Determinants of Money Demand Function in Ethiopia

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Abstract

In Least developed countries (LDCs) like Ethiopia, one of the major macroeconomic problems is the absence of effective monetary policy. The money demand function play a major role in macroeconomic analysis, especially in selecting appropriate monetary policy actions. The objective of monetary policy in LDCs is usually related to money and credit control, price stabilization and economic growth. Many LDCs considered, price stability as the most important objective of monetary policies and it is important to testing the stability of parameter of money demand function indicate the effectiveness of the conduct of monetary policy. The research to be conducted therefore is to investigate the determinants of money demand function. Based on the data, an error correction model (ECM) will be applied to estimate the money demand function in Ethiopia. From the study it is found that, money demand is positively related with real GDP and it is negatively related with expected inflation and real effective exchange rate. Therefore, the paper recommends that the determinant of money demand which is real GDP, real money balance, inflation rate and real effective exchange rate should be first stabilized in order to have appropriate circulation of money.

Introduction

The demand for money is a heavily researched area of economics. This is due to the important role of private economic agents' behavior in

determining the outcome of economic policy reform that target monetary aggregate. Theoretical and empirical studies suggest that the demand for money is a function of scale variable (income or wealth) and opportunity cost variables such as interest rates and expected inflation. Voluminous studies have been made with regard to the empirical investigation of the demand for money function both in developed and developing countries. However, much of the empirical research has focused on developed economies. This study focused on a developing country. Empirical research has also concentrated on the identification of the appropriate key economic variables that determine the amount of real money balance that economic agent want to hold. Thus, the most common money demand specification include real income as a measure of scale variables one or more measure of the opportunity cost of holding money, lagged value of dependent variable and dummy variables to account for seasonal variation and regime shifts. Most of the empirical studies have employed aggregate real income, the rate of general inflation and other variable as explanatory variables (Siram, 1999).

During the last decade of the 20th century most African countries specifically south of Sahara started to implement economic liberalization measures and structural adjustment program (SAP). This changed situation has made empirical investigation of money demand to remain of interest to researchers. Ethiopia is one of the sub-Saharan African countries which have embarked on structural adjustment program. The reform measures implemented so far have changed the prices of assets and this change might have affected the demand for cash balance. Furthermore, Ethiopia is developing economy with heavy dependence on external assistance. This situation makes the behavior of domestic agent to be strongly influenced by external economic and monetary development. This makes it appropriate to

include a variable that measures changes in exchange rate (World Development Report 1998).

Demand for money plays a major role in macro economic analysis especially in selecting appropriate monetary policy actions. Consequently, a steady stream of theoretical and empirical research has been carried out worldwide over the past decades (Siram, 2005). The presence of stable money demand function greatly facilitate the conduct of monetary policy as it tells policy makers that different variable are affected by change in the money supply (Samuel, 2005). Estimating the money demand function for an economy has been a quest of many research endeavors since the beginning of the previous century. The special role that money plays in the economy has made it an important research topic.

The presence of money demand function enables policy makers to influence changes in important economic variable such as GDP, expected inflation and exchange rate. A stable money demand function has long been sought after because it can be very useful for explaining and even predicting the behavior of other aspects of the macro economy. Moreover, testing the stability of parameters of the money demand function is important as it indicates the effectiveness of the conduct of monetary policy. This is because that the demand for money is a link between economic activities and monetary policy (Al-Saji, 1998). Stability of the money demand function that refers to constancy of the coefficients of the explanatory variables and changes in variances are crucial to studies of money demand function. Hence, demand for money plays a pivotal role in selecting appropriate policy actions. Studies have also suggested that changes in macroeconomic policies like financial innovations, financial sector liberalization, use of indirect monetary policy instruments and some other country specific variables may cause instability

in parameter estimates that in turn suggests unpredictability of policy changes.

Statement of the Problem

Ethiopia is one of the poorest countries in the world. The poor performance of the Ethiopian economy has been largely attributed to distorted economic policies. The government of Ethiopia has accepted and started to implement the Structural Adjustment Program (SAP) supported by International Monetary Fund (IMF) and World Bank since October, 1992. This was the time where Structural Adjustment Program (SAP) was preached to be a step toward the adjustment of macroeconomic imbalances and ensure sustainable economic growth. According to this comprehensive economic reform program, a series of policy reform measures and deregulations have been made in view of correcting the distortions in the macro economy and fostering economic growth.

Monetary policy is macroeconomic policy laid down by the central bank which involves management of money supply and interest rate and is the demand side economic policy used by the government of a country to achieve macroeconomic objectives like inflation, consumption, growth and liquidity. It is one of the policy instrument employed to achieve rapid economic growth and stability (Seth, 1985)

The objectives of monetary policy in Least Developed Countries (LDCs) are usually related to money and credit control, price stability and economic growth. The relationships between money demand and its determinants is crucial concern for policy makers since it allows them to formulate an appropriate monetary policy and increase the level of accuracy in targeting money growth. The issue of the stability money demand function in the long

run has received extensive attention in the past. However, mixed results are found in the literature. Some studies indicate that money demand is unstable while others claim it is stable. Both theory and empirical studies seem to conclude that macroeconomic policies matter in influencing economic performance (Fisher, 1991). One of the reason why the money demand function is widely researched is that demand for money lies at the heart of macroeconomic policies (Adam, 1999). Money is linked to changes in the economic variables that affect all of us and are important to the health of the economy (kin, 1998).

Besides, testing the stability of parameters of the money demand function is important as it indicates the effectiveness of the conduct of monetary policy. The reason is that the demand for money is a link between economic activities and monetary policy (Al-Saji, 1998). Stability of the money demand function that refers to constancy of the coefficient of its determinants and changes in variances of money demand function are crucial to the studies of money demand. As Deadman, (1995) showed one operationa l consequence of parameter instability in a demand for money equation is that predications about the effect of alterations in monetary policy would become more hazardous. Indeed such instability could in itself be a source of disturbance to the economy.

Previous studies on the determinants of money demand function in the case of Ethiopia is revealing. In order to correct macroeconomic distortion and imbalance, Ethiopia like most of African countries, has accepted and been implementing a comprehensive economic reform program since 1992. Hence, the attainment of targets of the program by the monetary authorities requires knowledge of the determinants and stability of the demand function. Ethiopia has been undertaking a comprehensive economic reform program

since October, 1992 after being ruled by centrally planning socialist regime for nearly two decades. In this regard, since the adoption of financial sector has undergone significant changes. For instance, the exchange rate that was also fixed (pegged) before the reform period devalued significantly.

These and other monetary policy variables, therefore, have their own impact on the money demand function previous rigorous study on the determinants of money demand function in the case of Ethiopia is scanty. The purpose of this study was bridging this research gap by investigating the determinants of the demand for money, testing the stability of the money demand function and proposing policy advises.

Objectives of the Study

The general objective of the study is to formulate and estimate the money demand function in Ethiopia.

In line with the general objective, the study is carried out with the following specific objectives:

- To examine the determinants of the money demand function
- To draw some policy implications based on the findings.

Scope of the study

This study is limited only to estimating the broad money demand and looking for its determinants. Therefore, it focuses on determining the determinants of the demand for money in the Ethiopia using time series econometric model. The coverage time span of the research will be from 1982 to 2012.

Significance of the Study

Understanding the major determinants of money demand function plays a significant role for monetary policy formulation. Therefore, the study is significant in this respect by assessing the effectiveness of monetary policy. In addition, it is significant by bridging the research gap that is not so far studied by previous research. For example (Zekarias 2003), to determine the money demand function in Ethiopia; He used only two variables such as GDP and expected inflation. However, this study differed by including the variable together such as real GDP, expected inflation, real effective exchange rate and real money balance. It may also lead to identification of new problem for further investigation.

Research Hypothesis

The researcher wants to test the following hypothesis

- The demand for money has positive relationship with real GDP
- The demand for money has negative relationship with real effective exchange rate
- The demand for money has negative relationship with expected inflation
- The demand for money has positive relationship with real money balance

Model Specification and Methodology

Sources of Data

The data consists of annual time series covering periods from 1982 to 2012. The main sources of data of this study are the National Bank of Ethiopia (NBE) and Ministry of Finance and Economic Development (MoFED).

Methodology

To conduct the study, data was collected only from secondary sources. These secondary data were obtained by analysing documents and data bases. Time series econometric techniques were applied to analyse the data. Time series stationary test were conducted using Augmented Dickey Fuller test (ADF); test for the existence of long run equilibrium and short run relationship between the dependent and explanatory variables are conducted using co-integration and Error Correction Model (ECM) respectively.

Model specification

Conventional money demand theory suggests that behaviour of money demand function is determined by scale and opportunity cost variables. This standard equation approach to the estimation of a demand for money function for a less developed country (LDCs) has been familiarized by (Gujarati 1968, as cited in Ghatak, 1995). According to his estimation, real demand for money is assumed to be function of real income, real interest rate and inflation uncertainty. These could be categorized as scale variables, which related to measures of economic activities like income, expenditure or wealth, while the others as opportunity cost variables. These include variables such as both domestic and foreign interest rates, expected inflation, expected exchange rate (currency substitution) and the price level. In this study econometric technique of co-integration is employed to identify the determinants of money demand function in Ethiopia in the long run. The co-integration equation revealed that the long run determinants of money demand function in Ethiopia. And the Error Correction Model is used to show the short run relationship between the dependent and the explanatory variables. Money demand function in Ethiopia can be determined by economic growth, expected inflation, real effective exchange rate and real

money demand. This relation can be expressed using the model developed by Friedman as follows:

logMD= f (logGDP, πe, reer, logMd/P),

Where logMD- log of money demand

logGDP- log of economic growth

πe- expected inflation

reer- real effective exchange rate

logMd/P- log of real money demand

Following a common formulation of money demand we specify the money demand function as:

$$logMD = \beta_0 + \beta_1 logRGDP + \beta_2 \pi e + \beta_3 \, reer + \beta_4 log(M_d/p) + \varepsilon$$

Where   logMD- log of money demand

logRGDP- log of real GDP

πe- expected inflation

reer- real effective exchange rate

logMd/P- log of real money demand

ε- error term

Data Analysis and Discussion

Stationarity test

ADF test is used to test whether the variables become stationary or not. Time series is stationary if its mean and variance do not vary systematically over time where as a non stationary time series has different mean and variance as time varies. This indicates that a non stationary variable is dependent on time. Since the data set is a time series data, stationary of the variables is important. First a regression based on non stationary time series explains the relationship during the study period only. This means that it is impossible to infer about the long run relationship of the variables. In addition, regression of non stationary time series on another non stationary time series may lead to spurious regression. In order to avoid these problems stationary test has been conducted on the variables using Stata IC. Augmented Dickey Fuller (ADF) test has been chosen to test for the existence of unit root because it accounts for correlation. In addition it is also widely used in unit root tests. The results are depicted in the table below and this table shows the unit root results of the variables at level.

Table 1: Stationarity test of variables in their levels

Variables at level	tests	Z(t)	Critical value	Results
Logmoney	ADF	1.364	-2.992	Non-stationary
LogRGDP	ADE	-2.587	-2.992	Non-stationary
logM/p	ADF	-1.008	-3.00	Non-stationary
Inflation	ADF	-1.176	-2.992	Non-stationary
Reer	ADF	-0.159	-2.992	Non-stationary

The above table shows all the variables have a unit root in their levels. In order to avoid the unit root I tested for the variables in their first difference and there is no problem of unit root, i.e. all the variables are stationary.

Table 2: Stationarity test of variables in their first difference

Variables at first difference	Tests	Z(t)	Critical value	Results
Dlogmoney	ADF	3.14	-2.994	Stationary
DlogRGDP	ADE	3.12	-2.994	Stationary
dlogM/p	ADF	-5.104	-2.994	Stationary
DInflation	ADF	-3.577	-2.994	Stationary
Dreer	ADF	-3.219	-2.994	Stationary

Cointegration test

In the case where the variables are difference stationary, the model can be estimated using first difference. However, the first difference gives only the short run dynamics. In order to have the short run and long run relationship, we have to use what is known as cointegration test. After testing time series for stationary, the next step of the time series analysis is testing for co-integration.

Long run model

The long run regression results of the variables are shown in the table below.

Table 3: Regression result of long run model

Variables	Coefficients	Std. err	t- statistics	P- value
logRGDP	0.0327093	0.0145928	2.24	0.036
logM/p	0.2322883	0.0962451	2.41	0.025

Inflation	-0.0418735	0 .0104688	-4.00	0.001
Reer	-0 .192912	0 .0323444	- 5.96	0.000
Constant	6.64013	0 .7475076	8.88	0.000

Durbin-Watson d-statistic (3, 30) = 1.620302

F (1 27)=141.35, prob. >F=0.0000

R -Squared= 0.96, Adj. R- Squared=0.957

To check whether the variables in the model are cointegrated, quicker method is Cointegration Regression Durbin-Watson (CRDW). In CRDW we used the DW statistics value obtained from the above equation, such as DW=1.620302 is greater than critical value, so I rejected the null hypothesis of no co-integration.

Interpretation of the result

A percentage increase in real GDP, increases money demand by 3.2%. We know that as GDP grows the per capita income of individuals will increase. This needs to the rise of money demand. The income that measures the volume of transaction emanates from role of money as a medium of transaction. Therefore, model of money demand shown that whenever income increases, individuals demand for money also increase. Therefore, RGDP and money demand have positive relationship.

A percentage increase in inflation, decreases money demand by 4.18% since the holding of money for long time has an opportunity cost. When at the time of inflation is high, the opportunity cost of holding money is also high. Due to the fact of this as expected inflation increase individuals reduce their holding money and increase holding of real assets. Thus inflation and demand for money have a negative relationship. A percentage increase in the

reer, decreases the demand for money by 19.29%, that is, depreciation of the domestic currency by one unit, will result a decline in the demand for money by 0 .192912. To explain depreciation take for example, one dollar of USA is changed with 12 birr of Ethiopia before depreciation. After depreciation the exchange rate rises to 18 birr. So that many birr will start to change by one dollar, so people demand for Ethiopian birr will decline because few dollar of USA will changed by a high amount of birr. Thus reer and demand for money have a negative relationship.

R-Squared of the regression, sometimes called the coefficient of determination, interpreted as the overall significance of the model. Its result shows that the explanatory variables account for 96% of the variation in money demand. The adjusted R^2 value, which accounts for the number of variables, shows that the explanatory variables account for 95% of the variation in money demand. The overall significance of the model is also significant. This shows that the variables incorporated in model account for the changes in the dependent variable. The Durbin-Watson value of 1.620302 which shows the absence of auto correlation in the model. The R-square, the adjusted R-square and the Durbin-Watson value show that the model is strong.

The Error correction Model (Short run Dynamics)

After having the Durbin-Watson test I undergo the Error Correction Model (ECM), to see the short run relationship of the demand for money with the dependent variables. And the results are shown in the table below.

Table 4: Regression result of Error Correction Model (short run Dynamics)

Variables	Coefficients	Std. err	t- statistics	P- value

dlogRGDP	0.01335	-0.0115368	3.37	0.004
dlogM/p	-0.0020175	0.0259878	1.08	0.299
dInflation	0.0032618	0.0030299	-0.48	0.636
Dreer	-0.0115368	0.0239052	-0.08	0.939
lagECM	-0.4996	0.0011200	-2.03	0.007
Constant	0.3040132	0.0659625	4.61	0.000

Significant at 5% level of significance

$F(5, 15) = 3.87$ R-squared= 0.5631

Prob > F= 0.0188   Adj R-squared   = 0.4175

Interpretation of the result

The coefficient of short term dynamics reveals that real GDP is statistically significant and showing its contribution for the money demand in the short run. Real money balance has shown statistically insignificant relationship with the demand for money as their relation become negative in the short run. The reer is statistically significant and showing its negative relationship with the demand for money. The other variable inflation has shown statistically insignificant relationship with the demand for money as their relation become positive in the short run.

The coefficient of error correction term or the speed of the adjustment (ECM) is negative as is expected to be negative, significant, and has an absolute value smaller than one, indicating the gradual convergence of the system toward long run equilibrium values. Based on the result, the magnitude of the error correction coefficient is -0.499 implying that within one year it adjusts about 49.9% of the disequilibria. In other words deviation from the long run equilibrium adjusted 49.9%   of the disequilibrium is removed each period.

Conclusion and Recommendation

 Conclusion

The review summarized in this paper revealed that the real money demand is affected by different factor and monetary policies variable like the real GDP of the country, the expected inflation, real effective exchange rate and the real money balance. As we tried to indicate in the outset one of the purposes of this study is to identify the determinants of money demand function in the case of Ethiopia. Having knowledge of these determinants is very crucial for policy formulation and its effectiveness. The paper has studied developments in the macro-economic situation and the financial system that are relevant for modeling the money demand function. In formulating the money demand function, the paper has tried to include real GDP, expected inflation, real effective exchange rate and real money balance that affect the demand for money. The analysis part result shows that real GDP and real money balance is positively related with the demand for money. The other variables expected inflation and real effective exchange rate affect demand for money negatively. Among these variables real GDP is the only significant determinants of money demand. A real GDP effect on money demand is highly significant and the effect of other variables is insignificant.

In general, the paper found that in Ethiopia money demand is affected by several factors. Among these determinants of money demand are real GDP of the country, the expected inflation, real effective exchange rate and the real money balance.

Recommendation

Demand for money plays a major role in conducting appropriate monetary policy. To conduct effective monetary policy the policy makers should consider the determinant of money demand.

- Policy makers should develop policies aimed at providing income generating to the society
- Policy makers should conduct effective monetary policies to stabilize inflation in the economy.
- The depreciation of reer is important to improve the competitive of Ethiopian exports in the international market. Only depreciating exchange rate will not be effective because it will affect money demand negatively. So to develop the exports sector other measures should be taken. Such as introducing import substitution industries and developing the capacity of small scale industries for stabilized demand for money.

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