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Impact of Broad Money Supply on Economic Growth of Ethiopia

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Abstract
This study is targeted to examine the impact of money supply on Real GDP of Ethiopia. The data used for this study was a time serious (2002-2017) data obtained from national bank of Ethiopia Annual report. The data is analyzed using Vector Autoregressive model and causality test to check the short causality between broad money supply and Real GDP growth in Ethiopia and the result of both tests revealed that broader money supply has positive significant effect on real GDP and statically significant at 5 percent level. However, Johansen co-integration test result shows that there is no long run association ship running from broader money supply to real GDP.The policy implication was that any short run fluctuation in country's broad money supply level by monetary policy officials will bring a significant positive impact on Real GDP in the short run .
Keywords: Broader money supply, Real GDP Impact, Vector Auto Regressive model
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I. Introduction

The annual report of national bank of Ethiopia shows that for the last sixteen years the mean growth rate of broader money supply in Ethiopia was 23.38 per year. During the year 2017-2018, the amount of broad money supply in Ethiopia is attained more than Birr740 billion having annual growth rate of above 29 percent per annum resulted from domestic loan expansion given to federal and state government of Ethiopia. Additionally, the amount of traditional money supply components increased by more than 29 percent resulted from increase in currency and demand deposit of commercial banks of Ethiopia which is a pointer of expansion of demand for money for transaction motives. Moreover, amount of quasi-money increased above 28 percent caused by an increase in the amount of time and saving deposit of commercial banks through new branch expansion. Correspondingly, the Ethiopia economy records mean annual growth rate of real GDP rose by 9.32 percent during the year 2002/3 to 2017/18.

In economics with regard to the impact of money supply toward the economics growth of a given nation had inconclusive findings (Wang Yan-liang, 2012; Bin Liu, 2001; Nwoko, Nnenna M.,et al,2016; Iwedi Marshal, 2016). And hence, this study aims to examine the impact of broad money supply on Real GDP in Ethiopia over the period 2002-2017.

II. Literature Review

2.1 Theoretical literature review

We have basically four theories with regard to the theory of money supply which can be explained as follows:

1. Traditional Approach

Under this theory money supply is defined as a medium of exchange which consists of currency in the hands of the public plus demand deposits in commercial banks (Keith band and Peter Howells, 2003;Wynne Godley and Marc Lavoie,2007).

It is also called narrow money (M1). Hence, M1=C+DD, where C is currency outside the bank, DD is demand deposit.

2. The Chicago approach

The Chicago economists led by Professor Milton Friedman adopted a broader definition of money and symbolized as M2 and they define money supply as a temporary store of value. Their argument is that since in the economy money income and spending flow streams are not completely harmonized in time so as to make transaction money should be temporarily stored as a general purchasing power (Keith band and Peter Howells,2003;WynneGodley& Marc Lavoie,2007).

Thus; M2=M1+Savings deposits + Time deposit.

3. Gurley and Shaw Approach

This approach is associated with the names of Professor John G. Gurley and Edwards Shaw. According to these economists there exists a fairly large spectrum of financial assets which are close substitutes for money and symbolized as M3. Therefore, they define money supply asserts adjacent to financial intermediaries. They believed that all these are feasible options to liquid stores of value to the community. Thus;

M3=M2+S+B .Where, S is Shares of credit institution and B is Bonds.

Where, S= Shares of credit institutions, B= Bonds The approach further views money supply as a weighted sum

of the above components as expressed in (4) above and goes ahead to assign weights to each component on the basis of their substitutability with money(Keith band and Peter Howells,2003;Wynne Godley and Marc Lavoie,2007).

4. The Central Bank Approach

The widest view of money as through it was one and the same thing as credit funds lent to borrowers which is symbolized as;

M4=M3+SB+TS+C+DD+SD +NCBD+NBFI+CL

Where; SB is Savings Bond, TS is Short Term Treasury Securities, NCBD is non clearing bank deposits, NBFI is Non-bank financial institution) deposits and CL is credit lines(Keith band and Peter Howells, 2003;Wynne Godley and Marc Lavoie,2007).

Practically in Ethiopia broad money supply is the sum of currency outstanding, net demand deposit plus quasi-money supply so that the research adopts it for this study (NBE, 2017/18).

2.2 Empirical Literature Review

This section presents literature on the impact of money supply on economic growth as follows;

An empirical research finding revealed that the changes of the money supply will have a force on the fluctuations of output in the short-term (Tobin, 1970).It is also found that the anticipated monetary growth is neutral to output (Barro, 1978). An empirical study finding discovered that found that the money supply has no brunt on the actual output in the long term (Komendi and Meguire, 1984). It is also found that money supply would have an effect on the output in the short term, but not in the long run (Bin Liu, 2001).An empirical analysis on the relationship among money supply, economic growth, and inflation in china from 1998 to 2007 with co-integration and Granger Causality test an approach shows that there is no long run association ship between money supply and economic growth (Wang Yan-liang, 2012). It is also found that money supply was insignificantly influencing gross domestic product (Nwoko, Nnenna M.,et al,2016). It is also found that money supply has a short and long run encouraging and significant link on Real Gross Domestic Product in Nigeria economy (Iwedi Marshal, 2016).

When we review different literatures there were inconclusive finding with regard to the impact of money supply in Gross Domestic Product of a given country that is why the researcher is motivated to examine the impact of money supply in real GDP of Ethiopia.

III. Research methods

The researcher followed descriptive research design. The study adopted quantitative research approach.

3.1Data type and source

The study employed secondary time serious data from Ethiopia from 2002-2017 and the methods of data collection was from annual report of National bank of Ethiopia data.

3.2 Methods of Data Analysis and Presentation

The data is presented in time serious line graph. The study used inferential statistics tool to analyze quantitative data the researcher use vector error correction model to show the long run impact of growth rate of broad money supply on growth rate of Real GDP growth of Ethiopia respectively.

3.3. Variable Selection and Model Specification

The dependent and independent variables of the studies are the following respectively.

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 ($RGDP_t$) as a measure of economic growth rate of Ethiopia.

Broad money supply (M2):-It is the broad money supply (M2) in Ethiopia and a measure of liquidity. Broader money in Ethiopia is the sum of narrow money (sum of currency outside the bank and demand deposit) plus quasi money (sum of time deposit and saving deposit) for this study broad money supply ($M2_t$) is used. It is expected to have positive impact on economic growth of Ethiopia.

If non stationery but I(1) time serious are no co-integrated ,we can run VAR to examine short run dynamic of the serious .

$$LogRGDP_t=\alpha + \sum_{i=1}^{K} \beta_i \text{Log RGDP}_{t-i} + \sum_{j=1}^{K} \phi_j \text{LogM2}_{t-j} + u_{1t}$$

$$LogM2_t=\epsilon + \sum_{i=1}^{K} \beta_i \text{Log RGDP}_{t-i} + \sum_{j=1}^{K} \phi_j \text{LogM2}_{t-j} + u_{2t}$$

Where, K is the optimal lag length, Uit is the residuals in the equations ; ϕj and β_i are short run dynamic coefficient

of the models adjustment long run equilibrium and α and ϭ are intercepts.

IV. Results and Discussions

4.1 Trend of broad money supply and Real GDP in Ethiopia (2020-2017)

The graph below shows that there is an increasing trend of currency outstanding, net demand deposit quasi-money supply, broad money supply and Real GDP of Ethiopia.

Figure.4.1.1: Trend of currency, demand deposit and Money supply in Ethiopia (2002-2017).

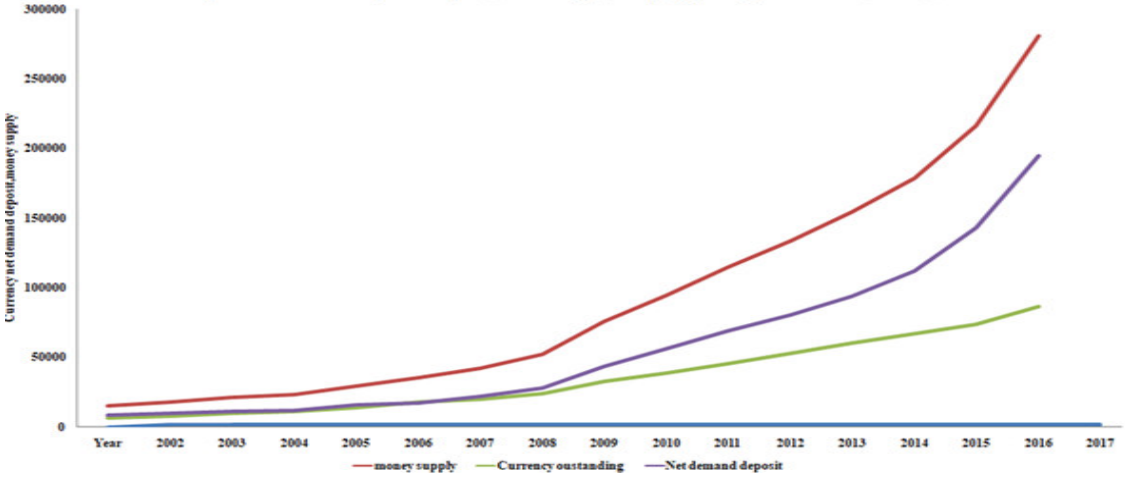


Figure4.1.2: Trend of money, quais- money and broad money supply in Ethiopia (2002-2017).

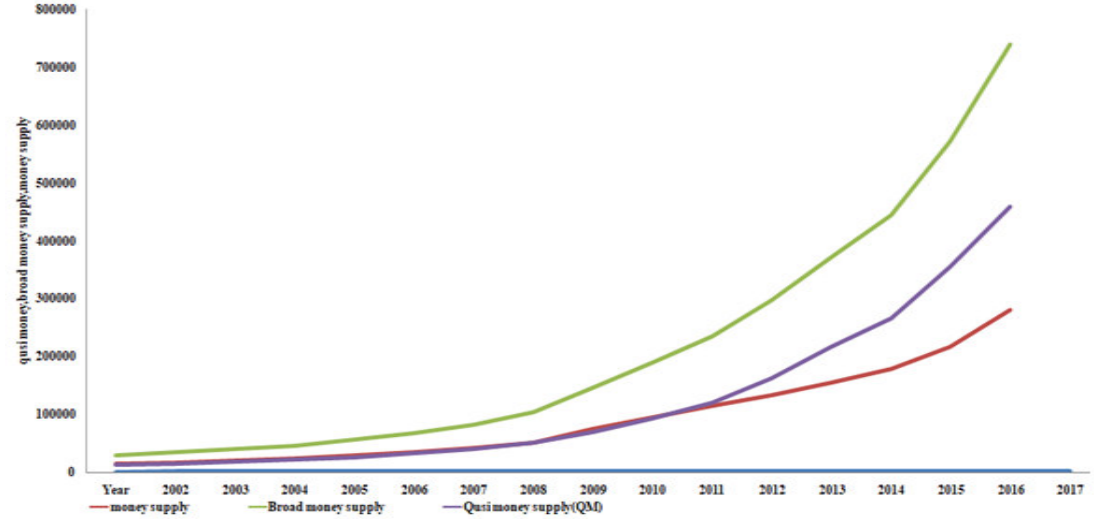
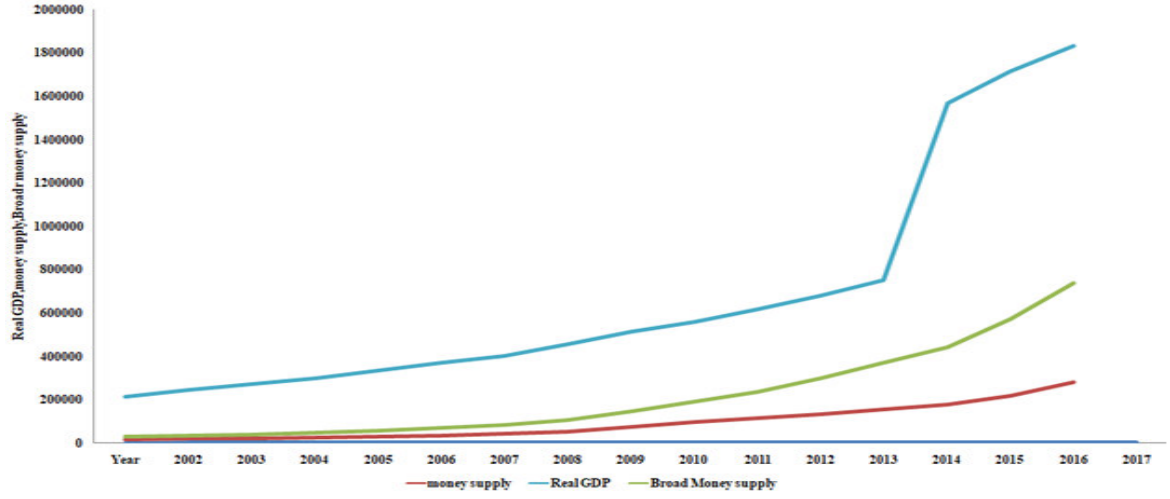


Figure 4.1.3: Trend of money, broad money supply, Real GDP in Ethiopia (2002-2017)



4.2 Inferential static Statistics

In this section the researcher clearly show the optimal lag selection criteria, Johansen co-integration test results and Vector error correction model results shortly and clearly.The following steps were is used to see the long run causality between growth rate of broad money supply and growth rate of Real GDP.

4.2.1 Optimal lag selection

As we seen in the table below the optimal lag order of VAR/VECM criteria outcome is same. In both cases all five of the five (LR, FPE, AIC, SBIC and HQIC) criteria's which are telling the same result and hence, better to select optimal lag is lag 1. So we shall use lag 1 as optimal lag.

Table 4.2.1: Lag selection criteria

Selection-order criteria
Sample: 2006 - 2017 Number of obs = 12

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	12.9905				.009405	-1.83176	-1.86168	-1.75094
1	15.4048	4.8285*	1	0.028	.007488*	-2.06747*	-2.11235*	-1.94624*
2	15.4269	.04413	1	0.834	.008952	-1.90448	-1.96432	-1.74284
3	16.2645	1.6753	1	0.196	.009454	-1.87742	-1.95222	-1.67537
4	16.2765	.02402	1	0.877	.011655	-1.71275	-1.80252	-1.4703

Endogenous: LogRGDP
Exogenous: LogM2 _cons

4.2.2 Unit Root Test (corrgram)

To undertake unit root test the hypotheses was developed as follows:
Ho: Our variables are stationary.
H1: Our variables are non-stationer
Decision rule: If p-value is less than 5 percent, we can reject Ho.
Know we have to check the unit root test of ship our variables Log Real GDP and Log M2. Let's first, checks our variables.

Table 4.2.1.1: Stationary Test result for Log of Real GDP at level

The table below shows that log RGDP is non stationery at level.

LAG	AC	PAC	Q	Prob>Q	-1 0 1 [Autocorrelation]	-1 0 1 [Partial Autocor]
1	0.7808	1.0330	11.704	0.0006		
2	0.5521	0.2141	17.975	0.0001		
3	0.3202	0.6866	20.247	0.0002		
4	0.2050	-0.9682	21.256	0.0003		
5	0.0979	5.7033	21.507	0.0006		
6	-0.0044	-7.5506	21.507	0.0015		

Table 4.2.1.2: Stationary Test result for first difference of Log of Real GDP

The table below shows that the first difference of log RGDP is stationary.

LAG	AC	PAC	Q	Prob>Q	-1 0 1 [Autocorrelation]	-1 0 1 [Partial Autocor]
1	-0.0966	-0.0985	.16991	0.6802		
2	-0.1477	-0.1664	.59765	0.7417		
3	-0.0139	-1.5089	.60173	0.8960		
4	-0.0495	-7.5145	.65857	0.9563		
5	0.0129	4.0348	.6628	0.9849		

Table 4.2.1.3: Stationary Test result for Log broad money supply at level

The table below shows that log RGDP is non stationery at level

LAG	AC	PAC	Q	Prob>Q	-1 0 1 [Autocorrelation]	-1 0 1 [Partial Autocor]
1	0.8226	1.0259	12.993	0.0003		
2	0.6446	-0.3671	21.54	0.0000		
3	0.4718	0.1199	26.471	0.0000		
4	0.2954	-0.1211	28.565	0.0000		
5	0.1273	0.2286	28.989	0.0000		
6	-0.0292	0.4164	29.014	0.0001		

Table 4.2.1.4: Stationary Test result for Log broad money supply at first difference

The table below shows that the first difference of Log M2 is stationery.

LAG	AC	PAC	Q	Prob>Q	-1 0 1 [Autocorrelation]	-1 0 1 [Partial Autocor]
1	0.4503	0.4804	3.6926	0.0547		
2	0.1486	-0.0290	4.1256	0.1271		
3	0.0708	0.1411	4.232	0.2375		
4	-0.0470	-0.1329	4.2832	0.3690		
5	-0.3143	-0.2404	6.8027	0.2357		

4.2.3 Long Run causality between growth rate of broad money supply and Real GDP (Johansen co-Integration Test)

In our study, both the two variables are non stationary at level but when we converts into first difference, they will become stationary. In our study here the two variables are fulfilled the precondition of running Johansen co-integration test. To undertake Johansen co-integration test.

At Rank 0

Ho:-There is no co- integration among variables in the model.

H1:-There is co- integration among variables in the model.

Decision rule:-When trace /max statics is more than 5% critical value, and then we can reject Ho (0) and accept H1.(Eng, Robert, F. Granger, Clive W.J., 1987).

The table below shows that trace and max statics are double confounded that there is no co-integration that is trace statics at rank zero (11.5426) which is less than 5 percent critical value (15.41) and Max statics at rank zero (8.8134) which is less than 5 percent critical value (14.07) and hence, we fail to reject Ho rather accept Ho which implies there is no long run association ship among log RGDP and Log Broad money supply in the system. And hence, we can run Vector Auto Regressive (VAR) model to see the short run causality between Log RGDP and Log M2.

Table 4.2.3: Johansen Test of co-integration

Johansen tests for cointegration

Trend: constant — Number of obs = 15

Sample: 2003 - 2017 — Lags = 1

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	2	56.099669	.	11.5426*	15.41
1	5	60.506367	0.44432	2.7292	3.76
2	6	61.870974	0.16635		

maximum rank	parms	LL	eigenvalue	max statistic	5% critical value
0	2	56.099669	.	8.8134	14.07
1	5	60.506367	0.44432	2.7292	3.76
2	6	61.870974	0.16635		

4.2.4. Short run causality between growth rate of broad money supply and Real GDP.

4.2.4.1T-Test statics of Regresses on VAR model

VAR model results in the table below shows that the first lag of broader money supply has positive significant impact on real GDP at 5 percent level on average.

Table 4.2.4.1: Vector Auto Regressive model result summer

Sample: 2003 - 2017		Number of obs	= 15
Log likelihood = 61.87097		AIC	= -7.449463
FPE = 2.02e-06		HQIC	= -7.45248
Det(Sigma_ml) = 8.96e-07		SBIC	= -7.166243

Equation	Parms	RMSE	R-sq	chi2	P>chi2
LogRGDP	3	.066004	0.9542	312.2822	0.0000
LogM2	3	.019483	0.9983	8975.078	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
LogRGDP						
LogRGDP						
L1.	.5813481	.2090046	2.78	0.005	.1717067	.9909896
LogM2						
L1.	.2930271	.1300972	2.25	0.024	.0380413	.5480129
_cons	.9596845	.5873276	1.63	0.102	-.1914564	2.110825
LogM2						
LogRGDP						
L1.	.0384631	.0616931	0.62	0.533	-.0824531	.1593793
LogM2						
L1.	1.002884	.0384015	26.12	0.000	.9276187	1.07815
_cons	-.1398075	.1733648	-0.81	0.420	-.4795963	.1999812

4.2.4.2: Granger causality Wald Tests

To check the whole short run causality runs from growth rate of broader money supply to growth rate of Real GDP the researcher employed Granger causality test.

Ho: Broader money supply doesn't cause granger causality to Real GDP.

H1: Broader money supply causes granger causality.

Decision Rule: If P–value is greater than 5 percent level, we can't reject Ho. The results in the table below shows, we can reject Ho and hence, border money supply granger causes Real GDP and the p- value is statistically significant at 5 percent level. How every, Real GDP does not have casual effect on broad money supply. The above value of T-test statistics of the regresses on the VAR model and Granger causality test both shows that short run causality running from broader money supply to Real GDP which shows the robustness of the model.

Table 4.2.4.2: **Granger causality Test result**

Equation	Excluded	chi2	df	Prob > chi2
LogRGDP	LogM2	5.0732	1	0.024
LogRGDP	ALL	5.0732	1	0.024
LogM2	LogRGDP	.3887	1	0.533
LogM2	ALL	.3887	1	0.533

4.2.4.3 Test of Linear Hypotheses

The table below shows that the chi-square result 12499.19 is statistically significant at 1 percent level and hence log M2 causes log GDP.

Table 4.2.4.3: Wald coefficient Test

```
( 1)  [LogRGDP]L.LogRGDP = 0
( 2)  [LogM2]L.LogRGDP = 0
( 3)  [LogRGDP]L.LogM2 = 0
( 4)  [LogM2]L.LogM2 = 0

           chi2(  4) =12499.19
         Prob > chi2 =    0.0000
```

In conclusion, three of the above causality checks in the above tables 4.2.4.1/ 2 and 3 can serve as robustness for one another that causality running from log of broad money supply to real GDP.

IV .Conclusion and Recommendation

The finding of this study revealed that an increase in growth rate of broad money supply has positively impact on growth rate of Real GDP in Ethiopia in the short run over the year 2002-2017; but real GDP does not causes broader money supply. Furthermore, the Johansen co-integration test result shows that there is no long run association ship between broader money supply and real GDP. This implying rising broad money supply is a necessary condition for promoting economic growth for the year 2002-2017 in the short run.

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