

An Empirical Analysis of Money Demand and Its Stability in Zambia 1984-2021



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ABSTRACT: The paper was an empirical analysis of the stability of money demand in Zambia between 1984 and 2021. The money demand function tries to explain the factors that influence people's demand for money in an economy. The determinants included real income, exchange rate, inflation rate and interest rate. Using E-views 9.0, an appropriate model was estimated for statistical analysis. In the analysis of data, unit root tests were done to check the order of integration of the variables. Furthermore, to test for long term equilibrium relationships among variables the Augmented-Dickey Fuller (ADF) was used to test procedure on the residuals. Out of the many ways of testing for normality, this paper chose the Jarque-Bera test to conduct the normality test on the variables.

From this study's results, the bound test showed that there is a long run cointegration relationship among demand for real money balances, real GDP, interest rates, exchange rate and inflation in case of broad money aggregates. In the long run, all the independent variables are significant determinants of money demand which will be positively affected by percentage changes in exchange rates and negatively by percentage changes in gross domestic product, inflation, and interest rate.

The study found that for the implementation of monetary policy in any economy to be successful, it relies heavily on the instruments of monetary policy used as well as the structure of the economy. However, for emerging economies such as Zambia, there are special hurdles that may make the implementation of monetary policy less effective in the achievement of the monetary policy goals. From the findings, it is recommended that as the process of modernizing monetary policy frameworks are implemented in addressing emerging economic challenges, there is need to continue with monetary aggregates in monetary policy conduct.

KEYWORDS: Money Demand, Auto Regressive Distributed Lag (ARDL)

INTRODUCTION

The stability of money demand for any country cannot be overemphasised. Considering this, the stability of money demand is one of the most significant prerequisites to monetary policy in theory and application of macroeconomic policy. In theory, it is held that the demand for money is mainly influenced by price levels, rates of real interest, national income, and the exchange rate (Mishkin, 2007). Cziraky and Gillman (2006) established that the stability of money demand function allows confident estimation and prediction of the effects of monetary policy on the macroeconomic variables. The preceding text implies that demand for money function should be stable and predictable to allow confidence in the execution of monetary policy.

If the money demand function is unstable, the LM curve will as well be unstable, and this will require policy makers to target the rate of interest instead (Singh and Kumar, 2010). As a result of this, the instability of money demand function has often been seen as the main reason for not emphasizing the role of monetary aggregates in the formulation of monetary policy (Özdemir and Saygili, 2013). The reduction in importance of the money demand function has been seen as mainly resulting from factors like financial innovation, deregulation of financial markets, a change in the exchange rate regime, and a sudden jump in oil prices (Bahmani-Oskooee and Barry, 2000).

BACKGROUND

Before the 1990s, Zambia's conduct of monetary policy was driven by many objectives. Most prominent among these was the provision of low-priced credit to state owned enterprises as well as deliberate measures put in place to spur economic growth

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through various initiatives and incentives. Further, the financing of the government's budget was facilitated through monetary policy through borrowing from the central bank. This was achieved using direct instruments like interest rate controls, directed credit allocation as well as core liquid assets and statutory reserve ratios. The economy at the time was state dominated, hence the heavy dependence on direct monetary policy instruments. Further, the central bank did not have control over money supply as the banking sector was dominated by foreign banks which mostly issued loans to foreign owned companies without taking into consideration the existing economic and financial conditions (Kalyalya, 2001).

Nevertheless, McPherson (2005) acknowledged that these controls resulted in poor financial intermediation in the form of negative interest rates, broad macroeconomic instability, unstable BoP, internal and external disequilibrium as well as structural and institutional deficiencies. The ensuing economic decline of the time led to discontent among the citizenry that eventually led to the elections of 1991 which saw a new Government formed. In 1992 the new government embarked on a process of economic restoration that aimed at spurring growth. To achieve this, many economic reforms and policies were instituted. These focused on creating a market-led economic system, which was to be private sector led. By virtue of these reforms, market forces gained greater prominence in the allocation of resources. Price controls were removed, and most subsidies were abolished. Further, the foreign exchange market was liberalized by way of the relaxation of exchange controls as well as liberalization of interest rates (ibid).

Further, the conduct of monetary policy was changed to a more liberal one. In 1996, amendments were made to the Bank of Zambia (BoZ) Act. The new BoZ Act narrowed the central bank's objective to price and financial system stability. As a result, monetary policy focused on creating a stable macroeconomic environment to support sustainable economic growth. Following the amendment of the BoZ Act, and as a way of achieving sustainable economic growth, the Bank was mandated to pursue appropriate monetary policy in support of the same. The Ministry of Finance set the target for inflation after consultations with the Bank of Zambia. After setting the inflation target, the Bank of Zambia had the option of using monetary policy instruments available in managing liquidity conditions in the economy with the view of achieving the set inflation target. Empowered by the new Act, the Bank of Zambia started to target monetary aggregates. This approach assumed that a strong and stable relationship existed between inflation, which was the ultimate target and money supply (Bertilsson & Rademar, 2017).

To further implement its monetary policy agenda, the Bank of Zambia made use of indirect market-based monetary policy instruments. These included auctions of treasury bills and government bonds in the primary market as well as auctions of short-term credit and term deposits. To further buttress the conduct of monetary policy, the central bank often engages in the purchase and sale of foreign currency. This is as a way of managing the exchange rate policy. There was a significant improvement in Zambia's macroeconomic environment. There was a marked decline in money growth and inflation reduced markedly. The inflation rate, for example, reduced to single digits from 2006 onwards. Due to the lessening of restrictions on lending and deposit rates, there was an initial increase in real interest rates, though they eventually stabilized at about 5%. From 2001 to 2012 the growth in real GDP averaged 6.6%. This was a significant increase from an average of 0.8% during the period of 1991 to 2000 (Chirwa & Odhiambo, 2016).

In this paper, money demand will mean monetary aggregate (M2 i.e., currency in circulation, demand deposits and time deposits), and interest rates will refer to treasury bills rate as reported by BoZ. On the other hand, the exchange rate was expressed as a ratio of the kwacha to the dollar and income to mean real GDP. The purpose of this paper, therefore, is to propose an empirical study on what constitutes money demand and how stable its function is for the period 1984 to 2021.

LITERATURE REVIEW

Africa and Money Demand

The author had noted that most studies done in Africa on money demand seemed to be concentrated in West Africa, with fewer studies centered in East Africa and even fewer existing for Southern Africa.

A study by Odeleye and Akam (2020) investigated the money demand function in sub-regions of Sub-Saharan Africa and its subregions with annual time series spanning between 1980 and 2017. Panel homogeneous Autoregressive Distributed Lag, panel co-integration tests, and Dumitrescu and Hurlin panel causality test were employed for analysis. The empirical results showed a co-integrating relation between money demand and its determinants in SSA and its sub-regions. The results also indicated divergence in terms of short-run determinants, long-run determinants, and error correction due to shocks across the subregions. The causality test revealed a bi-causal relationship between money demand and its determinants in SSA economies. However, there was divergence in the causality results across the sub-regions. The study concluded that the price level was the major driver of money demand in Sub-Saharan Africa. The paper, therefore, recommended that governments in SSA economies should employ policies that can enhance price stabilization, which would consequently lead to money demand stability in the whole region (Odeleye & Akam, 2020).

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Furthermore, Kumar, et al., (2010) also presented an estimate of money demand in Nigeria over the period of 1960-2008. After regressing their statistics using E-views, the income elasticity of money demand was found to be around a unit. This was different from Musona (1989) and Jammeh (2012), who established that the income elasticity of money demand was significantly more than unity. They found that the interest rate elasticity was negative and significant. After testing for stability, they concluded that there was no evidence that financial sector liberalization and reforms made the money demand function for Nigeria unstable. They reported that the demand for money was stable in Nigeria between 1960 and 2008, although there was evidence to suggest that it may have declined by a small amount around 1986.

Moreover, one seminal study conducted by Khan and Senhadji (2000) examined money demand stability in a panel of African countries. The authors utilized cointegration techniques to investigate the long-run relationship between money demand, income, and interest rates. Their findings revealed that money demand was stable in the long run for most African countries studied, suggesting that policymakers could rely on stable money demand functions in formulating monetary policy.

However, other studies have presented mixed results. For instance, Ajayi et al. (2015) focused on a select group of African economies and found that money demand instability was prevalent in some countries. The researchers employed time series analysis and reported that economic and financial shocks contributed to fluctuations in money demand. This highlights the importance of considering country-specific factors when assessing money demand stability.

Furthermore, external factors have also been identified as potential sources of instability in money demand functions. Ayandiran and Asongu (2018) examined the impact of foreign aid on money demand stability in African countries. Their study indicated that foreign aid volatility negatively affected money demand stability, suggesting that aid-related fluctuations could undermine the effectiveness of monetary policy.

A cross-country analysis by Mandela and Kimani (2019) and Nsambimana (2015) both focused on several African countries. The study utilized panel cointegration techniques and revealed that income elasticity and interest rate elasticity significantly influenced money demand in these economies. This suggested a relatively stable long-run relationship.

Other cross-country analyses done by Nautz and Rondorf (2017) and Farazmand and Morandi (2015) found that across different interest rate measures and model inclusions, the income elasticity of money demand consistently exceeded one, indicating declining income velocity. These cross-country approaches avoided distortions from common shocks. A stable cross-country money demand suggested instability in standard euro area money demand functions could result from omitted macro variables. This finding points to promising research directions for identifying these variables and renewed interest in monetary aggregate development due to recent financial crises.

Another study done on Nigeria and Ghana investigated the demand for real money balances in these two countries using panel time-series data between 1970 and 2014. The study used Levin, Lin, Chu common unit root process and Pedroni Residual Cointegration Test with which the results reveal that all the variables in the model are stationary and cointegrated respectively. The study used data sourced from the World Development Indicators (WDI), which was analyzed using Panel Two-Stage Estimated Generalized Least Squares (cross-section Seemingly Unrelated Regression model (SURE) with Instrumental Variables (IV). The finding adheres to the liquidity preference theory, with all the variables – inflation, real interest rates, and official exchange rates are statistically significant except real income. It is recommended that the monetary authorities in Africa, especially the economies of Nigeria and Ghana, should adopt appropriate monetary policies by placing interest rates, inflation, and official exchange rates at acceptable levels to boost income through private sector investments (Nkalu, 2020).

Literature shows several studies made on the demand for money, Musona (1989) undertook research on the money demand in Zambia between 1965 and 1984. In his model, he used M2, monetary aggregate, because there was a continual substitution of demand deposits for time and savings deposits by the public. Consistent with Musona (1989), Jammeh (2012) also carried out a similar study in Gambia and as in the case of the former; his money demand function was expressed as a function of real income, interest rate, inflation rate, and exchange rate. However, Musona (1989) was not satisfied with his results obtained from the regression output. This is because the inflation parameter in the results gave a negative sign which is contrary to theory. As such, he removed inflation from the model. While both studies used a log-linear econometric model, there was a difference in the regression output; the former found out that the elasticity of money demand was 1.51, meaning that when income changes by a one percentage point, there is a more than a unity change in money demand. The latter found income elasticity of 1.83, interpreted as, when income changes by one percent, in the long run real money demand will increase by about 1.83%. Having used the Chow Test for stability, Musona (1989) further discovered that demand for money in Zambia gave a structural break in 1970 that led to the conclusion that the money demand function was unstable. The interest rate had an expected sign (-0.05), and inflation also gave (-0.013) while the coefficient of exchange rate was positive (0.579). On the other hand, Jammeh (2012) stated that the transactional and precautionary motives of money demand were found to be held in Gambia. However, he discovered that the

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money demand function was unstable using Error Correlation Model (ECM) for stability and conclusively noted that inflation was purely a monetary phenomenon. In their study, Mutoti, Zgambo, and Kapembwa (2012) came up with a money demand function for Zambia. Their study covered the years 1994 to 2008. Included in their model are real money balances, real GDP, exchange rate, and TB rate. According to Mutoti et al, an increase in incomes leads to an increase in real money balances; the exchange rate has a negative relationship (an adverse exchange rate leads to reduced real money balances). As for the TB rate, an increase in the TB rate leads to reduced real money balances. As a way of accommodating reforms in the financial sector, Mutoti et al included a time trend to represent financial liberalization. The results indicate that the time trend is positively related to the demand for money. To verify if the money demand function is stable, Mutoti et al plotted the residuals from both the time-trend regression and the other without a time trend. According to the results obtained, the function of demand for money is stable.

Another study by Adam (1999) assessed the impact of monetary policy reforms in Zambia. In the study, Adam used portfolio shifts to estimate the money demand function as a way of determining the extent of changes, if any, in the stability of the demand function because of the reforms. Included in Adam's model is the Treasury bill rate, deposit rates, changes in the parallel exchange rate, inflation, currency in circulation, and the real Gross National Income. According to the results obtained, a stable long-run money demand function with a policy-induced structural break exists. Further, Adam finds that there are increased underlying variations in the money demand from about 1989. However, around 1994, these began to reduce. From this study, it was noted that because of the observed short-run forecast variance around the money demand function, stabilization policy based on controlling reserve money is not likely to have a strong link to inflation in the short to medium-term despite the long-run correspondence between the two.

The most recently published study, the author found on money Demand in Zambia was one aimed to investigate the money demand function in Zambia from 1978 to 2018 using annual time series data. Employing the Gregory Hansen cointegration technique and Hendry's General to Specific method, the research developed an error correction model, with a focus on simplicity. The Gregory Hansen test affirmed a cointegrating relationship, with the GH-2 model selected, identifying 1994 as a pivotal year in the money demand function. Notably, inflation and interest rates consistently influenced real money demand in both short and long terms, distinguishing Zambia from other developing nations where money is not as essential. Financial sector reforms in 1994 reduced real money demand, but a positive time trend indicated a gradual increase over time. The low-interest elasticity of money demand suggested limitations in using money supply for economic stabilization, while the stability of the money demand function in Zambia was confirmed by CUSUM and CUSUMSQ tests (Mumba & Ziramba, 2021).

Technology and Money Demand

In recent years, technological advancements and changes in financial behavior have introduced new dimensions to the stability of money demand functions. Oludele and Olofin (2019) and Mlambo and Msosa (2020) explored the impact of mobile money adoption on money demand stability in Nigeria and Sub-Saharan Africa, respectively. Oludele and Olofin (2019) concluded that the proliferation of mobile money services had altered the relationship between money demand and traditional determinants, emphasizing the need for updated models to accurately capture these changes, while Mlambo and Msosa (2020) concluded that all variables were negative, showing that mobile money transactions had no effect on the function. Another study conducted on the subject examined the impact of modern technology, including credit cards, automatic teller machines (ATMs), and electronic funds transfer at the Point-Of-Sale (POS), on money demand for Iran using seasonal data from 2001 to 2008. For this purpose, the money demand function had been estimated based on Rinaldian model using the ARDL approach. The findings indicated that the long-run impact of modern technology on the demand for money was significantly greater than in the short run. It was also demonstrated that, due to an increase in the number of ATMs and credit cards, the demand for currency increased both in the short and long runs. However, the impact of an increase in POS on the demand for currency was negative. Additionally, the error correction coefficient was 0.49, indicating that 49 percent of short-run fluctuations in money demand had been settled in the long run (Tehranchian, et al., 2012).

Studies like one done by Fujiki and Tanaka (2010) conducted a study on the impact of electronic money adoption on currency demand using unique household-level survey data from Japan, employing Quantile Regression in the analysis. The study was based on the Baumol–Tobin model of transaction demand for money, which considers factors such as transaction costs, opportunity costs, and the frequency and amount of cash withdrawals during bank visits. In the setup, electronic money provided an alternative means of conducting transactions, potentially reducing transaction costs by shortening the time required. The findings revealed that, contrary to expectations, average cash balances did not decrease with the adoption of electronic money as was the case in that of Tehranchian et al (2012). Instead, they appeared to increase under certain conditions. This suggests that consumers did not

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significantly replace cash with electronic money despite its rapid adoption among households. We employed instrumental Quantile regression in our analysis.

A study by Zhan et al (2022), which was slightly different from studies done by Oludele and Olofin (2019), Mlambo and Msosa (2020), (Tehranchian, et al., 2012), Fujiki and Tanaka (2010) in that it looked at the effects of financial technology on multiple measures of money, namely M0, M1, and M2. Zhan et al (2022). The study found that digital finance affected money demand functions stability differently across monetary aggregates: it leaves M0 unchanged and has no effect in influencing the unstable M1, but does disrupt the formerly stable M2 and affects the stability of M0, M1, and M2 demand functions. The study Further investigated how two key services of digital finance payment and asset management affected money demand.

This differed from Oludele and Olofin (2019) and Mlambo and Msosa (2020), who prioritize mobile money. For payment services, Zhan et al (2022) finds the stability impact on the money demand function follows the order of $M0 > M1 > M2$. In contrast, for asset management services, the impact is ranked inversely. The study found that employing the Divisia index softens the impact of digital finance on the stability of money demand functions.

CONCLUSION OF EMPIRICAL LITERATURE

The review of literature for this study reveals that there are many studies done in the past which looked at the stability of the money demand function. A few such studies in Africa did not use well-structured methodological techniques, as stated by Niyimbanira (2013). To avoid that pitfall, this study looked at the stability of the money demand using the Johansen co-integration test. In addition, it made use of the CUSUM and CUSUMSQ tests. These were developed by Brown et al. (1975) for use in examining the stability of the short-run dynamics as well as the long-run coefficients of the money demand function.

Table 1: Summary of Literature

Author	Sample/Data source/Period	Topic/Theory	Methodology/variables	Findings
Ferdinand Niyimbanira(2013)	South Africa	Money Demand in South Africa Revisited: A Detailed Analysis of Different Models	Review	Not many studies used co-integration and Error Correction Model approaches on the demand for money using South African data.
Pasquale Foresti, Oreste Napolitano(2014)	European Central Bank (1999-2012)-Multiple	Money Demand in the Eurozone: Do Monetary Aggregates Matter?	Panel Data, Dynamic least square(Interest rate, inflation, income, real money demand)	M2 is more stable than M1 and M3 and should be used as measure as target for Monetary Policy
Hasan Farazmand and Mahvash Moradi (2015)	WDI (1980-2013) MENA Region	Determinants of Money Demand: Evidence from MENA	Panel Data (GDP,Interest rate,inflation income,real money demand)	Inflation and exchange rate have negative money demand in MENA. Income positive to money demand
Yutaka Kurihara (2015)	Bank of Japan (2002-2014)	The Demand for Money: Recent Japanese Case	OLS And GMM (GDP,Exchange rate,Stock price,inflation,money demand)	Stable Money Demand. Stock Prices don't influence money demand

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Manamba Epaphra (2017)	Bank of Tanzania,IFS,IMF(1966-2015)-Tanzania	Econometric Analysis of Demand for Money and its Stability in Tanzania	Johansen cointegration, vector autoregressive-vector error correction model (VAR-VECM) (GDP,Deposit interest rate, Exchange rate,inflation,real money demand)	Stable money demand
Muhammad Ahmad Mazher, Prof. Dr. Jauhari Dahlan (2019)	WDI (1970-2018)-Malaysia	Determining Factor for Malaysian Money Demand Function	ARDL Bound test (CPI,Interest,GDP,Exchange rate,Financial innovation)	Financial innovation moves in the same direction with real money demand
Courage Mlambo and Steven Kayambazinthu Msosa(2020)	World Bank (1995-2014) South Africa, Botswana, Kenya, Mauritius and Nigeria	Financial technology effects on Money Demand	Panel Data and GMM panel technique(Atm,mobile subs,Inflation,interest,GDP,real money demand)	All variables have negative effect with money demand
Odeleye and Akam (2020)	IMF (1980-2017) Sub Sahara Africa	Money Demand in Sub Sahara Africa	Panel homogeneous Autoregressive Distributed Lag, panel co-integration tests, and Dumitrescu and Hurlin panel causality test were employed for analysis	Price Level is largest contributor to money demand. Stable money demand
Azimi(2023)	IMF (1996-2021)-Southern Asia	Re-examining money demand function for South Asian economies	CS-ARDL (GDP,Exchange rate,Foreign interest rates,inflation,money demand)	Money demand is stable in Bhutan,India,Pakistan and Maldives. Money demand unstable in Afghanistan,Nepal,Sri Lanka

OVERVIEW OF THE STUDY

Before the 1990s, Zambia's conduct of monetary policy was driven by many objectives. Most prominent among these was the provision of low-priced credit to state owned enterprises as well as deliberate measures put in place to spur economic growth through various initiatives and incentives. Further, the financing of the government's budget was done through monetary policy through borrowing from the central bank. This was achieved mainly using direct instruments like interest rate controls, directed credit allocation as well as core liquid assets and statutory reserve ratios. The economy at the time was dominated by the state, hence the heavy dependence on direct monetary policy instruments. Further, the central bank did not have much control over money supply as the banking sector was dominated by foreign banks which mostly issued loans to foreign owned companies without taking into consideration the existing economic and financial conditions (Kalyalya, 2001).

Nevertheless, McPherson (2005) acknowledged that these controls resulted in several poor financial intermediations in the form of negative interest rates, broad macroeconomic instability, unstable BoP, internal and external disequilibrium as well as structural and institutional deficiencies. The ensuing economic decline of the time led to discontent among the citizenry that eventually led to the elections of 1991 which saw a new Government being formed. In 1992 new government embarked on a process of economic restoration that was aimed at spurring growth. To achieve this, many economic reforms and policies were instituted. These were aimed at creating a market-led economic system, which was to be largely private sector led. By virtue of these reforms, market forces gained greater prominence in the allocation of resources. Price controls were done away with, and most subsidies were abolished. Further, the foreign exchange market was liberalized by way of the relaxation of exchange controls as well as liberalization of interest rates (ibid).

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THEORETICAL FRAMEWORK

1. Quantity Theory of Money

The classical economists put up a view that, in the long-run, changes in the money supply leads to proportional changes in the price level. This is a presentation of money demand by Fisher (1911), where he used the equation of exchange and the velocity. The theory of money is based on the notion that, in every market transaction, money must switch hands (Tucker, 2006). In his study, this arrived at the conclusion that the relationship between money supply (M), velocity (V), price level (P), and the number of transactions (T), in a particular period are shown by the equation:

$$MV=PT$$

On the left side, M represents the nominal money supply circulating in the economy, V represents the number of times a Kwacha switches hands in a specific period, P is the level of price while T represents the number of transactions taking place in each period and space. He further argued that T was re-stated as proxy for income (Y). The proponents of this theory argue that V and Y are constant because of people's habits of holding a specified amount of money, and the number of spending an extra Kwacha is expected to slow in changing, and that the economy would adjust to long-run full-employment and output, respectively. It follows, then, that according to the Quantity Theory of Money, any changes in the money supply must lead to a proportional change in the price level (Tucker, 2006).

2. Liquidity Preference of Money Demand

Following the 1930 Great Depression and the attempt by US President Roosevelt to stimulate the economy by changing (increasing) money supply with the view of creating motivation for business firms, the quantity theory of money failed to hold as the price remained sticky, instead there was significant change in the velocity of money (Mankwi, 1997). Therefore, according to Miller (2006), during this period Keynes (1936) observed and made a more rigorous approach to determine the money demand. He postulated that people's demand for money is premised on three basic motives: transaction, precautionary, and speculative motives. According to Keynes (1936), people demand for money to meet day-to-day business operations exemplifying the transaction motive. He also further argued that this motive is a positive function of disposable income.

He added that the precautionary motive explains that people hold money to mitigate unforeseen economic circumstances, and thus a positive relationship exists between money demand and disposable income. While the speculative motive tries to explain that the people hold money to invest and other transactions. In this case, money serves the function of store of value (Keynes, 1936). He also argued that the desire to hold money as a store of value leads to the asset demand for money. People choose to hold money rather than other assets for two reasons: liquidity and the lack of risk. Therefore, from the three motives above, the

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money demand function is represented as: $M = f(y, i)$, where y is the income with a positive relationship to money demand and i is interest rate which is negatively related to money demand (Keynes, 1936).

3. Portfolio Theory

Portfolio theories of money demand emphasize on the fact that money demand is premised on the function of money as a store of value. These theories money demand stress that people hold money as part of their portfolio of assets as it offers a different combination of risks and return than other assets. Friedman (1956) and Tobin (1958) came up with the most well-known portfolio theoretic approach models. Portfolio theories of money demand view money as any other asset and use the assets' demand theory to formulate the money demand theory. According to these theories, how much money a person demands is usually depended on the risk and offered by the money as well as other assets that can be held by households instead of money.

The portfolio theory focuses on the trade-off between holding money and holding interest-bearing assets. According to this theory, individuals and firms divide their wealth between money and other assets, such as bonds or stocks. The decision to hold money versus other assets is influenced by the liquidity preferences of economic agents. People hold money to carry out day-to-day transactions, while other assets offer a potential return on investment (Duesenberry, 1965)

In this context, the money demand function is derived from optimizing the balance between the costs of holding money such as the opportunity cost of not earning interest on other assets and the benefits of holding money for transactions. As income and wealth increase, the demand for money for transactions also rises. However, the demand for money as a proportion of total wealth decreases because the opportunity cost of holding money becomes relatively higher compared to other assets that can generate returns (Serletis, 2001).

The demand for money is also dependent on how much wealth an individual has. This is because the amount of wealth a person has influences the size of the portfolio to be divided between money and other assets. This theory can be shown mathematically as:

$$(M/p) d = f(r_s + r_b + r_m + \delta^e, Y_p)$$

Where r_s represents return on stock/equity, r_b represents return on bonds, r_m represents return on money, δ^e is the inflation rate and Y_p represents the permanent income which is used to represent wealth.

According to portfolio theories, since the demand for assets increases with an increase in wealth, the demand for money also increases with an increase in permanent income because higher wealth means larger portfolio. According to portfolio theories of money demand Friedman (1956) there are three main assets that people hold instead of money. These are bonds, stocks, and goods; and they argued that how much money an individual holds depends on the returns that these assets offer compared to holding money. If these assets offer a higher return, then the less money an individual will hold. Conversely, the less attractive these assets are, the more money will be held. As r_s or r_b (returns on stock and bonds) becomes more attractive, demand for money reduces as it becomes less profitable to hold money compared to holding stocks or bonds.

There is an inverse relationship between money demand and inflation. If expected inflation δ^e increases, money demand reduces. This is because money becomes less profitable to hold as its real value reduces with the passage of time. Mankiw (1997) argued that as far as portfolio theories of money demand are concerned, the liquidity preference function of money demand is but a simplification of the general theory of money demand. This is so in that in that theory real income is used in place of real wealth and secondly only the nominal interest rate on money is included. The theory fails to take note of the returns on other alternative assets.

4. Real Balance Effect

The real balance effect, also known as the Pigou effect, suggests that changes in the price level (inflation or deflation) can influence the real value of money balances held by individuals and businesses, thereby affecting the demand for money. When the price level falls (deflation), the purchasing power of money increases, leading to a higher real value of money balances. As a result, people may find it more attractive to hold money rather than spend it, as the increased value of their money allows them to buy more goods and services (Ireland, 2001).

Conversely, when the price level rises (inflation), the real value of money balances decreases. This can lead to a decrease in the demand for money as people aim to convert their money into goods and assets that are less affected by inflation. The real balance effect highlights the importance of the purchasing power of money in influencing money demand (Alvin, 1964).

5. Expectations Theory

The expectations theory of money demand emphasizes the role of future expectations, particularly regarding inflation and interest rates, in shaping the demand for money. According to this theory, people hold money not only for current transactions but also for precautionary reasons and as a store of value. If individuals and businesses anticipate higher future inflation, they might hold less money and instead invest in assets that can provide a higher return, like stocks or real estate. Similarly, if they expect higher future interest rates, they might hold more money to take advantage of the better returns on interest-bearing assets (Shinako, 1985).

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The expectations theory suggests that changes in people's beliefs about future economic conditions can lead to shifts in the demand for money. For instance, if inflation expectations increase, the demand for money might decrease as people seek to avoid holding assets that lose value due to inflation (Tease, 1986)

METHOD

The research was quantitative in nature incorporating an expo Facto design. The research used a time series with annual data for Exchange rates, interest rates and Gross Domestic Product and inflation for 1984-2021 obtained from Bank of Zambia. The Auto Regressive Distributive Lag (ARDL) was used. E-views 90 was used to analyse the data.

RESULTS

Stationarity Tests

Table 2: Augmented Dickey-Fuller (ADF)

	<i>Variable</i>	<i>Test statistic at level</i>	<i>Test statistic at 1st Difference</i>	<i>Order of Integration</i>
1	LnM2	-0.1263 (0.7165)	-7.0081 (0.0000)	I(1)
2	LnGDP	2.0442 (0.9888)	-2.9462 (0.0044)	I (1)
3	LnExch	-22690 (0.0243)	-2.0542 (0.0398)	I (0)
4	LnInf	-0.55568 (0.4691)	-7.1114 (0.0000)	I (1)
5	LnIntrst	-0.2265 (0.5979)	-5.1813 (0.0000)	I (1)

The above statistical evidence favored using the Autoregressive distributed lags model (ARDL) model as opposed to the vector error correction model which requires the same order of integration as Exchange rate was stationary at Level.

Table 3: Summary of Diagnostic Test Results

<i>To test:</i>	<i>What diagnostic test</i>	<i>T-statistic</i>	<i>p-value</i>	<i>Conclusion</i>
Model significance	F-test of significance	5.667385	0.005279	Model is significant
Goodness of fit	R-squared	0.935414	NIL	Model well fitted
Normality test	Jarque-Bera	1.203752	0.547783	Residuals are normal
Heteroskedasticity	Breusch-Pagan-Godfrey	0.573764	0.8642	No heteroskedasticity
Autocorrelation	Breusch-Godfrey LM	0.508386	0.7620	No autocorrelation

Diagnostic tests are taken to validate the results. The adjusted R-squared was 0.935 which implies that variation in the dependent variable are well explained by independent variables in the model. In other words, 93.5% of variation in dependent variables (M2) is being explained by the explanatory variables.

Table 4: Bound Test Summary

Test Statistic	Value	k
F-statistic	5.088795	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

The F-statistic value of 5.088795 was greater than all upper bound critical values, leading to the rejection of the null hypothesis of no existence of the long-run relationship. This prompted the estimation of the cointegration equation coefficients and the long run function.

Table 5: Short-Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNM2(-1))	1.601204**	0.546460	2.930136	0.0168
D(LNM2(-2))	1.457404**	0.472217	3.086304	0.0130
D(LNM2(-3))	1.118843**	0.394005	2.839667	0.0194
D(LNM2(-4))	1.464600***	0.416272	3.518372	0.0065
D(LNGDP)	5.964819	3.456532	1.725666	0.1185
D (LNGDP (-1))	5.091651	5.587177	0.911310	0.3859
D (LNGDP (-2))	7.977759	6.391750	1.248134	0.2435
D (LNGDP (-3))	18.081566**	6.749421	2.678980	0.0252
D(LNEXCH)	16.702142**	5.275392	3.166047	0.0114
D (LNEXCH (-1))	0.849069	4.803200	0.176772	0.8636
D (LNEXCH (-2))	1.210947	5.661089	0.213907	0.8354
D (LNEXCH (-3))	14.833653**	6.167645	2.405076	0.0396
D(LNINFL)	-10.217126***	2.439773	-4.187737	0.0023
D(LNIR)	4.443645	3.009345	1.476615	0.1739
D (LNIR (-1))	7.564915**	3.309009	2.286157	0.0481

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D (LNIR (-2))	4.592786	3.308296	1.388263	0.1985
D (LNIR (-3))	2.284848	1.730167	1.320594	0.2192
D (LNIR (-4))	-3.725348*	1.844399	-2.019817	0.0741
CointEq (-1)	-0.572157***	0.590517	-4.355771	0.0018
Cointeq = LNM2 - (-6.3702*LNIGDP + 1.8555*LNEXCH -7.3392*LNINFL -5.5323*LNIR + 197.9088)				

The coefficient is significant (<0.05) and negative, which shows that the variables move back to equilibrium in the long run at approximately 57% annually. This means that the speed of adjustment to equilibrium in the short run is approximately 57% per annum. Additionally, all the variables are significant at 5% level implying that they all explain short-run fluctuations in money demand.

Table 6: Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIGDP	-6.370245***	1.557977	-4.088792	0.0027
LNEXCH	1.855534****	0.254749	7.283789	0.0000
LNINFL	-7.339199***	1.658272	-4.425812	0.0017
LNIR	-5.532347***	1.466068	-3.773594	0.0044
C	197.90881***	42.511406	4.655429	0.0012

the table, it is interesting to note that all the independent variables are long-run significant determinants of money demand (M2). This is indicated by the significant probability values and large t-values (>2) at 5% level of significance. This model explains that in the long run, money demand (M2) will be positively affected by percentage changes in exchange rates and negatively by percentage changes in gross domestic product, inflation, and interest rate.

Stability Tests

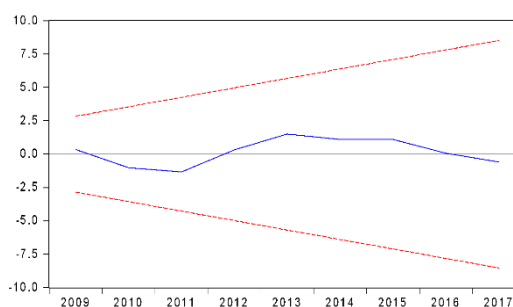


Fig 1: CUSUM test

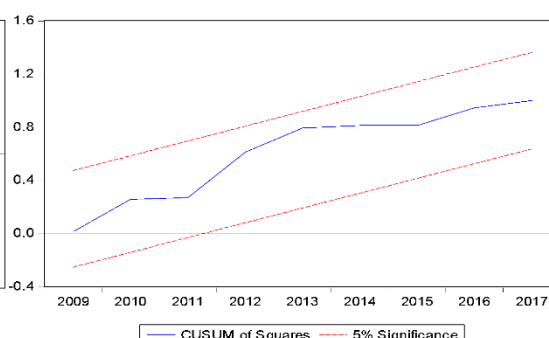


Fig 2 : CUSUM SQ Test

DISCUSSION

This study attempted to establish the determinant of money demand in Zambia as it is a prerequisite to the confident execution of monetary policy. As a proxy for money demand, the study used monetary aggregates (M2) which is in conformity with the Bank of Zambia. The choice of the regressors or independent variables were drawn from both the theoretical and empirical literature review and these variables include real gross domestic product, exchange rates, interest rates, and inflation. In achieving the desired outcome, the researcher conducted unit root tests and cointegration. It was discovered that all the variables were

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stationary at first difference except for log of exchange rate which was stationary at level; hence the adoption of the ARDL model of estimation. Further, a cointegration equation was established whose coefficient indicated that in the long run, variables move back to equilibrium at the speed of 57% per year.

In the short run, it was discovered that all the explanatory variables and the lag of broad money (M2) were significant and determined money demand. The lag of M2 had a coefficient of 1.465 which means the current demand for money is positively determined by the previous demand for money. In line with Keynes (1936), GDP positively affected money demand as evidenced from the obtained coefficient of 16.702. Contrary to Keynesian theory of liquidity preference, Treasury bill rate (interest rate) gave a positive sign of 7.565 at 5% level of significance. However, this is not paradoxical as Nell (1999), Ansari (2002), and Mutsau (2013) found similar observations. Ansari (2002) justifies the positive sign stating that it is plausible in developing countries to have such a relationship between money demand and interest rates (Treasury bill rate). He argues that it is the response of economical agents to higher interest rates of holding money in the form of long-term fixed deposits that perpetrate the positive short-term interest rate elasticity of money demand.

Therefore, this justifies the Zambian money demand model estimated in our study. Furthermore, the exchange rate has an expected negative sign which is in line with the formulated hypothesis supported by Kumar (2010) who also established that money demand responds negatively to variations in exchange rate and inflation albeit by small amounts. The negative sign of inflation was also the case for Musona (1989), despite being against theory. It is the reason why he dropped the inflation variable from his model and remained with a Keynesian demand model. However, a long period of a controlled economy can be an explanation to such an outcome.

While in the long run, all the independent variables were significant and therefore determined the money demand model in Zambia within the study period. Consistent with theory and empirical review, the exchange rate gave a significantly high and positive coefficient of 1.856. The significance of interest rates and inflation rates is mainly attributed to the fact that they are directly controlled by policy in the short run (Bank of Zambia, 2012).

Furthermore, the ultimate objective of this study was to assess the stability of the money demand function in Zambia between 1984 and 2021. In testing for stability, the paper adopted the CUSUM and CUSUM-SQ stability test. The test was adopted from Mutsau (2013) who used this stability test to assess the money demand function in South Africa. 5. E to the empirical analyses done in this study, the money demand function in Zambia is generally stable. The implication of this result is that monetary aggregates can still play an important role in monetary policy implementation in Zambia, as well as in other developing countries that have been using a similar framework. Monetary aggregates have a significant effect on output and prices. The results from the ARDL analysis of the monetary transmission mechanism also support the importance of monetary aggregates in the conduct of monetary policy which signifies the influence that monetary aggregates have on output and prices. Chileshe (2014) found similar results in a study of the stability of the money demand function for Zambia and other COMESA countries. In cross-regional analysis, Mutsau (2013) found a stable function existed in South Africa as well as Kumar (2010) in Nigeria. On the contrary, Jemmeh (2012) discovered that money demand was unstable in Gambia.

For the implementation of monetary policy in any economy to be successful, it must be dependent on the monetary policy tools used. Further, there must be a supportive structure of the economy. However, emerging and changing economies, like Zambia's, present challenges that may make the implementation of monetary policy not successful in the attainment of monetary policy goals. It is therefore very important to conduct empirical analyses of the monetary policy tools in place to assess their effectiveness and to design implementation tools that will produce the desired goals in case the current tools are found to be not effective.

The main objective of this study was to assess the determinants of money demand in Zambia between 1984 and 2021 as well as assessing its stability. This was premised on the fact that a variation in the money demand sets a significant basis for the confident formulation and execution of monetary policy. As far as the money demand function in Zambia is concerned, this study has shown that it is generally stable. The results of this study show that monetary aggregates can still play a determinant role in the implementation of monetary policy in the country. Further, in line with the monetarists view, the results for this study have shown that inflation is purely a monetary phenomenon, a case for Zambia. Because of the stability in the function, monetary policy which just focuses on money supply targeting may be reliable in controlling inflation for Zambia.

As the link between consumer prices and monetary aggregates weakens, the Bank of Zambia, as well as many other central banks in similar situations, would need to start the search for a policy instrument that would improve the implementation of monetary policy. This could include inflation targeting. This is where a reduction in inflation is targeted through a policy rate as opposed to focusing on maintaining a certain growth rate in money aggregates.

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CONCLUSION

It can be concluded that the specific relationship between income, inflation, interest, exchange rate and money demand are significant in relation to the effectiveness of the monetary policy.

For the implementation of monetary policy in any economy to be successful, it must be dependent on the monetary policy tools used. Further, there must be a supportive structure of the economy. However, emerging and changing economies, like Zambia's, present challenges that may make the implementation of monetary policy not successful in the attainment of monetary policy goals. It is therefore especially important to conduct empirical analyses of the monetary policy tools in place to assess their effectiveness and to design implementation tools that will produce the desired goals in case the current tools are found to be not effective.

The results of this study show that monetary aggregates can still play a determinant role in the implementation of monetary policy in Zambia. Further, in line with the monetarists view, the results for this study have shown that inflation is purely a monetary phenomenon, a case for Zambia. Because of the stability in the function, monetary policy which just focuses on money supply targeting may be dependable in controlling inflation for Zambia.

RECOMMENDATIONS

1. From the findings, it is recommended that while the modernization of the monetary policy frameworks is undertaken in addressing the emerging economic challenges, monetary aggregates are envisaged to continue playing an important role in the conduct of monetary policy particularly in the case of Zambia. It is therefore not advisable to do away with the traditional policy focus on monetary aggregates since these have a significant bearing on the major macroeconomic outcomes of output and prices.
2. One important observation resulting from this study is that when implementing their monetary policy, developing countries such as Zambia, should not do away with monetary aggregates. They should maintain them as they slowly transition to modern monetary policy instruments. In addition, deliberate mechanisms should be utilized to enhance monetary transmission mechanisms, especially the interest rate channel, by improving the extent of financial involvement and economic development.
3. As indicated in the introduction, most studies have been predominantly focused on the developed economies. There has been very little research done covering Sub-Saharan Africa. The researcher, therefore, implores future researchers to not only use and adopt new estimation techniques but also ensure actual data unlike use of proxies to generate realistic estimates.
4. Further, it is advised that researchers should consider disaggregating GDP into its various components such as gross consumption, capital formation, and net exports. This would help to establish a precise relationship between money demand and components of GDP to aid better policy formulation.

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