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DEMAND FOR MONEY IN ZIMBABWE: 2009 –2013

BY

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DEDICATION

I dedicate this dissertation to my mother Martha, and my late father, Patrick Tuluzawu who have supported and encouraged me in my life.

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ABSTRACT

This study estimates both narrow and broad money demand in Zimbabwe for the period 2009 to 2013. The money demand function is an important tool for macroeconomic policy analysis, especially monetary policy as it provides the relationship between money demand and macroeconomic variables. The study finds that income, interest rate and inflation are significant variables in the money demand function. The study uses the Augmented Dickey Fuller test to confirm the long-run cointegration and the Johansen approach for the error correction model. Stability tests conducted show that the narrow money demand function is stable while the broad money demand function is not stable.

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LIST OF ACRONYMS

ADF	Augmented Dickey Fuller
AfDB	African Development Bank
Afrexim Bank	African Export and Import Bank
CBZ	Commercial Bank of Zimbabwe
CPI	Consumer Price Index
ECM	Error Correction Model
ECT	Error Correction Term
ESAP	Economic Structural Adjustment Programme
FCAs	Foreign Currency Accounts
GDP	Gross Domestic Product
GMU	German Monetary Union
GNP	Gross National Product
IMF	International Monetary Fund
JB	Jarque-Bera
M1	Narrow Money
M2	Broad Money
MOFED	Ministry of Finance and Economic Development
OLS	Ordinary Least Squares
QTM	Quantity Theory of Money
RBZ	Reserve Bank of Zimbabwe
US	United States
VAR	Vector Autoregression
VMI	Volume of Manufacturing Index
Zimstat	Zimbabwe Statistical Agents

CHAPTER ONE: INTRODUCTION

1.0   Introduction

Studying money demand in Zimbabwe is important for macroeconomic policy formulation and analysisas well as ensuring that monetary policies support economic growth and development. This study will focus on money demand in Zimbabwe from 2009 when the multiple currency system was introduced. Moneydemand reflects the degree of willingness to hold money by economic agents (Mankiw, 1997). Money demand has been studied in both developed and developing countries. Money demand functions establish the link between money and the real economic variables such as income, interest rate and inflation, which provides the basis for monetary policy interventions with respect to designing and implementation.

Central Banks and policy makers use the money demand function in selecting monetary policy options, identifying growth targets for money supply and manipulating interest rates and reserve money to control liquidity in the economy (Treichel, 1997). The usefulness of a money demand function in conducting monetary policy is anchored on its stability. According to Sriram (1999a), the stability of a money demand function enables one to forecast policy driven change in monetary aggregates' influence on output, prices and interest.

Until 2009, Zimbabwe has been using its own currency. The country, however, started to be faced with hyperinflation in 1999 due to excessive money printing to finance huge Government deficits(MOFED, 2009a). In 1980, inflation was recorded at 7%. In 1990 it was 17%. In 1999 inflation was 56.9% and it continued on an upward trend. The worst recorded level of hyperinflation was 231 million percent in July 2008 (IMF, 2009). Hyperinflation rendered the Zimbabwean dollar worthless in 2008. By the end of 2008, the public shunned the Zimbabwean dollar and started using foreign currencies or barter trade where foreign currency was not available. In early 2009 the country adopted hard currencies like the United States dollar and the British Pound and other currencies like the South African Rand and the Botswana Pula (Kramarenko et al, 2010).

The adoption of foreign currencies resulted in the Reserve Bank of Zimbabwe losing control on money printing and exchange rate. This therefore meant that the country solved its major problem of hyperinflation but at the same time lost a crucial policy adjustment tool, money supply. In addition, the country lost the exchange rate, another important policy adjustment tool.

The adoption of the multiple currencies was not matched with demonetisation of Zimbabwe dollar balances. This resulted in all sectors of the economy including banks starting up at zero balances except for the foreign currency they held. Most companies had already lost their foreign currency balances to the Reserve Bank which seized their Foreign Currency Accounts (FCAs) in 2008 (Reserve Bank of Zimbabwe, 2008). Banks, especially the locally owned, therefore, starting at zero balances, scrambled for loans, most of which were short term and high interest loans, to undertake their business. The challenge was worsened when the Reserve Bank announced mandatory US$12.5 million capitalisation level for commercial banks and US$10 million for merchant banks in December 2010 (Reserve Bank of Zimbabwe, 2011). Undercapitalisation of banks and liquidity challenges in the economy resulted in banks failing to have a functioning interbank market (IMF, 2010).

The problem of undercapitalisation facing all sectors of the economy did not spare the Reserve Bank itself (IMF, 2010). In that regard, the Bank failed to play the lender of last resort function as well as strengthening supervision of the banking sector. In addition, since the Central Bank cannot print money, it has lost potential gains from seigniorage(Kramarenko, et al, 2010).

Most studies on money demand in developing countries like Teles and Zhou (2005) and Hamori (2008) were motivated by structural changes for example financial liberalisation, financial innovations in the domestic markets, globalisation of capital market and emergence of new financial assets in specific countries. This study is however motivated by the structural changes brought in by reversal of hyperinflation of 2008, new currency regime and liquidity challenges in the economy. Money demand is influenced by inflationary pressures.

According to Harvey (1998), by the 1970s Zimbabwe's financial sector had become one of the most developed in Sub-Sahara Africa. In the 1980s the financial sector remained tightly controlled and oligopolistic (Kanyenze, et al, 2011). In the 1990s, the financial sector was

liberalised (Kadenge, 1998). The liberalisation framework continued in the 2000s (Kanyenze, 2011).

1.1   Monetary Policy in Zimbabwe

The monetary policy regime in Zimbabwe has had several shifts since 1980. In the 1980s, the monetary regime was controlled thus rendering the monetary policy inactive according to (Kanyenze, et al. 2011). The economic conditions were basically characterised by extensive controls on domestic activity, there were controls on prices, wages, interest rates and credit as well as foreign exchange allocations (Ojo, 1997).

Zimbabwe's monetary policy was largely based on direct instruments that included controls on lending and deposit rates, quantitative controls on credit, the use of Reserve Bank Bills, prescribed liquid asset ratios and moral suasion, among others (Makina, 2009). Inflation averaged 12% while the interest rate averaged 9%. In this regard, real interest rate was negative thus discouraging savings mobilisation. In addition, Zimbabwe incurred high budget deficitswhich were financed by lending from the banking sector, further reducing the effectiveness of the monetary policy.

In the late 1980s, the Zimbabwean Government turned to the Bretton Woods institutions for financial assistance. The Bretton Woods institutions prescribed strict structural adjustment policies. Zimbabwe experienced a U-turn on the policy front. Liberalisation programmes were initiated under the Economic Structural Adjustment Programme. These included the removal of interest rate controls thus open market operations and a flexible interest rate system became the principal instruments through which the monetary policy was conducted (Ojo, 1997). The Reserve Bank embarked on a monetary targeting approach focusing on money supply measures: M1 and M2 (Makina, 2009). The Reserve Bank focused on regulating the amount of credit available for Government and the banking system so that it remained in line with the desired level of net domestic assets. However, this approach did not work because the budget deficit was financed by heavy borrowing from the banking sector which prompted inflation.

After failing to curb inflation by targeting money, the Central Bank shifted to reserve money targeting. The monetary policy aimed at fixing the level of reserve money with the desired

level of M3. This approach also did not bring about desired results as inflation continued on an upward trend surpassing 50% by 1999 (Zimstat, 2012). The challenge though was exacerbated by the fact that Government did not stick to the reserve money targets as it incurred huge deficits between 1998 and 1999 which had to be financed by the Reserve Bank (IMF, 2001).

Since the beginning of the 2000s, the Reserve Bank changed direction in terms of monetary policy thrust. The Reserve Bank embarked on various quasi-fiscal activities as well as direct lending to the private sector (IMF, 2004). The laws stipulating the functions of the Central Bank were vague and thus giving discretion on the extent to which the Bank could intervene to stimulate economic growth (Makina, 2009). The Reserve Bank thus ended up actively participating and leading agriculture support activities, manufacturing as well as retail services. Most of these activities were funded by printing money. The budget deficit in 2007 was 88% of the GDP while RBZ quasi fiscal activities contributed 23% of GDP (Coorey et al. 2007). In 2008 alone the Reserve Bank spent US$1.1 billion in financing elections, transfers to parastatals, subsidised directed lending, free agriculture equipment and inputs to farmers as well as allocation of foreign exchange at subsidised exchange rates (IMF, 2009). This continued to accelerate hyperinflation which reached 231 million in July 2008. Thereafter official inflation figures were not published but the IMF (2008) estimates thathyperinflation reached 500 billion percent. By the end of December 2008 the Zimbabwean dollar had become worthless such that the public rejected it. Transactions were done in foreign currencies or barter trading in some cases.

In February 2009, the new Government formalised the already publicly adopted dollarization. The US dollar was adopted as the major currency together with other currencies as the South African Rand, the Botswana Pula and the British Pound (MOFED, 2009b). Financing the budget deficit through money printing was no longer possible. The goal of price stability thus depended on fiscal adjustments as well as activities of the banking sector (Makina, 2009).

The Government has since 2009,announced the multiple currency regime as one of the major policy positions that arrested hyperinflation (MOFED, 2009b). However, with the Reserve Bank now unable to control money supply the country started facing liquidity challenges (RBZ, 2012). This is a result of cumulative current account deficits (MOFED, 2011). As the country continues to incur current account deficits, the liquidity situation continue to worsen.

The situation has not been made better by company closures as well as the informal sector which is largely unbanked. Supervision of the banking sector is thus critical for the Central Bank to ensure that the public do not shy away from the formal monetary system.

In addition, to having lost control over money supply, the Reserve Bank is unable to play the banker to Government role and lender of last resort because it is under capitalised. The function of banker to Government is being carried out by commercial banks especially the Commercial Bank of Zimbabwe (CBZ). It is the Government's view that undercapitalisation of the Central Bank may compromise its effectiveness in carrying out the banker to Government role. In the 2014 Budget, Treasury announced that the Reserve Bank will resume the banker to Government role after the Bank is capitalised (MOFED, 2013).

The lender of last resort function is critical for preventing financial panics and bank runs which many have a spill over effect to the rest of the economy (Diamond and Dybvig, 1983;Allenand Gale, 2000; and Freixas, et. al, 2000b). In as much as the interest rate will be higher than for other financing sources, the lender of last resort remains crucial as a fall-back position for banks. The Government has been sourcing money to ensure that Central Bank can play this role however to no avail.

In addition, the interbank market is non-functional. The interbank market is a market in which banks extend loans to one another on agreed terms. Usually these loans are for maturities for one week or less, and mostly overnight. These loans are made at the interbank rate or the overnight rate if the term of the loan is overnight. Normally, banks are required to hold adequate amount of liquid assets such as cash so as to manage any potential bank over runs by depositors. In the event that the bank is unable to meet these liquidity requirements, it will need to borrow on the interbank market. In the like manner, those banks with excess liquidity will lend on the interbank market and earn an interest. Normally, banks borrow and lend in the interbank market to manage liquidity as well as to satisfy regulations such as reserve requirements. In Zimbabwe most banks are however challenged with lack of liquidity.

1.2 Problem Statement

The existence of a money demand function is important to ensure that the quantity of money in an economy can be predicted and related to a set of key economic variables linking money and the real economic sector. Due to the country's currency regime and the growing size of the informal sector (Finscope Report, 2011), the effectiveness of the monetary policy is indeed compromised. The monetary policy effectiveness is further weakened by the general loss of confidence in the financial system by individuals and corporates who lost deposits in to the Reserve Bank of Zimbabwe in 2008, prevailing high cost of running an account and closure of some banks.

Studies on money demand in Zimbabwe have focused on the periods before 2009 when the country was using its own currency. Since February 2009 Zimbabwe has been using a basket of currencies including the United States dollar, the South African rand, the Botswana Pula, the British Pound, the Chinese Yuan, the Indian Rupee and the Australian dollar. This new dispensation solved the country's number one problem of hyperinflation at the time of its inception, but brought in new challenges like loss of control of money supply and exchange rate as monetary policy tools, undercapitalisation of the Reserve Bank leading it to fail to act as lender of last resort, undercapitalisation of banks leading to no interbank market and liquidity constraints.

Most studies on money demand in Zimbabwe cover the periodbefore the country adopted the multiple currency regime. The country had no liquidity constraints but rather problems related to excess liquidity like hyperinflation and currency depreciation (Kramarenko, 2010). During the hyperinflationary period, economic agents would hoard goods in favour of holding money. This behaviour has changed due to the reversal of hyperinflation in 2009. Economic agents have now shifted from hoarding goods to hoarding money in cash and also not banking it. This structural shift results in a shift in the money demand function in Zimbabwe. As a result the monetary transmission mechanism changes and the speed at which monetary shocks are corrected changes as well. Given the changes in the monetary system, we will study money demand in Zimbabweso as to give informed policy advice relevant to the current regime.

1.3 Research Objectives

The objective of this study is to determine the relationship between money demand and nominal variables, such as income, inflation, exchange rates and interest rate in Zimbabwe using narrow money and broad money. The specificobjectives of this study are three-fold as follows:

1. To determine the relationship between money demand (M1 and M2) and income, inflation, exchange rate and interest rate;
2. To determine the stability of the money demand functions (M1 and M2).
3. To give monetary policy advice to relevant authorities.

1.4 Research Questions

This study will be guided by the following questions:

1. How do income, inflation, exchange rate and interest rate affect money demand in Zimbabwe?
2. Is money demand in Zimbabwe stable?

1.5 Hypothesis

The study tests the hypothesis that money demand is positively related to income. In addition, the study hypothesises that money demand is positively related to inflation, interest rate and exchange rate. The study also tests the hypothesis that the demand function for M1 is more stable than the one for M2.

1.6 Justification of the Study

The change over from the use of a local currency to a multiple currency system and the prevalent liquidity problems in the economy indicate a change in money demand which need to be investigated. A critical analysis of the factors that influence money demand is very crucial in Zimbabwe. The study will inform policy makers on monetary dynamics in Zimbabwe thereby enabling them to come up with monetary policy strategies that support

economic growth and development. Although Zimbabwe is using foreign currencies, changes in factors affecting money demand affect the level of liquidity in the economy and this in turn affects the productive sectors of the economy. It is therefore important to understand how money demand is influenced by the macroeconomic factors and give informed policy recommendations. Further to the already existing studies on money demand in Zimbabwe, the study will add to literature especially focusing on money demand in a multiple currency regime.

1.7   Outline of the Study

The first chapter gives an introduction to the study. The second chapter gives the theoretical and empirical review of money demand. The third chapter presents the methodology. The fourth chapter presents the results and interpretations of the results. The last chapter concludes the study by summarising the findings and providing policy recommendations for monetary policy in Zimbabwe and areas of further research.

CHAPTER TWO: LITERATURE REVIEW

2.0   Introduction

This chapter reviews theoretical and empirical studies on money demand. The chapter is divided into threesections. The first section gives a theoretical review on money demand. The second section gives empirical studies of money demand. The last section concludes the chapter.

2.1   Theoretical Literature

Money demand has been studied from various perspectives. All theories established the relationship between the quantity of money demanded and some economic variables. The main theories that explain the demand for money are discussed below:

2.1.1   Quantity Theory of Money

Conceptual developments on the quantity theory of money date back to studies by Newcomb (1885), Foville (1907) and Fisher (1911). Notable work on the quantity theory of money is however attributed to Fisher (1911) and Friedman (1970). Friedman's quantity theory of money relates the quantity of money to nominal income and it is based on two assumptions. Firstly, it assumes that velocity of money (V) is constant in the short run. Secondly, quantity (Q) is at full employment level. These two assumptions are applicable to Zimbabwe. Friedman's QTM can be expressed mathematically as an equation of exchange as follows:

$$MV = PQ \hspace{4cm} 2.1$$

Where:
M, is the quantity of money;
P, is the price level;
Q, is the level of output; and
V, is the velocity of money, which refers to the number of times that money is used to purchase output

The equation of exchange states that total spending, which is given by *MV*, equals *PQ*. According to Mishkin (2007), the equation of exchange states that the quantity of money multiplied by the velocity of money must equal nominal income. It illustrates an equilibrium condition in which money is held simply to facilitate transactions.

Fisher's analysis on the transactions velocity of circulation of money, which refers to the rate at which money passes from one hand to another, begins with a simple identity. There are always two parties to each transaction, represented by a seller and a buyer. This implies that the value of receipts for the aggregate economy must equal the value of sales. This also implies that the value of sales must be equal to the number of transactions conducted over a period of time multiplied by the average price. This can all be expressed mathematically as follows:

$$M_s V_T \equiv PT \qquad\qquad 2.2$$

Where:

M_s is the quantity of money supply

V_T is the number of times that money turns over or money's transactions velocity of circulation;

P is the price level; and

T is the volume of transactions

Equation 2.2 can be transformed into a relation of quantity theory of money. This is a theory based on the determination of the price level and can be shown as follows:

$$\overline{M_s V_T} \equiv P\overline{T} \qquad\qquad 2.3$$

The bars signify that M_S, V_T and T are constants and the bar on the quantity of money supply $(\overline{M}_s)$ signifies that M_S is an exogenous variable. The demand for nominal money depends on the current value of the transactions. The supply of nominal money is exogenously given, and equilibrium dictates that the demand must equal supply. This can be shown mathematically as follows:

$$M_d = k_T P \overline{T} \qquad\qquad 2.4$$

Where

$$k_T = A \frac{1}{\overline{V_T}} \qquad\qquad 2.5$$

$$M_d = \overline{M}_s \qquad\qquad 2.6$$

Combining the two Equations above yields the following:

$$M_s \frac{1}{k_T} = \overline{M_s V_t} = P\overline{T} \qquad\qquad 2.7$$

The main issue of interest from the equation of exchange in Zimbabwe is that output and prices have an effect on money demand. From Friedman's equation it can be seen that money is directly proportional to the level of output and the price level. Fisher however treats transactions as constant thus leaving money demand to solely depend on the price level.

2.1.3   Keynesian Theory of Money Demand

Keynesmodified earlier work on money demand by Mill (1848), Hume (1748) by analysing money in terms of 'money held' and not 'money in motion' and focused on the reasons that lead people to hold money(Teigen, 1971). In his arguments, Keynes stated that individuals hold money for three motives: transactions, precautionary, and speculative.

The transactions motive is similar to Fisher's and the Cambridge approaches. The transactions motive agrees that money is there for the services it provides and to the extent that is a certain proportion of income. There is a stable relationship between the level of income and money demanded for transaction purposes. Individuals at any particular time hold sufficient funds to bridge the gap between non-receipts and payments. Individuals are uncertain about the payments they may want or make and they will hold money to guard against the unexpected (Teigen, 1971). This precautionary motive, to guard against unplanned expenses, also creates the demand for money. This is because money serves as a

medium of exchange in this motive and the amount of money demanded will obviously depend on the level of income. Therefore, the precautionary demand for money provides an emergency plan for unforeseen expenses.

Keynes also postulated that individuals will hold money in order to speculate or for the purpose of investment. This speculative motive shows Keynes's significant contribution to the theory of money demand. Keynes, however, focused on one variable, the future level of the interest rate, especially the future yield on bonds (Teigen, 1971). According to Keynes, bonds were the alternative assets to holding money. Money provides zero interest, whereas bonds provide interest income and capital gain. The analysis of speculative motive depends on expectation in the movements of future interest rates. When interest rates rise, the price of a bond falls. Therefore, if individuals expect interest rates to rise, they expect the price of the bond to fall and hence suffer a negative capital gain. Money and bonds are considered perfect substitutes, according to this theory. Individuals can hold their wealth either in money or in bonds. The price individuals are willing to pay to acquire bonds depends on the rate of interest that will be earned. The introduction of interest rate in the money demand by Keynes led to the function being represented as follows:

$$M_d = f(y, i) \hspace{4cm} 2.9$$

Where

   M_d is the demand for real money balances

   y is real income

   i is the interest rate.

The above equation shows that the demand for money is a function of interest rates and income. According to Keynes, low interest rates will lead to high money demand because people will prefer to hold money and expect interest rates to increase, hence if there is a decrease in the price of bonds no one would want to hold bonds (Ritter et al., 1997). The link between interest rate and income is obtained through the negative relationship between bond prices and interest rates. However, when the economy is in the liquidity trap, that is, the flat portion of money demand function, the interest elasticity of money demand can be infinite (Sriram, 1999a).

According to the Keynesian theory, how much money to keep for transaction, precautionary and speculative motives is determined by the level of income and most importantly the interest rate. His main empirical legacy in this area was the introduction of interest rates into the demand for money, primarily via the speculative motive. Keynes's conclusion that the demand for money is related not only to income but to the interest rates is a major departure from Fisher's quantity theory of money, in which interest rates have no effect on the demand for money, but it is less of a departure from the Cambridge approach, which did not rule out the possible effects of interest rates (Mishkin, 1997). The classical Cambridge economists did not explore the explicit effects of interest rates on the demand for money. The contribution by Keynes about the effects of level of income and interest rate on money demand led to the formulation of other theories which emphasised the three motives of holding money.

2.1.4. Inventory–Theoretic Approach

The inventory-theoretic approach associated with Baumol (1952) and Tobin (1956) analyses the costs and benefits of holding money. Money is viewed as an inventory held to make transactions. The inventory-theoretic models assume that there exist two stores of value: money and interest bearing alternative assets. It is also assumed that there is a cost in switching between money and the alternative asset. The benefit of holding money is convenience: for example, avoiding going to the bank every time a person wishes to buy something. The cost of this convenience is the forgone interest that a person would have received had he left the money on less liquid financial assets that paid interest. The assumption under this approach is that money is used to make payment and all the relevant information is known with certainty.

The individual has to balance his allocation of money in interest earning assets and holding money which does not earn interest. However, if an individual allocates part of his money to interest earning assets, there are brokerage costs that might be incurred when these interest earning assets have to be sold to finance transactions. Therefore, a higher average holding of money minimizes these brokerage costs, but this means greater forgone earnings on interest. The balance between the increase in transaction costs incurred in selling an interest earning asset and interest income forgone as a result of holding higher cash balances leads to the formula:

$$M^* = \sqrt{(a_0 y)/2r}$$ 2.10

Where

M^* is real money balances

a_0 is transaction costs

y is real income

r is the rate of interest.

The above "square-root formula" states that optimal demand for real money balances (M^*) is directly proportional to transaction costs (a_0) and real income (y). M^*, the demand for real money balances, is however inversely proportional to the interest rate (r). The individual agent minimizes the sum of brokerage costs and interest forgone. The importance of this approach is that it introduces the optimization behaviour of individuals in demand for money, the trade-off between money and alternative interest earning assets. The basic analysis of this approach is that there is an opportunity cost of holding money, that is, the forgone interest that can be earned on other assets. There is also a benefit to holding money, the avoidance of transaction costs.

The weaknesses of this approach are that: (1) although it assumed that money is used for transactions (payments), it failed to provide a convincing microeconomic foundation as to why people use money and (2) the assumption that receipts and payments are known with certainty might not be true in the real world. These weaknesses lead us to the precautionary demand for money approach, which introduces some uncertainty in the analysis of demand for money (Sriram, 1999b).

2.1.5 Precautionary Demand for Money Approach

The precautionary demand for money framework postulates that people are uncertain about the payments they might want, or have to make; hence there is demand for money balances for these unknown expenditures (Sriram, 1999b). People hold money for precautionary motive. The more money the person holds, the less likely that the person incurs the costs of illiquidity. There is, however a trade-off between money and interest. That is, the more

money the person holds, the more interest is forgone. The precautionary demand for money approach argues that people optimise the amount of money held for precautionary purposes by thoughtfully weighing the interest costs versus the advantage of not being caught insolvent. Therefore, the precautionary demand for money is negatively related to interest rates.

The precautionary money demand models introduced an element of uncertainty, unlike the inventory models which assumed that receipts and payments are known with certainty. The other implication of precautionary models is that an increase in the overall volume of transactions would lead to a less than proportional increase in money holding (Sriram, 1999b).

2.1.6 Buffer-Stock Models/Portfolio Models

The buffer-stock models recognise the role of money as a store of value. They consider demand for money in the framework of a portfolio choice problem. The buffer stock models state that the individual wealth-holder allocates his portfolio between money treated as a risk free asset and assets with an uncertain rate of return. The buffer stock models place major emphasis on risk and expected returns of the other assets. Money is viewed as providing liquidity for transactions and rendering safety. These models show the relationship between interest rates and the demand for real money. The importance of wealth and liquidity are noted as other key variables in determining the demand for money.

The portfolio demand theories argue that under the assumption of expected utility maximization, the optimal portfolio can be shown to depend on wealth and on the properties of the utility function and the distribution function for the return on the risky asset. The degree of risk aversion and the mean and variance of the return on the risky asset are of particular importance. An individual would hold part of his/her wealth in the form of money in his/her portfolio because the rate of return on holding money is more certain compared to that of holding interest earning assets. It is less risky to just hold money alone compared to holding alternative assets. The difference in the risk may be due to the fact that alternative assets are affected by market price volatility, while money is not. The individuals will only want to face the risk because of the reward offered by the alternative assets, which exceeds those offered by holding money.

Given a menu of assets available in a country, money pays a zero return, and if there is a riskless asset which is paying a positive rate of return (e.g. a savings deposit), then money will not be held (Goldfeld and Sichel, 1990). However, the risk-averse economic entities would want to include some money in an optimally structured portfolio. Risk-aversion behaviour, however, does not alone provide the basis for holding money.

Portfolio theories predict that the demand for money depends on the risk and return offered by money and alternative assets. The portfolio theory of demand for money can, therefore, be formulated as:

$$\left(M/P \right)^d = L(rs, rb, \pi^e, W) \tag{2.11}$$

Where

rs is the expected real return on stock

rb is the expected real return on bonds

π^e is the expected inflation rate

W is real wealth

M is the quantity of money

P is the price level

M/P is the quantity of money measured in units of constant purchasing.

This function simply shows, for example, that an increase in the expected real return on stock (rs) and/or the expected real return on bonds (rb) reduces money demand because alternative assets become attractive. An increase in expected inflation rate (π^e) reduces money demand because money becomes less attractive. An increase in real wealth (W) will obviously raise money demand because higher wealth means a larger portfolio. The demand function can, therefore, be simplified as, $L(i, y)$, where y is a proxy for real wealth (W) and $i = rb + \pi^e$ that is sum of real return on bonds and expected inflation.

Although the buffer-stock models recognise the role of money as a medium of exchange, its ability to act as a store of value makes it possible to facilitate the inter-temporal shift of consumption possibilities (Sriram, 1999b). Therefore, these models present money as an asset

rather than a means of exchange to facilitate transactions. The major criticism of these models is that they fail to explain the observed tendency for agents to hold money when other assets exist which are devoid of nominal risks but pay positive interest rates (Sriram, 1999b).

2.1.7 The Cambridge Approach

Modelling the demand for money using the Cambridge approach was popularised by Marshall and Pigou. This approach shifts the attention to the question, what determines the amount of money an individual agent would wish to hold, given that the desire to conduct transactions makes money holding desirable? In the Cambridge approach, the key determinant of people's taste for money holding is the fact that money is a convenient asset to possess as it is universally accepted in exchange for goods and services. The more transactions an individual undertakes, the more money he will want to hold and this is similar to Fisher's approach.

The emphasis in Fisher's approach was on people's desire to hold money, while the emphasis in the Cambridge approach is the need to hold money. This presents the major difference between the Cambridge monetary approach and Fisher's model. Depending on the volume of transactions an individual is willing to conduct, the demand for money varies with the level of his wealth and with the opportunity cost of holding money. This opportunity cost of holding money simply refers to the income forgone by not holding other assets. Pigou particularly chose to simplify this approach by assuming that for an individual, the level of wealth, the volume of transactions and the level of income move in stable proportions to one another over the short-run. According to Laidler (1993), Marshall and Pigou argued that, other things being equal, the demand for money in nominal terms is proportional to the nominal level of income for each individual and for the aggregate economy as well. They illustrated their arguments mathematically by starting with the demand equation for money as follows:

$$M_d = kPY \hspace{4cm} 2.12$$

The above equation can be combined with an equilibrium condition in the money market (equation 2.6) and yields the following equation:

$$\overline{M}_s \frac{1}{k} = \overline{M}_s V = PY \qquad\qquad 2.13$$

This is very similar to Fisher's equation (equation 2.2), but it is important to note that *V* does not represent the transactions velocity of circulation of money but it represents the income velocity. This is similar with saying *V* does not represent the number of times a unit of money physically turns over, but rather it is the rate of circulation relative to the rate of production of real income. Fisher's approach may be regarded as providing a theoretical model of the money market, which implies a constant equilibrium velocity of circulation in the short-run. The Cambridge approach places its emphasis on the rate of interest and expectations because these variables are expected to vary significantly in the short-run (Laidler, 1993).

2.1.8   The Monetary Inter-Temporal Model

The monetary inter-temporal model is concerned with money being held because it is needed to buy some goods and services that cannot be purchased on credit. This model is valid in Zimbabwe because most consumer goods are only available on cash sales. This model starts with the concept of neutrality of money, under which a one-time change in the money supply has no real consequences for the economy. This implies that consumption, investment, output, employment, real interest rate and economic welfare all remain unaffected. However, money is only neutral in the long-run and changes in the money supply will tend to have real effects on the economy in the short-run.

The monetary inter-temporal model assumes that there is a representative household which holds money to purchase some cash goods. This household also can purchase credit goods by means of credit cards and the household always pays its credit card bill at the end of the period. Let M_d denote demand for money in nominal terms while $\frac{M_d}{P}$ will be determined by factors determining the future demand for cash goods. The determinants of the demand for money are as follows:

- The current real demand for money increases when real income, *Y*, increases. This will increase lifetime wealth and thereby increase demand for future cash goods;
- The current real demand for money increases when future real income (*Y'*) increases, this increases with lifetime wealth;

- The current real demand for money decreases when the nominal interest rate, *R*, increases. The nominal interest rate refers to the opportunity cost of holding money.

The real demand for money can be written mathematically as:

$$\frac{M_d}{P} = L(Y, R) \qquad\qquad 2.14$$

Where *L(Y,R)* increases in current income and at the same time decreases in the nominal interest rate (*R*).

2.2   Empirical Literature

Melnick (1990) studied the demand for money in Argentina from 1978 to 1987. He uses two alternative approaches, a traditional approach, based on Goldfield (1973), and a modern time series approach based on Hendry (1980) as well as the theory of cointegration presented by Engel and Granger (1987). The results indicate that when the cointegration approach to time series analysis is combined with a behavioural equation, a stable relationship is obtained. This contradicts the common view of unstable empirical relationships.

Ericsson et al. (1996) used an error-correction specification to model the empirical relationship between broad money, prices, real output and interest rates in an attempt to test the stability of broad money demand in Greece for the period 1974 – 1996. Greece has undergone some changes in its financial system, including the removal of most external capital control and of restrictions on the portfolios of deposit-taking institutions. Capital market liberalisation was introduced in the early 1990s and the financial innovation started to take place in the country's financial sector during that period. In addition, the inter-bank market was deepened, interest rates have been more flexible, and indirect instruments of monetary controls were developed. Such financial reforms have an impact on the stability of the money demand function in Greece. The results showed that the money demand function in Greece remained remarkably stable during 1976 – 1994 in the face of large fluctuations in the inflation rate and the progressive financial liberalisation.

Rother (1998) studies the impact of regional monetary integration and financial liberalisation on the stability of the money demand function in African countries which are members of the West African Economic and Monetary Union. With financial liberalisation, new financial instruments may develop thus widening the array of financial assets at the agent's disposal. In response, economic agents will be able to substitute money holdings for other financial assets and vice versa, in case of changes in the economic environment. An error-correction model that links the demand for narrow and broad money with the traditional explanatory variables was specified and estimated. The results indicated that the relationship between real money (M1) and the explanatory variables remains stable over time and yields accurate forecast, while the relationship of broad money demand (M2) with explanatory variables is found to be unstable.

Sriram (1999) analyses the demand for broad money in Malaysia from August 1973 to December 1995 under both a closed and an open economic framework. The main purpose of the study was to evaluate the long and short-run determinants and stability of money demand. Malaysia had been liberalising its domestic financial markets and fostering financial innovation over the past three decades. Major efforts were directed at liberalising interest rates, boosting competition in the financial system, undertaking institutional reform, promoting growth and deepening in the financial and capital markets. Based on cointegration and weak-exogeneity test results, two short-run dynamic error-correction models were specified and estimated, one for an open economy and one for a closed economy. The two models were similar except that in the open economy model, two additional variables are included (foreign interest rate and the expected depreciation of the domestic currency) to take into account the currency substitution literature. The most important finding was that both in the long and short-run, the demand for real money M2 appears to be almost stable. The parameter constancy tests indicated that the financial system as a whole shows signs of structural break during 1994 as a result of measures taken to stem capital inflows.

Hamori (2008) analysed the empirical analysis of the money demand function in the Sub-Saharan Africa, using annual data on 35 countries from 1980 to 2005. He found that there exists a cointegration relation with respect to money demand in the Sub-Saharan African region over the period from 1980 to 2005, regardless of whether M1 or M2 is used as the money supply measure. The study also suggested that due to the existence of a stationary

relationship between money supply, output and price level, in attempting to control the price level (or output), the reliability of money supply as a target variable holds.

There has been notable work on money demand in Zimbabwe by Kadenge (1998) and Kwashirai (1993). Kadenge (1998) estimated the demand for narrow money in Zimbabwe for the period 1985 – 1996. The Zimbabwean economy undertook several economic reforms that changed the environment for the financial system. With the liberalisation of the financial system, the monetary policy began to play an active role in influencing monetary aggregates through open market operations. The study found that a regime shift leads to changes in parameters. The results show that the effectiveness of a monetary policy that is based on monetary targets is anchored on the stability and predictability of the money demand function. The study recommended the use of a wider set of indicators for the purposes of policy making including both monetary and real sector indicators.

Munoz (2006) investigated the divergence between inflation and monetary expansion in Zimbabwe using monthly data. The study used M3 and covers the period 2003 to 2005. The study employed the Friedman's model of demand for money. The stability of the long-run relationship was assessed through a log-linear specification. A cointegration system was estimated using the Johansen procedure. The study found a decline in velocity of money and increasing levels of real money balances during 2004. This, according to Munoz is at odds with a record of inflation closely tracking the growth rates of monetary aggregates in the past. The study concluded that possible explanations for the divergence included an unstable demand for money, a sudden shift in the underlying demand for real balances due to a sharp change in an explanatory variable, and a structural break or aberration in a normally stable money demand relation reflecting some unexplained factor such as repressed inflation or measurement errors in the consumer price index.

2.3   Conclusion

This chapter analysed theories and empirical studies on money demand. Theories and empirical studies revealed show that money demand is basically influenced by income, price level,opportunity cost of holding money and exchange rate. In some studies analysed expected inflation was used. In Zimbabwe however given low levels of inflation, there are no

high expectations for future inflation. In this regard, current price levels can be used in studying money demand. The theories and empirical studies revealed in this chapter will be used in the next chapter to specify the model for money demand in Zimbabwe.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

Thischapterpresents the methodology used in the study. Firstly, the chapter presents the model specification. Secondly, variables to be used in the study are defined and justified. Lastly, the chapter presents data sources and diagnostic tests to be carried out.

3.1 Model Specification

This section presents the model specification. Variables for the money demand model in Zimbabwe are derived from theories and empirical studiesreviewed in chapter two. It has been shown both theoretically and empirically that money demand is strongly related to income levels. The more income a person has the more money the person is willing to hold. Income has been the major determinant of money demand in theory and previous studies and will be one of the determinants of money demand in this study. Studies have also shown that the desire to hold money is related to inflation or inflationary expectations. In Zimbabwe inflation expectations are low given the fact that since the taming of hyperinflation in 2009 inflation has been low and stable. This study will include inflation as an explanatory variable for money demand in Zimbabwe. The opportunity cost of holding money which is measured by interest rate plays a role in determining money demand. Theoretically, low interest rate will lead to high money demand because people will prefer to hold money and expect interest rate to increase.

Empirical evidence including studies by Mcgibany and Nourzad (1995), Marashdeh (1997), Bahmani-Oskooee (2002) and Azali (2001), among others show that money demand also depends on the exchange rate (ER). Since Zimbabwe is not using its own currency, the study uses the exchange rate between the US dollar and the South African Rand. The choice of these currencies is based on the fact that these are the major currencies in use in Zimbabwe; the US dollar is mainly used in most transactions internally as well as for the purposes of the Government's Budget while South Africa is Zimbabwe's the major trading partner.

This study makes use of the money demand model in equation 2.4. The money demand modelistransformed to a log linear model which can be estimated empirically. When transformed, the model is thus as follows:

$$\log(m_t) = \alpha_1 + \alpha_2 \log(gdp_t) + \alpha_3 \log(r_t) + \alpha_4 \log(exr_t) + \alpha_5 \text{Infl}_t + \varepsilon_t \qquad 3.1$$

3.2   Definitions of Variables

This section gives descriptions of variables employed in this study. Narrow money (M1) is a measure of money supply which includes notes and coins in circulation. Broad money (M2) is a measure of the money supply that includes notes and coin (narrow money) plusdemand deposits at commercial banks, and any monies held in easily accessible accounts. Components of broad money are still very liquid, and non-cash components can usually be converted into cash very easily. Data on narrow money and broad money was provided by the Reserve Bank of Zimbabwe.

Inflation reduces the purchasing power of people's disposable income, and as such affects money demand in the economy. This study used the monthly Consumer Price Index (CPI) published by Zimstat as a proxy for the true price deflator. When inflation rises people desire to hold more money for making transactions, therefore money demand is expected to be positively related to inflation.

The GDP refers to the total value of goods and services produced within the borders of a country in one year. This study adoptedthe Volume of Manufacturing Index(VMI) as a proxy for real income. This choice of variable is supported by availability of VMI data for the period 2009 to 2013. Other studies have also used of the VMI as a proxy for real income (IMF, 2001), (IMF, 2002) and (Iqbal and James, 2002). Income is expected to be positively related to money demand.

The exchange rate is the price of foreign currency expressed in terms of the domestic currency. Despite the fact that Zimbabwe does not have its own currency, the US dollar is the major currency in circulation and all accounts including National Accounts are US dollar denominated. The South African Rand is the second major currency and South Africa is the

major trading partner of Zimbabwe. In this regard, the US dollar/South African Rand exchange rate is used in this study. Data on the exchange rate was accessed from the South Africa Treasury Department.

The interest rate employed in the study is the average lending rate, which is the average rate at which the commercial banks were lending. The interest rate in Zimbabwe is high because of high costs of money banks incur. When banks in Zimbabwe get credit from abroad the cost is high because of the country risk associated with Zimbabwe (RBZ, 2012). In addition, banks have huge overheads which arise from their operations which they pass on to borrowers as well as depositors. Data on the average lending rate was provided by the RBZ.

3.3   Stationarity

Stationarity in variables is very important in econometric analysis especially when one is to study the behavioural pattern of different time series. A series is considered stationary if it has a constant mean, constant covariance and constant autocovariances for each given lag (Brooks, 2002 and Lutkepohl & Kratzig, 2004).

Stationarity is a very important characteristic as models containing variables that are non-stationary could lead to spurious (misleading) regression results. These could lead to incorrect conclusions being made thus leading to incorrect policy formulations. However, the problem of non-stationarity can be addressed by differencing the variables a number of times to generate stationarity (Gujarati, 2004).

This study used the Augmented Dickey- Fuller (ADF) tests of stationarity.

In addition to unit root tests, the study employs Normality test on the data. The Jarque-Bera (1987) test is used because it is the common normality test used in literature. Normality tests are used to determine if a data set is well-modelled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed (Gujarati, 2004).

3.4 Cointegration

Cointegration is a statistical property of time series variables. Two or more time series are cointegrated if they share a common stochastic drift Johansen (1991). In other words, if two or more time series are individually integrated but their combination is integrated of a lower order, then the time series are cointegrated.

There are basically three methods to test for cointegration: the Engle–Granger two-step method, the Johansen test and Phillips–Ouliaris cointegration test. The Engle–Granger and the Johansen methods are used in empirical studies considered in chapter two. For this study, the Johansen (1988) method is preferred instead of the Engle-Granger (1987) method because the Johansen method evaluates the presence of multiple cointegrating relationships among variables other than the Engle-Granger method.

Johansen (1988) proposes two different likelihood ratio tests of the significance: the trace test and maximum eigenvalue test. The trace test on one hand tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of r+1 cointegrating vectors. The results of the two tests are usually similar.

When the tests are done and cointegration is established it means that the time series have a long-run relationship. In this case the long-run model can be estimated using the method of ordinary least squares. After estimating the long-run relationship of money demand it is also important to establish the short-run dynamics of the model. This is done by estimating the error-correction model.

3.5 Error Correction Model

The error correction model is a dynamic model which gives the long-run trend and short-run deviations from the trend. The long-run component is also called the cointegrating component. To come up with the short-run component we make use of the error term of the long-run model. The error term is made subject of the formula and lagged once then tested to see if it is stationary. The resultant error term is called the error correction term and is the

short-run component. The error correction model is then the sum of the long-run cointegrating component and the short-run component. This error correction model simply means we are reconciling the long-run relationship with short-run dynamics and usually takes the form:

$$\Delta y_t = \alpha_0 + \alpha_1 \Delta x_t - \rho(y_{t-1} - \beta_0 + \beta_1 x_{t-1}) + \varepsilon_t \qquad 3.12$$

The study uses the error correction model shown in equation 3.12 above and comes up with the model shown in equation 3.13 below.

$$D \log(m_t) = \alpha_1 + \alpha_2 D \log(gdp_t) + \alpha_3 D \log(exr_t) + \alpha_4 D \log(r_t) + \alpha_5 D(infl_t) - ECT_{t-1} + \varepsilon_t \qquad 3.13$$

3.6 Stability of the Model

The money demand model for Zimbabwe is subjected to stability diagnostic testing. This testexamines whether the variables of the model are stable across various subsamples of the data. If the money demand model is found to be stable it means it is useful for policy analysis and on the contrary an unstable money demand function cannot be used for policy analysis. Using an unstable money demand function for policy analysis will result in misleading forecasting as the model will not give consistent results. The CUSUM Test will be used to test stability of the money demand function.

CHAPTER FOUR: INTERPRETATION OF RESULTS

4.0   Introduction

This chapter presents the results of the study. The chapter firstly shows graphical analysis of time series followed by unit root tests. Thereafter cointegration results are given. Thirdly, the chapter presents long-run equations. Fourthly, the error-correction model is presented. Lastly, stability test results for the money demand model are presented.

4.1   Graphical Analysis

The behaviour of the variables used in the model is presentedin Annexes 1 and 2. The graphs give a pictorial view of time series data. Annex 1 show that log transformation ofM1 and M2 are decreasing over time. The log transformations of GDP, exchange rate, interest rate and inflation are also presented in Annex 1. Annex 2 presents plots of the first differences of the variables.

The Unit root test was done using the Augmented Dickey-Fuller (ADF) test to ensure that all variables are stationary and that regression of the variables will not lead to spurious (misleading) results. This will ensure that correct conclusions will be made thus leading to correct policy recommendations. The table below presents ADF test results for the variables.

Table 1: Results of Unit Root Test

Variable	ADF Statistic	Level of Integration
ln M1	-6.452831*	Level
ln M2	-7.031358*	Level
ln GDP	-1.491817**	Level
Infl	-4.014332*	Level
ln R	-2.909650**	Level
ln Exr	-0.577536**	Level
d ln M1	-7.549505*	1st difference
d ln M2	-6.691774*	1st difference
d ln GDP	-9.800242*	1st difference
d Infl	-10.60448*	1st difference

| d ln R | -5.873846* | 1st difference |
| d ln Exr | -5.055322* | 1st difference |

Critical value at 5% is -2.91263.

* indicates that the ADF test did not reject the null hypothesis therefore variable is stationary.

** indicates that the ADF test rejected the null hypothesis therefore variable is non-stationary.

The results of the ADF test presented in the table above show that there is need to confirm cointegrationbefore the money demand function can be modelled.However, before testing for cointegration it is important to check the specification of the data.

In the study before money demand was estimated the error terms were subjected to normality test using the Jarque-Bera (JB) test. This test helps to determine if a data set is well-modelled. The data set is well modelled if the error terms are normally distributed. The results for the JB test are presented in Annex 9a and indicate that the error terms for both M1 and M2 are normally distributed.

4.3   Cointegration

In order to estimate the money demand model for Zimbabwe M1 was subjected to the Johansen Trace test at 5% level of significance using Eviews 7. The results of the test indicate that there are 4 cointegrating equations. These results are presented in Annex 3a. The Johansen Maximum Eigenvalue test for cointegration for M1at 5% level of significanceindicates that there are 2 cointegrating equations. This is presented in Annex 3b.Therefore both the Trace test and Maximum Eigenvalue test confirm that there are at least 2 cointegrating equations.

M2 was also subjected to the Johansen Trace test and the Johansen Maximum Eigenvalue test for cointegration at 5% level of significance. The Trace test results indicate that there are 3 cointegrating equations. These results are presented in Annex 4a. The Max Eigenvalue testresults indicate that there are3 cointegrating equations. These results are presented in Annex 4b.

The cointegration tests employed confirm the existence of long-run relationships for both M1 and M2. The long-run relationships can therefore be estimated using the method of Least Squares.

Long-Run Estimation

The long-run relationship of the money demand was estimated usingOLS. The results of the estimations are presented below:

Table 2: Long-Run Equation for M1

	Coefficient	Std. Error	t-Statistic	Prob.
C	5.450596	0.732481	7.441282	0.0000
Infl	0.166708	0.058589	2.845402	0.0063
Lngdp	1.966817	0.219755	8.950053	0.0000
Lnexr	0.089708	0.329912	0.271916	0.7867
Lnr	0.310863	0.097316	3.194370	0.0024

$R^2 = 0.805$
5% level of significance

The table above suggest that money demand is influenced by GDP, interest rate and inflation. Exchange rate is found to be insignificant. Theory suggests a positive relationship between GDP and money demand which is being confirmed by the results. The results suggest that in Zimbabwe money demand increases with the level of income. The results presented above show that inflation has a positive relationship with money demand. This is in line with theory and shows that in Zimbabwe as inflation goes up people will prefer to hold more money for transactions. The results show a positive relationship between average bank lending rate and money demand in Zimbabwe. The R^2 of 0.805 suggest that in the long run about 81% of variations in money demand are explained by variation in GDP, inflationand interest rate.

Table 3: Long-Run Equation for M2

	Coefficient	Std. Error	t-Statistic	Prob.
C	4.698735	0.763811	6.151698	0.0000
Infl	0.149224	0.061095	2.442502	0.0180
Lngdp	2.108039	0.229154	9.199209	0.0000

Lnexr	0.308343	0.344023	0.896285	0.3742
Lnr	0.372690	0.101478	3.672598	0.0006

$R^2 = 0.818$
5% level of significance

The table above gives results obtained from regression of M2 and suggest that the money demand is influenced by GDP, interest rate and inflation. Theory suggests a positive relationship between GDP and money demand which is being confirmed by the results. Therefore an increase in income levels in Zimbabwe will result in people desiring to hold more money. The table above show that inflation is positively related to money demand. This conforms to theory and indicates that as prices go up people desire to hold more money.Interest rate was found to be positively related to money demand in Zimbabwe. The exchange rate was found to be an insignificant variable in explaining money demand in Zimbabwe. The R^2 of 0.818 suggest that in the long run about 82% of variations in money demand are explained by variation in GDP, inflationand interest rate.

4.4   Error Correction Model

The Johansen cointegration procedure estimated the long-run money demand equations. Money demand however has a tendency of deviating from the long-run equilibrium due to short-run dynamics. These short-run dynamics are captured by the error-correction model. The error correction models for both M1 and M2 were estimated and are shown below:

$$\Delta \ln m_t = \ 0.035 - \ 1.359\Delta \ln exr_t - \ 0.01\Delta \ln r_t + \ 0.276\Delta \ln gdp_t + \ 0.014\Delta infl_t -$$
$$0.104ECM(1)_{t-1} \qquad\qquad 4.1$$

$$\Delta \ln m_t = 0.034 - 0.794\Delta \ln exr_t + 0.032\Delta \ln r_t + 0.255\Delta \ln gdp_t + 0.019\Delta infl_t -$$
$$0.082ECM(2)_{t-1} \qquad\qquad 4.2$$

Equation 4.1 shows the error correction model for M1. The results are also presented in Annex 7. The error correction term has a negative sign and is significant at 10% level of significance. The model indicates that in Zimbabwe10% of any deviation from the long-run narrow money demand will be corrected in the next month. In other words, a monetary shock will completely be corrected in the next nine months.

The error correction model for M2 is shown in Equation 4.2. Its results are also presented in Annex 8. The error correction term has a negative sign and is significant at 5% level of significance. The results indicate that in Zimbabwe 8% of any shock to the long-run broad money demand is corrected in the next month. In other words, a monetary shock will completely be corrected in more than twelve months.

4.5   Stability Tests

The CUSUM plot for M1is presented in Annex 10a and indicates that M1 is statistically within the 5% critical bounds. This means that there are no structural breaks in the regression coefficients. Therefore the demand for narrow money in Zimbabwe is stable. Annex 10b presents the CUSUM plot for M2. The results show that there is some tendency of instability for M2 as part of the CUSUM plot moves outside the critical lines. The results therefore show that the demand for broad money in Zimbabwe is not stable.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.0   Introduction

The main objective of this study was to establish the determinants of money demand in the current monetary regime in Zimbabwe. In addition the study sought to investigate the stability of the money demand. This chapter presents the interpretation of the findings of this study. The findingsinform monetary authorities in coming up with knowledge driven policy positions. The recommendations of the study contribute to guiding the Reserve Bank of Zimbabwe in its conduct of monetary policy. The study also contributes to existing literature on money demand in Zimbabwe.

5.1   Summary of the Findings

This study established a long-term relationship for both M1 and M2 in Zimbabwe. Results show positive relationship between money demand and income, inflationand interest rate. This means that in Zimbabwe an increase in income, inflation or bank lending rate will lead to an increase in money demand. The exchange rate between the US dollar and the South African Rand was found to be insignificant in explaining money demand in Zimbabwe. An error correction model was estimated in the study. The results of the error correction model indicate that a monetary shock will be corrected in nine months in the case of narrow money and more than twelve months in the case of broad money. This is a rather slow adjustment process. Hence Zimbabwean authorities need to implement monetary policies in tandem with other macroeconomic policy tools to achieve economic growth and development. Stability tests conducted indicate that M1 is stable while M2 is not stable.

5.2   Policy Implications and Recommendations

The study found a positive relationship between income and money demand. This means as people's income increase they desire to hold more money. Since Zimbabwe does not print the currenciesused, an increase in incomes results in liquidity shortages in the short term. The RBZ should therefore come up with alternatives for cash. These alternatives include debit cards and mobile banking platforms. The Government and RBZ should therefore ensure that banks and mobile telecommunication operators play their roles to support this initiative and

ensure that transaction costs are kept low so that the alternative will be a good substitute for cash.

In Zimbabwe more people are employed in the informal sector than the formal sector. Money that is circulating in the informal sector is not going through banks. This is mainly due to lack of confidence in the banking system, inconveniences that come with banking including strict requirements for opening a bank account, the costs of maintaining the account and unavailability of banking services in areas where informal traders operate. The Central Bank therefore should devise ways to reduce money demand thereby availing more funds for onward lending by banksand in that way prompting economic development.

5.3   Areas for Further Research

This study used the average lending rate as a proxy for interest rate because the data was readily available. For future study, one may use other measures of opportunity cost like treasury bills as the government continues issuing such instruments. One may opt to use agricultural production as a proxy for GDP since about 60% of the population are involved in the agriculture sector (Census). Alternatively, if agricultural production data is not available on a monthly basis, one may use household disposable income as a proxy for income.

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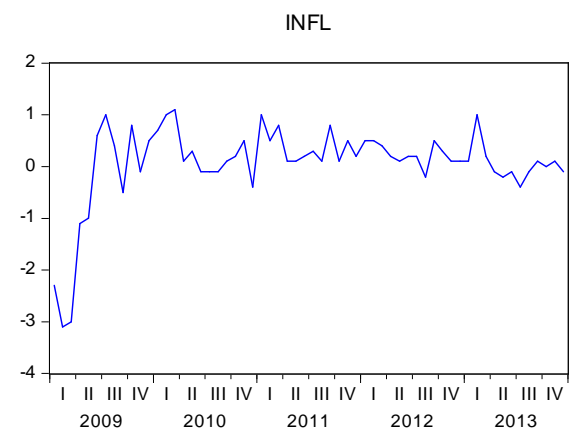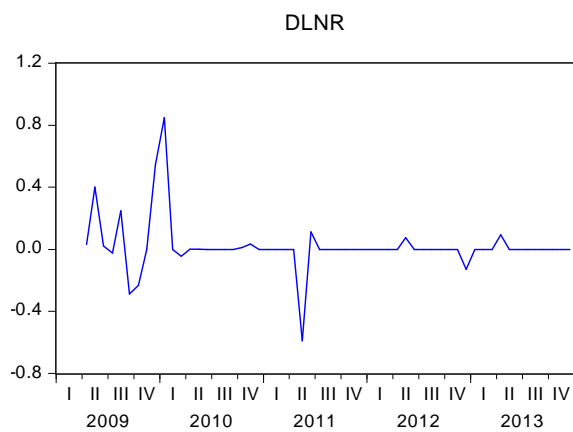Varian, R.H., (1992)."Microeconomic Analysis" (3e). New York: W.W. Norton & Company, Inc.
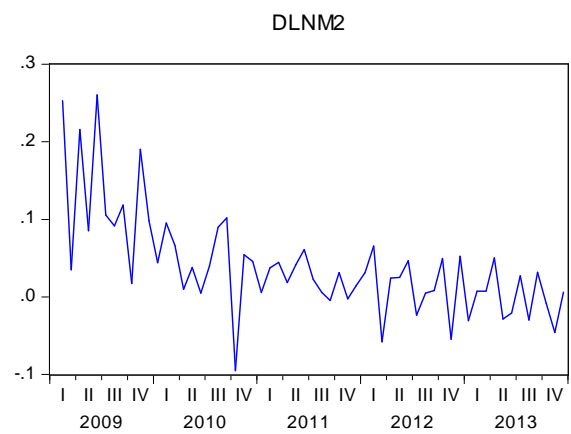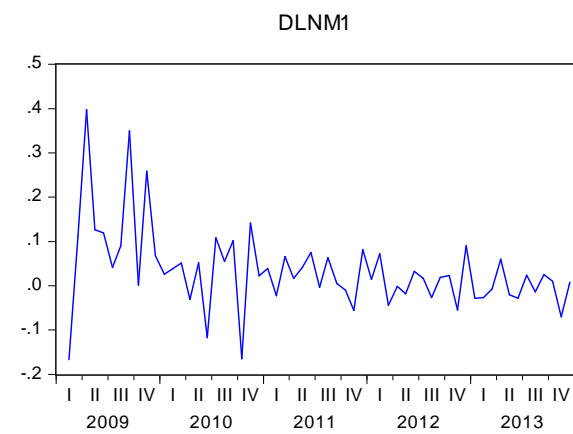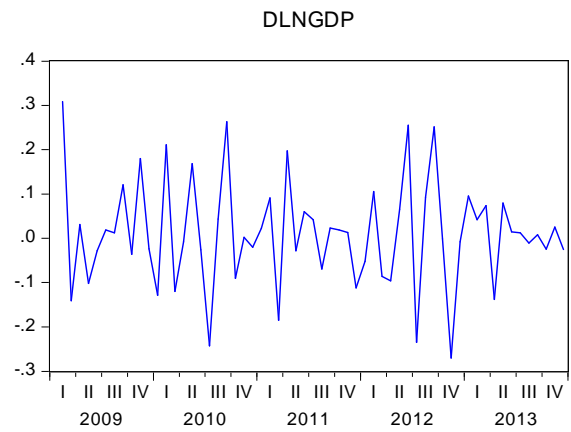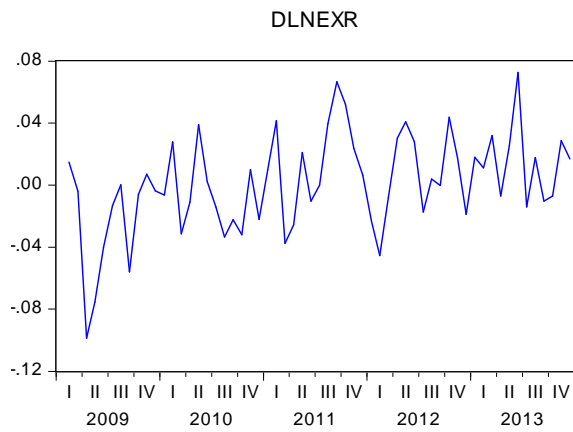
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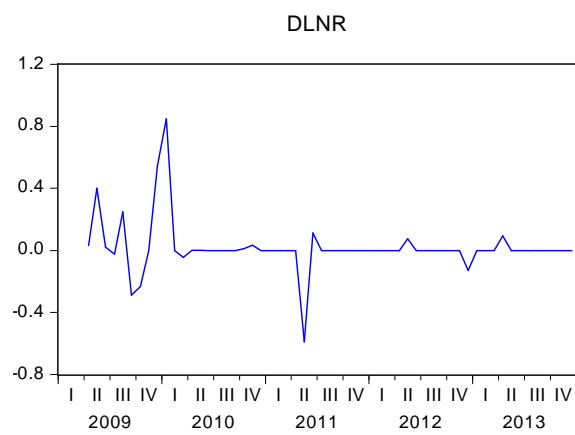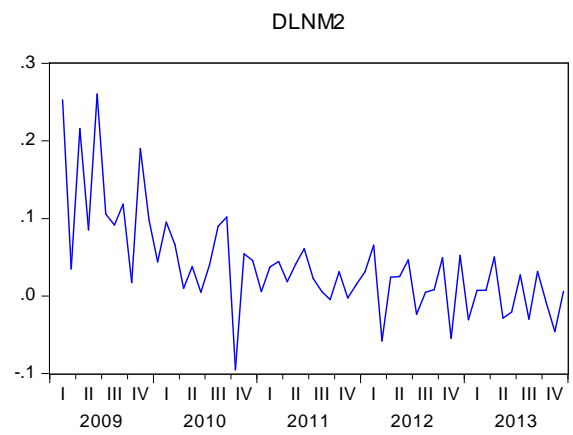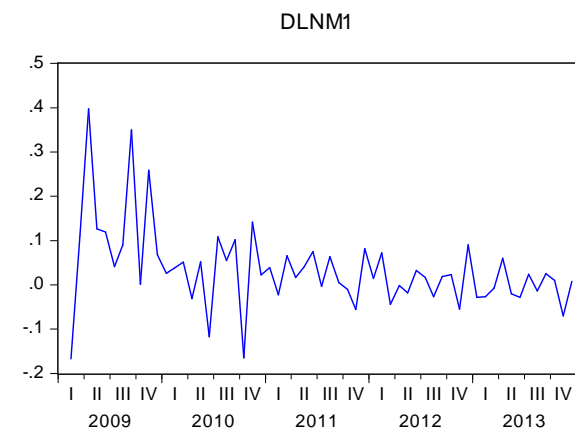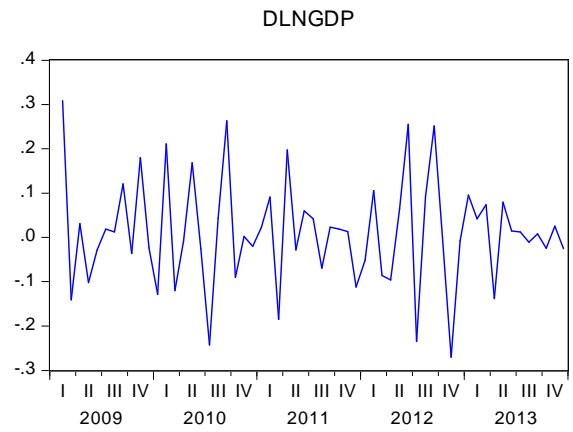Zimstat (2012), Zimbabwe Statistics Database (2012), Volume 6.1

ANNEXES

Annex1: Plots of Variables in Levels

DLNEXR

DLNGDP

DLNM1

DLNM2

DLNR

INFL

Annex 2: Plots of Variables in first differences
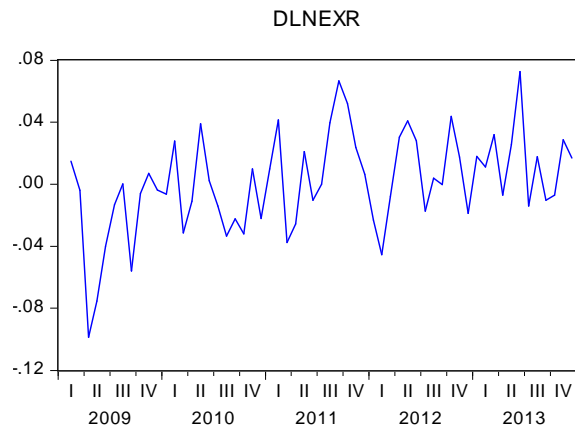
Annex 3a: Unrestricted Cointegration Rank Test (Trace) for M1

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.650345	130.1548	69.81889	0.0000
At most 1 *	0.474886	71.30956	47.85613	0.0001
At most 2 *	0.293805	35.23769	29.79707	0.0107
At most 3 *	0.239984	15.75732	15.49471	0.0457
At most 4	0.006941	0.390045	3.841466	0.5323

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Annex 3b: Unrestricted Cointegration Rank Test (Maximum Eigenvalue) for M1

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.650345	58.84523	33.87687	0.0000
At most 1 *	0.474886	36.07187	27.58434	0.0032
At most 2	0.293805	19.48038	21.13162	0.0838
At most 3 *	0.239984	15.36727	14.26460	0.0333
At most 4	0.006941	0.390045	3.841466	0.5323

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Annex 4a: Unrestricted Cointegration Rank Test (Trace) for M2

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.598080	125.8913	69.81889	0.0000
At most 1 *	0.459367	74.84720	47.85613	0.0000
At most 2 *	0.384145	40.40635	29.79707	0.0021
At most 3	0.200485	13.26073	15.49471	0.1056
At most 4	0.012964	0.730705	3.841466	0.3927

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Annex 4b: Unrestricted Cointegration Rank Test (Maximum Eigenvalue) for M2

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.598080	51.04413	33.87687	0.0002
At most 1 *	0.459367	34.44084	27.58434	0.0056
At most 2 *	0.384145	27.14562	21.13162	0.0063
At most 3	0.200485	12.53002	14.26460	0.0923
At most 4	0.012964	0.730705	3.841466	0.3927

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Annex 5: Unit Root Test for Error Correction Term for M1

Null Hypothesis: ECT has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.005129	0.0406
Test critical values: 1% level	-3.555023	
5% level	-2.915522	
10% level	-2.595565	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ECT)
Method: Least Squares
Date: 05/10/14   Time: 12:47
Sample (adjusted): 2009M06 2013M12
Included observations: 55 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.511062	0.170063	-3.005129	0.0041
D(ECT(-1))	-0.005955	0.144389	-0.041245	0.9673
D(ECT(-2))	-0.330344	0.128259	-2.575596	0.0129
C	0.010593	0.026317	0.402513	0.6890

R-squared	0.416873	Mean dependent var	0.002157
Adjusted R-squared	0.382571	S.D. dependent var	0.247971
S.E. of regression	0.194847	Akaike info criterion	-0.363256
Sum squared resid	1.936236	Schwarz criterion	-0.217268
Log likelihood	13.98953	Hannan-Quinn criter.	-0.306801
F-statistic	12.15315	Durbin-Watson stat	2.077704
Prob(F-statistic)	0.000004		

Annex 6: Unit Root Test for Error Correction Term for M2

Null Hypothesis: ECT_02 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.680168	0.0003
Test critical values:	1% level	-3.550396	
	5% level	-2.913549	
	10% level	-2.594521	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ECT_02)
Method: Least Squares
Date: 05/13/14   Time: 15:51
Sample (adjusted): 2009M04 2013M12
Included observations: 57 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT_02(-1)	-0.558369	0.119305	-4.680168	0.0000
C	0.004348	0.027753	0.156672	0.8761

R-squared	0.284822	Mean dependent var	0.004069
Adjusted R-squared	0.271819	S.D. dependent var	0.245542
S.E. of regression	0.209530	Akaike info criterion	-0.253446
Sum squared resid	2.414646	Schwarz criterion	-0.181760
Log likelihood	9.223218	Hannan-Quinn criter.	-0.225587
F-statistic	21.90398	Durbin-Watson stat	1.915002
Prob(F-statistic)	0.000019		

Annex 7: Error Correction Model for M1

Dependent Variable: D(LOG(M1))
Method: Least Squares
Date: 05/10/14   Time: 13:06
Sample (adjusted): 2009M04 2013M12
Included observations: 57 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.034951	0.010320	3.386782	0.0014
D(LOG(EXR))	-1.358758	0.337229	-4.029184	0.0002
D(LOG(R))	-0.009928	0.059194	-0.167729	0.8675
D(LOG(GDP))	0.275638	0.102867	2.679550	0.0099
D(INFL)	0.013991	0.018015	0.776638	0.4410
ECT1	-0.104293	0.054217	-1.923641	0.0600

R-squared	0.365830	Mean dependent var	0.036727
Adjusted R-squared	0.303656	S.D. dependent var	0.091820
S.E. of regression	0.076622	Akaike info criterion	-2.200577
Sum squared resid	0.299414	Schwarz criterion	-1.985519
Log likelihood	68.71644	Hannan-Quinn criter.	-2.116998
F-statistic	5.884015	Durbin-Watson stat	2.202426
Prob(F-statistic)	0.000229		

Annex 8: Error Correction Model for M2

Dependent Variable: D(LOG(M2))
Method: Least Squares
Date: 05/13/14   Time: 15:55
Sample (adjusted): 2009M04 2013M12
Included observations: 57 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.033617	0.006753	4.977803	0.0000
D(LOG(EXR))	-0.793834	0.218061	-3.640422	0.0006
D(LOG(R))	0.031992	0.038567	0.829504	0.4107
D(LOG(GDP))	0.255436	0.067367	3.791704	0.0004
D(INFL)	0.018628	0.011714	1.590286	0.1180
ECT2	-0.082030	0.033621	-2.439821	0.0182

|			
R-squared	0.408542	Mean dependent var	0.036674
Adjusted R-squared	0.350556	S.D. dependent var	0.062297
S.E. of regression	0.050204	Akaike info criterion	-3.046148
Sum squared resid	0.128542	Schwarz criterion	-2.831090
Log likelihood	92.81521	Hannan-Quinn criter.	-2.962569
F-statistic	7.045525	Durbin-Watson stat	1.943134
Prob(F-statistic)	0.000045		

Annex 9a: Jarque-Bera Normality Graph for M1
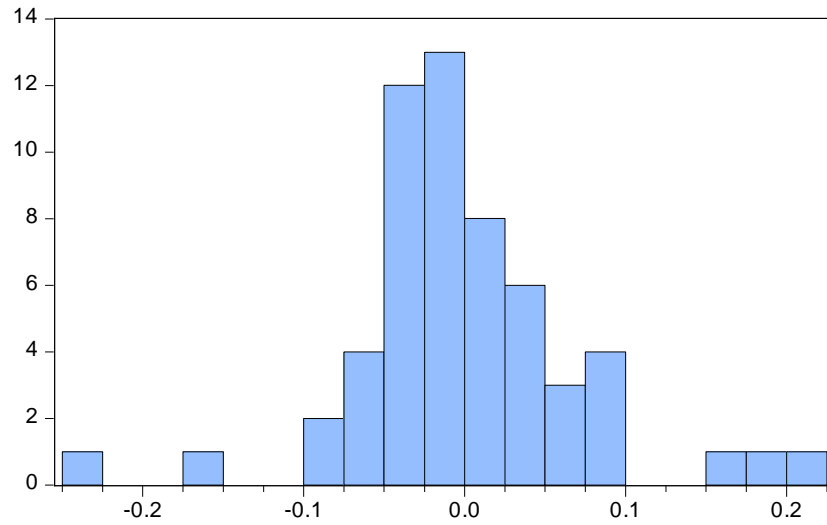
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Sample 2009M04 2013M12	
Observations 57	
Mean	1.16e-17
Median	-0.013505
Maximum	0.206404
Minimum	-0.241639
Std. Dev.	0.073121
Skewness	0.102331
Kurtosis	5.518612
Jarque-Bera	15.16506
Probability	0.000509

Annex 9b: Jarque-Bera Normality Graph for M2
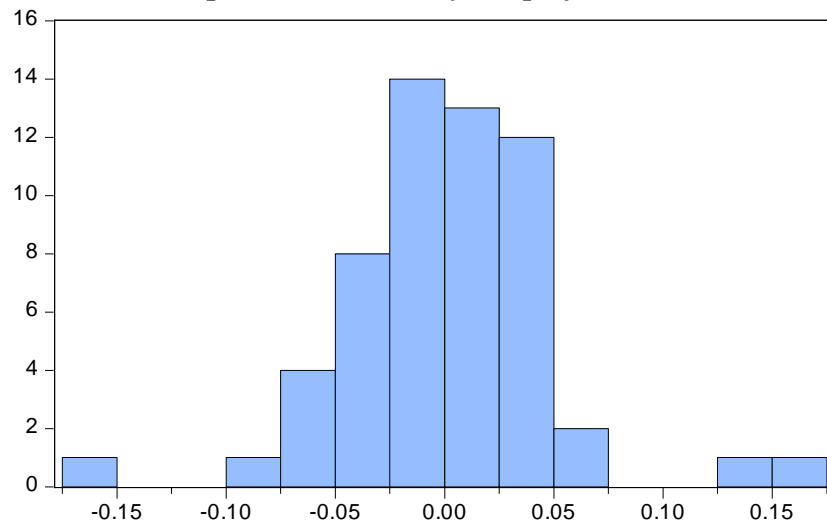
Series: Residuals	
Sample 2009M04 2013M12	
Observations 57	
Mean	-1.28e-17
Median	0.001444
Maximum	0.153810
Minimum	-0.150907
Std. Dev.	0.047910
Skewness	0.355688
Kurtosis	5.579048
Jarque-Bera	16.99917
Probability	0.000204

Annex 10a: CUSUM Plot for M1
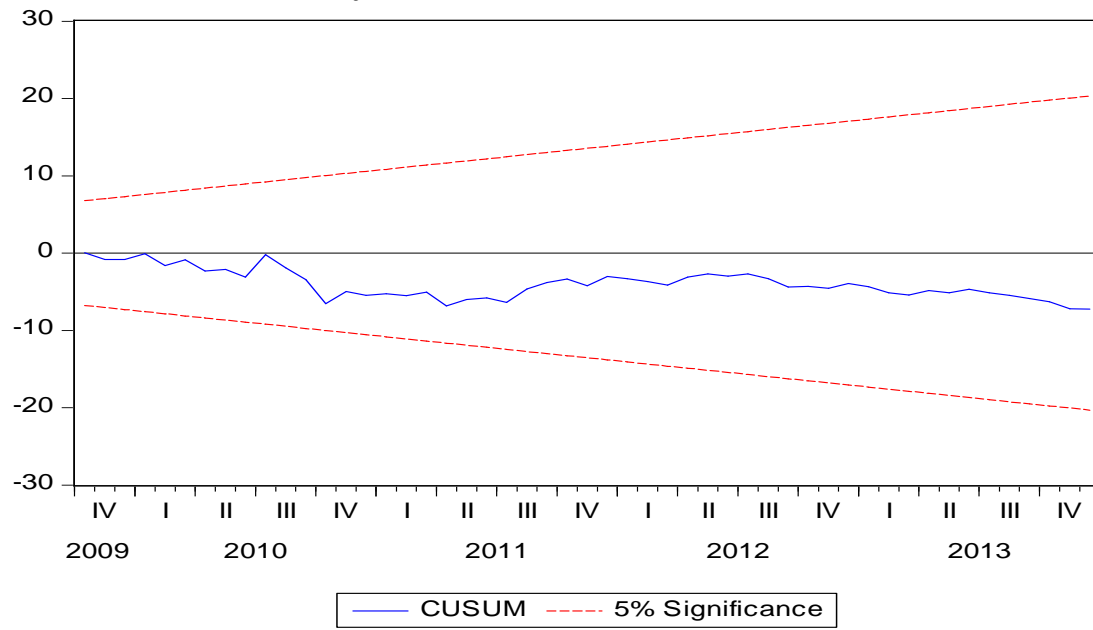
Annex 10b: CUSUM Plot for M2