

## **1. Introduction**

This study compares two articles, Article 1 and Article 2, examining money demand function and the long-term stability of money demand. Article 1 examines Algeria, while Article 2 investigates Nigeria. Both articles employ econometric techniques to estimate money demand functions and discuss their implications for monetary policy. The comparative analysis highlights the similarities and differences between the two articles, including their issues, Objectives, methods and findings. Additionally, this study aims to replicate the analysis from Article 2 using data from Chile. Then, this study would test the money demand function and its long-term stability of Chile by replicating Article 2's methodology and provide insights for monetary policy decisions in Chile.

## **2. Article 1**

The first paper is “Long-run stability of money demand and monetary policy: the case of Algeria”. This paper is to examine the long-run stability of money demand of Algeria, a resource-rich country that has experienced various external and internal shocks. The authors use real M2, M1 and cash data to estimate the money demand using the ARDL co-integration technique. This paper finds that the most significant motive is the transaction motive, especially for cash, reflecting the weight of informal economy “practices”. It also finds that money demand is determined by interest rate, inflation, and exchange rate, with different elasticities for different aggregates. It concludes that the money demand is stable for M2 and M1, but not for cash, and it also discusses the implications for optimal monetary policy design in Algeria.

### **2.1 Issues**

The instability and volatility of money demand and its relevant monetary policy in Algeria.

The role of interest rate, inflation, and exchange rate in money demand in Algeria.

Given the stability of money demand and the constraints imposed by fiscal dominance and financial repression, the selection of optimal monetary policy instruments and targets in Algeria assumes paramount significance.

## **2.2 Objectives**

To estimate the money demand functions for M2, M1 and cash respectively in Algeria over the period 1979–2019 by using ARDL method.

To test the stability of money demand for different monetary aggregates using various methods such as CUSUM, CUSUMSQ and recursive estimation.

To elucidate the implications of the empirical findings on the design of monetary policy in Algeria, particularly with regard to the selection between monetary aggregates and interest rates as policy instruments or targets.

## **2.3 Methods**

Use ARDL to estimate the long-run money demand functions for M2, M1 and cash in Algeria, taking into account various explanatory variables such as real income, inflation, interest rate, exchange rate and dummy variables for structural breaks.

Use CUSUM and CUSUMSQ to test the stability of the estimated coefficients over time.

The recursive estimation method is employed to assess the stability of the long-run relationships between money demand and its determinants over time.

## **2.4 Findings and Discussion**

The transaction motive exhibits statistical significance for all three aggregates. The elasticity of real income is approximately equal to one for both M2 and M1, while for cash, it is slightly higher.

Inflation exerts a negative and statistically significant influence on money demand across all three aggregates, with a higher elasticity observed for cash. Likewise, the interest rate exhibits a negative and significant impact on money demand for all three aggregates, with a relatively higher elasticity observed for M1 and cash. Furthermore, the exchange rate demonstrates a

positive and significant effect on money demand for all three aggregates, indicating the presence of currency substitution, particularly pronounced for M1 and cash.

The money demand is stable for M2 and M1, but not for cash. The instability of cash demand is mainly due to inflation shocks and structural breaks. The stability of M2 and M1 demand suggests that these aggregates can be used as intermediate targets or indicators for monetary policy in Algeria.

## **2.5 Conclusion**

The findings of the study lead to the conclusion that the demand for money in Algeria during the period of 1979-2019 is stable for M2 and M1 aggregates, while exhibiting instability for cash. This implies that monetary policy can rely on these aggregates as intermediate targets or indicators, rather than interest rates or exchange rates. However, the paper also warns that monetary policy should take into account the fiscal dominance situation and the financial repression mechanisms that limit its effectiveness and credibility. The paper recommends some reforms to improve the institutional framework and monetary policy transmission channels in Algeria.

## **3. Article 2**

The second paper is “The stability of money demand in Nigeria: An autoregressive distributed lag approach”. The focus of this paper is to investigate the stability of money demand in Nigeria, a developing country that has encountered numerous economic and political hurdles. To achieve this objective, the study employs the ARDL approach in conjunction with CUSUM and CUSUMSQ tests. The analysis centers on examining the cointegrating property and stability of M2 money demand throughout the period spanning from 1970 to 2003. The study conducted in this paper reveals that there exists cointegration between M2, income, interest rate, and exchange rate in the context of Nigeria. Furthermore, the analysis suggests that the money demand function exhibits a certain level of stability over time. The paper discusses the implications of the results for monetary policy design in Nigeria, especially in terms of

choosing between monetary targeting or inflation targeting regimes.

### **3.1 Issues**

The instability and volatility observed in money demand have significant implications for the design of monetary policy in Nigeria.

The determination of money demand for M2 in Nigeria is influenced by several key factors, income, interest rate, and exchange rate.

In Nigeria, the selection of an optimal monetary policy regime hinges on various factors, including the stability or instability of money demand and the trade-off between monetary targeting and inflation targeting.

### **3.2 Objectives**

To estimate the long-run money demand function for M2 in Nigeria, it is essential to incorporate various explanatory variables such as real income, interest rate, and exchange rate.

To assess the cointegrating property and stability of M2 money demand in Nigeria from 1970 to 2003, the study employs CUSUM and CUSUMSQ tests.

To discuss the implications for monetary policy design in Nigeria, especially in terms of choosing between monetary targeting or inflation targeting regimes.

### **3.3 Methods**

The ARDL approach is to test for cointegration among M2, real income, interest rate and exchange rate, using the bounds testing procedure and the error correction model.

The CUSUM and CUSUMSQ tests is to check the stability of the estimated coefficients over time.

### **3.4 Findings and Discussion**

The paper finds that M2 in Nigeria is cointegrated with income, interest rate, and exchange rate, establishing a long-run equilibrium relationship between money demand and its determinants. The study further reveals that income elasticity is positively and significantly related, interest rate elasticity is negatively and significantly related, while exchange rate elasticity is positive but not significant.

The paper finds that the money demand is stable over time, as indicated by the CUSUM and CUSUMSQ tests.

The paper discusses the implications of the results for monetary policy design in Nigeria. The paper argues that since money demand is relatively stable, monetary targeting can be a viable option for monetary policy in Nigeria. The paper suggests that inflation targeting may be an alternative option for monetary policy in Nigeria, but its implementation would necessitate certain prerequisites, including central bank independence, fiscal discipline, exchange rate flexibility, and the capability for inflation forecasting

### **3.5 Conclusion**

The paper reaches the conclusion that money demand in Nigeria exhibits a relatively stable behavior during the period 1970-2003. This finding suggests that monetary targeting can be a viable choice for shaping monetary policy in Nigeria. Additionally, the paper proposes that inflation targeting could serve as an alternative policy option in Nigeria. However, it highlights the necessity of fulfilling certain prerequisites, including central bank independence, fiscal discipline, exchange rate flexibility, and the ability to forecast inflation accurately, in order to effectively implement inflation targeting.

## **4. Comparison of Articles**

These are general points of similarity and difference based on the provided article.

### **4.1 Similarities**

Both articles examine the stability and volatility of money demand in resource-rich countries (Algeria and Nigeria, respectively) that have faced various economic challenges

Both studies involve the estimation of long-run money demand functions and the examination of the roles played by key determinants, including income, interest rate, and exchange rate.

Both papers explore the implications of their respective findings for the design of monetary policy, taking into account the stability or instability of money demand in their respective countries.

## **4.2 Differences**

**Object of Study:** Article 1 focuses on Algeria, while Article 2 focuses on Nigeria

**Time Period:** Article 1 analyzes the period from 1979 to 2019, while Article 2 covers the period from 1970 to 2003.

**Monetary Aggregates:** Article 1 examines the stability of money demand for three monetary aggregates (M2, M1, and cash) in Algeria, whereas Article 2 specifically focuses on M2 money demand in Nigeria.

**Methodology:** Article 1 employs the ARDL co-integration technique, CUSUM, CUSUMSQ, and recursive estimation, whereas Article 2 utilizes the ARDL approach, CUSUM, CUSUMSQ tests, and dummy variables for structural breaks.

**Findings:** Article 1 finds that the money demand is stable for M2 and M1 but not for cash in Algeria, while Article 2 finds that money demand is stable in Nigeria.

**Implications:** Article 1 discusses the optimal choice of monetary policy instruments and targets in Algeria considering fiscal dominance and financial repression, whereas Article 2 explores the trade-off between monetary targeting and inflation targeting regimes in Nigeria.

## **5. Replication Study**

Chile is a market economy that has achieved remarkable progress in global integration, economic freedom, and low corruption since 1990. It exports mainly copper and other commodities, and has free trade deals with over 60 countries or regions. It has a stable and sound banking system, regulated by an autonomous body. However, the banking system also faces some challenges, such as the high concentration of credit risk, the low financial inclusion, the limited competition, and the exposure to external shocks. The authorities have taken some measures to address these issues, such as strengthening the prudential regulation, enhancing the supervision, promoting the financial literacy, and diversifying the funding sources. Chile follows an inflation-targeting regime, with an independent central bank that sets the interest rate. The central bank has been successful in maintaining price stability and anchoring inflation expectations. However, the monetary policy also faces some difficulties, such as the volatility of capital flows, the uncertainty of output gap, and the changes in money demand. The money demand in Chile has been affected by several factors over the past decades, such as the financial innovation, the real income, inflation rate, and the exchange rate.

## 5.1 Data

This study uses data from the International Monetary Fund (IMF) website to analyze the economic situation of Chile. The data include broad money supply, real GDP, interest rate and exchange rate for Chile from 1996 to 2015. The data are quarterly and cover the entire period. The study aims to estimate the money demand function for Chile.

Table 1 Descriptive statistics

|           | (1) | (2)   | (3)   | (4)   | (5)   |
|-----------|-----|-------|-------|-------|-------|
| VARIABLES | N   | mean  | sd    | min   | max   |
| lnm2      | 79  | 18.37 | 0.505 | 17.54 | 19.27 |
| lny       | 79  | 17.27 | 0.245 | 16.87 | 17.66 |
| r         | 79  | 4.495 | 2.036 | 0.500 | 10.98 |
| exr       | 79  | 541.1 | 81.88 | 408.2 | 737.0 |

## 5.2 Model

In the replication study, the money demand function is estimated using a log-linear form. The monetary aggregates and scale variables are expressed in logarithms, while the interest rates and exchange rates are measured in levels. In this study, the specification of the money demand

function in Chile is as follows:

$$\ln M2_t = a + b \ln Y_t + cr_t + de_t + \varepsilon_t$$

where M2 represents board money in real terms. The choice of board money as M2 is motivated by its effectiveness in capturing the characteristics of weak banking systems and the levels of financial sector development. The variable Y denotes real GDP, while r represents the interest rate. Additionally, e represents the exchange rate, and  $\varepsilon$  represents the error term.

To further co-integrate the test, the ARDL model can be constructed:

$$\begin{aligned} \Delta \ln M2_t = & a_0 + \sum_{j=1}^n a_j \Delta \ln M2_{t-j} + \sum_{j=1}^n \mu_j \Delta \ln Y_{t-j} + \sum_{j=1}^n \rho_j \Delta r_{t-j} + \sum_{j=1}^n \theta_j \Delta e_{t-j} + d_1 \ln M2_{t-1} \\ & + d_2 \ln Y_{t-1} + d_3 r_{t-1} + d_4 e_{t-1} + \varepsilon_t \end{aligned}$$

### 5.3 Empirical results

Table 2: Benchmark regression

| VARIABLES    | (1)<br>lnm2             |
|--------------|-------------------------|
| lny          | 1.9664***<br>(38.38)    |
| r            | -0.0127<br>(-1.64)      |
| exr          | 0.0002<br>(1.52)        |
| Constant     | -15.6800***<br>(-17.03) |
| Observations | 79                      |
| R-squared    | 0.960                   |

$$\ln M2_t = -15.68 + 1.9664 \ln Y_t - 0.0127r_t + 0.0002e_t$$

t values      (-17.03)      (38.38)      (-1.64)      (1.52)

The regression results show that the signs of the coefficients of real income, interest rate and exchange rate are consistent with those in Article 2. In Article 2, the positive sign of the exchange rate implies that as the Nigerian naira depreciates, the money demand increases.



Similarly, the Chilean data results also imply that the depreciation of the Chilean peso increases the money demand, which is confirmed by observing the exchange rate changes. The interest rate and the money demand have a negative relationship, which is an obvious conclusion. The increase in real income also leads to an increase in money demand, which is consistent with the results obtained for Nigeria. The increase in Chilean money demand also indicates that the wealth effect is significant in Chile's development over the past decades.

The results of the ADRL model test are shown in Table 3, but the results between most variables were not significant, but the results between income and monetary demand was significant.

Table 3 Full Information estimate of ADRL model (dependent variable is  $\Delta \ln M2$ )

| Variables             | Model selection criterion |                     |                     |                     |
|-----------------------|---------------------------|---------------------|---------------------|---------------------|
|                       | AIC                       | SIC                 | HQ                  | Adjusted $R^2$      |
| $\Delta \ln M2_{t-1}$ | 0.101 (0.824)             | 0.093 (0.778)       | 0.113 (0.947)       | 0.132 (1.062)       |
| $\Delta \ln M2_{t-2}$ |                           |                     |                     | 0.089 (0.695)       |
| $\Delta \ln M2_{t-3}$ |                           |                     |                     | 0.117 (0.906)       |
| $\Delta \ln M2_{t-4}$ |                           |                     |                     | 0.155 (1.212)       |
| $\Delta \ln M2_{t-5}$ |                           |                     |                     | 0.318 (2.498)       |
| $\Delta \ln M2_{t-6}$ |                           |                     |                     | 0.216 (1.609)       |
| $\Delta \ln Y$        | -0.230 (-<br>1.482)       | -0.048 (-<br>0.581) | -0.060 (-<br>0.727) | -0.180 (-<br>1.121) |
| $\Delta \ln Y_{t-1}$  | -0.399 (-<br>2.038)       |                     |                     | -0.532 (-<br>2.515) |
| $\Delta \ln Y_{t-2}$  | -0.353 (-<br>1.800)       |                     |                     | -0.417 (-<br>2.051) |
| $\Delta \ln Y_{t-3}$  | -0.152 (-<br>0.935)       |                     |                     | -0.150 (-<br>0.902) |
| $\Delta \ln R$        | -0.004 (-                 | -0.008 (-           | -0.009 (-           | -0.007 (-           |

|                      |                     |                     |                     |                     |
|----------------------|---------------------|---------------------|---------------------|---------------------|
|                      | 0.372)              | 0.766)              | 0.922)              | 0.570)              |
| $\Delta \ln E$       | -0.052 (-<br>0.600) | 0.006 (0.0767)      | -0.019 (-<br>0.236) | -0.026 (-<br>0.299) |
| $\Delta \ln E_{t-1}$ | 0.101 (1.254)       |                     | 0.125 (1.567)       | 0.090 (1.102)       |
| Constant             | 0.0308 (3.789)      | 0.020 (4.426)       | 0.019 (4.251)       | 0.011 (1.013)       |
| $EC_{t-1}$           | -0.123 (-<br>2.314) | -0.062 (-<br>1.301) | -0.074 (-<br>1.552) | -0.241 (-<br>3.377) |

Figures 1 and 2 show the results of CUSUM and CUSUM Q test of ARDL model, and CUSUM Q test shows poor model stability.

Figure 1 CUSUM test

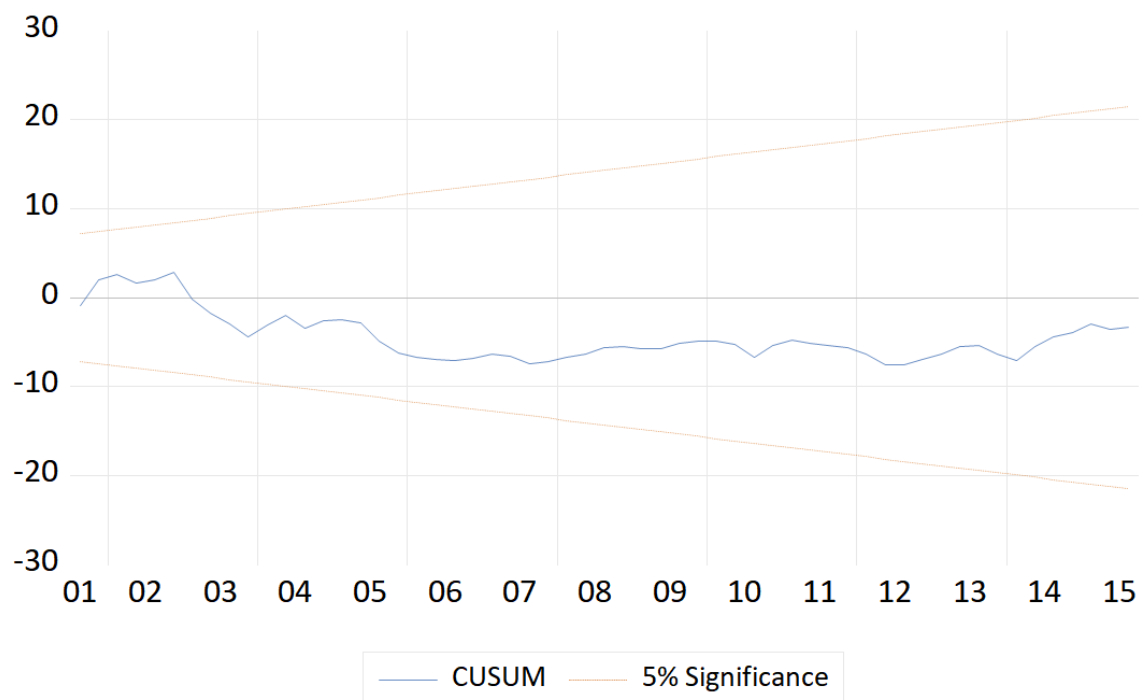
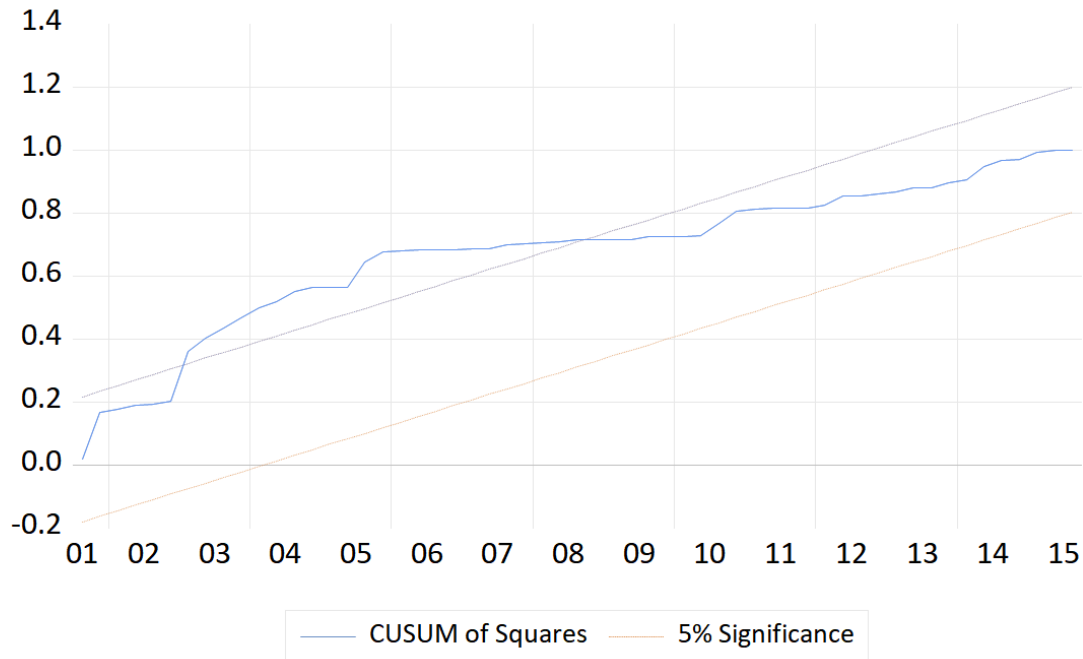


Figure 2 CUSUM Q test



## 6. Conclusion

This study compares two articles on money demand and money demand stability, which study the cases of Algeria and Nigeria respectively. Both articles use econometric methods to estimate money demand functions and discuss their implications for monetary policy design. The comparative analysis highlights the similarities and differences between the two articles, including their problems, objectives, methods and findings. In addition, this article also attempts to replicate the analysis of the second article using data from Chile. Replicating the second article's method allows us to test the money demand function in the context of Chile, providing insights for Chile's monetary policy decision-making.

This study finds that the money demand function for Chile is stable and co-integrated with real income, interest rate and exchange rate. The paper also confirms the findings of Article 2, which applied the same method to Nigeria. The paper shows that both countries have similar patterns of money demand, which are influenced by the depreciation of their currencies, the level of interest rate and the growth of real income. The paper also suggests that the wealth effect is an important factor for the increase in money demand in Chile, as the country has experienced significant economic development over the past decades.

