Exchange Rate Liberalization and Money Demand :
The Case of Malawi

By

William Simwanza

Thesis

Submitted to

KDI School of Public Policy and Management

in Partial Fulfilment of the Requirements

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Professor Lee, Jinsoo

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DEVELOPMENT POLICY Committee in

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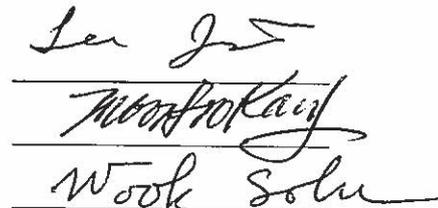
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Abstract

This paper's main objective is to ascertain if there exists any relationship between exchange rate and money demand in Malawi. The results indicate a positive and significant relationship between Money demand and exchange rate. The results also indicate an increase in money demand after 1994 when a flexible exchange rate was adopted.

An Error Correction Model (ECM) is estimated and short run and long run results confirm our appriori assumptions in terms of the signs of the coefficients. The short run results indicate that demand for real money in the country is influenced by exchange rate while in the long run it is influenced by national income, the opportunity cost of holding money (interest rate) and the exchange rate.

There is need for Malawian policy makers to consider putting in place measures to stabilize the local currency as the current state leaves the country vulnerable to external sector developments and foreign exchange earnings. Economic diversification and an export led growth will be essential to achieve a stable foreign exchange and achieve sustained economic growth.

Dedication

This paper is dedicated to my mum, Norias Kayira, for her commitment towards my education.

Eeeh Kayira

Acknowledgements

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List of Acronyms

ADF   :   Augmented Dickey Fuller

BoP   :   Balance of Payments

CPI   :   Consumer Price Index

ECF   :   Extended Credit Facility

ECM   :   Error Correction Model

FCDA :   Foreign Currency Denominated Account

GDP   :   Gross Domestic Product

IMF   :   International Monetary Fund

LRR   :   Liquidity Reserve Requirements

OLS   :   Ordinary Least Squares

OMO   :   Open Market Operations

SAPs   :   Structural Adjustment Programmes

SDR   :   Special Drawing Rights

USD   :   United States Dollar

CHAPTER ONE

BACKGROUND

1.0.   Introduction

Effective economic policy formulation requires a deep understanding of the various variables at play in an economy. In monetary policy for example, since money supply is assumed as given in Macroeconomic literature, a deeper understanding of the demand side is of paramount importance as it is said to be volatile and unpredictable[1]. A money demand function that is stable, therefore, is crucial for Monetary Policy formulation and implementation.

After gaining independence in 1964, Malawi has adopted various policies measures that were aimed at among other things price stability, a sustainable Balance of Payments (BoP) position and an accelerated economic growth and development. To achieve this, various policy instruments which have included exchange rate and interest rate adjustments have been used[2]. The period between 1960 and 1980 was, however, characterised by great state intervention in the economy with price controls, agricultural subsidies and a repressed financial system among others[3].

In the early 1980s Malawi began to implement various economic reforms as a result of the adoption of the Structural Adjustment Programmes (SAPs) propagated by the International Monetary Fund (IMF) and the World Bank. According to Chirwa E. (2001), the reforms

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1 Sahin (2013) *Estimating Money Demand Function by a Smooth Transition Economics, Management, and Financial Markets* Volume 7(3), pp. 31–52

2 Reserve Bank of Malawi (..) *Evolution of the Exchange rate in Malawi*

3 Droppelmann K., Makuwira J., and Kumwenda I. (2012) *All Eggs in One Basket: A Reflection on Malawi's Dependence on Agricultural Growth Strategy*, The International Food Policy Research Institute

included the liberalization of the financial sector which was highly repressed, characterised by government intervention in the banking sector through credit and interest rate controls[4].

With the coming in of the multiparty dispensation in 1994, the country continued to liberalise the economy. Economic Liberalisation policies were aimed at moving away from government intervention to one that relies on more private sector participation. Macroeconomic policies were, therefore, aimed at liberalising international and domestic trade including liberalising of agricultural commodity prices and marketing, removal of agricultural subsidies, reducing trade tariffs and removing nontariff barriers[5]. They were also focused on liberalising the exchange rate and the financial sector at large and interest rates and provision of investment incentives to both foreign and domestic investors.

1.1. Problem Statement

In 1963, Nobel Laureate, Robert Mundell, proposed the idea that the demand for money could depend on the exchange rate, apart from income and the interest rate[6]. Various studies have tried to explore the relationship between exchange rate and the demand for money demand in different countries.

Previous studies on Money demand in Malawi (Shawa, 2012) have tried to investigate the money demand function, however, not much emphasis was put on the Exchange rate variable which has aroused debate among economists and policy makers and remains an important policy tool in Malawi especially after readopting the flexible exchange rate regime in 2012.

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4 Chirwa E. (2001) *Market structure, liberalization and performance in the Malawian banking industry*

5 Ibid (2001)

6 Bahmani S. and Bahmani-Oskooee M. (2012) *Exchange Rate Volatility and Demand for Money in Less Developed Countries.* Journal of Economic Finance Vol. 37 pp 442–452

This paper will, therefore, use annual data from 1970 to 2007 to try and establish the relationship between exchange rate and Money Demand in Malawi.

Due to the perpetual unfavourable terms of trade the country faces the exchange rate regime has enormous consequences on economic growth of the country. For example, during the latter part of 2011 and early in 2012 when the country was pursuing a fixed exchange rate regime, there was a severe foreign exchange crisis which led to fuel shortages and a drop in economic output and consequently the country registered a meagre 1.8 percent of growth against an average of over 6.7 percent in the preceding five years[7].

The use of money growth as a monetary policy tool to achieve price stability adopted by the Central Bank (the Reserve Bank of Malawi) in 2012 requires that the money demand function should be stable in order for the country to achieve its policy objectives[8]. Examining the stability of the money demand function in Malawi will, therefore, provide guidance to policy makers on whether the policy tool adopted will yield the expected goals and results.

1.2. Research Objectives

The main objective of this paper is to investigate the relationship between money demand and exchange rate in Malawi. The paper will build on the work of other researchers like Shawa, in 2012 who tried to analyse the Money demand function on Malawi. This paper, however, will use annual data from 1970 to 2007 estimate the money demand function for Malawi. It will try to point out the relevant factors that impact on demand for money in Malawi with a special focus on the exchange rate.

The paper will also try to establish the sign for the coefficient of the exchange rate variable for Malawi. It is argued that the sign for the elasticity coefficient on the exchange rate

[7] Malawi Government *(2012) Malawi Economic Recovery Plan*
[8] Ibid *(2012)*

variable can either be positive or negative. If the exchange rate depreciation is perceived as an increase in wealth by economic agents in an economy and leads to a rise in domestic money, the coefficient on exchange rate positive[9]. On the other hand if the increase in exchange rate results into a decrease in holding of domestic money (currency substitution) then the coefficient of exchange rate will be negative[10].

The paper will further try to establish whether the money demand function is stable both in the short and long run. The stability of demand for money implies that the quantity of money can be predictable related to various macroeconomic variables and is vital for a robust monetary policy transmission[11]. The stability of the model in the study period will inform current and future monetary policy formulation as the country reverted to the floating exchange rate regime in May, 2012.

The study will also try to compare the two periods when the country followed the managed exchange rate regime (1970-1993) and the period when the country floated the local currency (1994-2007) to compare money demand in the two different regimes.

1.3. Data and Organization of the Paper

Most studies of money demand in developing countries are often faced with by serious data limitations, including inadequate monetary records and lack of high-frequency observations such as monthly or quarterly indicators of economic activity. In this study, however, the paper uses secondary annual data from the International Monetary Fund, International Financial

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[9] Bahmani S. (2013) *Exchange Rate Volatility and Demand for Money in Less Developed Countries.* Journal of Economic Finance Vol. 37 pp 442–452.
[10] Ibid(2013)
[11] Kumari J. & Jitendra M. (2012) *Relationship Between Stock Prices, Exchange Rate and The Demand for Money in India.* Economics, Management, and Financial Markets Volume 7(3), 2012, pp. 31–52.

Statistics database, and the World Bank (World Development Indicators) covering the period from 1970 to 2007. The choice of the period is based on some important political and economic events that took place in the country.

In May, 1994 the country elected the first democratic government which went on to liberalize the economy and the exchange rate. This was followed by high rates exchange rate depreciation and high inflation rates averaging 35 per cent between 1995 and the year 2000[12].

In addition to this chapter, the paper is organized as follows: chapter two will give a brief on both theoretical and empirical literature. Chapter three describes the model underlying the analysis and specification, while chapter four presents the empirical estimation. Chapter five concludes by presenting the results in the context of policy implications.

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[12] Chirwa E.W. (2005) *Macroeconomic policies and Poverty Reduction in Malawi: Can We Infer from Panel Data*, Global Development Network (GDN)

CHAPTER TWO

LITERATURE REVIEW

2.0. Exchange rate and Monetary Developments in Malawi

The Exchange rate regime in Malawi has gone through a number of regimes since independence in 1964. Soon after attaining self rule, the country adopted its own currency, the Malawi pound, which was renamed the Malawi kwacha in 1971 and was pegged at par to the British pound sterling until November 1973[13].

The Malawi kwacha was de-linked from the British pound on 19th November, 1973 and pegged to a trade weighted basket of two currencies namely: the British pound and the US dollar. This meant determining the exchange rate was done by setting daily buying and selling rates for the US dollar and the British pound based on the foreign exchange market developments by the Reserve Bank of Malawi.

The Malawi kwacha was pegged to the IMF's Special Drawing Rights (SDR) From June 1975. The US dollar middle rate was arrived at on the basis of the IMF's daily calculations of the US dollar-SDR rate. Exchange rates for other currencies were arrived at based on the cross rates on the London inter-bank market.

The Malawi kwacha was de-linked from the SDR and pegged to a trade weighted-basket of seven currencies in 1984. The currencies are: the US dollar; the South Africa Rand; the British Pound Sterling; German Deutsche mark; French franc; the Netherlands Guilder; and Japanese yen. This gives the geographical makeup of Malawi's main trading partners and the currencies that were used in making the country's international trade transactions.

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[13] RBM (2013) *Evolution of the Exchange rate in Malawi*

The foreign exchange market was fully liberalized on February 7, 1994 and the kwacha was sanctioned to float with no interferences from the monetary authorities. However, this policy led to the high depreciation of the kwacha[14]. Monetary authorities reverted back to the fixed exchange rate regime in 2008 with Administrative controls in the current account. This was followed until May, 2012 when the Malawi Kwacha was devalued by 49 percent and was also floated against major trading currencies This policy shift played a major role in normalizing relations with the International Monetary Fund (IMF), which approved a USD156.2-million Extended Credit Facility (ECF) for Malawi on 23rd July, 2012[15].

The period between 1964 and the mid 1980s, therefore, is characterised by financial repression and a managed exchange rate regime in Malawi. Due to the implementation of the SAPs the country the country underwent reforms to liberalise the economy in the early 1980s. The reforms were further implemented after the political transformation from one party state to a multiparty dispensation. The table below gives a summary of the exchange rate and monetary policy developments in Malawi since independence.

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[14] RBM (2013) *Evolution of the Exchange rate in Malawi*
[15] Malawi Govt, (2012) *Malawi Economic Recovery Plan.*

Table 1: Evolution of Monetary and Exchange rate policy

Period	Monetary Policy	Exchange Rate Policy	Lending Framework
1964-1986 (Financial Repression)	Interest rate controls Preferential lending to agricultural sector Price control on selected commodities	Fixed Exchange Rate regime	Credit controls
1987-1993 (Financial Reforms)	o 1987-deregulation of lending rates o 1988-deregulation of deposit rates o 1989-Review of the Banking Act o 1990-abolition of preferential lending rates	Pegged to a basket of currencies	Deregulated lending
1994-2007 (financial liberalization)	o Indirect Monetary Policy instruments: Discount rate, Open Market Operations (OMO), Liquidity Reserve Requirements (LRR) o New commercial banks entered the system	o Free float o Partial deregulation of exchange controls o establishment of foreign exchange bureau o establishment of Foreign Currency Denominated Account (FCDA) o establishment of foreign exchange market	Deregulated lending
2008-April 2012: liberalized financial sector)	o Indirect Monetary Policy instruments: Discount rate, OMO, LRR	Defacto fixed exchange Rate with administrative controls over current account transactions	Deregulated lending
May 2012- to date; (liberalized fin. sector)	o Indirect Monetary Policy instruments: Discount rate, OMO, LRR	Free float with liberalized current account transactions	Deregulated lending

Source: Reserve Bank of Malawi

All in all, Malawi's exchange rate regimes before 1994, have on to a large extent been involved some kind of peg either to one currency or basket. The government through the Reserve Bank of Malawi has mostly controlled the nominal exchange rate as a means to promote economic growth. This has also been done to protect consumers and investors from inflation since the country imports more than it exports[16].

2.1. Literature Review

2.1.0. Theoretical Literature

Demand for money involves decision making on how much wealth would be to held as money (cash) at any given time (It means that it is a stock demand). If wealth is assumed to be a stock, an economic agent, therefore, must make decisions on how he will allocate it among different types of assets. For example cash, a savings and/or checking account, real estate, and securities like bonds and shares.

Three main theories of money demand have held sway in economics. These are: the Classical Theory of Money, the Liquidity Preference Theory and the Modern Quantity Theory of Money. The three theories try to put forward, elements that determine economic agent's decisions to hold money.

Economist Irving Fisher is credited for putting forward the Classical Theory of Money in 1911. This theory is derived from an identity called *the equation of exchange* which is given as follows:

$MV = PY.$

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[16] Pauw K, Dorosh P., and Mazunda J. (2013)) *Exchange Rate Policy and Devaluation in Malawi* International Food Policy Research Institute

M is the quantity of money demanded, P gives the price level, and Y is aggregate income or output, while V is velocity which measures the number of times in a given period of time for example, a year that a unit of a currency is used to purchase goods and services on the market.[17] The main assumption here is that the demand for money is only a function of nominal GDP and is not affected by the return on investment given by interest rates.

The most popular theory in economics on money demand, the Liquidity Preference Theory, was put forward by John M. Keynes in 1936. This theory's examination of money demand has inspired most of the research in monetary economics. In his theory, three motives for holding money by an economic agent were proposed[18]. First is the transactions motive where people hold money to buy goods and services and Money serves as a medium of exchange. The other motive is precautionary where money is held for future unforeseen circumstances that may occur. The third motive is speculative where people store their money in either bonds or cash. This is mainly influenced by interest rate, and income. When interest rates are low (high), so is the opportunity cost, so people hold more (less) cash.[19] This theory established a negative association between money demand and interest rate and a positive association between money demand and income. The Keynesian argument is that people hold less money when interest rates go up since this is an incentive to save and earn more returns, at the same time, it is also costly to borrow money while people will hold more money when interest rates are low, since the opportunity cost of holding up would also be low.[20] This theory has been extended by other theorists who came after him and have tried to include the asset component.

[17] Mankiw G, (1998) *Macroeconomics*.
[18] Dornbusch , Fischer, Startz, (2001) *Macroeconomics.*
[19] Ibid, 2011
[20] Baumol & Blinder (1988), *Economics-Principles and Policy,*

A majority of the post Keynesian theories of demand for money emphasize on the asset function of money and these have been called portfolio theories of money in some literature. The Friedman's Modern Quantity Theory of Money was put forward by Milton Friedman and his arguments hinge on the theory of asset demand. He proposed that Money demand is like the demand for any other asset should be seen as a function of wealth and the returns of other assets relative to money.[21]

In this theory, Money demand is positively related to income. Other variables are expected returns on securities, and goods relative the expected return on money. These variables have a negative relationship with money demand: this means that the higher the returns on bonds, equity and goods compared to the return on money, the lower the quantity of money that will be demanded. The return on money is dependent on the services that the bank provides on bank deposits and the interest given on checkable deposits.

The amount of money held by an economic agent, therefore, mainly depends on the best possible combination of risk and return that can be obtained from holding either money or alternative assets. In addition to risk and return factors demand for money depend on the total wealth of the households[22].

2.1.1. Empirical Literature

The theories discussed above have no exchange rate as one of the explanatory variables which is the variable of concern in this study. These theories would auger well with closed economies (in autarky) i.e. where there is no international trade involved. With the increasing financial globalization, however, it is necessary to take into consideration foreign factors that may impact on money demand. Bahamin (2013), claims that Nobel Laureate,

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[21] Ibid, 1988

[22] Mankiw Gregory (2000) *Macroeconomics,* Macmillan

Robert Mundell, was the first person to put forward the idea that money demand depends on foreign factors including the exchange rate.

Many empirical studies have used foreign factors especially in developing countries on the demand for money. To capture these factors, most studies have included the impact of foreign interest rate and the exchange rate[23] of the domestic currency in their studies, Bahmin (2013), Gaurisankar and Kwie-jurgens(2013), Hsing (2007), Kumari Mahakud (2012) and Shawa (2012).

Bahmin (2013) Used data from fifteen (15) less developed countries and the bounds testing approach. He found that that exchange rate volatility had short-run effects on the demand for real monetary aggregate (M2) in these countries.

Gaurisankar and Kwie-jurgens (2013) used a two co-integration approach in his study for the real money demand for Suriname for the period 1981-2010. Their results revealed that in the long run real broad money growth has a positive relationship with Real GDP growth, while real demand for money has a negative relationship with real exchange rate movements and real lending rate. In the short run, real money demand is influenced by real GDP growth and Real Exchange rate. The real money demand function shows instability in terms of its coefficients.

Hsing (2007) using quarterly data from 1996 to 2005 in Estonia found that real output, real stock prices and the depreciation of the currency positively affect the demand for real monetary aggregates (M2). The deposit rate, interest rate of the euro and expected inflation rate have a negative effect on demand for real balances. Applying the CUSUMSQ test for stability suggests that there is stability in parameters of the Estonian money demand function.

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[23] Both real and nominal exchange rates including exchange rate volatility have been used in the various studies

Investigating the relationship between stock prices, exchange rate and demand for money in India during the post liberalization period in India, Kumari and Mahakud (2012), used monthly data from 1996 to 2005 and the Error Correction Approach. Results reveal that the Indian long run money demand function is sensitive to inflation, stock prices and economic activity.

To establish stability of the Money demand function in Australia, Hossain (2013) used the Johansen cointegration approach to establish the long-run relationship for broad money demand in Australia. He used annual data for the period 1970-2008 to establish this relationship. The results suggested that of a long-run relationship between real broad money balances, real output, the yield on Australian Government long-term bonds, yield on the US Government Treasury bills and the nominal effective exchange rate of the Australian dollar exists. The Hansen-Johansen Test results indicate that the broad money demand relationship was unstable during the early 1990s but has stabilized since then.

Moghaddam and Bah (2008) in their quest to establish the money demand in the Gambia used data from 1970 to 1998 and the Error Correction Model. They found that real output, the rate of interest and the real exchange rate are the main factors affecting it.

Using an Error-correction approach to estimate the Malawian money demand function, Shawa (2012) used annual data from 1970 to 2005. He found that the income elasticity of money demand had the positive sign as per theoretical assumptions, the level of financial development and exchange rates were also found to significantly influence money demand in Malawi. The study also found a stable demand function which is essential for monetary policy formulation.

2.2. Conclusion

Studies above suggest that money demand is not homogeneously affected. Different countries face different economic situations and hence different money demand functions. The diverse results above indicate the need for more studies especially with the diverse economic conditions that different countries face. Of paramount importance are the diversified exchange rate policies that countries implement.

The use of annual data to estimate this relationship between money demand and exchange rate in Malawi among other things reduces the variability in trends in this study. By focusing on this time period, the study better informs the researcher how two different exchange rate regimes may affect money demand.

CHAPTER 3

MODEL SPECIFICATION AND METHODOLOGY

3.0. Model Specification

This paper employs an econometric procedure to estimate the money demand function in Malawi. It uses annual data from 1970 to 2007 in trying to establish this relationship[24]. Since time series data is subject to nonstationarity due to trends, the unit root test will is employed to check all the variables of this problem. This is to avoid spurious regressions. If nonstationarity is observed in any of the variables, de-trending is used through differencing. Cointegration technique is used to check if a long run relationship exists in case the variables are not cointegrated of the same order.

The paper employs the Keynesian Liquidity preference theory of money demand in the analysis with exchange rate as an additional variable and is given as:

$$\mathbf{m} = f\,(\mathbf{y},\ \mathbf{exch},\ \mathbf{int},\ \mathbf{cpi}) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

M is the demand for money, *y* is the national income, *exch* is the nominal exchange rate, *int* represents the interest rate and *cpi* is the price levels given by the consumer price index.

The model adopted by this paper is given as:

$$\mathbf{lnM_t} = \beta_0 + \beta_1 \mathbf{lnPRCGDP_t} + \beta_2 \mathbf{lnEXCH_t} + \beta_3 \mathbf{TBR_t} + \beta_4 \mathbf{lnCPI_t} + \varepsilon_t \dots\dots\dots\dots\dots\dots(2).$$

Table 2 below summarizes the variables and expected signs of their coefficients.

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[24] The period 1970-1993 is used to compare with the period 1994-2007 as different exchange rate regimes were in place in the two periods

Table 2: Variable Description and Expected Sign

Variable	Description	Expected Sign
M2	Money demand, defined by M2, deflated (Real Money)	
PRCGP	National Income, defined by the per capita GDP	*Positive*
EXCH	Nominal exchange rate of the local currency (Kwacha) to the USD	*Either positive or negative*
CPI	General price levels, defined by consumer price index	*Positive*
TBR	Interest rate, defined by the 91 day treasury bills rate	*Negative*

The expected signs are based on economic theory and they provide a statistical relationship between the dependent and independent variables captured by β_t while ε_t is the disturbance term capturing the unexplained component of the model.

The study uses real money balances (M2 deflated) as the dependent variable. Broad Money comprises local currency in the hands of the public, demand deposits, time deposits, savings deposits and foreign currency deposits. The figure below gives the composition of the broad money in Malawi.

Figure 1: Composition of Broad Money in Malawi
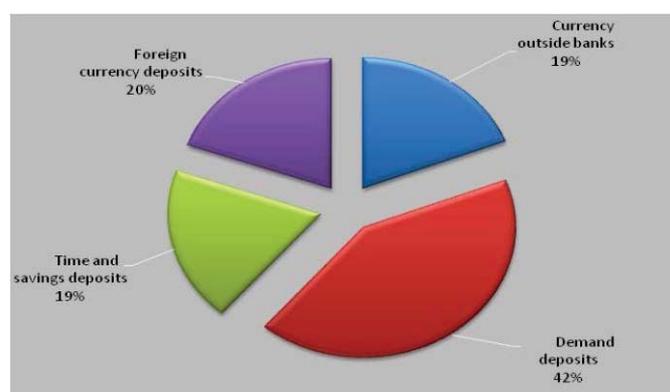
Source: Reserve Bank of Malawi

The per capita GDP (PRCGDP) is used to capture the levels of income in this study. The openness and small size of the Malawian economy justifies the inclusion of exchange rate (EXCH) as it plays a vital role in its economic stability. This variable, Consumer Price Index (CPI) and the 91day Treasury bill rate (TBR) are being used as proxies for the opportunity cost of holding money. The price levels and interest rates represent the opportunity costs with respect to holding physical assets and domestic financial assets.

3.1.1. Stationarity

A time series is stationary if it has probability distributions that are stable over time[25]. This means that its mean, variance and covariance are constant over time. Models that contain non-stationary variables in the data may produce spurious regression results. The results may indicate existence of statistically significant relationships between variables with a high R-squared among others. Relying incorrect results as correct may end up with wrong conclusions and would mislead economic policy formulation.

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[25] Wooldridge J.M. (2013) *Introductory Economics* 5th ed. South Western, Cengage Learning

To avoid the problem of spurious regression, trended data is differenced a minimum of time to generate a stationary series[26]. A series is intergraded of order one (d) or I(1), if it is stationary after differencing it once.

To test for Stationarity, the Dickey-Fuller (DF) test after David Dickey and Wayne Fuller in who developed the test in 1979. We cannot use the simple DF test in this analysis due to its limitations. The main drawback of simple DF test is that it is based on the Autoregressive (1) processes. The use of the standard DF test critical values would be invalid if the error term in the test is correlated over time. This violates the white noise assumption of the DF test. This paper, therefore, uses an Augmented Dickey-Fuller (ADF) test as it takes into account any autocorrelation that may still exist after the inclusion of lagged observations of the endogenous variable in the regression. It is given by:

$$\Delta x_t = \mu + (\delta-1)x_{t-1} + \sum \eta x_{t-1} + \mu_t \text{...(3)}$$

Where η is chose to make sure that the residuals are white noise. The t-statistic on $1-\delta$ is used instead of the basic DF critical value. The ADF test statistics have the same asymptotic distribution as the DF test statistic, such that the same critical values can be used[27].

3.1.2 Cointegration

In Econometric theory, cointegration is defined as a long-run relationship of variables that are linked to form an equilibrium relationship when the individual series themselves are non-stationary in levels, but become stationary after differencing. Two series are said to be cointegrated if they have comparable long-run properties. Individual series may be unstable and diverge from each other over a shorter period, but converge towards equilibrium over

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[26] Gujarati *Basic Econometrics*, 2009
[27] Green R. *Econometrics*, 2003

the long run[28]. Cointegration, therefore, highlights the existence of a long-run equilibrium to which the system converges overtime[29].

We use the two stage cointegration test investigate the possibility of cointegration. This was proposed by Engle and Granger in 1987. If there exists a cointegrated relationship between a set of economic variables, a statistical basis for the use of the Error-Correction Model (ECM), therefore, avails itself. The ECM clearly differentiates between long-run and short-run parameters[30]. Our error correction model is given as below:

$$\Delta LM2_t = \delta 1 + \varphi \xi + \sum \beta_1 \Delta lnPRCGDP_{t-1} + \sum \beta_2 \Delta lnEXCH_{t-1} + \sum \beta_3 \Delta TBR_{t-1} + \sum \beta_4 \Delta ln\, CPI_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots(4)$$

δ and ξ are our constant and as our error correction term respectively.

3.2. Diagnostic Tests

The diagnostic tests are used to validate the model's conformity to basic statistical requirements based on the classical assumptions of Ordinary Least Squares (OLS) regressions. These include homoscedasticity, normality, no serial correlation and correct specification.

The homoscedasticity assumes a stable variance of the error term and in contrast to this is heteroscedasticity. When heteroscedasticity is present, the estimates of the regression are unbiased but their variance is biased. The serial correlation assumption is that the residuals in time series data are correlated over time. The study we uses the Autogressive Conditional Heteroscedasticity (ARCH), a Lagrange multiplier test for conditional heteroscedasticity.

The study uses the Jarque-Bera (JB) test to investigate normality. This test is in line with the chi-square distribution that has two degrees of freedom. The null hypothesis is rejected if the

[28] Green R. *Econometrics*, 2003
[29] Gujarati *Basic Econometrics*, 2009
[30] Woldridge, *Introductory Econometrics*, 2013

residuals are normally distributed i.e. if computed p-values are sufficiently low. In case of reasonably high p-values, we fail to reject the normality assumption.

The Ramsey's RESET test helps us to establish the functional form of our model under study. We reject the null hypothesis for no correct specification if the calculated values are greater than the critical values of Chi-square or if computed p-values are found to below five percent.

3.3. Stability tests

Stability test is performed on the error correction model to check the stability of the coefficients over time. The study uses the Chow breakpoint test to test whether the coefficients before and after the liberalization of the exchange rate in 1994. The test can help check if there were any impacts of structural changes over the period under study due to policy shifts.

CHAPTER 4

RESULTS AND INTERPRETATION

4.1 Unit Root Test

The Augmented Dickey-Fuller (ADF) test is performed on all variables of the series compiled in this study. The analysis of unit root test is shown in Table 4.1 below. The tests were carried out in levels and first differences and were done by including both constant and a deterministic trend in the regressions.

Table 3: Stationarity Test

Variable	Test Statistic	Critical value	Level of Integration
LM2	9.996	1.950	I(0)
LEXCH	4.236	1.950	I(0)
LCPI	5.417	1.950	I(0)
TBR	1.749	1.692	I(1)
LPRCGDP	4.165	2.966	I(0)

The critical values for ADF test given in the table above are at five percent confidence levels. We learn from the stationarity test that the variable, 91day treasury bills rate (tbr), stationary after first differencing but with a drift. The stationarity test also reveals that our variables are not integrated of the same order as others are stationary in levels while others are stationary after first differencing.

4.2 Cointegration Tests

We test for cointegration to assess the stationarity of residuals and examine if there exists a long run relationship between money demand and the exogenous variables. Results from the

Engle-Granger two stage cointegration test confirm an existence of a long run relationship of money demand in Malawi.

According to the Granger Representation theorem, if cointegration exists among nonstationary series, there exists an error correction mechanism that maintains it.

4.3 Diagnostic Tests

Diagnostic tests are used to confirm the reliability of our model. These tests confirm that our model is valid and can be used to make inferences. *LM* is a Lagrange Multiplier test for autocorrelation. The *p*-values show, that there are no problems with autocorrelated residuals occurring in our model.

The Jarque Berra test for normality confirms that our residuals are normally distributed. The Ramsey Reset Test also indicates that our model is correctly specified as we fail to reject the null hypothesis at 5 per cent level of significance.

4.4 Stability Test

The Chow breakpoint test confirms stability of our coefficients over the study period. Despite the change in exchange rate policy in Malawi in 1994, the money demand function has remained stable. We test the null hypothesis that there is no structural break. The p-value (0.4275) presented from the test is greater than 0.05 and hence we fail to reject the null hypothesis that there is no structural break due to policy shift.

The stable money demand function entails that we can make plausible policy decisions from it.

4.5 Regression Results

Since cointegration results indicate that there is a long run relationship and there are no feedback effects as indicated by the Ganger causality test, we proceed to estimate an Error Correction Model.

Results of our ECM are given below:

Table 4: Error Correction Model Regression Results

ΔLog m2	
ΔLog Per capita gdp	0.245
	(0.335)
ΔLog Exchange Rate	0.309**
	(0.150)
ΔTreasury Bills Rate	-0.000
	(0.003)
ΔLog Consumer Price Index	0.146
	(0.231)
Dummy Variable	0.042
	(0.074)
Error Correction Term	-0.399**
	(0.165)
_cons	0.123***
	(0.037)

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

4.5.1 Error Correction Term

Meaningful results of the ECM can be interpreted from the error correction term. It shows how in the short run LM2 adjusts into the long run equilibrium in our model. The negative sign and it value which is less than 1 confirms the validity of the estimated model.

The results indicate that 40 per cent of short run shocks are adjusted into the long run equilibrium in one period. In the short run, money Demand in Malawi is influenced by the exchange rate.

4.6 Long run regression results

The long-run regression results are presented in table 5.2 below:

Table 5: Long Run Regression Results

ΔLog m2	
ΔLog exchange rate	1.350***
	(0.151)
ΔLog consumer price index	-0.153
	(0.150)
ΔLog Per Capita gdp	1.414***
	(0.083)
ΔTreasury Bills rate	-0.010***
	(0.003)
Δ Dummy	-0.307**
	(0.114)
_cons	-0.869**
	(0.365)

* p<0.1; ** p<0.05; *** p<0.01

The long run results indicate that money demand in Malawi is influenced by the exchange rate, peoples' income, the opportunity cost of holding money.

4.6.1 Per Capita GDP

The per capita GDP in our model confirms our priori assumptions that income has a positive effect on money demand. It is significant both at 1 per cent level of significance. The money demand in Malawi therefore confirms that with high incomes people will hold more real money balances.

4.6.2 Exchange rate

The long run results indicate that exchange rate significantly impacts on money demand. The exchange rate is found to be significant at 1 per cent level of significance which confirms this relationship.

The results also indicate that exchange rate positively affects money demand in Malawi. The sign of the coefficient indicates that economic agents view an exchange rate depreciation as an increase in wealth and hence a hold more money. While there may be a positive sign in the exchange rate, it should be noted that the country had a lot of administrative controls in the exchange rate market during the study period which included surrendering all the foreign exchange rate receipts to the Reserve Bank of Malawi (RBM)[31]. This led to a thriving black market and hence we may not be able to capture the behaviour of economic agents in totality.

4.6.3 Treasury Bills Rate (TBR)

The treasury bills rate gives the opportunity cost of holding money and significantly affects money demand in Malawi. It also gives us the expected negative sign from our apriori assumptions. Given the low risk that the treasury bills have, economic agents would invest in them and hence hold less money when interest rates are high and vice versa. As a result the treasury bills comprised almost 90 percent of the domestic debt stock for Malawi in 2007[32]. A rise in the rate of interest would, therefore, entice investors to put their money in treasury bills and hence less real balances would be held while a reduction in the interest rate would lead to investors to hold their money rather than putting them in interest earning assets.

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[31] Maehle N, Teferra H, and Khachatryan A (2013) Exchange Rate Liberalization in Selected Sub-Saharan African Countries: *Successes, Failures, and Lessons*
[32] Malawi Government (2008)

4.6.4 Consumer price index (CPI)

The consumer price index does not significantly influence money demand in Malawi. The results indicate the price changes do not affect the demand for Malawi. Malawi's financial sector is underdeveloped and access to financial services including savings services is very low[33]. With this low access to financial services implies that an increase in prices will not change demand for money as they have no access to loans and other financial services.

4.6.5 Dummy Variable

The results also show that there was a reduction in demand for money as a result of a policy shift from a managed exchange rate to a free float in 1994. This result is significant at 5 per cent level of significance. The reduction in money demand may be due to the high inflation rates that followed the exchange policy shift as economic agents would rather have held their wealth in long term fixed assets rather than in money whose value kept on getting eroded with time due to inflation.

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[33] UNDP Malawi (2007) *Building an Inclusive Financial Sector in Malawi (FIMA)* Project Document

CHAPTER 5

CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Conclusion

This study embarked on establishing the relationship between money demand and exchange rate in Malawi. The study has been able to meet the objectives it set out to meet which are: To establish the sign for the coefficient of the exchange rate variable for Malawi given that it can either be positive or negative depending on the behaviour of economic agents; checking for stability of the demand function for policy making process; draw a parallel between a managed exchange rate regime and free float.

The paper employs the Error Correction technique to establish this relationship. A two-stage Engle granger cointegration test is used to establish if a long run relationship exits. The test uses checks for stationarity of the residuals by using the augmented Dickey Fuller test. It is observed that our model is valid as given the value and sign of the error correction term and short run results indicate that almost forty per cent of the shocks in the short run are carried into the long run. Diagnostic tests also prove that our model meets the basic OLS assumptions.

The study finds the money demand function to be stable over the study period despite policy changes in 1994 in exchange rate and the economy at large. The chow break point used to check the effect of the policy change on the stability of the money demand function.

5.2 Policy Implications

A stable money demand for Malawi as established in this study is vital for monetary policy makers in their quest to reduce inflation by targeting growth of M2 and achieve sustained

economic growth. These results show that targeting M2 growth can be used a policy tool to achieve inflation reduction in Malawi.

The positive sign of the exchange rate suggests that there may not be enough evidence for currency substitution in Malawi. Currency depreciation suggests people hold more money especially for transaction costs. A well-developed exchange rate market would be vital to ensure that people are able to freely trade in foreign currency as it would among other things reduce dealings on the black market. While the administrative regulations in the foreign market are said to be in the interest of safeguarding the integrity of the local currency, a flourishing black market entails loss to the economy in terms of government revenues among other things.

A stable exchange rate is vital for the country's development. Given the current situation where the major foreign exchange earner is tobacco and agriculture drives economic growth, the country's foreign exchange earnings position, therefore, remains vulnerable[34]. The country remains vulnerable to a number of shocks including weather-related shocks, aid shocks, and trade shocks and a diversified productive and export base should developed to mitigate its vulnerability in the long term.

The positive relationship between money demand and income which is measured by the Per capita GDP shows that an increase in income would lead to demand for more real balances with an estimated value of over one hundred per cent. This demand is mainly for the transactionary purposes which would be absorbed in the economy.

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[34] Lea and Hanmer (2009) *Constraints to Growth in Malawi,* Policy Research Working Paper 5097, World Bank

The insignificant relationship between price levels and money demand relationship is surprising to this researcher; however we note that the low levels of the population that had access to savings and only 1% has access to credit[35]. The low access to financial services under the study period may explain this insignificant result. Deliberate policies need to be put in place to ensure an inclusive banking sector in Malawi. There is need to expand banking and microfinance services across the country especially in rural and underserved areas.

The stable demand function suggests monetary targets may be used as a policy tool. This is in line with the Reserve Bank of Malawi's monetary policy stance that was adopted in 2012 as means of reducing inflation. Our results confirm that this policy tool may be used in Malawi.

5.3 Areas for Further Research

Data availability remains one of the challenges in research for developing countries like Malawi. Further and more comprehensive studies on Money demand are still required to guide monetary policy formulation. Further Studies with recent and with high frequency data for example monthly data or quarterly data may also be done for more in depth understanding of the money demand function.

Other proxies for the exchange rate variable could also be used for example the real exchange rate, the exchange rate volatility. Other studies like Kumari J. & Mahakud J. (2012) and Harvey H. (2012) have used these proxies for exchange rate in estimating the demand for money.

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[35] Lea and Hanmer (2009) *Constraints to Growth in Malawi,* Policy Research Working Paper 5097, World Bank

APPENDIX I: SUMMARY OF VARIABLES

```
. sum m2 exch tbr gdp cpi
```

Variable	Obs	Mean	Std. Dev.	Min	Max
m2	38	10707.98	20363.59	47.16	85860.3
exch	38	25.75053	42.46284	.8	139.96
tbr	38	18.74974	12.34279	8	46.3
gdp	38	95.21605	24.98768	37.3	132.75
cpi	38	22.38947	35.79691	.73	123.04

APPENDIX II: COINTEGRATION TEST

Engle-Granger Two Stage Cointegration Test

```
. dfuller residual, lags(0)


Dickey-Fuller test for unit root                    Number of obs   =       37


                        ———————— Interpolated Dickey-Fuller ————————
                Test       1% Critical       5% Critical      10% Critical
            Statistic         Value             Value             Value
————————————————————————————————————————————————————————————————————————————
   Z(t)        -4.517        -3.668            -2.966            -2.616
————————————————————————————————————————————————————————————————————————————

MacKinnon approximate p-value for Z(t) = 0.0002
```

Breusch-Pagan/Cook-Weisberg Test for Heteroskedasticity

Ho: Constant variance

Variables: fitted values of Dlm2

chi2 (1)   =   0.56

Prob > chi2 =   0.4526

Ramsey RESET Test Using Powers of the Fitted Values of Dlm2

Ho: model has no omitted variables

F(3, 26) =   0.66

Prob > F =   0.5833

Durbin Watson Test of Autocorrelation

```
. estat durbinalt
```

Durbin's alternative test for autocorrelation

lags(p)	chi2	df	Prob > chi2
1	2.107	1	0.1467

H0: no serial correlation

```
. estat dwatson
```

Durbin-Watson d-statistic(7,   36) = 2.448306

Jarque-Berra Nomality Test

Skewness/Kurtosis tests for Normality

| | | | | ——— joint ——— | |
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
residual	38	0.8703	0.2992	1.17	0.5585

Heteroskedasticity Test

. estat archlm

LM test for autoregressive conditional heteroskedasticity (ARCH)

lags(*p*)	chi2	df	Prob > chi2
1	0.099	1	0.7529

H0: no ARCH effects   *vs.* H1: ARCH(*p*) disturbance

Granger Causality Test

Equation	Excluded	chi2	df	Prob > chi2
lm2	lexch	2.5002	1	0.114
lm2	lcpi	.3397	1	0.560
lm2	lgdp	6.4495	1	0.011
lm2	tbr	1.1656	1	0.280
lm2	dumm	.01114	1	0.916
lm2	ALL	11.192	5	0.048
lexch	lm2	.11638	1	0.733
lexch	lcpi	3.8874	1	0.049
lexch	lgdp	.07643	1	0.782
lexch	tbr	.00062	1	0.980
lexch	dumm	2.4605	1	0.117
lexch	ALL	16.078	5	0.007
lcpi	lm2	2.0236	1	0.155
lcpi	lexch	1.4159	1	0.234
lcpi	lgdp	7.7342	1	0.005
lcpi	tbr	.19145	1	0.662
lcpi	dumm	1.6052	1	0.205
lcpi	ALL	35.397	5	0.000
lgdp	lm2	1.2451	1	0.264
lgdp	lexch	.68457	1	0.408
lgdp	lcpi	.02037	1	0.887
lgdp	tbr	.02734	1	0.869
lgdp	dumm	1.1e-06	1	0.999
lgdp	ALL	2.9618	5	0.706
tbr	lm2	2.1381	1	0.144
tbr	lexch	.60836	1	0.435
tbr	lcpi	.09692	1	0.756
tbr	lgdp	3.5183	1	0.061
tbr	dumm	1.2103	1	0.271
tbr	ALL	9.0641	5	0.107
dumm	lm2	2.2456	1	0.134
dumm	lexch	5.0112	1	0.025
dumm	lcpi	5.3107	1	0.021
dumm	lgdp	2.5082	1	0.113
dumm	tbr	5.4686	1	0.019
dumm	ALL	15.054	5	0.010

APPENDIX III: STABILITY TEST

Chow Test

test dumm duDlm2 duLlexch duLtbr duDlprcgdp duLlcpi

(1) dumm = 0

(2) duLDlm2 = 0

(3) duLlexch = 0

(4) duLtbr = 0

(5) duDlprcgdp = 0

(6) duLlcpi = 0

$F(6, 22) = 1.04$

$Prob > F = 0.4275$

References

Bahmani S. (2013) *Exchange Rate Volatility and Demand for Money in Less Developed Countries.* Journal of Economic Finance Vol. 37 pp 442–452.

Baumol W.J. & Blinder A. (1988) *Economics-Principles and Policy* 4th ed. Harcourt

Chirwa E.W. (2005) *Macroeconomic policies and Poverty Reduction in Malawi: Can We Infer from Panel Data*, Global Development Network (GDN)

Chirwa E. (2001) *Market structure, liberalization and performance in the Malawian banking industry*

Dornbusch R., Fischer S., Startz R.(2011) *Macroeconomics,* Mcgrawhill.

Droppelmann K. Makuwira J. Kumwenda I (2012) *All Eggs in One Basket: A Reflection on Malawi's Dependence on Agricultural Growth Strategy*, The International Food Policy Research Institute

Gaurisankar S. and Kwie-Jurgens (2013) *The Money Demand Function in Suriname.* Business, Finance & Economics in Emerging Economies Vol 8. No 2. 2013/3.

Greene W H, (2003) *International Edition Econometric Analysis,* Fifth Edition, Prentice Hall, Upper Saddle River, New Jersey.

Hanmer L. and Lea N (2009) *Constraints to Growth in Malawi,* Policy Research Working Paper 5097, World Bank

Hsing Y (2007) *The Roles of the Exchange Rate and the Foreign Interest Rate in Estonia's Money Demand Function and Policy Implications.* Applied Financial Economics Letters, Vol. 3, 221–224

Kumari J. & Mahakud J. (2012) *Relationship Between Stock Prices, Exchange Rate and The Demand for Money in India.* Economics, Management, and Financial Markets Volume 7(3), 2012, pp. 31–52.

Malawi Government (2012) *Malawi Economic Recovery Plan*: Ministry of Economic
Planning and Development.

Mankiw, G. N. (1998), *Principles of Economics*, the Dryden Press

Mankiw, G. N. (2000), *Macroeconomics,* Macmillan

Maehle N, Teferra H, and Khachatryan A (2013) Exchange Rate Liberalization in Selected
Sub-Saharan African Countries: *Successes, Failures, and Lessons* IMF Working
paper

Malawi Government (2008) *Annual Debt and Aid Report,* Ministry of Finance

Moghaddam M. and Bah M. (2008) *The Money Demand Function in a Small, Open and
Quasi-Monetary Economy: The Gambia* Applied Economics,
40, 731–734.

Mouyad A. S. (2010), *An Empirical Analysis of the Money Demand Function in
Syria* Economic Centre of Sorbonne, *Regression* Series No.
MDT2013-0382 pp.1-19.

Pauw K, Dorosh P., and Mazunda J. (2013) *Exchange Rate Policy and Devaluation in
Malawi* International Food Policy Research Institute

RBM (2013) *Evolution of the Exchange rate in Malawi* unpublished

Sahin A. (2013) *Estimating Money Demand Function by a Smooth Transition Economics,
Management, and Financial Markets* Volume 7(3), pp. 31–52.

Shawa, K.C. (2012) *A macro-econometric diagnosis of the Keynesian propositions of the
money demand function in Malawi: An error-correction approach*, International
Journal of Development and Sustainability, Vol. 1 No. 1, pp. 31–46.

UNDP Malawi (2007) *Building an Inclusive Financial Sector in Malawi (FIMA)* Project
Document.

Wooldridge J M (2013) *Introductory Economics* 5th ed. South Western, Cengage Learning.