INTERNATIONAL JOURNAL OF ECONOMICS AND FINANCE STUDIES
Vol 10, No 1, 2018 ISSN: 1309-8055 (Online)

MONEY DEMAND FUNCTION IN THE SOUTH AFRICAN ECONOMY: EVIDENCE FROM ARDL AND STRUCTURAL BREAKS ANALYSIS

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-Abstract-

Stability of money demand remains an important issue in monetary policy effectiveness. This is because a stable money demand function is an important monetary policy tool in achieving monetary objectives and stability. This paper investigated structural breaks in money demand and its determinants in the South African economy. The study made use of quarterly data obtained from the South African Reserve Bank, from 2003 to 2017, using the Bai-Perron Multiple Breakpoint Tests in conjunction with an ARDL model. The empirical results indicated that the money demand function in South Africa has not undergone regime shifts during the study period. This was further confirmed by means the CUSUM Test. The findings also ascertained that money demand is cointegrated with the interest rate, inflation rate, GDP, the exchange rate and credit to the private sector as a measure of financial development. The results proved that the interest rate and inflation rate have negative and significant effects on the money demand function in the long-run, while GDP is found to have a positive and significant impact. It is concluded that the money demand function in South Africa could be effectively employed in predicting and forecasting monetary policy outcomes.

Key Words: Money demand, South Africa, structural breaks.

JEL Classification: E41**;** C01.

1. INTRODUCTION

The effects of the demand for money function on macroeconomic policy outcomes in general, and monetary policies in particular, have always been of concern to economists in both developed and developing countries over time. The money demand function is a vital tool for economic stabilisation (Gali & Monacelli, 2005). Money demand's significance is precipitated on its impacts on monetary policy instruments and their roles in achieving macroeconomic goals, inclusive of economic stability (Balke & Zeng, 2013). The macroeconomic significance of the money demand function has been outlined in various theoretical and empirical writings (Muscatelli & Papi, 1990; Hoffman & Rasche, 1991 and McNown & Wallace, 1992). Theoretical and empirical studies conclude that the money demand function facilitates the design and implementation of monetary policy frameworks. The money demand function plays an important role in the determination of the optimum growth rate of money supply, which is to control and manage inflationary growth within an economy (Bernanke & Gertler, 1995; Kim, 2000; Bernanke, Gertler & Gilchrist, 1999). The money demand function is also believed to play a crucial role in the transmission of both monetary and fiscal policy using variables such as interest rates, money stocks, savings and investment (Bernanke, Gertler & Gilchrist, 1999; Ireland, 2010; Adrian & Shin, 2009). The understanding of a stable demand for the money function helps in predicting and forecasting of monetary policy with the aim of attaining economic stability (Meyer, 2001).

Consequent upon the macroeconomic importance of the demand function and its stability, several studies have thus attempted to investigate the determinants of the money demand function (McPhail, 1991; Haug, 1999; Maki & Kitasaka, 2006; Caporale & Gil-Alana, 2005; Haug, 2006; Gill, 2000; Jonsson, 2001; Komijani & Nazarian, 2004; Wang & Shi, 2006; Akhtaruzzaman, 2008; Akinlo 2012; Dritsakis, 2012). However, evidence available from the literature has been largely preoccupied with the determinants of the money demand function while limited efforts have been devoted to determination of structural breaks in the process (Bordes, Clerc & Marimoutou, 2007; Dritsakis, 2012; Kumar & Webber, 2013; Kumar, Webber & Fargher, 2013). Investigation of the presence or absence of structural breaks in money demand analysis provides information about the regime shift in the money demand function, which often affects the stability or not of the said function and therefore could undermine its use and effectiveness as a tool of monetary policy. Moreover, only a stable money demand function can effectively be used in predicting and forecasting monetary policy outcomes. Hence, this study contributes to the literature on the money demand function by investigating the possible regime shifts in the money demand function in the

South African economy. Inadequate empirical evidence exists concerning the determinants of the money demand function of the South African economy. The available empirical works on this subject matter concerning the South African economy are Hurn and Muscatelli (1992), Moll (2000) and Jonsson, (2001). This study therefore provides further evidence related to the South African economy.

2. REVIEW OF RELATED LITERATURE

Empirically based arguments on the stability of the demand for money function have been contentious. The genesis of the contention could be traced to the great intellectual debate between the Keynesians and Monetarists of the 1960s and 1970s. The earliest studies after the great debate of 1960s and 1970s (Muscatelli & Papi, 1990; Hoffman & Rasche, 1991; McNown & Wallace, 1992; Adam, 1991; Johansen, 1992; Bahmani-Oskooee, 1996; Karfakis & Parikh, 1993; Hafer & Kutan; 1994; Bahmani-Oskooee & Shabsigh, 1996) concluded that money demand is cointegrated with income and interest rates.

However, subsequent empirical efforts have been more divergent in their conclusions as various methods and more variables are considered in the analysis of the money demand function. Ball (2001) finds that income, rather than interest rate, exerts a higher significant impact on money demand in the United States while Anderson and Rasche (2001) submit that the interest rate is more consistent and significant than any other determinant. Bahmani-Oskooee and Ng (2002) examined the long-run demand for money in Hong Kong by means of quarterly data over the period 1985-1999 using cointegration techniques. They identified a long-run relationship between real broad money aggregate, real income, nominal interest rates, foreign interest rates, and foreign exchange rates. The result of their CUSUM test also confirms the stability of long-run coefficients of the money demand function. Kumar and Webber (2013) investigated the level and stability of money demand (*M1*) for Australia and New Zealand during the period 1960-2009. They show that both countries experienced regime shifts; Australia moreover experienced an intercept shift too. The CUSUM stability test revealed that money demand functions were unstable over the 1984 to 1998 period for both countries although tests for stability were not rejected thereafter. Applying an error correction model (ECM) to query the stability of demand for money in Uganda, Opolot (2007) suggests that the money demand function is unstable. The instability of the money demand function was corroborated by Komijani and

Nazarian (2004) in Iran. This is further supported by Hromcova (2004) and Wang and Shi (2006).

Wang and Shi (2006) argued that the money demand function measured by velocity of circulation of money is largely affected by money growth shocks. Akhtaruzzaman (2008) investigated the demand for money for Bangladesh. Employing a cointegration technique, he found that the demand for money was negatively related to real GDP (growth) and financial development (demand deposit – time deposit ratio) reflecting the early stages of economic and financial development in the country; the two variables jointly account for about half of the variance of money demand. A study by Sitikantha & Subhadhra (2011) in India investigated the determinants of money demand using a reduced VAR model. They submit that GDP, interest rate and financial deepening (credit to GDP ratio) were statistically significant for the Indian data, but parameter estimates were found to be unstable.

Lungu, Simwaka, Chiumia, Palamuleni and Jombo, (2012) analysed the money demand function for Malawi during the period of 1985-2010, using monthly data. They employed a cointegration technique and their empirical findings suggest that a long-run relationship exists amongst real money balances, prices, income, exchange rate, Treasury bill rate and financial innovation. They argued that all the variables significantly influence money demand in the long and short-run. Adam, Kessy, Nyella & O'Connell, (2010) aimed at forecasting the velocity of income in Tanzania using a reduced VAR approach. They conclude that a stable cointegrating relationship exists between velocity and the determinants of money. Akinlo (2006), making use of the ARDL approach, combined it with CUSUM and CUSUMSQ tests to examine the cointegration property and stability of M2 money demand in Nigeria. He concludes that money demand is cointegrated with income, the interest rate and the exchange rate. He argued that money demand is stable in relation to the CUSUM test in particular. Okafor, Shitile, Osude, Ihediwa, Owolabi, Shom and Agbadaola, (2013) empirically investigated the determinants of income velocity of money in Nigeria, using a quarterly time series that ran from 1985 to 2012. Their findings confirmed a positive and statistically significant relationship between the growth of income and the velocity of money, which supports the quantity theory of money. They submitted that interest rate has a positive and significant relationship with the income velocity of money. The financial sector development variable as adopted, and growth rate of stock market capitalisation, has a negative relationship with the income velocity of money.

Similarly, Kumar, Webber and Fargher (2013) attempted to determine if money demand underwent regime shifts in Nigeria between 1960 and 2008. They concluded that although the money demand relationship has undergone relative regime shifts, it is however, largely stable.

Jonsson (2001) empirically examined the stability of the money demand function in South Africa between 1970(Q1) and 1998(Q2). His findings evidenced that a long-run relationship exists between money demand and its determinants. He also argued that the money demand function is stable in South Africa. Given the 2007/2008 global financial crisis, the stability of money needed to be re-examined. This is because economic shocks such as financial crisis is a potential catalyst for a structural break. More generally, as may be seen from the survey of the literature, not many empirical studies could be found based on the South African economy. Hence, this study contributes to the limited extent of empirical studies on this subject matter in the South African economy.

3. EMPIRICAL PROCEDURES

This study focused on determining if structural breaks exist in the money demand function for the South African economy. Economic theory provides several variables that influence the demand for money, such as inflation, interest rate, exchange rate, gross domestic product (GDP) and credit extended to the domestic private sector, all of which are often subjected to empirical investigations. This study began by specifying the following models to determine the existence or otherwise of structural breaks in the money demand function (Equation (1):

$$md_t = \alpha_0 + \alpha_1 inf_t + \alpha_2 int_t + \alpha_3 exr_t + \alpha_4 lgdp_t + \alpha_5 lpsc_t + \epsilon_t \quad \ldots\ldots\ldots\ldots..(1)$$

$$md_t = \alpha_0 + \alpha_1 inf_t + \alpha_2 int_t + \alpha_3 exr_t + \alpha_4 lgdp_t + \alpha_5 lpsc_t + \alpha_6 D_t + \epsilon_t \quad \ldots.(2)$$

where md_t is the demand for money, represented by the velocity of money in circulation, inf_t is inflation rate, int_t is the rate of interest, exr_t is the exchange rate, $lgdp_t$ is the natural log of gross domestic product, $lpsc_t$ is natural log of the credit extended to the domestic private sector, D_t is a vector of dummy variables to determine the existence or otherwise of structural breaks and ϵ_t is the residual term, assumed to be white noise.

Equation (1) is estimated by using Bai-Perron Multiple breakpoint tests within the framework of Ordinary Least Square (OLS) in order to determine the possible break dates. After proposition of the possible structural break dates, the dummy series is then formed in order to determine the significance of the break dates as contained in Equation (2). In order to estimate Equation (2), an ARDL or bounds test is applied. This method, developed by Pesaran, Shin and Smith (2001), is considered superior to other cointegration methods because of its several econometric advantages: it allows for simultaneous estimation of both long-run and short-run parameters; it can be applied whether the regressors are purely I(0), purely I(1) or a combination of both; it avoids endogeneity problems; and it provides better results with a small sample than other methods. The ARDL representation of Equation (2) is formulated as follows:

$$\Delta md_t = \beta_0 + \sum_{i=1}^{j} \beta_i \Delta md_{t-i} + \sum_{j=0}^{k} \beta_j \Delta inf_{t-j} + \sum_{k=0}^{l} \beta_k \Delta int_{t-k} + \sum_{l=0}^{m} \beta_l \Delta exr_{t-l} + \sum_{m=0}^{n} \beta_m + \sum_{n=0}^{o} \beta_n \Delta lpsc_{t-n} + \sum_{o=0}^{p} \beta_o \Delta D_{t-o} + \theta_1 md_{t-1} + \theta_2 inf_{t-1} + \theta_3 int_{t-1} + \theta_4 exrt_{t-1} + \theta_5 lgdp_{t-1} + \theta_6 lpsc_{t-1} + \theta_7 D_{t-1} \epsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

where all the variables are as earlier defined, j, k, l, m, n, o, p are lag orders, $\beta(\beta_i, \beta_j, \beta_k, \beta_l, \beta_m, \beta_n, \beta_o)$ is a vector of short-run parameters to be estimated, $\theta(\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_{6,}\theta_7)$ is a vector of short-run parameters to be estimated, and ϵ_t is the error term. This approach for cointegration is established on the null hypothesis of no long-run relationship among the variables $(H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = \theta_7 = 0)$ against the alternative hypothesis of long-run association $(H_1: \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq \theta_6 \neq \theta_7 \neq 0)$. The long-run association among the variables is tested for the joint significance of the estimated coefficients of the lagged level. Based on the Wald tests, the Fisher-statistic is obtained in order to test for the existence of long-run co-movement among the variables. The value of the F-statistic is then compared with the two critical values (upper and lower bounds) provided by Pesaran, Shin and Smith, (2001). The first critical value assumes that all the variables are integrated of the order zero, and it corresponds to the lower bound, while the second critical value assumes that all the variables are integrated of the order one and correspond to the upper bound. If the F-statistic exceeds the upper bound, then the null hypothesis of no cointegration among the variables is rejected; if it falls below the lower bound, then the null hypothesis of no cointegration among the variables cannot be rejected; if it falls between the lower and upper bounds, then the result is inconclusive. Finally, Equation (3) is estimated for both the long-run and short-run parameters. Quarterly data sets for all the variables between 2003 and 2017 are used in this study. The data on all the variables are sourced from the South African Reserve Bank (SARB).

4. EMPIRICAL FINDINGS AND DISCUSSION

Table 1 presents the descriptive statistics of the variables of interest. It can be observed that the mean and median of all the variables are very close in values, with the sole exception of the exchange rate. This implies that their distributions are nearly symmetrical and indicates low variability of the data. The skewness statistics indicate that two of the variables- demand for money and interest rate- are positively skewed, while the remaining three, log of GDP, inflation, exchange rate and log of credit flow to the domestic private sector, are negatively skewed. The Jarque-Bera probability values for all the variables, except inflation are above the 0.05 critical level. This suggests that the null hypothesis of normal distribution cannot be rejected for the variables at 5 percent level of significance. This indicates that all the variables, besides inflation, follow normal distribution.

Table 1: Descriptive Statistics of the variable

Variables	md	inf	int	exr	lgdp	lpsc
Mean	1.7688	4.2830	4.7896	-0.7881	14.8144	1.4989
Median	1.7700	4.8000	4.6100	-0.3	14.8253	1.5173
Maximum	2.0300	9.2000	8.3400	14.6000	14.9652	2.1210
Minimum	1.5600	-11.2000	2.0200	-14.6	14.5700	0.7030
Std. Dev.	0.1000	3.1988	1.6169	5.2432	0.1165	0.3584
Skewness	0.0838	-2.2689	0.1761	-0.1471	-0.6499	-0.3116
Kurtosis	3.1156	11.1617	2.0061	3.5720	2.3092	2.1247
Jarque-Bera	0.1037	214.38***	2.7797	1.0172*	5.4166	2.8385
Sum	106.13	252.70	287.38	-46.5000	888.868	88.4365
Sum Sq. Dev.	0.5904	593.4831	154.25	1594.50	0.8011	7.4532
Observations	60	60	60	60	60	60

**** significance at 1%, * significant at 10%.*

The possibility of structural break dates is examined using Bai-Perron Multiple breakpoint tests. The Bai-Perron tests suggest three possible structural break dates as contained in Table 2. However, the structural breaks or the regime shifts could not be confirmed to have occurred until the significance or lack of significance of the dummy variables are proved using the ARDL approach.

Table 2: Proposed break dates using Bai-Perron Multiple Breakpoint Tests

Structural break dates	Sequential	Repartition
1	2005Q3	2005Q3
2	2007Q3	2007Q3
3	2010Q2	2010Q2

While the ARDL approach to cointegration is applicable whether the variables are all integrated of the order zero or of the order one, it is still necessary to carry out unit root tests on the variables in order to be sure that no I(2) variable is involved, as its presence renders the Fisher-statistic for testing cointegration invalid. As shown in Table 3, both the Augmented Dickey-Fuller (ADF) and the Phillips-Peron (PP) unit root tests conducted indicate that three of the variables, i.e. money demand, inflation and exchange rate are stationary at levels, while the remaining three variables: interest rate, log of GDP and log of credit flow to the domestic private sector are stationary at first difference. This indicates that all the variables under study are a combination of I(0) and I(1) variables.

Table 3: Unit root tests

	ADF (P-v)		P-P (P-v)	
Variable	**Level**	**1st diff.**	**Level**	**1st diff.**
md	0.07	0.00**	**Level**	**1st diff.**
inf	0.02*	0.00**	0.08	0.00**
int	0.28	0.00**	0.04*	0.00**
exr	0.00**	0.00**	0.28	0.00**
lgdp	0.57	0.00**	0.00**	0.00**
lpsc	0.14	0.00**	0.84	0.00**

Notes: P-v denotes probability value. ** and * represent significance at 1% and 5% levels of significance respectively.

Following the results of the unit root tests, the lag-length tests are estimated based on 5 different criteria as presented in Table 4. As presented in the table, all 5 criteria (LR, FPE, AIC, SC and HQ) unanimously select the optimum lag length of one.

Table 4: Lag order selection criteria

Lag	LL	LR	FPE	AIC	SC	HQ
0	98.9220	-	0.0023	-3.2335	-2.8685	-3.0923
1	124.1236	40.3224*	0.0009*	4.1135*	3.7121*	3.9583*
2	124.3164	0.3015	0.0009	-4.0842	-3.6462	-3.9148
3	125.8272	2.3073	0.0009	-4.1028	-3.6283	-3.9193
4	126.9342	1.6503	0.0009	-4.1066	-3.5957	-3.9091

Note: LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion. * Indicates lag order selected by the criterion at 5% level of significance.

Table 5 presents the result of the Bounds test for cointegration amongst the variables. From the result, it is confirmed that the F-statistic is 3.17, which is greater than the upper bound value (2.99) at 10% per cent significance level. This result indicates a rejection of the null hypothesis of no cointegration and confirms that there is a long-run relationship amongst the variables. In other words, money demand is cointegrated with the other independent variables. This is in conformity with the majority of previous empirical studies such as Bahmani-Oskooee and Shabsigh, (1996), Sitikantha and Subhadhra (2011) and Lungu *et al.* (2012) amongst others.

Table 5: Bound test for cointegration

F-Statistic	90% lower bound	90% upper bound
3.17	1.88	2.99

Following the estimation of Equation (2), the ARDL long-run estimates are presented in Table 6. As indicated in the table, the long-run coefficient of interest rate, inflation rate and GDP are significant, while the rest of the variables are insignificant. This finding also supports some earlier studies by Jonsson (2001) and Akinlo (2006). Turning to our main objective, which is the determination of the existence or not of structural breaks in the money demand function, three possible breaks or regime shifts are identified in the series and they occur in the third quarter of 2005, the third quarter of 2007, and the second quarter of 2010, respectively. However, the results from Table 6 indicate that none of the coefficients of the dummy variables, which capture the existence or not of structural breaks at the various time periods, is significant. This result indicates that none of the breaks is strong enough to have any impact on the money demand function in the model over the long-run. In other words, money demand function in the South African economy, has no strong occurrence of structural breaks. By implication, the money demand function in South Africa has not undergone regime shifts and thus, the money demand function could be confirmed as stable. The findings also support the earlier empirical studies such as Jonsson (2001) and Akinlo (2006) and Lungu *et al.* (2012). However, the findings are in sharp contrast with studies of Kumar and Webber (2013), Kumar, Webber and Fargher (2013), Opolot (2007) and Sitikantha & Subhadhra (2011) which found the money demand function to be unstable.

Table 6: ARDL long-run estimates

Variable	Coefficient	Std. Error	t-Statistic
inf	-0.0030	0.0012	-2.5574
int	-0.0018	0.0007	-2.3076
exr	-0.0002	0.0007	-0.2986
lgdp	0.0179	0.0083	2.1360
lpsc	0.0122	0.02307	0.5329
d01	-0.0204	0.0264	-0.7730
d02	0.0061	0.0186	0.3312
d03	0.0265	0.0248	1.0669

For the short-run, the results as presented in Table 7 provide evidence of no short-run relationship between money demand and all the independent variables, as all the coefficients of the short-run variables are non-significant. Also, as in the case of the long-run results, the coefficients of the dummy variables are equally non-significant in the short-run, indicating that the breaks identified in the series have no effect on the money demand function. Finally, the estimate of the lagged error correction term (ect_{t-1}), which estimates the speed at which the dependent variable converges to long-run equilibrium after changes of independent variables is negative and statistically significant at the 1% level. This validates the earlier established long-run relationship among the variables.

Table 7: ARDL short run estimates

Variable	Coefficient	Std. Error	t-Statistic	P-value
inf	0.0006	0.0053	0.1273	0.8992
int	-0.0015	0.0016	-0.9506	0.3465
exr	-0.0007	0.0006	-1.2045	0.2343
lgdp	0.4153	0.5299	0.7837	0.437
lpsc	0.0117	0.0208	0.5629	0.5761
d01	0.0188	0.0314	0.6009	0.5507
d02	-0.0293	0.0301	-0.9724	0.3357
d03	0.0378	0.0315	1.2009	0.2357
ect_{t-1}	-1.1613	0.3357	-3.4584	0.0011*

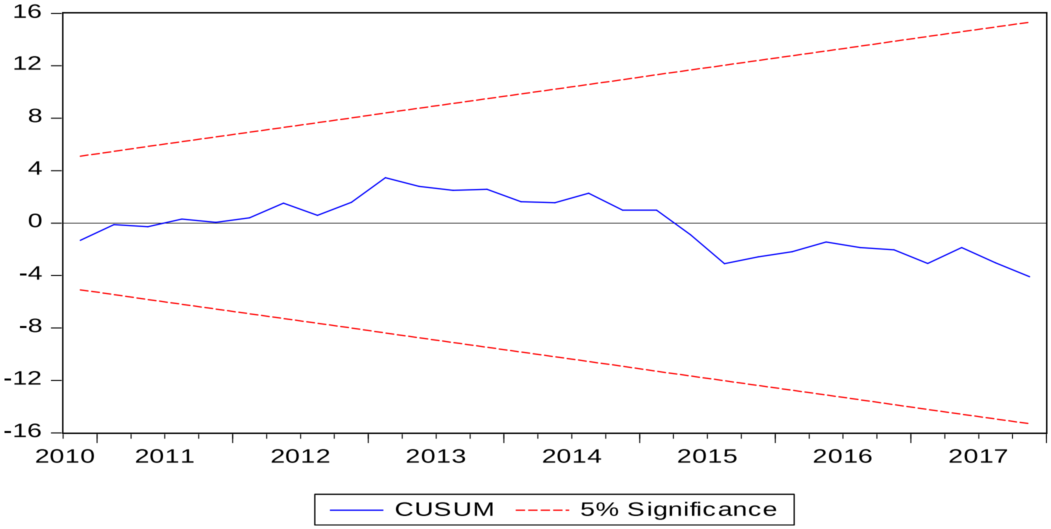
Note: * represents significance at 1%

For the diagnostic tests, the Lagrange multiplier test of residual serial correlation is presented in Table 8. As presented in the Table, the null hypothesis of no serial correlation cannot be rejected for the model. This indicates that the model does not suffer from the problem of serial correlation. To support the robustness of the results, the dynamic stability of the parameters in the model is examined by using a cumulative sum of the recursive residuals (CUSUM) test. As illustrated by Figure 1, the results of the CUSUM test imply that that the parameters of the model are stable at 5% level of significance. This further confirms the stability of the money demand function in South African economy.

Table 8: Breusch-Godfrey Serial Correlation LM test

F-Statistic	0.0086	Prob. F(1, 46)	0.9264
R-Squared	0.0000	Prob. Chi-Square(1)	1.0000

Figure 1: CUSUM Test



5. CONCLUSION

This study revisits the debate on the stability of the money demand function by examining the determinants and stability of the money demand function in the South African economy. It employs quarterly data obtained from the South African Reserve Bank from 2003 to 2017 using both the Bai-Perron Multiple breakpoint tests and the ARDL to investigate the stability of the money demand function in South Africa and to analyse its determinants. The empirical findings indicate that money demand is cointegrated with interest rate, inflation rate, GDP, exchange rate and credit to the private sector as a measure of financial development. The results show that interest and the inflation rate have negative and significant effects on the money demand function in the long run, while GDP is found to have a positive significant impact. Both the exchange rate and credit to the private sector are found to be non-significant in the long-run. Nevertheless, none of the variables were found to have a significant impact in the short-run, when the error correction term (ECT) which measures the speed of adjustment is found to be negative and significant. This further confirms the existence of cointegration amongst the variables. The structural break test reveals that the money demand function in South Africa has no record of strong episodes of structural breaks. This is further corroborated by the CUSUM Test. The study concludes that the money demand function in South Africa could be correctly employed in predicting and forecasting of monetary policy outcomes.

REFERENCES

Adam, C.S. (1991). Financial innovation and the demand for M3 in the UK 1975–1986. *Oxford Bulletin of Economics and Statistics*, *53*, 401-423.

Adam, C., Kessy, P., Nyella, J.J. & O'Connell, S.A. (2010). *The demand for money in Tanzania*. International Growth Centre, London, UK. http://eprints.lse.ac.uk/36393/. Accessed 2018/05/05.

Adrian, T. & Shin, H.S. (2009). Money, liquidity, and monetary policy. *American Economic Review*, 99(2), 600-605.

Akhtaruzzaman, M.D. (2008). Financial development and velocity of money in Bangladesh: A Vector Auto-Regressive Analysis. Bangladesh: *Bangladesh Bank Working* Paper Series 0806. https://ideas.repec.org/p/ess/wpaper/id2062.html. Accessed 2018/05/08.

Akinlo, A.E. (2012). Financial development and the velocity of money in Nigeria: An empirical analysis. *The Review of Finance and Banking*, 4(2), 97-113.

Anderson, R.G. & Rasche, R.H. (2001). The remarkable stability of monetary base velocity in the United States, 1919-1999. *Federal Reserve Bank of St. Louis Working Paper Series*, (2001-008). file:///C:/Users/10513086/Downloads/2001-008.pdf. Accessed 2018/05/09.

Bahmani-Oskooee, M. (1996). The black market exchange rate and the demand for money in Iran. *Journal of Macroeconomics*, 18, 171-176.

Bahmani-Oskooee, M. & Ng, R.C.W. (2002). Long-run demand for money in Hong Kong: An application of the ARDL model. *International Journal of Business and Economics*, 1(2), 147-155.

Bahmani-Oskooee, M. & Shabsigh, G. (1996). The demand for money in Japan: Evidence from cointegration analysis. *Japan and the World Economy*, 8, 1-10.

Balke, N.S. & Zeng, Z. (2013). Credit demand, credit supply, and economic activity. *The BE Journal of Macroeconomics*, 13(1), 643-680.

Ball, L. (2001). Another look at long-run money demand. *Journal of Monetary Economics*, 47(1), 31-44.

Bernanke, B.S. & Gertler, M. (1995). Inside the black box: The credit channel of monetary policy transmission. *Journal of Economic Perspectives*, 9(4), 27-48.

Bernanke, B.S., Gertler, M. & Gilchrist, S. (1999). The financial accelerator in a quantitative business cycle framework. *Handbook of Macroeconomics*, 1, 1341-1393.

Bordes, C., Clerc, L. & Marimoutou, V. (2007). *Is there a structural break in equilibrium velocity in the Euro Area?* Banque de France Working Paper No. 165. SSRN: https://ssrn.com/abstract=1694523. Accessed 2018/06/12.

Caporale, G.M. & Gil-Alana, L.A. (2005). Fractional cointegration and aggregate money demand functions. *The Manchester School*, 73, 737-753.

Dritsakis, N. (2012). Structural breaks, cointegration and the demand for money in Greece. *IUP Journal of Applied Economics*, 11(3), 1-24.

Gali, J. & Monacelli, T. (2005). Monetary policy and exchange rate volatility in a small open economy. *The Review of Economic Studies*, 72(3), 707-734.

Gill, K.G. (2000). The third job: Employed couples' management of household work contradictions, Aldershot, England: *Ashgate*. ISBN 1-84014-304-5

Hafer, R.W. & Jansen, D.W. (1991). The demand for money in the United States: Evidence from cointegration tests. *Journal of Money, Credit and Banking*, 23(2), 155-168.

Hafer, R.W. & Kutan, A.M. (1994). Economic reforms and the long-run money demand in China: Implications for monetary policy. *Southern Economic Journal*, 60, 936-945.

Haug, A.A. (1999). *Money demand functions: Data span and tests.* Conference paper presented at the New Zealand Econometrics Study Group Meeting, Auckland. http://www.econ.canterbury.ac.nz/research/working_papers.shtml. Accessed 2018/05/05.

Hoffman, D. & Rasche, R.H. (1991). Long-run income and interest elasticities of money demand in the United States. *Review of Economics and Statistics*, 73, 665-674.

Hurn, A.S. & Muscatelli, V.A. (1992). The long-run properties of the demand for M3 in South Africa. *South African Journal of Economics*, 60(2), 93-101.

Hromcová, J. (2004). On the income velocity of money in a cash-in-advance economy with capital. Working Papers. Serie AD 2004-21, *Instituto Valenciano de Investigaciones Económicas*, S.A. (Ivie). https://core.ac.uk/download/pdf/7150904.pdf. Accessed 2018/06/17.

Ireland, P.N. (2010). Monetary transmission mechanism. In *Monetary Economics* (pp. 216-223). London: Palgrave Macmillan.

Johansen, S. (1992). Testing weak exogeneity and the order of cointegration in UK money demand data. *Journal of Policy Modeling*, 14, 313-334.

Jonsson, G. (2001). Inflation, money demand, and purchasing power parity in South Africa. *IMF Staff Papers*, 48(2), 243-265.

Kim, J. (2000). Constructing and estimating a realistic optimising model of monetary policy. *Journal of Monetary Economics*, 45(2), 329-359.

Karfakis, C.I. & Parikh, A. (1993). A cointegration approach to monetary targeting in Australia. *Australian Economic Papers*, 32, 53-70.

Komijani, A. & Nazarian, R. (2004). Behavioral pattern of income velocity of money and estimation of its function (The case of Iran). *Iranian Economic Review*, 9(11), 21-55.

Kumar, S. & Webber, D.J. (2013). Australasian money demand stability: Application of structural break tests. *Applied Economics*, 45(8), 1011-1025.

Kumar, S., Webber, D.J. & Fargher, S. (2013). Money demand stability: A case study of Nigeria. *Journal of Policy Modeling*, 35(6), 978-991.

Leão, P. (2005). Why does the velocity of money move pro-cyclically? *International Review of Applied Economics,* 19(1), 119-131.

Lungu, M., Simwaka, K., Chiumia, A., Palamuleni, A. & Jombo, W. (2012). Money demand function for Malawi: Implications for monetary policy conduct. *Banks and Bank Systems*, *7*(1), 50-63.

Maki, D. & Kitasaka, S. (2006). The equilibrium relationship among money, income, prices and interest rates: Evidence from a threshold cointegration test. *Applied Economics,* 38, 1585-1592.

McNown, R. & Wallace, M.S. (1992). Cointegration tests of a long run relationship between demand and the effective exchange rate. *Journal of International Money and Finance*, 11, 107-114.

McPhail, K. (1991). The long-run demand for money, Canada savings bonds and treasury bills in Canada. http://www.esri.go.jp/en/archive/dis/discussion-e.html. Accessed 2018/04/23.

Meyer, L.H. (2001). Does money matter? *Federal Reserve Bank of St. Louis Review*, 83 (September/October 2001).

Moll, P.G. (2000). The demand for money in South Africa: Parameter stability and predictive capacity. *South African Journal of Economics*, 68(2), 80-89.

Muscatelli, V.A. & Papi, L. (1990). Cointegration, financial innovation and modelling the demand for money in Italy. *The Manchester School*, 58(3), 242-259.

Okafor, P.N., Shitile, T.S., Osude, D., Ihediwa, C.C., Owolabi, O.H., Shom, V.C. & Agbadaola, E.T. (2013). Determinants of income velocity of money in Nigeria. Central Bank of Nigeria. *Economic and Financial Review,* 51, 1-32.

Opolot, J. (2007). A re-examination of the demand for money in Uganda: Nature and implications for monetary policy. *The Bank of Uganda Staff Papers Journal*, 1(1), 5-32.

Pesaran, M.H., Shin, Y. & Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326.

Sitikantha, P. & Subhadhra, S. (2011). The velocity crowding-out impact: Why high money growth is not always inflationary. *Reserve Bank of India Working Paper Series* (WPS (DEPR).

Wang, W. & Shi, S. (2006). *The variability of velocity of money in a search model*. Working Papers tecipa-190, University of Toronto, Department of Economics.