



MONETARY POLICY AND MISERY INDEX IN NIGERIA

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Abstract:

This study investigated the influence of monetary policy on the misery index in Nigeria. The data for the study were collected from the numerical bulletin of Nigeria's apex bank spanning 1985 to 2019. The misery index was measured by the sum of unemployment, inflation, and lending rates minus the percentage change in Real Gross Domestic Product per capita. The Augmented Dickey-Fuller test and Autoregressive Distributed Lag - ARDL model were the main tools of analysis. The outcome of the unit root test indicated that the variables were stationary at order zero and one, which fulfilled the requirement to employ the ARDL Bounds testing method. The ARDL Bounds test revealed the presence of long-run association among the variables. The results revealed that monetary policy rate and exchange rate have a significant relationship with the misery index in Nigeria during the period of study. However, there is no significant relationship between the broad money supply and the misery index in Nigeria during the period of study. The study concluded that though monetary policy has the potential of reducing the misery index in Nigeria but it has not been well managed to reduce the misery index in Nigeria during the period of study. That is, monetary policy has not been effective in reducing the misery index in Nigeria during the period of study. Based on these findings, the study recommended that monetary authority should adopt the monetarists' 'monetary rule' whereby the money supply is increased at a rate equal to the potential annual growth rate of the Gross Domestic Product. The monetary authority should also evaluate her interest rate policies to stimulate investment, increase output of goods and services, employment opportunities and reduce the poverty and misery index in the country. That is, make the financial sector to be strong to provide credit at lower interest rates which in turn will increase investment, output of goods and services, employment opportunities and reduce the poverty and misery index in Nigeria. The authority should maintain a managed floating exchange rate system to redress the problem of exchange rate variation in order to reduce the misery index in Nigeria.

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1. Introduction

Monetary policy involves measures designed by monetary authorities to control the volume, cost, availability and direction of money and credit in an economy to achieve some specified macroeconomic policy objectives (Anyanwu & Oaikhenan, 1995; Tom-Ekine, 2011). That is, a conscious effort by the monetary authorities to regulate the money supply and credit conditions for the purpose of achieving certain broad economic objectives. One of the objectives of governments' policies especially monetary policy is to improve the wellbeing of the citizens. In Nigeria, this action is usually taken by the central bank which is the apex monetary authority in the country. It is the responsibility of the monetary authorities to initiate policies that will help to achieve basic macroeconomic objectives which are necessary to maximize the economic well-being of the citizens and at the same time minimize the level of economic misery.

Economic misery is measured by the misery index (MI) developed in the 1960s by Arthur Melvin Okun as a way to provide President Lyndon Johnson with a snapshot of the economy. The misery index put forward by Arthur Melvin Okun was a simple sum of a country's annual unemployment and inflation rates. It is assumed that both an increase in the rates of unemployment and inflation will create economic and social costs for a country. Okun's index measures how people are faring economically in a country. According to Po-Chin, Shiao-Yen and Sheng-Chieh (2014), Okun's misery index can be perceived as a crude utility or just a disutility function in an economy.

However, Okun's index was later modified by Robert Barro of Harvard and Professor Steve Hanke of Johns Hopkins University further improved the model for measuring the misery index. Hanke's modified Misery Index (MI) score for any country is simply the sum of the unemployment, inflation and bank lending rates, minus the percentage change in real GDP per capita. Higher values on the first three variables (unemployment, inflation and lending rates) are "bad" and make individuals more miserable in the country. These "bads" are offset by a "good" (real gross domestic product per capita growth), which is subtracted from the sum of the "bads". A higher value of MI reflects higher stages of "misery" in the country. Following this measurement, the misery index for Nigeria has been troublesome; the country was placed 6th on Hanke's MI in 2017 and 2018. What this suggests is that in 2017 and 2018, Nigeria was the 6th country with miserable people in the world. The word misery connotes unhappiness, distress, wretchedness, hardship, suffering, affliction, anguish, sadness, sorrow, etc. (George-Anokwuru, 2022).

Furthermore, the factors contributing to Nigeria's misery include high unemployment, inflation and interest rates. For instance, in 2005, 2006, and 2007, Nigeria's unemployment rate maintained an increasing trend of 9.4, 9.9 and 10.9 percent respectively. Nigeria's unemployment rate was 12.8 percent in 2008 and 11.2% in 2009 (CBN, 2007 and George-Anokwuru, 2022). The rate of unemployment in Nigeria stood at 10% in 2013. The Public Works and Women/Youth Employment (PW/WYE) Initiatives

launched in 2012, as a component of the Subsidy Reinvestment and Empowerment Programme (SURE-P), recorded significant milestones in 2013. The Scheme engaged 119,680 unskilled youth in labour-intensive activities across the 774 Local Government Areas in the country. Of this, 70,363 were enlisted under the Graduate Internship Scheme. The graduate interns were made up of 50,231 males and 20,130 females. A total of 269 of the graduates were disabled. In an attempt to reduce unemployment, the government initiated job creation programmes including the Graduate Entrepreneurship Scheme (GES). The thrust of the Scheme was to equip unemployed Nigerian graduates with the requisite skills to establish small and viable businesses of their choice. The intent of the training was to empower unemployed young graduates across the nation (CBN, 2013).

In 2014, the number of unemployed in the labour force stood at 7.8%. In 2015, the number of unemployed in the labour force, increased to 10.4 percent, compared with 7.8 per cent 2014, representing an increase of 2.6 percentage points. In 2016, the proportion of unemployed in the labour force, increased to 13.9% at end-December 2015, compared with 10.4% at end-December 2015. The double digits unemployment rate continued until it increased from 18.8% in Q3 2017 to 23.1% in Q3, 2018. The unemployment rate in Q2, 2020 was 27.1% (CBN, 2013, 2014, 2015, 2016, 2017 and 2018).

In addition, rising inflation is another key component of the misery index that has eroded the quality of life of the average Nigerian. Nigeria's inflation rate has warranted considerable attention. For instance, available evidence shows that in 2012, the inflation rate stood at 12.2% and slightly declined to 8.5 and 8.1 in 2013 and 2014. This decline was not sustained as the inflation rate rose to 9.0% and 18.6% in 2015 and 2016 respectively. In 2017, it declined mildly to 15.4%. The continued double-digit inflation rate in Nigeria is worrisome (Gbosi, 2015 & CBN, 2018). In 2019, inflation remained above the single-digit benchmark. Available data revealed that the all-items composite Consumer Price Index (CPI) stood at 307.5 (November 2009=100) at end-December 2019, compared with 274.6 at end-December 2018. The Year-on-Year headline inflation stood at 11.98 per cent at end-December 2019, indicating an increase of 0.54 percentage point, above the level at end-December 2018. Further analysis indicated that inflation decelerated consistently from 11.37 per cent at end-January to 11.25 per cent at end-March 2019 (CBN, 2019).

According to George-Anokwuru (2022), a high inflation rate is linked to resource misallocation that distorts economic efficiency and reduces output growth. High inflation discourages savings and investment, and thus, impedes productivity and output growth. It increases the cost of borrowing and lowers the rate of return on investment. In an inflationary period, the store of value function of money suffers greatly with concomitant implications on output, employment and income distribution (George-Anokwuru, 2022). Various measures were, therefore, taken to ensure that monetary growth was consistent with the macroeconomic objectives including price stability. The Central Bank of Nigeria (CBN) maintained a tight monetary policy stance as the Monetary Policy Rate (MPR) was retained at 12% throughout 2013 (CBN, 2013). In 2014, the CBN also maintained a restrictive monetary policy stance, in the first three quarters of 2014, the apex bank retained the monetary policy rate at 12% and at the end of the fourth quarter the CBN raised it to 13% to maintained domestic price stability (CBN, 2014). The monetary policy

rate was maintained between 11.0 and 13% in 2015 (CBN, 2015). Monetary policy continued to be restrictive in 2016, following inflationary pressures and the eventual sliding of the economy into recession. In that year, the monetary policy rate was raised twice, from 11% to 12% and further to 14%. Its yearly average stood at 12.83 and the cash reserve ratio also increased to 22.50 from 20% during the course of 2016 (CBN, 2016). In 2017 and 2018, monetary policy remained non-expansionary in nature, the MPR was maintained at 14% throughout 2017 and 2018 (CBN, 2017 and CBN, 2018).

In 2019, monetary policy was anchored on key developments in the global and domestic macroeconomic environment. The external factors include the trade war between the US and China; declining oil prices; lingering uncertainty around Brexit; subdued growth in the European Union and Japan, as well as the dampening output growth in China. The major domestic influences include slow economic recovery; banking system liquidity and the need for increased lending to the private sector; decline in external reserves, resurging inflationary pressure, and growing unemployment. The MPR was reduced to 13.50% in March and was maintained throughout the year. High-interest rate – lending rate or double digits interest rate has extremely discouraged investors in Nigeria. This has worsened the well-being of Nigerians. Even as Nigeria's economic well-being has continued to worsen and the misery index has remained high. It is difficult to find empirical work on the influence of monetary policy on the misery index (the sum of unemployment, inflation and lending rates minus the percentage change in real gross domestic product per capita) in Nigeria from 1985 to 2019.

Importantly, existing empirical literatures have reported a plethora of findings on the efficacy of monetary policy on various macroeconomic endogenous variables, but hardly is there any empirical record on the influence of monetary policy on the misery index (the sum of unemployment, inflation and lending rates minus the percentage change in real gross domestic product per capita) in Nigeria from 1985 to 2019. What is rather easily found in existing literatures were the effect of monetary policy on economic growth in Nigeria spanning 1986 to 2016, the impact of monetary policy on inflation control in Nigeria from 1980 to 2019, the effect of monetary policy instruments on unemployment in Nigeria (1986- 2018) among others (Ufoeze, Odimgbe and Ezeabalisi, 2018; Clement, Cyril, Imoagwu, and Ejefobihi, 2021; Okeke and Chukwu, 2021; etc.). These studies have employed different techniques for data analysis, thereby recording incongruent empirical results. In view of the apparent gap in empirics, this study investigated the influence of monetary policy on the misery index in Nigeria from 1985 to 2019. The remaining parts of this paper were structured into a literature review, materials and methods, results and discussion, conclusion and recommendations.

2. Literature Review

2.1 The Monetarist Theory

Monetarists argued that governments should stop trying to direct and regulate economic activities for they distort things and create more problems for the society when they do so, that their policies destabilize rather than stabilize the economy (Akpakpan, 1999). In

addition, monetarists hold that money is the key determinant of macroeconomic activities. In particular, an increase in money supply leads directly to an increase in output and employment (if the economy is operating under capacity) and increases the general price level (if the economy is already operating at full capacity). Put differently, monetarists believe that the money supply is the key determinant of economic activities. They infer that instability in the money supply translates into observed economic instability in economies. They believe that in a dynamic situation, it is impossible to stabilize the economy with a stop-go policy (involving monetary expansion and contraction). This is basically because of the limitation of human knowledge in precisely identifying the right solution. Additionally, there are lag problems: the recognition lag, execution lag, administration lag, etc. which lead to delays in monetary impacts or overreaction to monetary problems. For example, efforts to cure a 'recession' may inadvertently precipitate inflation, and efforts to cure inflation may bring about a recession.

In light of the above problems, the monetarists prescribe what has been referred to as the 'monetary rule'. This is the principle that the amount of money injected into the economy should be equivalent to the rate of growth of the potential GDP of that economy. This, they assert, will stabilize the economy as it grows. According to Umo (2012), the monetarists prescribed something between a 3% and 5% rate of monetary growth annually for the United States. If this monetary rule is adopted, it is claimed, economic fluctuations would be smoothed out. There would, therefore, be no need for the application of fiscal policy. The monetarists believe that fiscal policy is not an important tool of stabilization because of its crowding-out effect. That is, monetarists generally believe that there is an adverse effect of easy fiscal policy on economic growth stabilization. In their view, if government finances a deficit by borrowing from the public, it will be competing against the private sector for loanable funds. This competition will raise the rate of interest. The rise in the interest rate will discourage private investment (i.e., investment in the country will be reduced because of a rise in interest rate); hence inducing cutbacks in their investment and consumption. Put differently, an increased rate of interest following government borrowing from the public will 'crowd out' both private investment and consumption. The expansionary impact will, therefore, be very minimal.

Monetarists also believe that if the deficit is financed by borrowing directly from Central Bank, the effect will be expansionary. But they do not regard this as pure fiscal action. It is essentially a monetary action brought about by the creation of new, high-powered money (i.e., direct supply of money credit). Monetarists believe absolutely in the potency of monetary action.

Monetarists consider that changes in money supply play a direct role in the determination of output growth in any economy. That is, the money supply performs a causal role in economic growth, and being treated as an exogenously determined tool, disequilibrium in the economy can be tackled by controlling the money supply therefore, they believe in the effectiveness of monetary policy in output growth stabilization. Therefore, deducing from the above implicit theoretical stance, the functional relation of the variables in this study can be presented as:

$$Y = f(MP) = f(M2, MPR, EXR) \quad (1)$$

Where; Y depicts the Misery Index (MI), MP is monetary policy tools; where the dependent variable is MI while the selected independent variables are broad money supply ($M2$), monetary policy rate (MPR) and exchange rate (EXR).

2.2 Empirical Review

Empirically, this study reviewed studies on the effect of monetary policy on separate indicators of the misery index. For example, Onyeiwu (2012) used Ordinary Least Squares (OLS) method to investigate the impact of monetary policy on Nigeria's economy. The finding revealed that monetary policy represented by money supply exerted a positive impact on GDP growth and balance of payments but a negative impact on the rate of inflation. The researcher concluded that monetary policy is effective in regulating the liquidity of the economy which affects some macroeconomic variables such as output, employment and prices.

Ahiabor (2013) employed descriptive techniques to investigate the effects of monetary policy on inflation in Ghana from 1985-2009. The results revealed a long-run positive association between money supply and inflation, a negative relationship between interest rate and inflation, and, a positive relationship between exchange rate and inflation.

Osasohan (2014) studied the impact of monetary policy on economic growth in the United Kingdom (UK) from 1940-2012 using Vector Error Correction Model (VECM). The study found that money supply and rate of inflation were the major tools of UK monetary policy that enhances economic growth in the country.

Similarly, Chipote and Palesa (2014) employed Error Correction Model and Johansen Co-integration to investigate the impact of monetary policy on economic growth in South Africa for a period of 2000 to 2010. The outcomes revealed that money supply as a monetary policy tool had an insignificant influence on economic growth in South Africa.

Chinwuba, Akhor and Akwaden (2015) studied the impact of monetary policy innovations on the growth rate of output in Nigeria within the period 1985 to 2012. The study employed Vector Autoregressive (VAR) estimation technique in the analysis of data. The outcome showed that the money supply exerts a significant influence on the growth of output in Nigeria while the exchange rate and interest rate were insignificant.

Using Error correction models, Attamah, Anthony and Ukpere (2015) investigated the impact of fiscal and monetary policies on the unemployment problem in Nigeria spanning 1980 to 2013. To realize this, fiscal policy variables - government expenditures and revenues were used while monetary policy variables - broad money supply ($M2$), interest and exchange rates were. The outcome of the study exposed that while government expenditure had a positive relationship with the unemployment rate in Nigeria, government revenue was negative and insignificant to the unemployment rate. For monetary policy, the result revealed that money supply and exchange rate had a positive and significant impact while interest rate has only a positive relationship with

the unemployment rate in Nigeria. The study also discovered that increases in interest and exchange rates escalate unemployment through an increase in production cost which discourages the employment of a large workforce by the private sector. Also, real GDP (national productivity) had a negative and meaningful impact on Nigeria's unemployment rate.

Essien, Manya, Arigo, Bassey, Ogunyinka, Ojegwo and Ogbuehi (2016) examined the link between unemployment and monetary policy in Nigeria using a vector autoregressive (VAR) framework for the period 1983q1 – 2014q1. The paper investigates the effect of structural change by identifying three structural breakpoints and incorporating them into the VAR model as dummy variables. The outcomes revealed that a positive shock to the policy rate raises unemployment over a 10-quarter period. The result also revealed the existence of a dynamic association between monetary policy and unemployment in Nigeria.

Using money supply as a measure of monetary policy, Ordinary Least Square technique and the Granger causality test, Inam and Ime (2017) carefully examined the impact of monetary policy on Nigeria's economic growth spanning 1970 to 2012. The study discovered that money supply has a positive and insignificant relationship with economic growth. The result also revealed no causality between money supply and economic growth in Nigeria.

Ufoeze, Odimgbe and Ezeabalisi (2018) explored the influence of monetary policy on economic growth in Nigeria spanning 1986 to 2016. The study adopted an Ordinary Least Squares technique, granger causality and co-integration tests. The study discovered the existence of a long-run association among the variables. In addition, the study specifically revealed that monetary policy rate, interest rate, and investment have an insignificant positive effect on economic growth in Nigeria. Money supply however has a significant positive effect on growth in Nigeria. The exchange rate has a significant negative effect on GDP in Nigeria. Money supply and investment granger cause economic growth, while economic growth causes interest rates in Nigeria. Overall, monetary policy explains 98% of the changes in economic growth in Nigeria. Thus, the study concluded that monetary policy can be effectively used to control Nigerian economy and thus a veritable tool for price stability and improve output.

Ekwe (2018) investigated the relationship between monetary policy variables (Treasury bill rate, money supply, monetary policy rate, and exchange rate) and unemployment using the error correction model (ECM) as the main tool of analysis. The study discovered that the Treasury bill rate and money supply have a positive relationship with unemployment in Nigeria. The result also revealed monetary policy rate and exchange rate have a negative relationship with unemployment in Nigeria.

Ayodeji and Oluwole (2018) studied the impact of monetary policy on economic growth in Nigeria by employing Error Correction Model and Granger causality test techniques. From the result, two variables (money supply and exchange rate) had a positive but fairly insignificant impact on economic growth. Measures of interest rate and liquidity ratio had a negative but highly significant impact on economic growth. At the same time, the Engle-Granger co-integration test was done and showed the existence of

a long-run association between monetary policy and economic growth in Nigeria. Also, the Granger causality test was done and the results showed the existence of a unidirectional causality between money supply and economic growth, economic growth Granger causes liquidity ratio and exchange rates while bidirectional causality exists between interest rate and economic growth.

Adamu (2020) examined the role of monetary policy as an instrument for growth in the Ghanaian economy. The study was conducted based on yearly data from 1983 to 2017. The ARDL bounds test technique was employed to investigate cointegration among the variables. The results confirmed the presence of cointegration among the variables. The results also showed that in the long run, money supply has a significant positive effect on growth in Ghana. However, in the short run, the money supply has a significant negative effect on growth in Ghana. Furthermore, in the long run, the lending rate was found to have an insignificant negative effect on growth but in the short run, it (lending rate) has a significant positive effect on growth.

Bashir and Sam-Siso (2020) investigated the relationship between monetary policy and macroeconomic performance in Nigeria during 1981-2018. The stochastic properties of the time series data were examined using both conventional and unit root tests with structural breaks to account for shift dummy in the series. Their outcomes exposed that in the short run, the lag value of the inflation rate, exchange rate appreciation and unexpected appreciation (i.e., shift-dummy) could reduce the inflation rate while lower MPR and high volume of money in circulation could stimulate the inflation rate. Also, the lag value of the unemployment rate, high MPR and exchange rate depreciation significantly stimulate the unemployment rate while unexpected appreciation reduces it. Low MPR and exchange rate depreciation could stimulate GDP growth rate while unexpected appreciation in exchange rate retards GDP growth in Nigeria. In the long run, the inflation rate is constrained by exchange rate appreciation while depreciation promotes growth but stimulates the unemployment rate in Nigeria. Also, MS2 stimulated inflation and unemployment rate but produce a negative effect on GDP growth in Nigeria.

Using 45 studies conducted between 2001 and 2014, Nguyen (2020) employed a meta-regression analysis (MRA) to synthesize vector-autoregressive findings of the output effects of a tight monetary policy in 32 emerging and developing countries. The outcomes indicated a publication bias. At the same time, strong monetary policy has negatively affected output. Primary studies including commodity price variable(s) tend to report stronger negative effects. In an economy with a developed financial system, output effects are likely to be more negative but less effective in an economy with high inflation volatility.

Henry and Sabo (2020) studied the impact of monetary policy management on inflation in Nigeria spanning 1985-2019. The autoregressive distributed lag analysis was employed on time series data. The result revealed that while monetary policy rate and foreign exchange rate impacted negatively on inflation; broad money supply impact positively on it.

Clement, Cyril, Imoagwu, and Ejefobihi (2021) investigated the impact of monetary policy on inflation control in Nigeria. The study is based on time series data from 1980 to 2019. The Augmented Dickey-Fuller test, Johansen's co-integration test, and the Error Correction model (ECM) estimations were employed in the analysis. The results indicated that monetary policy has no meaningful impact on Nigeria's inflation control both in the short run and long run. Money supply has a negative and inconsequential impact on Nigeria's inflation control both in the short run and long run. Again, the exchange rate has a negative and insignificant influence on Nigeria's inflation control both in the short run and long run. The treasury bill rate has a negative but meaningful effect on Nigeria's inflation control in the short run; meanwhile, it has a positive but insignificant effect on Nigeria's inflation control in the long run.

Zhou (2021) investigated the association between monetary policy and unemployment in the United States from the first quarter of 1983 to the second quarter of 2018. Data were collected and divided into two groups, namely an ex-crisis group and a post-crisis group, based on the event of the 2008 world financial crisis. This paper used an extended version of the original Taylor's rule by adding the concept of unemployment degree. The results suggested that in both periods, the unemployment gap degree made a positive impact on the Fed interest rate and has a constantly significant impact on the Fed rate. As a result, Central Banks should adopt an easy monetary policy to stimulate the domestic economy from recession.

Okeke and Chukwu (2021) examined the effect of monetary policy instruments on unemployment in Nigeria (1986- 2018). The study adopted an Autoregressive Distributed Lag technique and also conducted the unit root and co-integration test. The study found that the cash reserve ratio and monetary policy rate had a positive and insignificant effect on the employment rate in Nigeria, the broad money supply had a positive and significant effect on the employment rate in Nigeria, exchange rate and liquidity ratio had a negative and significant effect on the employment rate in Nigeria. The study concluded that monetary policy has a significant effect on the rate of unemployment.

Chukwuemeka (2022) studied the impact of monetary policy on the unemployment rate in Nigeria using time series data from 1981 to 2020. Autoregressive Distributed Lag (ARDL) model and Error Correction Model (ECM) were utilized to address the main objectives of the study. The estimated short-run coefficient result revealed that the prime lending rate has a positive and insignificant impact on the unemployment rate while the minimum rediscount rate has a negative and insignificant impact on the unemployment rate. In the long run, the outcome revealed a positive and meaningful impact between the prime lending rate and unemployment rate in Nigeria but a negative and meaningful impact between the minimum rediscount rate and unemployment rate in Nigeria. In the short run, the outcome revealed a positive and insignificant impact between the exchange rate and the unemployment rate in Nigeria.

3. Materials and Methods

This study used secondary data spanning 1985 to 2019. Annual time series data on the misery index (the sum of unemployment, inflation, lending rates less GDP per capita growth rate), broad money supply, monetary policy rate and exchange rate were collected from the numerical bulletin of Nigeria's apex bank from 1985 to 2019. In addition, the researcher would have loved to cover from 1960 when Nigeria gained independence from Great Britain to 2022 but because of the paucity of data, the researcher decided to cover the period data were available. Therefore, the period 1985 to 2019 was chosen because of the paucity of data.

3.1 Model Specification

The research model for this study is founded on the explicit form of the Monetarist theory which argued that monetary policy (MP) measures are more influential for income and output growth in an economy thus leading to poverty and misery reduction. That is, $MI = f(MP)$. Where; MI is the misery index and MP is the monetary policy variables (broad money supply, monetary policy rate and exchange rate). The model for this study is presented thus:

$$MI = f(M2, MPR, EXR) \quad (2)$$

The linear form of equation (2) produced;

$$MI_t = \varphi_0 + \varphi_1 M2_t + \varphi_2 MPR_t + \varphi_3 EXR + \varepsilon_t \quad (3)$$

Where; MI is the misery index, M2 is the broad money supply, MPR is the monetary policy rate, EXR is the exchange rate, ε is the error term that denotes other variables not included in the model, t is the period of time and φ_0 is the intercept. The parameter estimates are expected to behave in line with φ_1 and $\varphi_3 < 0$; and $\varphi_2 > 0$.

3.2 Techniques of Data Analysis

Augmented Dickey-Fuller (ADF) unit root test, Johansen Co-integration test and Error Correction Mechanism (ECM) were used in this study as the main analytical techniques. Momentously, all the variables in the model were tested for stationary using the Augmented Dickey-Fuller unit root test procedure. Usually, the ADF test consists of estimating the following regression:

$$\Delta Y_t = M_1 + M_2 t + \delta Y_{t-1} + \sum \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (4)$$

Where: Y is a time series, t is a linear time trend, Δ is the first difference operator, ε is a pure white noise error term, M_1 is a constant, M_2 and δ are parameters and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$, etc. The number of lagged difference terms to include is often

determined empirically, the idea is to include enough terms so that the error term in (3) is serially uncorrelated. In ADF, we test whether $\delta = 0$ (Gujarati & Sangeetha, 2007).

The study employed Autoregressive Distributed Lag Bounds testing method to co-integration developed by Pesaran and Shin (1999). Unlike other co integration test, bounds test is applicable irrespective of whether the variables included in the model are I(0) or I(1) or a mixture of those. However, the technique is not appropriate in the presence of I(2) series. Therefore, before employing the Bounds Test it was necessary to test for the level of integration of all the variables of interest by using the ADF Test. The test to find out if the variables in this study are co-integrated or have long-run relationship was done by computing the Bounds F-statistic (bound test for co-integration). The null hypothesis of no co-integration is rejected when the value of the test statistic exceeds the upper critical bounds value, while it is not rejected if the F-statistic is lower than the lower bounds value. Otherwise, the co-integration test is inconclusive. The Autoregressive Distributed Lag (ARDL) method was employed in order to capture the long-run as well as the short-run dynamic relationship among the variables. Therefore, the ARDL model is written as follows:

$$\begin{aligned} \Delta MI_{t,j} = & b_0 + b_1 MI_{t-1,j} + b_2 M2_{t-1,j} + b_3 MPR_{t-1,j} + b_4 EXR_{t-1,j} + \sum_{i=1}^{n1} a_{1i,j} \Delta MI_{t-1,j} \\ & + \sum_{i=0}^{n2} a_{2i,j} \Delta M2_{t-1,j} + \sum_{i=0}^{n3} a_{3i,j} \Delta MPR_{t-1,j} + \sum_{i=0}^{n4} a_{4i,j} \Delta EXR_{t-1,j} + \mu_t \end{aligned} \quad (5)$$

Where Δ is the difference operator, n is the optimal lag length, $\alpha_1, \alpha_2, \alpha_3, \alpha_4$, represent the short run dynamics of the model and b_1, b_2, b_3, b_4 , are the long run elasticities and μ_t is the error term. ECM_{t-1} is the error correction term obtained from the co-integration model. The error coefficients (λ_1) show the rate at which the co-integration model corrects its previous period's disequilibrium or speed of adjustment to restore the long run equilibrium relationship. The coefficient of ECM is expected to be negative and statistically significant. A negative and significant ECM_{t-1} coefficient implies that any short run movement between the dependent and explanatory variables will converge back to the long run relationship.

4. Results and Discussion

To avoid spurious regressions which may arise as a result of carrying out regressions on time series data, this study first subjected the data to stationarity test by using the Augmented Dickey Fuller (ADF) tests. For detail result of the Augmented Dickey Fuller (ADF) tests, see the Table 1.

The stationarity test result presented in Table 1 reveals that at five per cent level of significance, MI, M2 and EXR were stationary at first difference 1(1) as their respective ADF statistics are greater than 5 per cent critical values, while MPR was stationary at

level 1(0). Given that the variables were integrated of order 1(1) and 1(0). The requirement to fit in an ARDL model to test for long run relationship is satisfied.

Table 1: Unit Root Test

Variables	Level form		First difference		Order of integration
	ADF Statistics	5% Critical Value	ADF Statistics	5% Critical Value	
MI	-2.651243	-2.951125	-5.336912	-2.954021	1(1)
M2	-1.973483	-3.552973	-3.616783	-3.595026	1(1)
MPR	-3.124012	-2.951125	-	-	1(0)
EXR	-0.916929	-2.951125	-5.894184	-2.954021	1(1)

Note: MI, M2, MPR and EXR as earlier defined

Source: Authors' Computed Result from E-views 10.

Table 2: ARDL Bounds Test for Co-integration

Model	F-Statistic = 5.282313	
MI = F(GCE, GRE, TRE, EXD, DDT)	K = 3	
Critical Values	Lower Bound	Upper Bound
5%	3.38	4.23

Source: Authors' Computed Result from E-views 10.

The result of the ARDL bounds test for co-integration reveals that there is a long run relationship amongst the variables (MI, M2, MPR and EXR). This is because the computed F-statistic of about 5.28 is higher than the upper critical bounds at 5% critical value. This provided evidence to reject the null hypothesis of no co-integration at 5% significance level for the misery index model. Following the establishment of long-run co-integration relationship among the variables, the long-run and short-run dynamic parameters for the variables were obtained.

Table 3: Estimated ARDL Long Run Coefficients. Dependent Variable: MI ARDL (4, 3, 3, 3, 0, 2)

Regressors	Coefficient	t-Statistic	P-Value
LOG(M2)	48.16819	3.321600	0.0043
LOG(EXR)	-43.64840	-4.424777	0.0004
MPR	8.650981	4.764268	0.0002

Source: Authors' Computed Result from E-views 10.

The estimated ARDL long run coefficients reveal that in the long run, broad money supply and monetary policy rate have positive relationship with misery index. At the same time, exchange rate has negative relationship with misery index. Interestingly, all the independent variables are statistically significant. This means that, in the long run, if monetary policy – broad money supply, monetary policy rate and exchange rate is well managed it will have a meaningful influence on misery index in Nigeria.

Table 4: Error Correction Representation for the Selected ARDL Model ARDL(2, 1, 3, 4)

Regressors	Coefficients	t-Statistic	P-Value
LOG(M2)	9.906512	0.743254	0.4681
LOG(EXR)	14.76361	2.385829	0.0297
MPR	-1.527185	-2.549094	0.0214
ECM (-1)	-0.948943	-5.745821	0.0000
R-squared = 0.787475	Akaike info criterion = 7.361051	Schwarz criterion = 7.869885	Durbin-Watson stat = 2.169464

Source: Authors' Computed Result from E-views 10.

Table 4 suggests that the dynamic model is a good fit. The reason is that the difference in predictors account for 79 percent of the overall disparity in the model looking at the R². Put differently, the R² value of 0.787475 reveals that the variation in the misery index explained by broad money supply, monetary policy rate and exchange rate is 79 percent. Therefore, the explanatory power of the model estimated is 79 percent. The Durbin Watson (DW) value of 2.169464 suggests that the model is free from autocorrelation. The coefficient of ECM has the hypothesized negative sign (-0.948943) and is statistically significant. This shows it adjustment from short-run equilibrium to long-run equilibrium in the dynamic model.

Furthermore, in Table 4, the coefficients of broad money supply and exchange rate have a positive sign. This means that a percentage increase in the broad money supply and exchange rate will increase the misery index in Nigeria. The outcome is not consistent with theoretical expectations in economics. At the same time, the absolute value of the t-statistic for the slope coefficient of the broad money supply is not significant. This means that the broad money supply has not been well managed to reduce the misery index in Nigeria during the period of study. It also means that there is no significant relationship between the broad money supply and the misery index in Nigeria during the period of study. Meanwhile, the absolute value of the t-statistic for the slope coefficient of the exchange rate is significant. Therefore, if policies regarding exchange rates are well managed, they will help to reduce the misery index in Nigeria. This also means that there is a significant relationship between the exchange rate and the misery index in Nigeria during the period of study.

The coefficient of the monetary policy rate has a negative sign. This outcome is not consistent with theoretical expectations in economics. This means that a percentage increase in monetary policy rate will reduce misery index. In addition, the absolute value of the t-statistic for the slope coefficient of monetary policy rate is significant. This means that there is a significant relationship between monetary policy rate and misery index in Nigeria during the period of study. Therefore, if monetary policy regarding monetary policy rate is well managed it has the ability to maintain a meaningful influence on misery index in Nigeria.

4.1 Post-Estimation Diagnostic Test Result

The Wald test was applied to confirm if the coefficients of the causal variables in the ECM model are jointly significant. The F-statistic in Table 5 was utilized to ascertain this. In

addition, normality was also conducted. In this test, the Jarque-Bera statistic was applied to examine whether the error term in the misery index model is normally distributed at 5 per cent significance level.

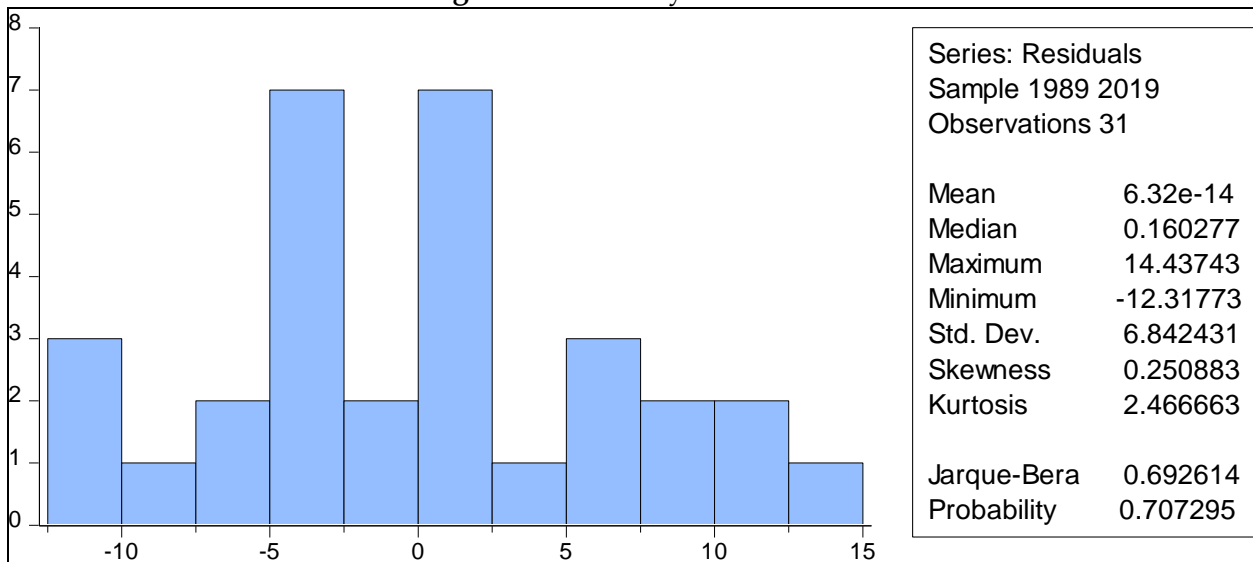
Table 5: Wald Test Result

Wald Test			
Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	19.10738	(4, 16)	0.0000
Chi-square	76.42952	4	0.0000

Source: Authors' Computed Result from E-views 10.

The result in Table 5 shows that the F-statistic is approximately 19 and the probability value of 0.0000 is less than 0.05 at the conventional 5 per cent level. Therefore, all the independent variables used in the model are jointly important in explaining misery index in Nigeria during the period of study.

Figure 1: Normality Test Result



Source: Authors' Computed Result from E-views 10.

The result shown in Figure 1 depicts that the error term is normally distributed at the conventional level (i.e., 5%). This is because the probability value of the Jarque-Bera statistic of approximately 0.707 is greater than the 0.05% conventional level. This implies that the Jarque-Bera statistic hypothesis of normally distributed residuals in the ECM model is accepted.

5. Conclusion and Recommendations

There is no gain in saying that indicators of the misery index including inflation and unemployment are enemies of the poor. For example, a high rate of inflation wipes out whatever meagre earning power the poor might have had. Unemployment, on the other

hand, denies the poor of income which constitutes an important means of livelihood. The role of monetary policy in stabilizing the economy in order to rein inflation and generate employment is therefore critical to the poverty and misery index reduction effort in Nigeria. This study examined the effect of monetary policy on the misery index in Nigeria from 1985 to 2019. Annual time series data on the misery index (the sum of unemployment, inflation, lending rates less GDP per capita growth rate), broad money supply, monetary policy rate and exchange rate were collected from the numerical bulletin of Nigeria's apex bank. The study employed unit root test via Augmented Dickey-Fuller test and Autoregressive Distributed Lag (ARDL) method. The results revealed that the monetary policy rate and exchange rate have a significant relationship with the misery index in Nigeria during the period of study. However, there is no significant relationship between the broad money supply and the misery index in Nigeria during the period of study. The study concluded that though monetary policy has the potential of reducing the misery index in Nigeria but it has not been well managed to reduce the misery index in Nigeria during the period of study. That is, monetary policy has not been effective in reducing the misery index in Nigeria during the period of study. Based on these findings, the study recommended that monetary authority should adopt the monetarists' 'monetary rule' whereby the money supply is increased at a rate equal to the potential annual growth rate of the Gross Domestic Product (GDP). The monetary authority should also evaluate her interest rate policies to stimulate investment, increase the output of goods and services, and employment opportunities and reduce the poverty and misery index in the country. That is, make the financial sector to be strong to provide credit at lower interest rates which in turn will increase investment, output of goods and services, employment opportunities and reduce the poverty and misery index in Nigeria. The authority should maintain a managed floating exchange rate system to redress the problem of exchange rate variation in order to reduce misery index in Nigeria. Importantly, this study has made a significant contribution to knowledge in that it examined the effect of monetary policy on misery index in Nigeria from 1985 to 2019. Furthermore, it is obvious that the subject matter of this study is by no means exhausted in this work. Therefore, further studies should focus on the impact of monetary policy adopted by the monetary authorities in Nigeria on separate indicators of misery index.

Conflict of Interest Statement

The author declares no conflicts of interest.

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