International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2017): 7.296

The Stability of Money Demand in Rwanda and its Implication on Monetary Policy

Regine Muramutse[1], Dr. Patrick Mulyungi[2]

[1]Student, Jomo Kenyatta University of Agriculture and Technology

[2]Lecturer, Jomo Kenyatta University of Agriculture and Technology

Abstract: ***The level and stability of the demand for money has received enormous academic attention because an understanding of its causes and consequences can usefully inform the setting of monetary policy. Over the last couple of years, the Rwanda economy has suffered major shocks such as foreign exchange pressures, huge import bills and domestic oil shortages that place extra pressure on prices to rise. As a result, some of these shocks suffered by the economy have contributed to the stability of prices being out of targeted range. The general objective of this study to analyze the stability of money demand in Rwanda and its iM2lication on monetary policy, over the time period 2000-2017. This study was used both descriptive and analytical research design. Ordinary Least Square (OLS) method will employ in analyze time series data captured over the period under study. Granger casualty test was used to test causality relationship between stability of money demand and its implication on monetary policy. The study was used secondary data analysis. The data is an annual time series data spanning from 2000 to 2017. The annual data was extrapolated into annual series. In order to understand very well and to expose the bi-direction between stability of money demand development and its implication on monetary policy, researcher decided to learn on statistical analysis for catching up the relationship between two variables. The econometric techniques used, such as statistical analysis, econometric graphs and the diagnostic test was Carried out to ensure that the data is reliable and is was not affect by such as serial correlation or heteresdostecity. Researcher was used different methods of overcoming the problem of spurious regression arising from using no-stationary time series. Augmented Dickey-Fuller (ADF) Unit root Test. The findings of the ECM, which incorporate the money demand and its implication on monetary policy, estimated through ECM testing approach. As such, real income (3.602411), interest rate (0.112121) and inflation (2.381232) are statistically significant relationship on monetary policy. It shows that money demand stimulates the economic activities and development process in the country to a greater extent, which is obvious from the higher positive value of its coefficient. The result shows that all independent variables have positive effect monetary policy. All coefficients of variables have positive sign. This shows that money demand has been contributed positively on the monetary policy from 2000-2017. R^2 (0.022003) this show the goodness of fit the model. The co-integration test illustrates that the variables were co-integrated and implying that a long run relationships exists between money demand and monetary policy in Rwanda. Therefore researcher accepts H1#0 and fails to reject H0. In order to strengthen the financial sector, the Central Bank of Rwanda has to encourage the introduction of more financial instruments that are flexible enough to meet the risk preferences and sophistication of operators in the financial sector.***

1. Background of the Study

A good understanding of the determinants of the demand for real money balances in the economy by investigating the behavior of the money demand function is crucial for the formulation and iM2lementation of an effective monetary policy (Adam, 2007). Moreover, the identification of a stable relationship between the demand for money and its determining variables provides empirical evidence that the monetary targeting is an appropriate framework for economic stabilization policy.

The level and stability of the demand for money has received enormous academic attention because an understanding of its causes and consequences can usefully inform the setting of monetary policy. It is vital to investigate and test the stability of money demand since its instability is a major determinant of liquidity preference (Poole, 2007). Interest rate should be targeted if liquidity preference is unstable while the money supply should be targeted if the investment-savings relationship is unstable and the demand for money is stable. It is necessary to select the correct monetary policy instrument since selecting the wrong instrument may result in large fluctuations in output.

Most economists and policymakers agree that the overall aim of monetary policy is to advance the economic well-being of the country‘s citizens‖ (Hubbard, 2007). By economic well-being, Hubbard (2008), emphasizes an economy that performs and creates an economic environment providing maximum benefits to all citizens. To accoM2lish this, any monetary authority must formulate and conduct an adequate monetary policy. (Mishikin, 2007), highlight price stability as being the overriding objective of monetary policy so as to provide a sustained and favourable macroeconomic environment for economic agents.

The implementation of financial reforms in many countries has raised doubts about the use of monetary aggregates to stabilize inflation rates. Since the 1980s and following countless deregulation and liberalization policies, central banks in many advanced economies switched between instruments of monetary policy by moving away from policies that influence the money supply towards those which influence the bank rate. A large number of developed country case studies show that the demand for money has become unstable due to financial reforms and hence support the targeting of the rate of interest by central banks (Haug et al., 2008).

Central banks in many developing economies have followed suit and switched towards monetary policies directed at the bank rate. A major part of this policy switching is grounded on the view that their own financial market reforms and liberalizations might have contributed to the instability in their own money demand functions. However, recent studies

have raised doubts about the validity and strength of central bank interest rate targeting in developing economies (Bahmani & Kumar, 2009). Getting monetary policy right is crucial to the health of any economy (Mishkin, 2009). Monetary policies, over the years, have developed to better achieve economic targets such as increasing the growth of real output, the reduction in unemployment, stability in exchange rate markets and the attainment of low and stable price levels. The different kinds of monetary policies that economies have used over time had been designed to solve economic challenges at the time and had been reviewed based on the results of some key indicators such as the rate of inflation.

The argument in favour of an important role for money demand in monetary policy starts from the observation that, when there is an expected future increase in productivity and the central bank follows a standard Taylor rule, the economy may experience "boom-bust episodes" where sharp movements in asset prices affect all nominal and real variables. The key point here is that nominal wage rigidity is transformed into real wage rigidity by an in nation targeting central bank. This point is developed analytically by (Christiano & Rostagno, 2007). When wages are rigid, in nation targeting reduces to real wage targeting and this interferes with the ability of real wages to allocate resources efficiently. Monetary authorities however, can avoid the booms and busts by responding to movements in credit variables since this makes the economy react to the shocks in a way that corresponds more closely to the efficient response.

Owing to the contradictory evidence presented in previous studies with some studies suggesting stable money demand while others suggest otherwise, this study re-examines the stability of the money demand function in Kenya. A clear understanding of the stability of money demand is crucial given its implications for monetary policy formulation. Currently, in Kenya, broad money, M3 is the intermediate target variable of monetary policy. The choice of an intermediate target variable to conduct monetary policy is based on the understanding that the demand for the monetary aggregate is stable (Qayyum and Nishat, 2007).

Demand for money in Rwanda Rwanda's financial system is still little developed: six commercial banks, a development bank, and savings and credit cooperatives are the key players in the Rwandan financial sector. Only three commercial banks were in operation before 1995, Today are eleven licensed commercial banks in Rwanda (BNR, 2017). Private enterprises have no other source of funding than bank loans. The financial assets available on the market include interest-bearing fixed term deposits in commercial banks, development bills and Treasury bills. Until 2016, the volume of the last two types of assets was limited and their acquisition was essentially reserved for commercial banks, non-banking financial institutions and some state-owned companies. It thus appears that except for physical assets and possibly foreign currency, substitutes for money are limited in the Rwandan economy (Randa, 1999). The lower the Rwandan population's income, moreover, the more limited are the changes in the coM2osition of their portfolio. In view of these peculiarities of the Rwandan economy, in order to estimate the money demand function in Rwanda. This study seeks to examine the stability of money demand in Rwanda and its implication on monetary policy from 2000-2016.

2. Statement of the problem

The incorporation of monetary aggregate targeting in the inflation-targeting regime in Rwanda has not been worked on in recent literature. For Rwanda, this has become a new area of concentration for monetary policy. Over the last couple of years, the Rwanda economy has suffered major shocks such as foreign exchange pressures, huge import bills and domestic oil shortages that place extra pressure on prices to rise. As a result, some of these shocks suffered by the economy have contributed to the stability of prices being out of targeted range. As one of the recommendations to improve monetary policy performance for Rwanda, the central bank was recently required by the IMF to reduce support in paying government deficits and expenses of state owned agencies in its policy framework (IMF, 2015).

Enforcing such new recommendations suggests a shift back to controlling money supply especially to the central government and state-owned agencies and raises the question of the role that the money demand function plays in targeting monetary aggregates in the current monetary policy framework. This is where the gap for Rwanda exists.

With such an understanding, theory posits that controlling money supply is most often anchored in the face of a stable money demand function. Indeed, the argument for controlling inflation through monetary aggregate targeting assumes the presence of a stable money demand relation (Hussein et al., 2012). This is because a stable money demand function means that the velocity of money is constant and for that reason, the central bank can use money supply as an operating instrument to achieve low and stable price levels.

Hence, this study sets out to address this problem by estimating a money demand in Rwanda and discussing its implication on monetary policy. Furthermore, not much exists in the literature about the stability of money demand and how it serves as an indicator of successful monetary aggregate targeting countries such as Rwanda.

3. Objective of the Study

1) To determine the effect of money demand and its implication on monetary policy in Rwanda in short run.
2) To determine the effect of money demand and its implication on monetary policy in Rwanda in long run.
3) To examine the co-integration between money demand and monetary policy in Rwanda.

4. Conceptual Framework

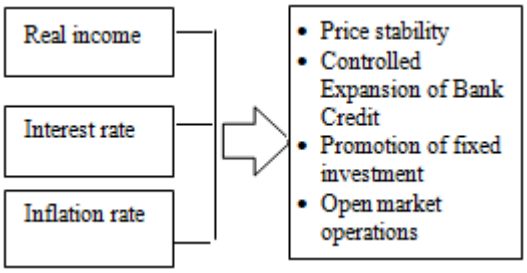

Figure 2.1: Conceptual framework

Research Design
Research design is the blue print for the collection, measurement, analysis of data and a plan to obtain answers to research questions. This study was used both descriptive and analytical research design. Ordinary Least Square (OLS) method was employ in analyze time series data captured over the period under study. Granger casualty test was used to test causality relationship between stability of money demand and its implication on monetary policy.

Source of data and data
The study used secondary data analysis. The data is an annual time series data spanning from 2000 to 2017. The annual data was extrapolated into annual series. Data for study was obtained from the BNR and NISR.

Model specification
In line with the conceptual framework, the model of this study composed by M2 as dependent variable and real income, interest rate and inflation as independents variable.

Model in linear-from M2=β0+β1Y+β2r+β3inf+εt
M2 = Monetary policy t;
Yt = Real income at time t;
rt =interest rate at time t;
inf: inflation at time t;
β0= intercept; ε_t = Error term; t after each variable is the time subscript.
β_1& β_3= Coefficients of each of the independent variable.

7.1 Model development
Economic growth or M2 = dependents variable x_1 –x_3 are independent variables (f) represents the functional notation. This can be specifically stated as:
M2= f (Y, r, inf) …….. (2)
Where; M2 = monetary policy, Y = Real income r = interest rate inf=inflation. The explicit form of equation (i) is represented as:
M2=β0+β1Y+β2r+β3inf+εt *…….. (3)*
Where: β_0 = intercept of relationship in the model / constant
β1-β3 = Coefficients of each of the
Independent variables ε = stochastic/ Error terms By loglinearising, the model becomes;
log (M2) = β*0* + β*1log(Y)* + β*2log(r)* + β*3log(inf)* + ε
……..(4)
Where; Log = Natural log from equation (4) model can be specified in a time series forms as;
log(M2)t = β*0* + β*1log(Y)t* + β*2log(r)t* + β*3log(inf)t*+ ε
……..(5)
$\Delta Log(M2) = \beta 0 + \sum_{i=0}^{n} \beta 1 log(Y)t - 1 + \beta 0 + \sum_{i=0}^{n} \beta 2 \log(r)t - 1 + \beta 0 + i=0n\beta 3$ loginft−1 + $\beta 0 + i=0n$ ECMt−1 + β0 + t…….. 6

5. Research findings and discussion

Table 1: Unit root test

Unit root test at second different							
Variables		ADF	CV	Prob	R squared	DW	LAG
M2	Intercept	-4.456287	-1.872113	0.0000	0.388913	1.835832	3
Y	Intercept	-5.444503	-2.903923	0.0000	0.233172	1.523372	2
Unit root test at level							
r	Intercept	-3.434611	-2.530442	0.0000	0.637653	2.423743	2
Unit root test at level at second different							
inf	None	-2.712847	-1.724400	0.0000	0.252181	1.111935	2

Source: CoM2uted by Researcher using E-views version 7

Referring to above table, researcher observes that Monetary policy is stationary at level of intercept at lag 3 and Real income is stationary at intercept on lag 2 while interest rate(r) and infr were stationary at intercept and None in lag 2. This means that all variable are stationary at different level.

Test of Residuals
By using the ADT Unit Root test on the residuals estimated from the co- integrating regression, the Econometric package E-views version 7 gives the following results.

Table 2: Residuals test

Null Hypothesis: R has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.652352	0.0000
Test critical values:	1% level	-2.699769	
	5% level	-1.341412	
	10% level	-1.606610	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(R)
Method: Least Squares

Date: 1/11/18 Time: 9:02
SaM2le (adjusted): 2000- 2017
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R(-1)	-0.673764	0.472104	-1.871843	0.0001

R-squared	0.753125	Mean dependent var	338.3694
Adjusted R-squared	0.095128	S.D. dependent var	2307.612
S.E. of regression	2195.110	Akaike info criterion	18.26091
Sum squared resid	1.302.08	Schwarz criterion	18.30849
Log likelihood	-254.6528	Hannan-Quinn criter.	18.27546
Durbin-Watson stat	1.111925		

Source: CoM2uted by Researcher using E-views version 7.

Referring to the above Table 4.3 the residual is stationary, t-statistic (-3.652352) is less than critical value (-1.341412) and the probability (0.0001) is less than 5% and this table shows that the Durbin- Watson Stat is greater than R^2 which is (1.111925) >(0.753125). Basing on those results, the researcher found that R-squared is significant at 95%. This means that money demand influence contribution of monetary policy.

Estimation of model

To estimate the long the monetary policy run relation between variables

Model: $M2=\beta_0+\beta_1Yt+\beta_2rt+\beta_3inft+\varepsilon$

After analyzing the stationarity by using the ADF Unit Root test, let's estimate this model by taking into the consideration the model of the variables that are stationary.

Table3: Co-integration (Long run relationship)

Dependent Variable: M2
Method: Least Squares
Date: 1/11/17 Time: 15:05
SaM2le: 2000 2017
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y	4.215200	1.712110	3.418454	0.0019
rt	4.002136	2.911208	1.274603	0.0001
inf	2.426134	2.082507	1.351976	0.0002
C	0.012738	624.2051	0.455424	0.0072

R-squared	0.055132	Mean dependent var	1467.438
Adjusted R-squared	0.219610	S.D. dependent var	2282.372
S.E. of regression	2016.240	Akaike info criterion	18.17232
Sum squared resid	1.142408	Schwarz criterion	18.35554
Log likelihood	-286.7572	Hannan-Quinn criter.	18.23306
F-statistic	3.907913	Durbin-Watson stat	1.691052
Prob(F-statistic)	0.018909		

Source: Computed by Researcher using E-views version 7.

Estimation Equation:

IVG = C(1)*Tax + C(2)*Gd+C(3)* FCI

Substituted Coefficients:

M2 =4.215200*Y +4.002136*r+2.426134*inf

β0=0.012738

M2=0.012738+4.215200*Y +4.002136*r+2.426134*inf

Co-integration is an econometric property of time series variables. If two or more variables are themselves non-stationary, but a linear combination of them is stationary, the theory of time series are said; to be co integrated it is often said that co integration is a means for correctly testing hypothesis concerning the relationship between two variables having unit roots. Testing co integration, there are two most popular approaches, the Engle Granger (EG) two steps method and Johansen procedure. The first is analysis of stationarity for the residuals from the levels regression.

The variables were co- integrated; all variables have a long run relationship between them. Therefore, the researcher confirms that all variables are co-integrated and there is long run relationship between variables.

6. Discussion and interpretation

The results of the relationship of fiscal policy and investment growth presented in Table 4; It is clearly visible from the results that monetary demand influences monetary policy in Rwanda. Both variables of the study model (fiscal policy) affected the monetary policy.

The result shows that all independent variables influence the dependent variable. All coefficients of variables have positive sign, (4.215200) Y, (4.002136) r and (2.426134) inf. This shows that money demand has been contributed positively on monetary policy in Rwanda from 2000-2017. When Real income at time increased 1 unit, holding interest rate and inflation constant, constants, monetary policy (M2), expected to increase (4.215200). R^2 (0.055132) this show the goodness of fit the model. Even if R^2 is still small but the variables used on this research are not only contributed to the monetary policy in Rwanda, they are others variable contributes to the monetary policy.

Error correction model (ECM)

Error Correction Models (ECMs) is a category of multiple time series models that directly estimate the speed at which a dependent variable (Robin Best, 2008).

Y - Returns to equilibrium after a change in an independent variable - X.

ECMs are useful for estimating both short term and long term effects of one time series on another. ECMs are useful models when dealing with integrated data, but can also be used with stationary data. The dynamic relation established by the model with correction of error ECM is deducted from relation of long term rising from the method of Engel and Granger, the characteristics of the models with correction of the error is to combine in the same specification of the effects of that short term with those of the long term, thus all the information of long term on the level of variables is stored in the model (Judith, 2011).

Around the long run relationship, the error correction model permits to integrate the short run fluctuations, if the coefficient comes negative it would change model in the long run equilibrium so with E-views the long run model was done the short run model.

Table 4: Error correction model

Dependent Variable: M2
Method: Least Squares
Date: 1/11/18 Time: 16:22
SaM2le (adjusted): 2010 2017
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.082806	614.2038	1.622068	0.0249
Y	3.602411	1.94E-10	0.994922	0.0003
r	0.112121	5.152408	1.790498	0.0000
inf	2.381232	2.061207	0.252162	0.0011
R(-1)	-0.022003	0.439025	-0.330257	0.0024

R-squared	0.071011	Mean dependent var	1488.290
Adjusted R-squared	0.430018	S.D. dependent var	2316.999
S.E. of regression	1749.268	Akaike info criterion	17.91847
Sum squared resid	79558393	Schwarz criterion	18.14976
Log likelihood	-272.7363	Hannan-Quinn criter.	17.99387
F-statistic	6.658312	Durbin-Watson stat	2.064655
Prob(F-statistic)	0.000790		

Source: CoM2uted by Researcher using E-views version 7

This Table 4. shows that R(-1)= -0.022003, this means that as far as time is concerned, the errors will be corrected at time t. The value of R(-1), this means that, nowadays money demand influence the monetary policy in long run. All independents variable (Real income at time, interest rate and inflation) are positive correlated to the monetary policy. R^2 (0.071011) show the goodness of fit the model. This means that from 2000-2017 money demand has contributed 7% on monetary policy in Rwanda.

M2=0.082806+3.602411Y+0.112121r +2.381232inf -0.022003 (R-1)

The findings of the ECM, which incorporate the effect of money demand and monetary policy, estimated through ECM testing approach. Real income at time (3.602411), interest rate, (0.112121) and inflation (2.381232) have established its positive and statistically significant relationship on monetary policy.

In view of goings on the money demand over recent years it might be interesting to inquire whether the behavior of the market (as represented, say, by the Dow–Jones Industrial Average) can be modeled as a case of "long-run equilibrium plus error correction". What might be a plausible model for long-run equilibrium in this case? Well, corporate stocks ultimately derive their value from the fact that they are claims on the profits made by firms. Thus it seems reasonable to suppose that stock prices should reflect the present discounted value of the future (expected) stream of corporate profit.

7. Conclusion

The main aim of this paper was to investigate the stability of the long-run and short run relationship between money demand and its implication on monetary policy. Three tests were conducted: Augmented Engel-Granger, a Co-integration Regression Durbin-Watson test and the Error Correction Mechanism test. All these three tests support the presence of a long-run and short run relationship between M2, real income, the interest rate and inflation in Rwanda.

The increasing of money demand has reinforced the researcher to study the the stability of money demand in Rwanda and its implication on monetary policy. The effect of independents variables is empirically tested on dependent variable for the period of 2010 to 2017. As such, the results reported the expected positive signs which are statistically significant at some level of significance. The development of money demand (M2) is important in sustaining monetary policy. The co-integration test illustrates that the variables were co-integrated and implying that a long run relationships exists between money demand and monetary policy in Rwanda. Therefore researcher accepts H1#0 and fails to reject H0.

A researcher has faced some limitations during the research process they include the following; the accessibility of second data during the study process, financial constraints and inadequate source of relevant local researchers. The central hypotheses of the study have been to test how money demand affected monetary policy in Rwanda. There is a significant change in money demand in Rwanda within the study period. The study confirms the importance of money demand as the most important determinant of monetary policy.

8. Recommendations

Based on the results of findings of the study, the following recommendations were made:

1. Government should introduce a specification of the financial structure that is richer than the existing ones, recognizing the positive effect of a stable monetary policy.
2. Attempts should be made by the government to improve on its infrastructure in order to reduce cost of production and increase exportation so as to achieve the objective of fighting Rwandan francs devaluation. This adds to the country's national income and in general promotes the nominal GDP.

References

[1] Adam, (2007), The Demand for Money in Nigeria, *European Journal of Business and Management*, Vol. 3, No. 6 Adam, Kessy, Nyella, and O'Connell (2011)
[2] Bahmani & Kumar, (2009), Stability of the Nigerian M2 Money Demand Function in the SAP
[3] BNR, (2017), *Economic Liberalization, Monetary Policy and Money Demand in Rwanda*. Rwanda

[4] Christiano & Rostagno, (2007), Money Demand Stability: A Case of Nigeria. *Munich Personal RePEc Archive*s
[5] Hubbard, (2007),The Demand for Money in South Africa. *South African Journal of Economics, 49*(2),145-152.
[6] Hussein et al., (2012), A Cointegrated VAL Model of M3 demand in South Africa. South African Reserve Bank, Department, Unpublished Paper.
[7] IMF, (2015), *Introductory Econometrics: A Modern Approach*. Canada, South-Western College Publishing. Irving Fisher, (1947), In *Readings in Macroeconomics* by Mueller, M.G. Reprinted from Chicago, University of Chicago Press, 3-21.
[8] Judith, (2011), On the dynamic specification of money demand in Kenya". *Journal of African*
[9] Mishkin, (2009), Exchange rate sensitivity of demand for money and effectiveness of fiscal and monetary policies". *Applied Economics*, 22: 917–25.
[10] Poole, (2007), Money demand and stabilisation in Zimbabwe". *Journal of African Economies*, 8: 386–419.
[11] Qayyum and Nishat, (2007), *Monetary Policy in Kenya*, 1967-1988. Working Paper no.39, Overseas Development Institute, London.
[12] Randa, (1999), A cointegration analysis of broad money demand in Cameroon". IMF Working Paper No. 2001/26, International Monetary Fund, Washington, D.C.