used to check for the existence of long-run co integration of the model. Accordingly, when the value of F-statistic is below lower bound (I0), we fail to reject the null hypothesis and inconclusive when it is between the lower and upper bounds. However, we reject the null hypothesis when it is above the upper bound (I1).

Table 6: ARDL Bound Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.848945	10%	1.88	2.99
k	9	5%	2.14	3.3
		2.5%	2.37	3.6
		1%	2.65	3.97

Source: Model test result

The Long Run ARDL bounds tests for co-integration result showed that the calculated F statistics (5.848945) was greater than the upper bounds of critical values (3.97) at 1% significance levels (Table 6). Hence, the null hypothesis of non-existence of a long-run relationship would be rejected. The result verified that there was significant long run relationship between real gross domestic product and gross capital formation, money supply, consumer price index, real effective exchange rates, total labour force, human capital, trade openness, terms of trade and total factor productivity.

As verified by the unit root test and the ARDL bounds testing procedures, the study variables have meaningful cointegrating relationships; consequently, the study model is viable to be used to examine the long-run relationships as well as the error correction short-run dynamics. The result of bound test analysis also helps us to estimate both the long-run and the short-run error correction models (ECM) so as to have a comprehended look on the effectiveness of monetary policy on real GDP of Ethiopia.

4.3. ARDL Long Run and short run (ECM) Dynamics

4.3.1. Long Run Estimates

The long run cointegration relationship between real GDP (lnrgdp) and the explanatory variables considered in the model is estimated by the ARDL bound test summarized in the following table.

Table 7: ARDL long run effect

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
LNREERI	0.3149	0.2731	1.1528	0.2758
LNLM2	-0.2012	0.4109	-0.4896	0.6349
LNLF	0.6867	0.4835	1.4202	0.1861
LNKINV	0.1662	0.0739	2.2497	0.0320**
LNHC	0.0890	0.0318	2.7982	0.0089***
LNLCPI	-0.7031	0.0789	-8.9116	0.0000***
LNTFP	-0.1321	0.0520	-2.5396	0.0294**
LNTOP	-0.0274	0.2913	-0.0943	0.9267
LNTOT	-3.0436	0.6981	-4.3597	0.0014***
C	3.9259	2.2226	1.7663	0.1078

Note: *** significant at 0.01, ** significant at 0.05

Source: Model estimation

From the above table, the long run model was written as follows.

$$\text{LNLRGDP} = 3.9259 - 0.2012\text{LNLM2} + 0.3146\text{LNREERI} + 0.6867\text{LNLF} + \text{LNKINV}0.1662 + 0.0890\text{LNHC} - 0.7031\text{LNLCPI} - 0.1321\text{LNTFP} - 0.0274\text{LNTOP} - 3.0436\text{LNTOT}$$

The results presented in Table 4.6 above shows that Money supply (M2) has an insignificant negative influence on real GDP in Ethiopia in the long run. The influence of money supply on Economic growth is negative and statically insignificant. This is due to that an increase in money supply leads to higher inflation and it reduces the purchasing power of consumers. As a result, aggregate demand falls and firms decrease their production. This result was in line with the findings of Yeshiwas (2021) and Tewoldebrehane (2010) who found empirical evidence of the absence of long run effect of monetary policy on output growth in Ethiopia. Also, studies conducted by Twinoburyo (2018), David (2020), Ibrahim (2018), Amedero (2019), Thi (2019), George & Warren (1995), Okoroafor (2020), Montiel (2012) and Buigut (2009) have also shown the neutrality of money supply in the long run. Long run monetary policy (money supply) neutrality is also backed by several empirical studies (Onyinyechi O., 2019; Suliman, 2011; Bernanke and Mihov, 1998; Bullard, 1999; Nogueira, 2009; Asongu, 2014)

The result also supports the *classical monetary theory* which is the first renowned theory of monetary policy and is enshrined in the Irving Fisher QTM, which lays the foundation for the link between monetary policy (money) and economic variables. According to this, money supply has long run neutrality. Similarly, the finding is in line with the *monetarist thought* led by Milton Friedman. The monetarist claim that in the long run, the effect of expansion in money supply is primarily on the price level and other nominal variables. The level of economic activity in the real term that is level of employment and real output is determined by a real factor such as capital stock, state of technology, size, and quality of labor force. However, in the short-run change in money is the dominant factor causing cyclical fluctuations in output and employment. An increase in money supply in the short-run is divided into between the rise in price level and increase in real income depending on the elasticity of the short-run aggregative supply curve (Ahuja, 2017). Therefore, it is recommended that as the monetary policy action of NBE does not have effect on real output in the long run , the major target of NBE need to be ensuring money supply growth is in line with the inflation target.

With respect to employment/labour force/, Growth of economy contributes for employment as investments require manpower and as the finding shows employment and economic growth have positive relationship. When the economy grows, more labour is employed and unemployment rate decreases. However, in the long run, the contribution of labour force to real GDP is statistically insignificant indicating that even though the number of educated unemployment rate, in the country is increasing; the agricultural and industrial sector could not absorb the labour force.

Real effective exchange rate (REERI) has a positive but statistically insignificant effect on real GDP due to higher domestic inflation rate relative to that of trading partners and continuous depreciation of REER. This implies that Ethiopia is not able to compete in the international market. Therefore, the government should take measures such as improving prudent foreign exchange cash flow management, strengthening other sources of foreign exchange and intervening in the foreign exchange market so as to stabilize foreign exchange market and to prevent the negative impact of a slowdown in export earnings.

On the other hand, Domestic investment, human capital and terms of trade are found to have statistically positive significant impact but their contribution to real GDP is small in the long run. Hence, the government should develop strategies that will encourage domestic investment and attract foreign direct investment (FDI) so that export will raise and imported items will be replaced domestically. This will lead to improvement in trade deficit of the country.

4.3.2. Analysis of Short-Run Relationships and Error Correction Model (ECM)

Due to the existence of long-run relationships between variables as indicated by the Bounds co-integration test, it is necessary to analyse the short-run relationships as well by using an Error Correction Model (ECM). The coefficient of ECM indicates the speed with which the system converges to equilibrium. This short-run result also shows whether changes in the variables affect the dependant variable (real GDP of Ethiopia) in the short run.

Table 8: Short-run relationships and error-correction results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP)	0.045	0.0265	1.6845	0.1021
D(LNREERI)				
D(LNM2)	2.2730	0.1802	12.6136	0.0000***
D(LNLF)	0.2059	0.0817	2.5182	0.0305**
D(LNKINV)	0.4671	0.0847	5.5099	0.0033***
D(LNHC)	0.0905	0.0195	4.6407	0.0019***
D(LNCPI)	0.0418	0.0351	1.1916	0.2431
D(LNTFP)	-0.0668	0.1027	-0.6507	0.5202
D(LNTOPI)	-0.5426	0.0710	-7.6322	0.0001***
D(LNTOT)	-0.433	0.2138	-2.0252	0.0515**
C	0.2975	0.4230	0.7033	0.4873
ECM(-1)	-0.603152	0.044593	-13.5257	0.0000
R-squared	0.934819	Mean dependent var		0.035106
Adjusted R-squared	0.900513	S.D. dependent var		0.057881
S.E. of regression	0.018257	Akaike info criterion		-4.892008
Sum squared resid	0.006333	Schwarz criterion		-4.378236
Log likelihood	84.38012	Hannan-Quinn criter.		-4.727648
F-statistic	27.24967	Durbin-Watson stat		2.361451
Prob(F-statistic)	0.000000			

Note: *** significant at 0.01, ** significant at 0.05, * significant at 0.1

Model estimation result using Eviews

As displayed in table 4.7 above, the result of the error correction model for real GDP shows that broad money (domestic credit) has significant role in stimulating the growth of aggregate real output in the short run. That is, the coefficient of broad money supply (m2) is 2.27 indicating that a 1 % change in money supply will lead to a rise in real GDP by 2.27% in the short run and vice versa. The result supports the empirical works of Alemayehu (2015), Mahara (2020), Sunanda (2020), Twinoburyo & Odhiambo (2018), Marshal (2017), Chuku,(2009). The finding also supports Keynesian views so long as there is unemployment in the short run. Keynes argues that the output will change in the same proportion as the quantity of money in the short run; but in the long run, change in money supply affects price not output

as the economy is at its full employment level. Similarly, the monetarists also argue that since the economy may not always be operating at the full employment level of real GDP, in the short-run, *expansionary monetary policies* may increase the level of real GDP by increasing aggregate demand. However, in the long-run expansionary monetary policy only leads to higher inflation and does not affect the level of real GDP.

Furthermore, the coefficient of the error correction term denoted by **ECM (-1)** captures the speed of adjustment towards the long run equilibrium and the result shows that it is found with the correct sign and magnitude. Since the error correction term is negative and significant, this implies that the results support the existence of a long run between the variables. The speed of adjustment is **-0.603152**, which implies that around **60%** deviations from long-term equilibrium are adjusted every year. This also indicates once the disequilibria happened, it will take more than one year to adjust itself towards the long run equilibrium.

4.4. Post-Estimation Diagnostic Test

To accept this model as a good one, it has to meet the required criteria of the post estimation test such as serial correlation, normality and stability tests. The post-Estimation diagnostic test results are presented as follows:

A) Serial Correlation/ Misspecification Test

<i>Table 9 : Breusch-Godfrey Serial Correlation LM Test:</i>			
F-statistic	0.656550	Prob. F(1,9)	0.4387
Obs*R-squared	2.039703	Prob. Chi-Square(1)	0.1532

According to the value of Breusch-Godfrey Serial Correlation LM Test, we accept the null hypothesis of no autocorrelations meaning that the residuals are Heteroskedastic.

B) Model Stability

To check the robustness of our results, structural stability tests of the parameters of the longrun results are performed by the CUSUM and CUSUMSQ tests (Brown et al. 1975). This same procedure has been utilised by Pesaran and Pesaran (1997) and Mohsen et al. (2002) to test the stability of long-run coefficients.

Figure 6: CUSUM stability test

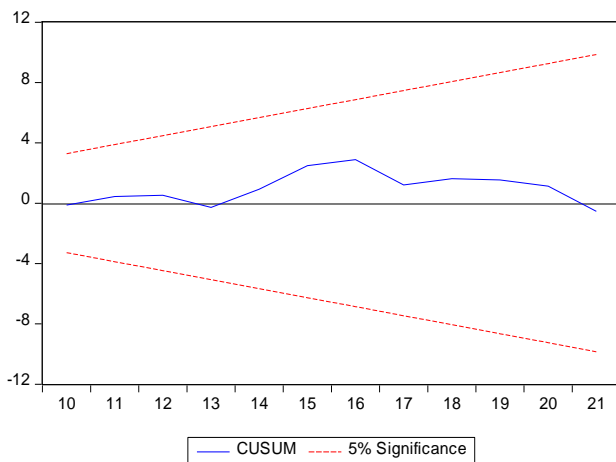


Figure 7: CUSUM square stability test

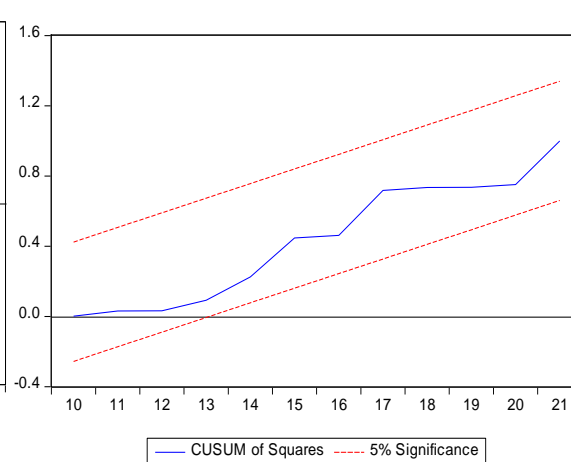
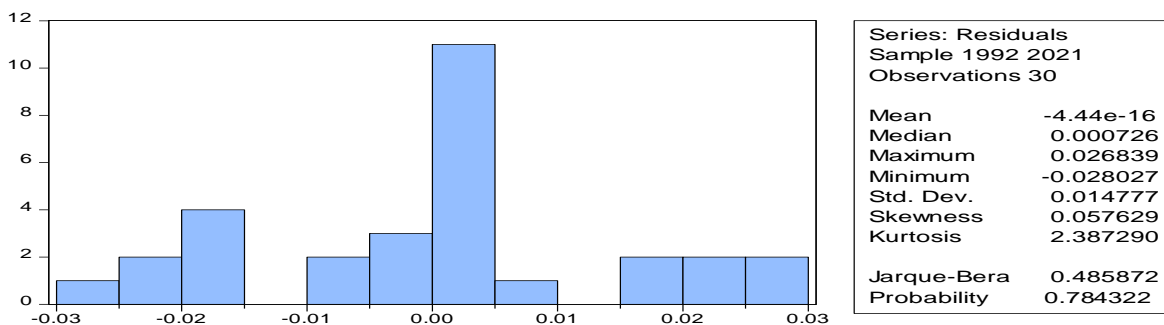


Figure 2 and Figure 3 show that the graphs are within the critical boundaries of a 5% significance level. Therefore, the observed evidence from CUSUM and CUSUM Square tests support the stability of the estimated coefficients parameter of the ARDL model. The diagnostic and stability tests confirm that model is econometrically sound and stable and hence, it can be used for policy-related decision making.

C) Normality Test

Figure 8: Normality Test



CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.3. Conclusion

This study has investigated the effectiveness of monetary in affecting economic growth of Ethiopia both in long run and short run using time series annual data from 1990/91 to 2020/21 by applying ARDL Bounds testing approach to co-integration as it has varieties advantage over other any method for small sample size. The bound test for the existence of co-integration showed that the existence of long run relationship between dependent and independent variables. The empirical result from the estimation of the long run co-integration reveals a significant relationship of the dependant variable (real GDP growth) with money supply and the other explanatory variables considered in the study: Real Effective Exchange Rate (REER), Consumer Price Index (CPI), Gross Capital Formation (KINV), Labour Force (LF), Total Factor Productivity (TFP), human capital (HC), terms of trade (TOT) and trade Openness (TOP).

Based on the findings of this study, it determines that money supply has contributed positively and significantly to economic growth in the short run, while in the long run the opposite has been the case. This confirms that money supply in long run causes inflation that impaired the growth; but in the short run it creates asset that boost economic growth. Real effective exchange rate has a positive but statistically insignificant effect on real GDP due to higher domestic inflation rate relative to that of trading partners and continuous depreciation of REER.

On the other hand, employment/labour force/ and economic growth have positive relationship. When the economy grows, more labour is employed and unemployment rate decreases. However, in the long run, the contribution of labour force to real GDP is statistically insignificant indicating that even though the number of educated unemployment rate, in the country is increasing; the agricultural and industrial sector could not absorb the increasing labour force.

Gross capital formation and human capital have significant positive impact on economic growth in the short run and it has low impact in the long run. This may be due to the fact that inflation has positive impact in the short run which attracts more investors to invest which

leads to rise in output. But, in the long run, inflation has significant and negative impact on GDP; this confirms that the higher inflationary pressure affects aggregate demand negatively and as a result investment is discouraged and the impact of gross capital formation on real GDP becomes lower in the long run. Similarly, total factor productivity and terms of trade have significant negative impact on output due to negative impact of inflation, declining trend of investment (capital formation) and insignificant contribution of human capital to real GDP.

Furthermore, terms of trade and trade openness have significant negative impact on real GDP in the short run; and small negative impact in the long run. This is because in the short run the country has been suffering from trade deficit and in the long run due to the negative impact of inflation both variables impact on GDP is insignificant.

Labour force, capital formation, human capital and inflation have positive impact but the statistical measures of real effective exchange rate and inflation are insignificant. Similarly, total factor productivity, terms of trade and trade openness have negatively affected output in the short run and in terms of statistical measures only trade openness is significant.

5.4. Policy Recommendations

The principal objective of the monetary policy of the National Bank of Ethiopia is to maintain price & exchange rate stability and support sustainable economic growth of Ethiopia. Price stability is a proxy for macroeconomic stability which is vital in private sector economic decision on investment, consumption, international trade and saving. Finally, macroeconomic stability fosters employment and economic growth. Maintaining exchange rate stability on the other hand is considered as the principal policy objective of NBE so as to be competitive in the international trade and to use exchange rate intervention as policy tools for monetary policy to affect both foreign reserve position and domestic money supply.

The policy implications obtained from the analysis of this study clearly suggest that monetary policy does not play a crucial role in influencing the level of economic activity in the long run. In other words, it is found to be ineffective in the long run as it causes inflation that impaired economic growth. But, in the short run it creates asset that boost economic growth. Therefore, this study forwards the following policy recommendations:

- **Price stability should be an overriding objective for monetary policy of the Central Bank of Ethiopia:** The NBE should ensure that the level of money supply is consistent with the inflation target set in the NBE's monetary policy framework. Notwithstanding

the possibility of multiple objectives (price and exchange rate stability, financial stability, and support economic growth); choosing price stability as an overriding objective for monetary policy will help to win public confidence and better anchor inflation expectations. When trade-offs occur between inflation and growth, the NBE should be able to prioritize the inflation objective as it is impossible to achieve two goals with just one instrument, monetary policy.

- **Modernized and strengthened monetary policy:** To correct the macro imbalances manifested by mainly the high inflation rate, the NBE should modernize and strengthen its monetary policy operation by introducing indirect monetary policy instruments and eliminate financing of budget deficit.
- **Stabilize foreign exchange market:** The contribution of REER is insignificant on real GDP implying that Ethiopia is not able to compete in the international market. Therefore, the government should take measures such as improving prudent foreign exchange cash flow management, strengthening other sources of foreign exchange and intervening in the foreign exchange market so as to stabilize foreign exchange market and to prevent the negative impact of a slowdown in export earnings.
- **Implement market driven interest rate policy:** The monetary policy operational framework should consider gradual transition from the current monetary aggregate targeting framework to interest rate targeting (price-based). The transition to a price-based monetary policy, may, take time partly due to the absence of a functioning money market which provides a benchmark interest rate for monetary policy. Successful operation of an interest rate targeting monetary policy also requires capability to implement an active liquidity management by the central bank, sound liquidity forecasting, and sufficient supply of tradable securities in the market, among others. Therefore, a smooth transition involves the use of a hybrid monetary policy framework, which combines elements of both monetary aggregate targeting and price-based monetary policy frameworks.

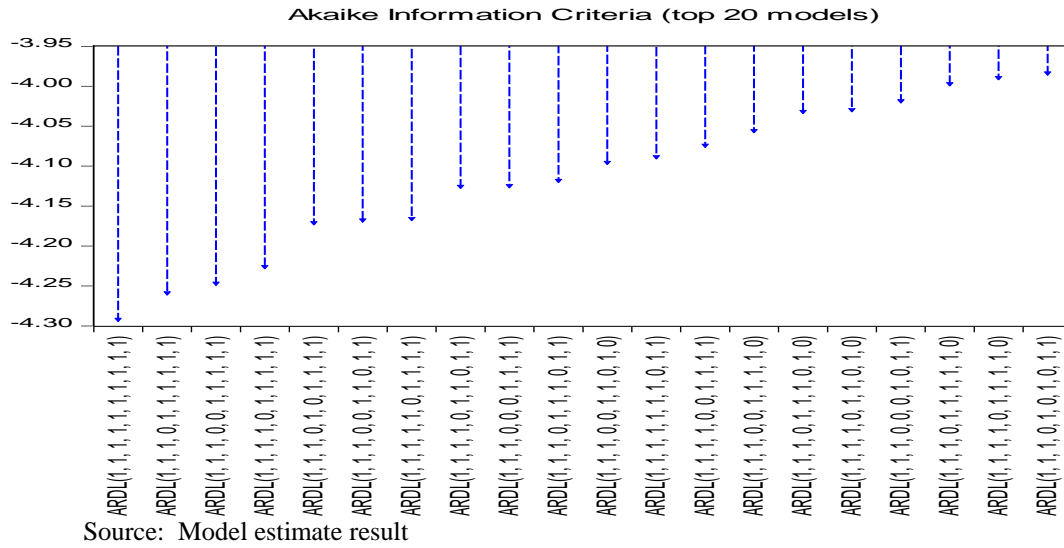
REFERENCES

- Bhattacharya, R., Patnaik, I. and Shah, A., (2011) Monetary Policy Transmission in an Emerging Market Setting.
- Chuku A.(2009) Measuring the effect of monetary policy innovation in Nigeria. African Journal of Accounting, Economics, Finance and Banking research, Vol. 5, No.5
- Enock Nyorekwa Twinoburyo & Nicholas M. Odhiambo (2018). Monetary Policy and Economic Growth: A Review of International Literature, Journal of Central Banking Theory and Practice, Central bank of Montenegro, vol. 7(2), pages 123-137.
- Ichiro Iwasaki (2020), Meta-Analysis of Emerging Markets and Economies: An Introductory Note for the Special Issue. Emerging Markets Finance and Trade 56:1, pages 1-9.
- Ifionu, Ebele & Akinpelumi, Omotayo F.(2015) Macroeconomic Variables and Money Supply: Evidence from Nigeria. African Research Review Journal, VOL. 9(4), No. 39.
- Mankiw, N.G.(2007). Macroeconomics, Seventh Edition.
- Mengesha M. (2016). The impact of monetary policy shocks on output and price in Ethiopia.
- National Bank of Ethiopia (2021). Annual bulletin'' Vol.38, No.4, pp.18-38
- National Bank of Ethiopia,(2009). Monetary policy Framework of Ethiopia
- National Bank of Ethiopia, (2021).Ten Years Corporate Strategic Plan.
- Omodero (2019), Effect of Money Supply on Economic Growth: A Comparative Study of Nigeria and Ghana. International Journal of Social Science Studies Vol. 7, No. 3; May 2019.
- Owolabi, A.U. and Adegbite, T.A.(2014) Money Supply, Foreign Exchange Regimes and Economic Growth. Research Journal of Finance and Accounting, 5, 121-129.

- Pesaran M.H., Shin, Y., & Smith, R.J. (2001). Bound testing approach to the analysis of level relationships. *Journal of applied Econometrics*, 16(3), 289-329.
- Reginaldo Pinto Nogueira Jr., (2009) "Is monetary policy really neutral in the long-run? Evidence for some emerging and developed economies", *Economics Bulletin*, Vol. 29 no.3 pp. 2432-2437.
- Sisay Demissew BEYENE and Balázs KOTOSZ (2020), "Is Fiscal or Monetary Policy More Effective on Economic Growth? An Empirical Evidence in The Case of Ethiopia", *Journal of African Research in Business & Technology*, Vol. 2020.
- Tadesse, T., & Melaku, T. (2019). Analysis of the relative impact of monetary and fiscal policies on economic growth in Ethiopia, using ARDL approach to co-integration: which policy is more potent? *Copernican Journal of Finance & Accounting*, 8(2), 87-115.
- Sagar & L.N. Koli (2019), *A Study of Monetary Policy and its impact on GDP Performance (With reference to Indian Economy)*.
- Temesgen Bantie (2014). *The impact of monetary policy shocks on Ethiopian Economy*.
- Tesfaye Gebrehiwot (2017). *Relative effectiveness of monetary policy shocks on Ethiopian Economic Growth: A Structural Vector Autoregressive Model*
- Twinoburyo, Enock Nyorekwa; Odhiambo, Nicholas M. (2018) : Can monetary policy drive economic growth? Empirical evidence from Tanzania, *Contemporary Economics*, ISSN 2300-8814, University of Finance and Management in Warsaw, Faculty of Management and Finance, Warsaw, Vol. 12, Iss. 2, pp. 207-222.
- Yeshiwas (201), *impact of Broad Money Supply on Economic Growth of Ethiopia*. *Research Journal of Finance and Accounting* Vol.12, No.5, 2021
- Zerayehu, S.(2014). 'Monetary policy and macroeconomic shocks in Ethiopia specification, estimation and analysis of monetary policy reaction function', *international journal of current research*. Vol. 6, pp.5123-5135, 2014.

Appendices

Appendix 1: Model Selection Summary



Appendix 2: Trends of the variables (from 1990/91 -2020/21)

