A LOOK AT EXCHANGE RATE AND MONETARY POLICY IN MALAWI*

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Abstract

The paper assesses whether the exchange rate is affected by monetary policy and whether these effects are permanent or transitory. The paper takes the position that monetary policy is very crucial to exchange rate management.

A real effective exchange rate model is estimated to generate real effective exchange rate misalignment. Causality tests are performed between several measures of monetary shocks (consistent with other empirical works) and the real effective exchange rate misalignment. The results show that excess money supply predict real effective exchange rate misalignment with no feedback effects. In the second stage, a model of nominal exchange rate is estimated. Since we find co-integration, the model is estimated with first difference of the non-stationary variables, level variables and the co-integrating vector. Results indicate that nominal exchange rate over the period is determined by real income growth, rate of inflation, money supply growth and real effective exchange rate misalignment. The adjustment speed from the error correction term is consistent with a market-determined exchange rate responding to excess money supply.

Keywords: Exchange Rate; Monetary Policy; Integration

* The findings, interpretation and conclusions expressed in this paper are entirely those of the author. They don't necessarily represent the views of the Reserve Bank of Malawi.

1.0 Introduction

Exchange rate and monetary policy are key tools in economic management and in stabilization and adjustment policies of developing countries. In most developing countries, low inflation and international competitiveness have become major policy targets. The real effective exchange rate is a measure of international competitiveness, while inflation mainly emanates from monetary expansion, currency devaluations and other structural factors.

The basic questions implicitly asked in this study are the following:

- Do monetary shocks have any effects on the real exchange rate? Calvo, Reinhart and Vergh (1995) argue that the steady state real exchange rate is independent of (permanent) changes in monetary policy. They assert that this result depends on the fact that there is no direct steady state link in theory between inflation and real effective exchange rate so that monetary effects are transitory. In this study we thus intend to test whether monetary shocks are related to real effective exchange rate movements.

- Is there link between nominal money supply and the nominal exchange rate? In the long run, De Grauwe (1994) argues that the correlation between money supply and nominal exchange rate is relatively strong but tends to be lost in the short run. We would expect this relation ship to be stronger in periods of exchange rate flexibility. We thus intend to investigate whether money supply and other variables account for nominal exchange rate movements over time.

The rest of the paper is organized as follows: Section 2 provides a brief on monetary and exchange rate policy in Malawi. Section 3 outlines the proposed analytical framework for the study. The empirical results are presented in Section 4 and Section 5 concludes.

2.0 A brief of Exchange Rate and Monetary Policies

2.1 Exchange Rate Policy

From independence in 1964 to January 1971, Malawi operated within the Sterling zone with the Malawi Pound pegged at par to the British pound Sterling. The Malawi Kwacha was introduced in 1971 and it was pegged to the Pound Sterling at two to one. In November 1973, the currency was pegged to a weighted average of the Pound and the US Dollar. However, due to heavy fluctuations of the two currencies, the Kwacha was pegged to the SDR in June 1975. This allowed the Kwacha some measure of stability until early 1980s when the SDR started appreciating rapidly, forcing authorities to devalue the

local currency against the SDR by 15 and 12 percent in April 1982 and September 1983, respectively.

Because of the continued appreciation of the SDR and the fact that the SDR did not properly represent the currencies of Malawi's trading partners, the authorities decided to add the South African Rand to the SDR basket in January 1984. Following this peg, the main thrust was to maintain external competitiveness by ensuring that the real effective exchange rate (REER)[1] was not appreciating. This was achieved by periodic devaluations of the Kwacha, especially that the rate of inflation in Malawi remained higher than that of the trading partners. Towards the end of 1991, the Kwacha appreciated rapidly in real terms because of sharp devaluations in some trading partners' currencies such as South Africa, Zimbabwe and Zambia and also due to unfavourable movements in relative prices. That led to two devaluations in June 1992.

Progressively, it became apparent that the exchange rate was becoming heavily politicized with each devaluation becoming subject of intense speculation within the private sector. That led to lack of confidence in the exchange system, of which a major consequence was a marked slowdown in repatriation of export proceeds. The situation was worsened by the cut in non-humanitarian assistance by bilateral donors in 1992 because of governance issues. As a result, the foreign exchange situations became critical and external arrears began to accumulate. Consequently, the authorities decided to have a far-reaching overhaul of the exchange rate system by floating the Kwacha against other currencies on February 7, 1994.

As a step towards market determination of the exchange rate, the Malawi authorities created a foreign exchange market administered by the Central Bank where weekly auctions of the foreign exchange would take place. Buyers of the foreign exchange would bid through the commercial banks the price at which they wanted to buy a certain amount of foreign exchange. In the same way, sellers would determine their selling price and amounts. Successful bidders would then pay their bidding prices and not the clearing rate. The central bank only intervened by adjusting the amount of foreign exchange supplied to the auction.

Together with the exchange rate liberalization, all foreign exchange transactions were liberalized except for the capital account, which remained under exchange control regulations. Opening the capital account in the initial stages of a liberalizing process overexposes a country to external volatility. In order to support the foreign exchange liberalization effectively, the authorities

[1] This is a trade weighted adjusted real exchange rate (RER). The RER is defined as the relative price of tradable to non-tradable goods.

encouraged new entrants into the foreign exchange market by licensing other authorized foreign exchange dealers (Bureau de Changes) in addition to the two commercial banks that existed then. Investment in the banking sector was encouraged so much that by the end of 1995 two new commercial banks had become operational. Reflecting the scarcity of foreign exchange reserves and overvaluation of the Kwacha before the floatation, the Kwacha depreciated from about MK4.5 to the US Dollar in January 1994 to MK7.3 to the Dollar by end June 1994 when the weekly auctions were abandoned. The Kwacha continued to depreciate and stabilized at around MK15.3 to the Dollar by the end of 1994.

Following the abandonment of the auction system, all foreign exchange transactions to do with the private sector are dealt with by the dealer institutions at exchange rates privately determined. Following this move, the official exchange rate is determined by averaging the rates offered by the Authorized Dealer Banks (ADB).[2] Rates offered by the bureaus act as signals to the developments in the parallel markets. The central Bank however continues to intervene in the foreign exchange market by seasonally buying or selling foreign exchange to control fluctuations in foreign exchange supplies. The flow of foreign exchange in Malawi is seasonal because of its dependence on agriculture (mainly tobacco) as the main foreign exchange earner.

The ADBs are free to work out their own operating rate for the USD based on the available information. Ideally, the ADBs are supposed to be guided by demand and supply conditions in the market, their own trading positions that mainly constitutes the safeguarding of their profit margins, positions of the competitors, and the general outlook of the economy. The obvious advantage of the system is that it is transparent and easy, simply requiring the allocation of the rates from the banks and calculating the simple average.

Obviously the system assumes that ADBs are able to assess the market correctly. In the course of operating this system however, it has been noted that capacity to interpret information is lacking in most ADBs. Notably, smaller ADBs always ask for rates from the big ADBs before working out their rates. This is obviously a 'follow-the lender' market behavior and therefore, reduces competition that is essential in ensuring that the Kwacha is set at the right price.

[2] National bank of Malawi, Commercial Bank of Malawi, Indebank Financial Services, Finance Bank of Malawi, First Merchant Bank and Loita Investment Bank

2.2 Monetary Policy

Up until late 1980s, monetary policy in Malawi was characterized by repressive procedures involving a wide range of direct instruments that included administrative controls of interest rates, minimum liquidity ratios and credit ceilings on commercial bank lending and preferred lending to agricultural sector. The preferred interest rates were used to support the agricultural sector at the expense of other sectors.

Supported by the International monetary Fund, Malawi went into structural adjustment programs beginning in the second half of 1988. The main objective has been to foster domestic resource mobilization by improving the efficiency of and the competition within the banking system. The programs comprised reforms aimed at reducing direct Government intervention in the economy and where necessary developing new mechanisms for indirect market based polices. These included the development and diversification of interest rates ceilings, elimination of direct controls; replacing them with more indirect techniques for influencing monetary aggregates. Credit ceilings and rationing were abandoned by 1989.

Interest rates, which were initially prescribed by the Reserve Bank, were completely deregulated in 1990. Instead the Liquidity Reserve Requirement ratio was introduced as a monetary policy instrument. In August 1997, the calculation of the LRR was changed from daily averaging to monthly averaging and RBM also started to pay 5% interest on 14.3% of the full LRR. These changes were made in an attempt to influence the commercial banks to reduce their lending rates and / or increase their deposit rates and thereby the prevailing interest rate spread. Use of LRR is limited by the fact that it cannot be adjusted often to take into account daily fluctuations in liquidity estimates for fear of disrupting the financial planning process in the banking system.

Treasury bills (TBs) auctions, as a major indirect monetary policy instrument, were introduced in 1992. The purposes for the issuance of such bills were two-fold: first, for fiscal budgetary purposes and second, for liquidity management purposes. Treasury bill tenors are of 91 days, 182 days and 271 days. Currently Treasury bills are held every week to ensure a smooth monetary policy implementation.

3.0 Analytical Framework

3.1 The Real Effective Exchange Rate (REER) and Monetary Shocks

In most empirical models, the REER is computed from a purchasing power parity relation. This shows that there is an underlying tendency of movements in the nominal exchange rate to offset movements in the ratio of foreign and domestic price levels (see among others Edwards, 1994; Elbadawi, 1994; and Faruque, 1995). This relationship is generally formulated as:

$$REER_t = (EX_t * P_F)/P_D \quad (1)$$

Where EX_t is the effective nominal exchange rate index, P_F is the foreign price of tradable goods (usually proxied by the wholesale price index of major trading countries) and P_D is the domestic price of non-tradable goods (usually proxied by the domestic consumer price index), and all the variables are in logs. EX_t and P_F are trade weighted.

Our interest in this study is to investigate whether monetary shocks drive real effective exchange rate misalignment[4]. We formulate a model of real effective exchange rate and generate real effective exchange rate misalignment from the residuals of the long run model of the real effective exchange rate. The real effective exchange rate model used in this study is adopted from Edwards (1989) and Elbadawi (1994). It is formulated as follows:

$$LogREER = \beta_0 + \beta_2 logGCON + \beta_3\, logTP + \beta_4 log\, OPEN + \beta_5 CF + \beta_6 TOT + e \quad (2)$$

Where *REER* is the real effective exchange rate, *GCON* is government consumption on non-tradable goods measured by recurrent government expenditure, *TP* is the technical progress captured by industrial production index, *OPEN* is trade orientation measured as the ratio of the sum of exports and imports to *GDP*, *CF* is capital flows, TOT is terms of trade, e is the white noise process, t is the time index and β_0 to β_6 are the parameters to be estimated

The next stage is to compute what constitutes monetary shocks in the economy. This could be induced from the fiscal side through domestic credit extended to the Treasury by the Central Bank to finance fiscal deficit. Several measures have been used in empirical literature. The appropriate measure of

[4] The real effective exchange rate misalignment refers to a deviation of the real effective exchange rate from its equilibrium value.

credit squeeze or ease in a country like Malawi with shifts in the exchange rate regimes is best reflected by the growth of domestic credit. The monetary stance in Malawi should be reflected by growth of domestic credit. We thus follow Edwards' (1994) definition of excess supply of domestic credit:

$$EXDC_t = [\Delta log\ (DC_t) - \Delta log\ (Y_{t-1})\ ] \qquad (3)$$

Where $EXDC_t$ is excess domestic credit, DC_t is domestic credit, Y_t is national output and Δ indicates the first difference. In addition, growth of domestic credit can also be used. On the other hand, Elbadawi (1994) uses excess money supply, EXMS, which is defined as:

$$EXMS_t = (\Delta DC/MS)_{t-1} - \Delta log\ P_{Ft} - \Delta log EX_t - \Delta log RY_t \qquad (4)$$

Where MS_t is money supply, EX_t is nominal exchange rate and RY_t is real national output. That is excess money supply is defined as the ratio of growth in domestic credit to money supply in excess of foreign rate of inflation, exchange rate movements and the real growth of output. We thus have three measures of monetary shocks for our empirical investigation. The investigation will show whether the real effective misalignment is driven by monetary shocks. If at all the authorities aim at competitive exchange rate, then they should pursue a monetary policy consistent with this target.

In order to analyse more closely the links between nominal exchange rate, the money and goods markets, and the real effective exchange rate misalignment, we follow De Grauwe (1994). The model is shown in equation 5 where, unlike De Grauwe (1994) and Ndung'u (1999), the $REERMS_t$ is included as one of the explanatory variables:

$$Log\ Ex_t = \beta_0 + \beta_1\ logMS_t - \beta_2\ logPD_t + \beta_3 RY_t + \beta_4 log REERMS_t + \mu \qquad (5)$$

Where Ex_t is the nominal exchange rate, MS_t is money supply, RY is the domestic output, PD_t is the domestic prices, $REERMS$ is the real effective exchange rate misalignment and μ is the white noise process. Equation 5 can thus be estimated to explain nominal exchange rate movements in terms of money supply, income, domestic prices and deviations from the trend of the real effective exchange rate in the previous period, which we consider to be a dis-equilibrium movement.

3.2 Empirical Implementation

The study uses quarterly series from 1993 to 2000. Domestic output, GDP, is interpolated from annual to quarterly. The first thing to be noted is that the data series are likely to be non-stationary, so the first stage in the empirical investigation is to analyze the time series properties of the data. We will test for stationarity to ensure that we are not analyzing inconsistent spurious relationships[5]. The next stage is to test for the long-run relationship between non-stationary variables, that is, whether they are co-integrated. The final stage is to estimate a dynamic error correction specification of equation 5 and assess the contribution of the variables in the model towards explaining nominal exchange rate movements in Malawi.

4.0 Empirical results

4.1 Time Series Properties of the Data

We first report the data properties by showing the unit root test results of the variables in the analysis (Table 1). Firstly, the data properties of the models are tested using the Phillips Perron test. Secondly, we will investigate whether the variables that will a have a unit root, are co-integrated. We will use the multivariate co-integration test, the Johansen Procedure.

[5] A variable is considered to be stationary if the effects of a random disturbance dampens out over time. A variable that exhibits no tendency to return to its original value following a disturbance is said to be non-stationary. The existence of non-stationarity in a time series implies that the time series have a unit root.

Table 1: Phillips-Perron Unit Root Test [6]

Variable	PP Value (Intercept)	PP Value (Intercept & Trend)	Order of Integration
LNDPRICE	-0.619055	-1.802164	
	(-2.9591)	(-3.5614)	I(1)
ΔLNDPRICE	-4.017751	-3.963710	
	(-2.9627)	(-3.5670)	
LNGCON	-2.389211	-3.140589	I(1)
	(-2.9591)	(-3.5614)	
ΔLNGCON	-5.966814	-6.468243)	
	(-2.9627)	(-3.5670)	
LNGDP	-3.672306	-2.499937	I(1)
	(-2.9591)	(-3.5614)	
ΔLNGDP		-6.462713	
		(-3.5670)	
LNMS	-1.771799	-3.666315	I(1)
	(-2.9591)	(-3.5614)	
ΔLNMS	-7.464050		
	(-2.9627)		
LNEXCH	-0.362490	-2.104367	I(1)
	(-2.9591)	(-3.5614)	
ΔLNEXCH	-4.938386	-4.854598	
	(-2.9627)	(-3.5670)	
LNOPEN	-1.762000	-2.864606	I(1)
	(-2.9591)	(-3.5614)	
ΔLNOPEN	-6.178803	-6.611342	
	(-2.9627)	(-3.5670)	
LNREER	-2.097032	-2.089666	I(1)
	(-2.9591)	(-3.5614)	
ΔLNREER	-3.52112	-3.454687	
	(-2.9627)	(-3.5670)	
LNTP	-3.473223	-4.125700	I(0)
	(-2.9591)	(-3.5614)	
REERMS	-3.776086	-3.696608	I(0)
	(-2.9591)	(-3.5614)	

[6] The Phillips Perron test, PP, is used since it is a generalization of the Dickey Fuller test procedure but does not require the errors to be serially uncorrelated or homogenous. Instead, the PP test allows the residuals to be weakly dependent and heterogeneously distributed.

CF	-3.336932 (-2.9591)	-4.119147 (-3.5614)	I(0)

The figures in brackets are Mackinnon critical values for rejection of unit root at the conventional 5 % level of significance. The results show that variables such as technical progress, real effective exchange rate misalignment and capital flows are stationary in their levels (integrated of order zero). On the other hand variables such as domestic prices, domestic output, nominal exchange rate, real effective exchange rate, government consumption, money supply and openness are non-stationary (integrated of order one) and thus become stationary after first difference.

Co-integration analysis

The next stage is to determine the co-integrating vectors that span the variables in equation 5, that were found to be integrated of order one. That is we test whether the nominal exchange rate, the domestic price level, and real income are co-integrated[7].

In this investigation, we use the multivariate co-integration test, the Johansen Procedure (see Johansen, 1988 and Johansen and Juselius, 1990, 1992). The test results are shown in table 2 below

Table 2: The Johansen Co-integration test

Eigen values	Likelihhod ratio	5% critical value	1% critical value	Hypothesized No. of CE(s)
0.467066	37.69258	34.91	41.07	None*
0.386397	18.81182	19.96	24.60	At most 1
0.129471	4.159625	9.24	12.97	At most 2

*(**) denotes rejection of the hypothesis at 5%(1%) significance level.
The table shows the eigen values, the likelihood ratio for the significant eigen value and the probability values. The hypothesis that we have no co-integrating vector (none) is rejected. The results thus show that we have one significant co-integrating vector. It should be noted that in a system of N

[7] We carry out the co-integration test for a number of reasons. First, we need to know the plausibility of estimating an error correction model that incorporates the long run information lost by differencing the variables. The variables are differenced to make them stationary so that we can carry out tests of significance using the usual inferential procedures. Second, we want to know the speed of adjustment of the Nominal Exchange Rate to the long run equilibrium level. The validity of the nominal exchange rate model as a long run representation depends on whether there is a long run equilibrium relationship between the nominal exchange rate and its fundamentals.

variables, we should expect N-1 co-integrating vectors. The method used here helps us to get the significant vector(s). The vector is identified and normalized with nominal exchange rate consistent with the objectives of the study. The significant vector is formed as follows:

LNEXCH – 1.214826LNDPRICES + 0.107991LNGDP + 4.236525

We see that the coefficients of this vector for domestic prices and income are consistent with theory in terms of direction

Monetary Shocks and the Real Effective Exchange Rate

We estimated a model of real effective exchange rate to generate the real effective exchange rate misalignment. This enables us to test whether the real effective exchange rate misalignment is driven by shocks from money supply as defined in equation 3 and 4. The results are shown below.

1. Excess domestic credit.

EXDC ⇒⇒ REERMS F (9,21) = 0.59575[0.75981]
REERMS ⇒⇒EXDC F (9,21) = 0.79575[0.69093]

Nine lags of each variable were used and we also tested the reverse causation. The results of the F-test are shown and the figures in the brackets are the probability values. These results are interpreted as follows: EXDC does not predict REERMS and there are no feedback effects.

2. Excess money supply[8]

EXMS ⇒⇒ REERMS F (9,21) = 31.6382 [0.02614]
REERMS ⇒⇒EXMS F (9,21) = 0.17476[0.97508]

EXMS as defined from equation 4 is seen here to predict real effective exchange rate misalignment with a probability of less than 10 % while the reverse effects can only hold with a probability of 97% and so are not significant. Thus REERMS does not predict EXMS; that is, there are no reverse or feedback effects.

3. Domestic credit growth.

[8] The results should be read as, EXMS⇒⇒ REERMS, REERMS is predicted by EXMS. What has been done is to run a regression equation with EXMS as dependent variable and its own low lags and lags of REERMS as explanatory variables. Then exclude the lags of EXDC and re-estimate with these linear restrictions.

ΔDC ⇒⇒REERMS F (9,22) = 0.76596[0.66858]
REERMS ⇒⇒ ΔDC F (9,22) = 0.28047[0.93977]

Domestic credit growth is seen not to drive the real effective exchange rate misalignment. There are also no feedback effects.

The conclusion we draw from this set of results especially from item 2 is that monetary shocks drive real effective exchange rate movements but with no feedback effects. This implies that when money supply grows excessively out of line of the growth in economic activity, it feeds into the real effective exchange rate movements. Although domestic credit has no impact on real effective exchange rate, excess money supply has, through the channel of net foreign assets.

Table 3: The Short Run Model of Nominal Exchange Rate

Variable	*Coefficient*	*S.E.*	*T-Statistic*	*Prob.*
Constant	-0.005	0.024	-0.202	0.841
ΔLNDPRICE	1.022	0.210	4.852	0.000*
ΔLNGDP	0.027	0.035	0.771	0.447
ΔLNM2	0.176	0.094	1.858	0.074
REERMS	1.002	0.112	8.911	0.000*
ECM(-1)	-0.374	0.089	-4.193	0.000*

R^2 = 0.8022
Adj. R^2 =0.7627
D W =1.588107
F-Stat =16.36484 Prob =0.0000

Jarque Bera	Obs*R sq =1.13600	Prob	=0.56630
ARCH	F-Stat. =0.196555	Prob	=0.660623
Brusche Godfrey	Obs*R sq =0.405818	Prob	=0.816312
Ramsey Reset Test	F-Stat =1.091813	Prob	=0.306451
White Heteroscedasticity	F-Stat =0.009408	Prob	=0.923534

* Implies that the variables are significant at both 1% and 5% level of significance.
The results from the estimation show that the rate of inflation, the real effective exchange rate misalignment and money supply depreciate the nominal exchange rate. The results indicate that inflation and real exchange

rate misalignment are the strongest forces behind exchange rate instability in Malawi. A 1% rise in domestic prices results in a 1.02% depreciation of the local currency. The results also show that a 1 % growth in money supply results in a 0.17% depreciation of the Malawi Kwacha. The ECM at 37 % shows that the nominal exchange rate adjusts to its own equilibrium relatively slowly.

The diagnostic tests are all insignificant at 5% level of significance. This implies that the model is well specified, that there are no problems of autocorrelation of the second order, that the errors are homoscedastic and that the errors are normally distributed. There is also no problem of serious multicollinerarity among the variables (see appendix 1, table 4) and the Cusum test and Cusum of squares test on the short-run model show that the model is stable over the study period since the residuals lie within the 5% level of significance bounds according to the graph (see appendix 2). The forecasting power of the error correction model is also good as can be see from the One-step and N-step Forecast tests in Appendix 2(d), and (e). Appendix 2(c) shows graph of actual and fitted values of nominal exchange rate of the error correction model. Although the fitted values closely track the actual values, both values show a structural break in 1995 and 1999 depicting heavy devaluations that took place during 1994 and 1998. Dummies have been left out of the model as recursive coefficient estimation does not portray any episode of shocks. The parameters are stable as depicted in appendix 2(f).

5.0 Conclusion and Policy Implications

The paper analyzed the effects of expansionary monetary policy on real and nominal exchange rate. The results show that that excess money supply feed into the real effective exchange rate. This tends to confirm the hypothesis in this paper that monetary shocks affect the real effective exchange rate.

The results further show that money supply growth, domestic inflation and real exchange rate misalignment depreciate the nominal exchange rate. They also indicate that inflation and real exchange rate misalignment are the strongest forces behind exchange rate instability in Malawi.

What are the policy implications? First, the exchange rate policy has been supported by appropriate monetary policy in Malawi at least for the period covered. This is because we find that the short-run monetary shocks affect the real exchange rate with no feedback effects. However, it should be stated that a tight monetary policy needs to be complemented with a tight fiscal policy since monetary policy is just an intermediary policy and its success depends on fiscal discipline. With fiscal discipline, there cannot be excess liquidity. Second, results from the long-run part of the model are consistent with the floating

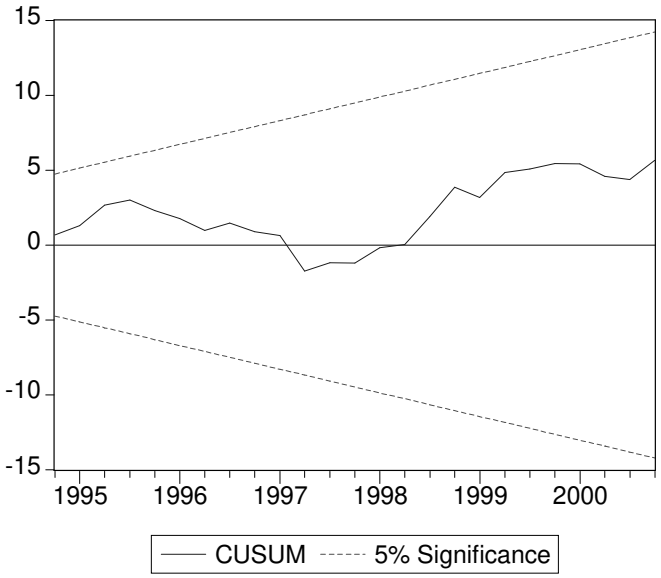
exchange rate policy where the exchange rate should move to equilibrate reserves while monetary policy is independent. Finally, inflation, money supply and real effective exchange rate misalignments depreciate the nominal exchange rate. These results provide evidence and reinforce the thesis in this paper that monetary policy is crucial to exchange rate management in Malawi.

Table 2: The Correlation Matrix

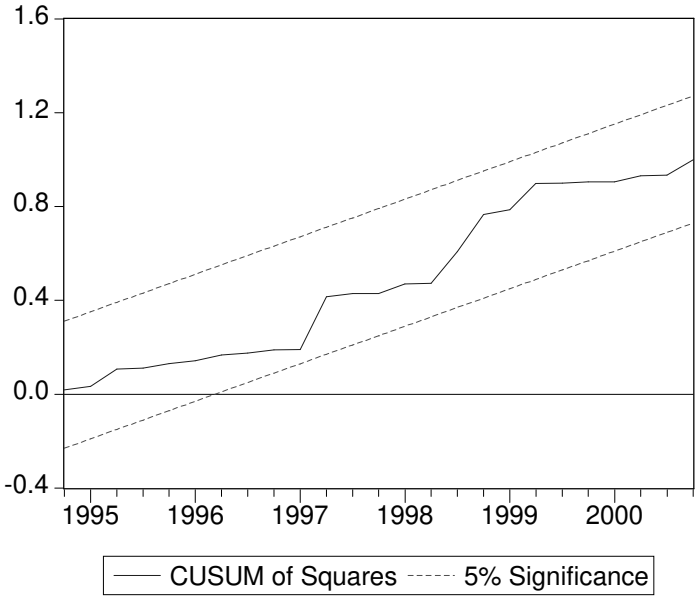
	REERMS	ΔLNPRICE	ΔLNGDP	ΔLNEXCH	LNMS
REERMS	1.0000	0.0764	-0.3643	0.7676	-0.0242
ΔLNPRICE	0.0764	1.0000	-0.0025	-0.2952	-0.1195
ΔLNGDP	-0.0364	-0.0029	1.0000	0.0660	-0.3349
ΔLNEXCH	0.7677	-0.2952	0.0660	1.0000	0.0207
LNMS	-0.0242	-0.1195	-0.3549	-0.0207	1.0000

Appendix 2

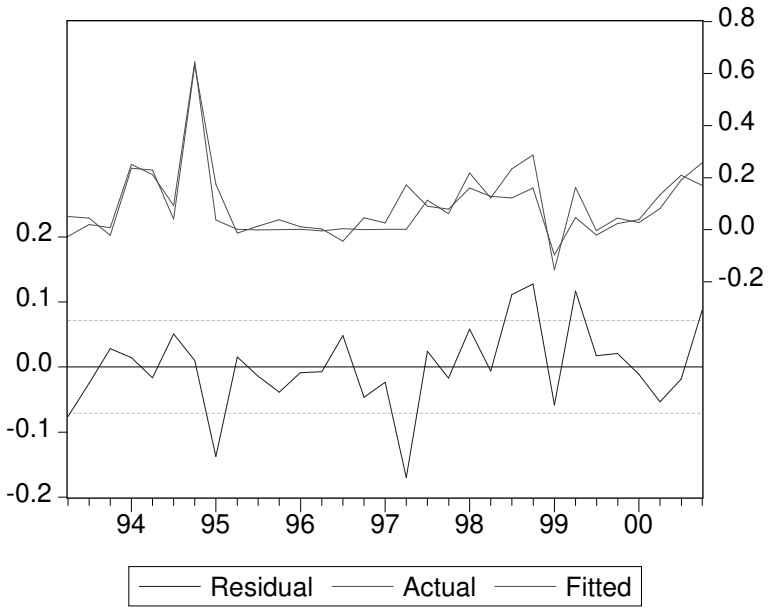
(a) Cusum Test



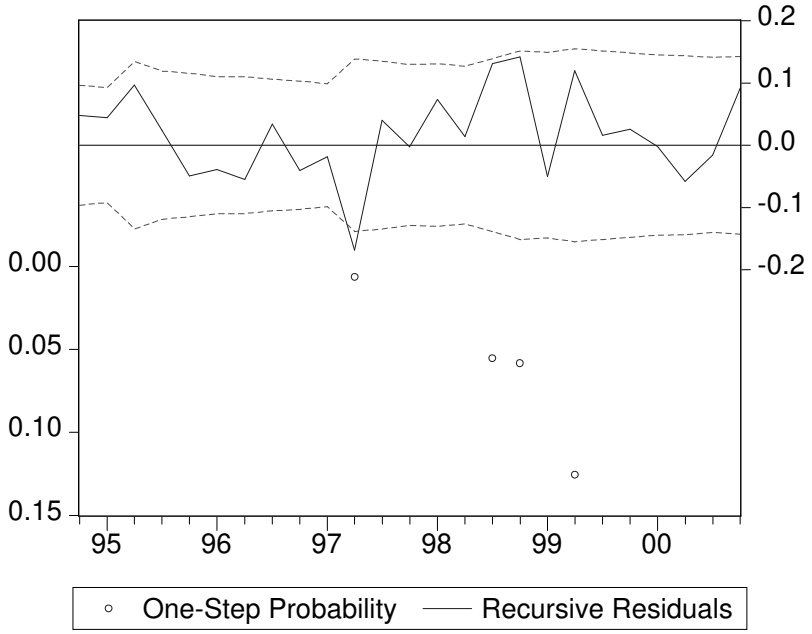
(b) Cusum of Squares Test



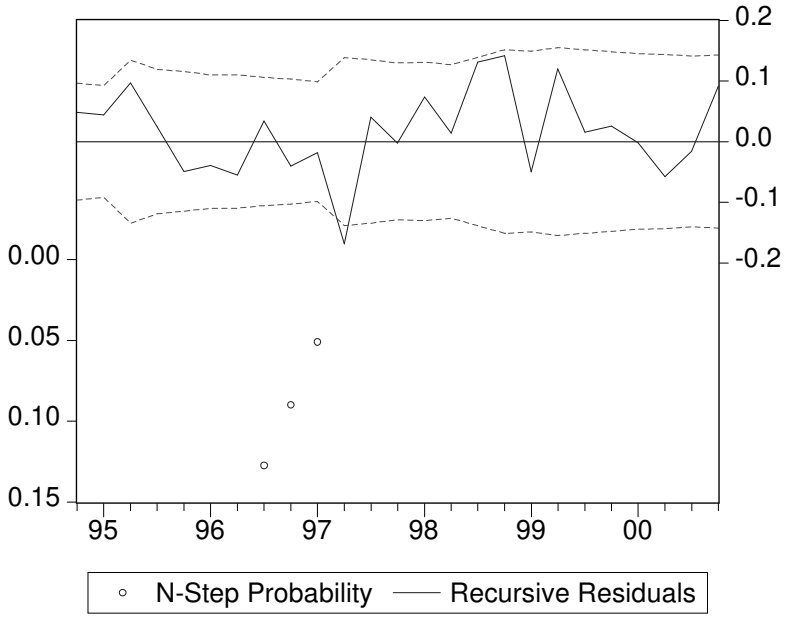
(c) Graph depicting actual versus fitted values



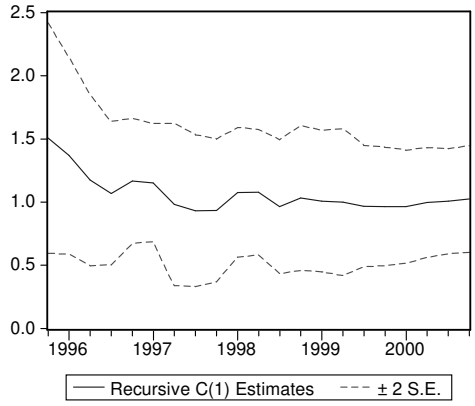
(d) **One – Step Forecast test**

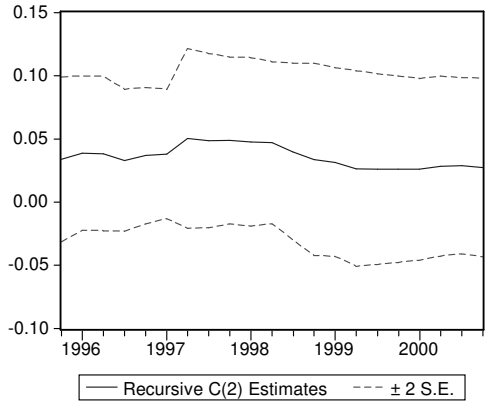


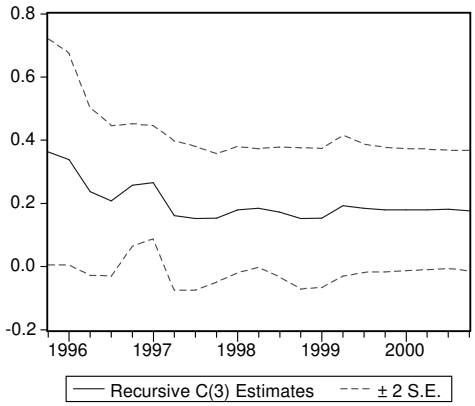
(e) N-Step Forecast test

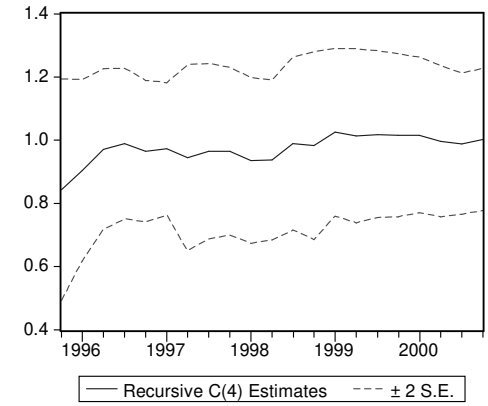


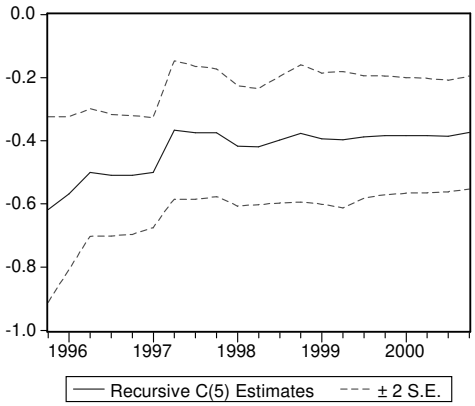
(f) Recursive coefficients test

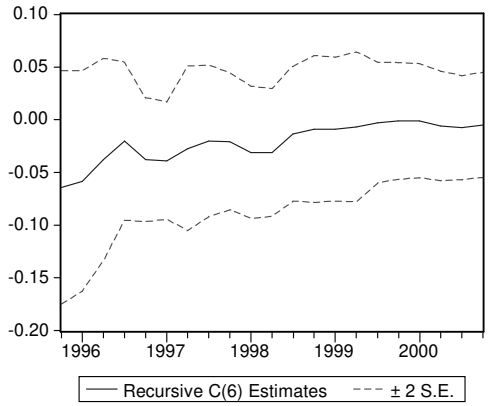












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