

Monetary Policy and People's Socio-Economic Welfare in Nigeria

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Abstract: This study examined the effect of monetary policy on the socio-economic welfare of Nigerians between 1980 and 2021 from three perspectives: income, health and education. We assessed the short and long run effects of six monetary policy variables (lending rate, savings deposit rate, liquidity ratio, monetary policy rate, loan deposit ratio and private sector credit to gross domestic product ratio) and inflation (control variable on three different socio-economic welfare variables (gross domestic product per capita, child mortality rate and primary and secondary school enrolment) during the study period. Results of the autoregressive distributed lag (ARDL) technique show that revealed interest rate, liquidity rate and private sector credit have negative and significant effect on the per capita income while savings deposit rate, monetary policy rate, loan deposit rate and inflation have a positive and significant effect on per capita income. In the long run liquidity ratio and monetary policy rate have significant positive effect on income per capita while the ratio of private sector credit to GDP has a significant negative effect on it. Inflation has a positive but insignificant effect on per capita income. Furthermore, in the short run, all the selected monetary policy variables have significant effects on child mortality rate. While the effect of interest rate, liquidity ratio and monetary policy rate is negative, that of savings deposit rate, loan deposit ratio, private sector credit and inflation is positive. On the long run, interest rate, private sector credit and inflation have positive effect on child mortality but whereas the effect of interest rate is insignificant, the other two have significant effect. Regarding number of school enrolment, in the short run, interest rate has a negatively significant effect while liquidity ratio, loan deposit ratio and inflation have direct positive effect on it. Savings deposit rate has an insignificant positive effect on it while private sector credit has a negative insignificant effect on it. On the long run, interest rate, private sector credit and inflation have an insignificant positive effect on the number of primary and secondary school enrolment. Savings deposit rate, monetary policy rate and loan deposit ratio have insignificant negative effect on it. The effect of liquidity ratio is significantly positive. The study concluded that monetary policy has significant effect on the socio-economic welfare of Nigerians both in the short and long run. The study recommends the sustenance of the existing liquidity ratio and monetary policy rate due to their favourable effects on the people's welfare.

Keywords: Socio-economic welfare, monetary policy, ARDL

I. Introduction

The West African sub-region has depended largely on exportation of primary products over the years and has equally designed and implemented several policies to enhance the economy and people's welfare, including monetary policy. The countries in the sub-region have tried to achieve welfare goals including employment, better standard of living, sustainable environment and economic growth. However, the advent of the COVID-19 pandemic had worsened an already precarious welfare gap among the people Aslam (2021). Lakner (2020) reported that, sequel to several interventionist policies, the long-term notable decrease in the poverty level in Nigeria was reversed due to the pandemic. Although the situation is not peculiar to the West Africa sub-region, the World Bank (2022) reported that more than 39 million of people fell into deep poverty in year 2020 and 2021 due to the pandemic.

The welfare of a people is partly influenced by the effectiveness of monetary and fiscal policies put in place by the government to boost domestic production, increase employment and improve people's income (Landes, 1996). Legros (1998) argued that the economic wealth of the nation is not determined by the amount of silver and gold it holds only but the standard of living of each citizen. Hence, programmes and policies that influence the welfare of citizens have always been the focus of researchers.

Foxton et al (2018) defined monetary policy as conscious actions of the monetary authorities such as the Central Banks to change the quantity and cost of money in an economy to achieve laid down goals. Monetary policy instruments are deliberate attempts by Central Banks aimed at improving the economic and social economic wellbeing of the citizens. These attempts include the manipulation of money market and exchange rates to achieve low unemployment, high output growth rate, low inflation and stable exchange rate.

After the global economic crisis of 2007/2008, major advanced countries embarked on far-reaching easy monetary policies resulting in sharp rise in capital flows into emerging economies. This also spurred the latter to embark on varied monetary policy instruments to curtail inflationary trend that resulted from the inflows.

A major instrument of monetary policy in Nigeria is interest rate which was described by Sanusi (2002) as the price a borrower pays for using someone's else's money. This implies that interest rate determines the cost of credits such that low interest rate can make borrowers to borrow more and vice-versa. Economists believe that *ceteris paribus*, high interest rate will discourage investment, deplete gross domestic product (GDP) and ultimately adversely affect the welfare of the people (Sekuma, 2011). As noted by Oko et al (2016), several challenges are usually faced by monetary authorities in the implementation of monetary policies, including execution/operating cost, fiscal dominance, structural rigidities and external shocks.

As stated by Quirós et al (2018), the people's economic welfare is most times captured by present and future consumption and other resources such as wealth, income and households' endowments. The present consumption view captures economic welfare from immediate consumption perspective while the future lifetime consumption view captures it as welfare a future attainable consumption

El-Jahel et al (2020) noted that in attempt to promote wellbeing in countries, Central Banks enact specific legislations mainly in the form of monetary policy. The authors argued that modelling optimality in monetary policy is typically based on "social welfare loss function" which is expressed in terms of unemployment and inflation. These two macroeconomic variables reduce the wellbeing of the people as they directly impair income and prices. Monetary policy can have damaging effect on the economic and social welfare of the people, including increasing the poor-rich gap and poverty. Termed "regressive monetary policy", Mehar (2018) opined that such policies can reverse the trend of improvement and growth. For example, liberalization with high interest rate spread can cause regression in the anticipated effect of interest rate policy on productive economic sectors and citizens' welfare. The same scenario will characterize the effect of higher return rate and deposits. Higher returns, according to Mehar (2018), can also widen poverty and the rich-poor gap because only the rich few can wait for long period to earn high return on their deposits.

Doepke *et al* (2019) asserted that the view that expansionary monetary policy worsens poverty and inequality has become more popular after the global financial crisis although explicit analysis to confirm the specific "gainers" and "losers" of such policies have remained scarce. High interest rate can elicit cost-push inflation in countries where manufacturers usually obtain their working capital from banks. Producers, especially of products requiring seasoned based raw materials will have to inflate their prices to offset the effect of inflation. Interest rates on personal loans are usually higher than corporate loans because of the high probability of default. In many cases loan beneficiaries are lured to spend their future savings now even when they have to pay high interest rate because the present consumption may ordinarily not be affordable for them Mehar (2018).

Tischbirek (2014) summarized the conventional monetary policy tools as those designed for controlling the monetary base to achieve price stability/inflation control, economic growth and financial system stability. By lowering interest rates, banks try to spur the economy through credit availability to industries thereby ensuring closing the output/productive capacity gap as much as possible. However, monetary policy effectiveness is subject to cyclical fluctuations, shocks and other uncertainties (Zhang, 2019).

Poloz (2019), the Governor of the Bank of Canada, posited that interest rate, as the main monetary policy tool which can be used to promote improved economic welfare, is not a perfect tool. While it can be a tool to control inflation, it should not be the only target of monetary policy. Also, lowering interest rates, according to Poloz, can induce excessive borrowing that makes investment unprofitable. For example, after the global economic crash, lower interest rates have encouraged large borrowings that became risky to emerging economies. This is apart from the problem of lag between execution and effect of monetary policy. Empirical evidence abound that monetary policies affect people's welfare economically (Li, *et al.* 2021; Kuang X, *et al.* 2019. Doepke *et al.* 2019).

How should a citizen's welfare be measured? The conventional measures of welfare (income or poverty reduction) have been criticized as inadequate. Esping-Anderson (2000) argued that the common welfare indicators by the United Nations, World Bank and OECD will never work due to its inability to provide information about individuals' behaviours. Information about the subjective feelings, biasness, values and other behavioural issues are essential for proper measurement of welfare. Esping-Anderson (2000) believed that a more reasonable measure of people's welfare should include economic metrics (income, wealth, savings, debt etc); health measures (illness, wellness, mortality, expectancy); education (educational levels, human capital development, enrolment in schools, dropouts etc); housing (house standard, recreation, neighbourhood, facilities access etc); family and social integration (networking, contacts, family size/members, friendships etc.); leisure time, employment/ workplace experience; personal security, political resources/power among others. Sen (1995) stated that "while mortality rate is not in itself an economic phenomenon, the influences that increase or reduce mortality often have distinctly economic causes. Consequently, there is a prima facie reason for not dismissing mortality as a test of economic performance". The assessment of mortality rate as

economic welfare measure as it is affected by monetary policy provides the motivation for this study. The study examines the effect of monetary policies on the economic welfare of Nigerians from three (3) perspectives: per capita income, access to education and mortality rate.

In Nigeria, frantic efforts have been made by the Central Bank, in the last decade, to design monetary policies that will favour the welfare of the people, especially in terms of their economy and income (Kayode & Adaramola, 2022). However, the extent to which this objective has been achieved over these years is the focus of this study.

II. Literature Review

According to the International Monetary Fund, IMF (2021), the discussion on the effect of monetary policy on citizens' welfare, inequality and poverty, especially in developing countries continues and that wealth and income inequality have increased in both developed and developing countries since the 1980s. The Fund stated that more attention has been placed on inequality versus government policies especially after the global economic crisis than on citizens' economic welfare. Added to this is the debilitating effect of the COVID-19 on income, employment and wealth.

The UNCTAD (2020) reported that authorities' projections on the possible effect of the shock resulting from the Covid-19 pandemic on the global economy have been varied. Nevertheless, there is consensus that the global economy will experience some degree of contraction due to the unexpected shutdown of economic activities that invariably caused losses in both service and manufacture. When added to the financial market distress, the effect of the pandemic on developed countries such as China and the USA is expected to be devastating. At the domestic level, prices of goods and services are expected to skyrocket while public debt would rise.

The UNCTAD noted that many countries have continued to announce packages to reduce the effect of the damage caused by the Covid-19 pandemic to the economic, health and social welfare of people. The packages included financial injections, government spending and transfer payments. If the steps undertaken by developed countries have not sufficiently addressed the welfare gap created by the Covid-19 pandemic, developing countries who were also ravaged by the pandemic couldn't have fared better.

Bonifacio *et al* (2021) in analyzing the path through which monetary policy announcements can affect income and wealth, assessed the "within-country inequality" in advanced economies before and during the Covid-19 pandemic. It was found that well-identified and evaluated monetary policy shocks result in reduction in income inequality among the people. This it does by reducing the rate of unemployment as confirmed by Fuceri *et al* (2018) and Coibion *et al*. (2017). According to Ampudia *et al* (2018), pre-Covid-19 studies have found mixed but negligible negative economic effect of expansionary monetary policy on people's welfare in terms of income inequality. The same scenario was found by Kaplan *et al*. (2018) and Auclert (2019) whose results showed that easy monetary policy announcements reduced poverty and inequality. However, Andersen *et al* (2020) found that expansionary monetary policy in Denmark resulted in wealthy households benefiting more than low-income households because of the returns accruing to the former in terms of increased asset prices.

Oye, *et al* (2018) investigated the "welfare effect of fiscal and monetary policy on the Nigerian economy" using the 2nd order approximated technique of the "Dynamic Stochastic General Equilibrium Model (DSGE)" the study found that monetary policy specifically contributed positively to welfare gains of the people

While examining the channels through which monetary policy affect wealth and income, Bonifacio *et al* (2021) observed that as many Central Banks in the world embarked on easy and relaxed monetary policy in response to the COVID-19 pandemic shock, the possibility of widening the inequality gap has been the concern of researchers and policy makers.

Ha, *et al*. (2020) developed the new Keynesian model which incorporates Calvo price and wage to assess the effect of "shifting trend inflation" on welfare of the Vietnamese people. The authors used Simulated Method of Moment (SMM) to analyze selected economic data (data collected on real GDP, GDP per capita, consumer price index, interest rate yield, nominal interest rate, government expenditure, employment rate and private consumption) from 2005 and 2016 and found that continuous rise in trend inflation played a crucial role in transmitting the effect of shifting inflation to the overall economy. In essence, the authors suggested that targeting a high inflation rate was unfavourable to the Vietnamese's welfare.

El-Jahel *et al* (2021) pooled a sample of 1.5 million people drawn from 141 countries to examine how the welfare of respondents were affected by monetary policy between 2005 and 2019. The authors investigated this effect from two perspectives: 'the best possible life' and the "emotional quality of daily experience" They found that inflation and unemployment adversely impacted the welfare of the people, but the effect was greater on the 'the best possible life' than for "emotional quality of daily experience"

Doepke *et al* (2019) quantitatively assessed the distributional impact of monetary policy in the United States using the life-cycle model and observed that interest rates generated by expected inflation significantly but mixed effects on the welfare of the people. It was discovered that monetary policy pronouncements by the Fed can potentially have sizeable effect on income redistribution

and welfare of the people. The mechanism is such that when inflation is expected to rise, nominal interest rate will increase, depleting nominal positions values and then redistribute wealth from surplus to deficit units.

The question of how relevant monetary policy is to addressing welfare issues during pandemic was dealt with by Li, *et al.* (2021) while studying five world economies: the United Kingdom, Brazil, Japan, China and India. Using event study with regression to examine how consumer price index and real gross domestic product are predicted by interest rates, the authors found that interest rate abnormal changes were significant in United Kingdom China and Brazil whereas they were insignificant in Japan and India.

Kuang, *et al.* (2019) investigated how fiscal and financial policies affect poverty alleviation in selected 382 extremely poor counties in China. Using “panel smooth transition regression (PSTR) models” the study found that both policies positively and non-linearly influenced poverty reduction in the counties. Specifically, in both low and high poverty levels, fiscal policies effectively reduced poverty but in medium poverty level, financial policies were more effective in poverty reduction. Kuang, *et al.* (2019) advised that poverty levels should dictate the type of fiscal and financial policies that should be put in place. Fiscal policies should be used to reduce poverty when it is low or high while financial policies should be used when the poverty level is medium.

Boyce et al (2018) studied how individuals’ health respond to the Bank of England’s (BOE) monetary policy announcements, especially with respect to interest rates changes. These authors observed that a strong link existed between people’s indebtedness and their psychiatric morbidity because of the influence of interest rates on individual’s ability to repay due debts. Using the structured “General Health Questionnaire (GHQ-12) to measure psychiatric morbidity and distress, the authors found that rising (falling) interest rates induced (reduced) the risk of having psychiatric morbidity among heavily indebted respondents respectively. In essence, rise in interest rates as stipulated by the BOE contributed to difficulty in debt repayment and unfavourable mental health state for individuals.

In Nigeria, studies have been conducted to examine the effect of monetary policy on economic growth and some other areas of the economic wellbeing of the people, including the capital market (Oye, et al, 2018; Kayode & Adaramola, 2022; UNCTAD, 2016), which have yielded conflicting results. However, a single study that examine the effect of monetary policy on the socio-economic welfare of the people in an integrated manner is rare. Therefore, the present study examined the effect from three different perspectives that capture the economic (standard of living or income), health-wise and educational) which makes the study to differ from existing empirical literature.

III. Methodology

This study used historical data of monetary policy and welfare variables extracted from the Central Bank of Nigeria Statistical Bulletins for the different years covered. The dataset includes those of actual annual lending rate, savings deposit rate, monetary policy rate, liquidity ratio, loan-deposit ratio, private sector credit, inflation, gross domestic product per capita, child mortality rate and primary school enrolment for the period 1980 to 2021. The study model expresses the effect of selected monetary policy variables and inflation on economic, health and educational welfare of Nigerians from three perspectives in the form:

Model ECWF = f[(MPVINFR (control)]

But ECWR = (GDPC, MORT, PSCE)

MPV = f[(INTR, SITR, MPLR, LIQR, LODR, PCGD,],

$$GDPC = \alpha + \beta_1 INTR + \beta_2 SITR + \beta_3 MPLR + \beta_4 LIQR + \beta_5 LODR + \beta_6 PCGD + \beta_7 INFR + \epsilon \dots (i)$$

and

$$MORT = \alpha + \beta_1 INTR + \beta_2 SITR + \beta_3 MPLR + \beta_4 LIQR + \beta_5 LODR + \beta_6 PCGD + \beta_7 INFR + \epsilon \dots (ii)$$

$$PSCE = \alpha + \beta_1 INTR + \beta_2 SITR + \beta_3 MPLR + \beta_4 LIQR + \beta_5 LODR + \beta_6 PCGD + \beta_7 INFR + \epsilon \dots (iii)$$

where:

ECWA = Economic welfare

MPV = Monetary policy variables

INFR = inflation rate

GDPC = Gross domestic per capita

MORT = Child mortality rate

- PSCE = Primary school enrolment
- INTR = Interest rate (lending)
- SITR = Savings interest rate
- MPLR = Monetary policy rate
- LIQR = Liquidity ratio
- LODR = Loan deposit ratio
- PCGD = Private sector credit to GDP
- α = Intercept
- β_1, β_7 = Regression coefficients
- \mathcal{E} = Stochastic error term

The descriptive statistics and correlation coefficients of all the selected variables are estimated and the Augmented Dickey Fuller stationarity test to ascertain the order of stationarity of the variables. further, we used the Autoregressive Distributed Lag (ARDL) Bound co-integration to test for long-run association between the dependent and explanatory variables. Finally, we employed the ARDL long-run form and error correction mechanism (ECM) to examine the long and short run effects of monetary policy on the welfare of Nigerians. The general ARDL model if expressed as:

$$y_t = \sum_{i=1}^j a_i y_{t-i} + \sum_{i=0}^k b_i x_{t-i} + e_t \quad \dots \dots \dots \quad (iv)$$

- y_t = dependent variables (GDPC; MORT; PSCE)
- x_t = independent variables (INTR, SITR, MPLR, LIQR, LODR, PCGD, INFR)
- a, b = ARDL Regression parameters
- e_t = error term

In addition, we further subjected our results to post-estimation tests which include the Jarque-Bera (J-B) residual normality, serial correlation, and the heteroscedasticity tests.

IV. Results and Discussion

This section contains the results of the descriptive statistics, correlations, unit root and long-run co-integration tests. All these tests are carried out to ascertain the statistical properties and the behaviour of study variables with one another for the three models.

4.1 Preliminary Analyses

(a) Descriptive Statistics

Appendix 1(a-c) contain descriptive statistics of the study variables. Relevant to the present study are the mean, skewness, kurtosis and the J-B statistics (and its probabilities). For the three models, the average (mean) values of GDPC, MORT, PSCE, INTR, LIQR, LODR, MPLR, PCGD, SITR and INFR are N1,473.961billion, 157.8448 million, 91.71243 million, 18.9440%, 48.52945%, 65.0234%, 13.5%, 10.518%, 11.21831% and 17.42241% respectively. All the variables are skewed to the right of the mean. GDPC, MORT, PSCE, INTR, LIQR, LODR, MPLR, PCGD, SITR and INFR have skewness coefficients 0.185763, 0.305851, 0.0014048, 1.655890, 0.579228, 0.55034, 0.916362, 1.040158, 0.931329 and 1.950712 respectively. These skewness coefficients are not far from the mean. GDPC, LIQR, LODR, PCGD, and SITR have kurtoses approximately 3, signifying that the variables are normally distributed; MORT and PSCE have are platykurtic with kurtoses less than 3 (2.355407 and 1.601611 respectively) and are normally distributed. However, INTR, MPLR and INFR are all leptokurtic as their kurtoses are all greater than 3. This scenario is further confirmed by the JB statistics and their respective probabilities. GDPC, MORT, PSCE, LIQR, LODR, PCGD and SITR are normally distributed with probabilities that are greater than the 5% level of significance (0.290024, 0.244752, 0.791582, 0.440683, 0.887439, 0.057053 and 0.445269 respectively) while INTR, MPLR and INFR are not normally distributed given their respective probabilities (0.000002, 0.003044 and 0.00000). There are 29 observations (years) in all.

(b) Correlations Coefficients

Appendix 2 contains correlation coefficients among the study variables in the three models. However, our interest is in the correlation of GDPC, MORT and PSCE with other monetary policy variables. While INTR, MPLR, SITR and INFR have fairly high negative correlation with GDPC (-0.686857, -0.567549, -0.657242 and -0.571568 respectively). LIQR and LODR have low negative correlation with GDPC (-0.012660 and -0.076329 respectively). PCGD has a fairly high positive correlation with GDPC (0.698734).

INTR and INFR positively and highly correlate with MORT (0.71236916 and 0.6913995 respectively) while LIQR, LODR, MPLR, PCGD and SITR have negative correlation with MORT (-0.2345477, -0.02165631, 0.52836609 and 0.6704513 respectively). However, it is observed that the correlation of LODR (-0.02165631) and LIQR (-0.2345477) are low.

Unit Root Tests

To test for the stationarity of the research data, we subject the variables to the Augmented Dickey Fuller – Fisher unit root test and the results are summarized in table 1.

Table 1: Summary of Unit Root Tests Results

Null Hypothesis: Unit Root Exists					
Variable	At Level		At first Difference		Stationarity Order
	ADF- Fisher Statistics	Probability	ADF- Fisher Statistics	Probability	
GDPC	-0.924740	0.7657	-3.738248	0.0089	1(1)
MORT	-1.700089	0.0840	-3.622234	0.0387	1(1)
PSCE	-0.761425	0.3766	-3.448994	0.0014	1(1)
INTR	-2.495373	0.1269	-8.356116	0.0000	1(1)
SITR	-2.346383	0.1652	-7.098633	0.0000	1(1)
MPLR	-3.054212	0.0416	-	-	1(0)
LIQR	-2.753504	0.0775	-6.509694	0.0000	1(1)
LODR	-2.569009	0.1107	-5.040685	0.0003	1(1)
PCGD	-2.661465	0.0933	-4.635126	0.0011	1(1)
INFR	-7.720494	0.0000	-	-	1(0)

Source: Author (2023).

Two of the variables (MPLR and INFR) are stationary at level given their ADF-Fisher statistics and their probabilities [-3.054212 (0.0416<0.05) and -7.720494 (0.0000<0.05) respectively]. However, GDPC, MORT, PSCE, INTR, SITR, LIQR, LODR and PCGD are all stationary at first difference given their ADF-Fisher statistics and their corresponding probabilities as revealed on table 2. These results, among other support the use of ARDL to analyze the data for inference purpose.

ARDL Bound Co-integration Tests.

We tested for the existence of long-run relationship between the explanatory and each of the dependent variables (GDPC, MORT and PSCE) using the ARDL Bound test. Table 1 summarizes the results of the tests.

Table 2: ARDL Bound Test (Models 1-3)

Model 1: Dependent Variable = GDPC				
F – Bounds Test		Null Hypothesis: No Long-run Relationship		
Test Statistic	Value	Significant	1(0)	1(1)
F – Statistic	6.670415	10%	2.03	3.13

k	7	5%	2.34	3.5
		2.5%	2.6	3.84
		1%	2.96	4.26
Model 2: Dependent Variable = MORT				
F – Bounds Test		Null Hypothesis: No Long-run Relationship		
Test Statistic	Value	Significant	1(0)	1(1)
F – Statistic	33.09585	10%	2.03	3.13
k	7	5%	2.34	3.5
		2.5%	2.6	3.84
		1%	2.96	4.26
Model 3: Dependent Variable = PSCE				
F – Bounds Test		Null Hypothesis: No Long-run Relationship		
Test Statistic	Value	Significant	1(0)	1(1)
F – Statistic	2.732772	10%	2.03	3.13
k	7	5%	2.34	3.5
		2.5%	2.6	3.84
		1%	2.96	4.26

Source: Author (2023)

At k = 7 degree of freedom, the calculated F-Statistics of models 1, 2 and 3 are 6.670415, 33.09585 and 2.732772 respectively. While the calculated F-Statistics of model 1, 2 are greater than both the upper [1(1)] and lower [1(0)] critical bound values, that of the third model (2.732772) is greater than the lower critical bound value at 5% level of significance. These results imply that there is long-run relationship (co-integration) between the dependent and independent variables for all the research models.

4.2: Short and Long-run Effects of Monetary Policy on the Economic Welfare of Nigerians

We used the ARDL technique to estimate the effect of monetary policy variables on the three welfare variables in the short- and on the long-run. The results of the ARDL short models are summarized in Table 3.

Table 3: Short and Long Run ARDL Results for Models 1 – 3

Short and Long-run Autoregressive Distributed Lag Results												
Variable	Short Run Effect						Long-Run Effect					
	Model 1: Dependent Variable = GDP		Model 2: Dependent Variable = MORT		Model 3: Dependent Variable = PSCE		Model 1: Dependent Variable = GDP		Model 2: Dependent Variable = MORT		Model 3: Dependent Variable = PSCE	
	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
INTR	-130.818	0.000	-0.08789	0.000	-1.1457	0.0244	-25.9176	0.590	0.00949	0.783	1.110402	0.104
SITR	87.43498	0.004	0.014874	0.013	0.30309	0.1455	14.68230	0.754	-0.1050	0.020	-0.38833	0.516
LIQR	-8.70875	0.007	-0.00807	0.000	0.50001	0.0055	14.00359	0.013	-0.0199	0.003	0.184210	0.031
MPLR	43.52915	0.002	-0.05497	0.000	-0.1030	0.4542	169.5705	0.000	-0.0656	0.020	-0.51194	0.163
LODR	10.04146	0.004	0.005114	0.001	0.14569	0.0188	-4.42430	0.261	-0.0130	0.002	-0.16087	0.502

PCGD	-127.842	0.000	0.052408	0.000	-0.5188	0.0605	-63.7758	0.036	0.07631	0.039	0.276891	0.569
INFL	6.927275	0.004	0.01565	0.000	0.35504	0.0066	0.693353	0.862	0.02254	0.003	0.006985	0.928
C	3327.074	0.000	2.031206	0.000	-115.85	0.0036	3327.014	0.007	2.03121	0.031	-8.04644	0.001
CointEq	-0.24352	0.000	-0.00499	0.000	0.34098	0.0036	-	-	-	-	-	-
R ²	0.889658		0.724321		0.78182		0.692716		0.69989		0.681821	
DW Sta	2.193262		2.19085		2.41911		2.193362		2.19085		2.089498	
F-Stat	10.99399		6330.05		49.6145		60.57227		6428.92		11.16677	
P(F-Sta)	0.00000		0.00000		0.00000		0.000001		0.00000		0.000445	

Source: Author’s (2023).

The results in Table 3 are explained from the perspectives of each of the welfare variables.

(a) Effect of Monetary Policy on GDP Per Capita – Model 1

In the short run, while INTR, LIQR and PCGD exert significant declining effect on GDPG with coefficients (and probabilities) -130.818 (0.000), -8.70875 (0.007) and -127.842 (0.000) respectively, SITR, MPLR, LODR and INFL exert significant increasing (positive) effect on the GDPG with coefficients (and probabilities) 87.43498 (0.004), 43.52915 (0.002), 10.041146 (0.004) and 6.927275 (0.004) respectively. About 24.352% of the previous year’s variations in the GDPG are corrected back to equilibrium in the present year. Furthermore, the coefficient of determination ($R^2 = 0.889658$) implies that about 89% of the variations in GDPG are explained by the monetary policy variables in the short-run in model 1. The remaining 11% are explained by other variables outside the model. The Durbin Watson Statistic of 2.193262 shows that the variables do not suffer autocorrelation problem. The F-Statistic (10.99399) and its corresponding probability (0.00000) reveal that the research model is not only significant but also reliable.

On the long run, whereas INTR, LODR and PCGD exert negative effect on GDPG with coefficients (and probabilities) -25.9176 (0.590), -4.42430 (0.261) and -63.7758 (0.036) respectively, This means that only the effect of PCGD on GDPG is significant among the three. On the other hand, SITR, LIQR, MPLR and INFL exert positive effect on the GDPG with coefficients (and probabilities) 14.68230 (0.754), 14.00359 (0.013), 169.5705 (0.000) and 0.693353 (0.862) respectively. Among the four, only the effects of LIQR and MPLR are significant. The $R^2 = 0.692716$ implies that about 69% of the variations in GDPG are explained by the monetary policy variables in the long-run in model 1. The remaining 31% are explained by other variables outside the model. Again, the Durbin Watson Statistic of 2.193262 shows that the variables do not suffer autocorrelation problem. The F-Statistic (60.57227) and its corresponding probability (0.0000) reveal that the research model is not only significant but also reliable.

(b) Effect of Monetary Policy on Child Mortality Rate – Model 2

In the short run, three (3) of the study variables, INTR, LIQR and MPLR have significant negative effect on MORT with coefficients (and probabilities) -0.08789 (0.000), -0.00807 (0.000) and -0.05497 (0.000) respectively. On their parts, SITR, LODR, PCGD and INFL exert significant positive effect on MORT with coefficients (and probabilities) 0.014874 (0.013), 0.005114 (0.001), 0.052408 (0.000) and 0.01565 (0.000) respectively. Only about 0.499% of the previous year’s variations in the MORT are corrected back to equilibrium in the present year. Furthermore, the coefficient of determination ($R^2 = 0.724321$) implies that about 73% of the variations in MORT are explained by the monetary policy variables in the short-run in model 2. The remaining 17% are explained by other variables outside the model. The Durbin Watson Statistic (2.19085) shows that the variables do not suffer autocorrelation problem. The F-Statistic (6330.05) and its corresponding probability (0.00000) reveal that the research model is not only significant but also reliable.

In the long run, whereas INTR, PCGD and INFL exert positive effect on MORT with coefficients (and probabilities) 0.00949 (0.780), 0.07631 (0.039) and 0.02254 (0.031) respectively, This implies that while the effect of INTR was not statistically significant, that of PCGD and INFL is significant given their *p* values that are less than the 0.05 level of significance. However, SITR, LIQR, MPLR and LODR all have significant negative effect on MORT given their coefficients (and probabilities) which are -0.1050 (0.020), -0.0199 (0.003), -0.0656 (0.020) and -0.0130 (0.002) respectively. The R^2 is 0.69989 which means that approximately 70% of the variations in MORT are explained by the monetary policy variables in the long-run in model 2. The remaining 30% are explained by other variables outside the model. The Durbin Watson Statistic of 2.19085 shows that the variables do not suffer autocorrelation problem. The F-Statistic (6428.92) and its corresponding probability (0.0000) reveal that the second research model is not only significant but also reliable.

(c) Effect of Monetary Policy on Primary and Secondary Schools' Enrolment – Model 3

In the short run, INTR, MPLR and PCGD exert negative effect on PSCE with coefficients (and probabilities) -1.1457 (0.0244), -0.1030 (0.0454) and -115.85 (0.0605) respectively. While the effects of MPLR and PCGD are insignificant given their p values ($p > 0.05$), that of INTR is significant ($p < 0.05$). SITR, LIQR, LODR and INFL exert positive effect on the PSCE with coefficients (and probabilities) 0.30309 (0.1455), 0.50001 (0.0055), 0.14569 (0.0188) and 0.35504 (0.0066) respectively. While LIQR, LODR and INFL have significant effect on PSCE, the effect of SITR is not significant. About 34.098% of the present year's variations in the PSCE will be corrected to equilibrium in the next year. The coefficient of determination ($R^2 = 0.78182$) implies that about 78% of the variations in PSCE are explained by the monetary policy variables in the short-run in model 3. The remaining 22% are explained by other variables outside the model. The Durbin Watson Statistic of 2.41911 shows that the variables do not suffer autocorrelation problem. The F-Statistic (49.6145) and its corresponding probability (0.00000) reveal that the model is not only significant but also reliable.

On the long run, whereas INTR, LIQR, PCGD and INFL have positive effect on PSCE with coefficients (and probabilities) 1.110402 (0.104), 0.184210 (0.031), 0.276891 (0.0569) AND 0.006985 (0.0928) respectively, SITR, MPLR and LODR have negative effect on PSCE with coefficients (probabilities) -0.38833 (0.163), -0.51194 (0.516) and -0.16087 (0.502) respectively. This means that only the positive effect of LIQR on PSCE is significant on the long run. The effect of the others are not significant. The $R^2 = 0.681821$ implies that about 68% of the variations in PSCE are explained by the monetary policy variables in the long-run in model 3. The remaining 32% are explained by other variables outside the model. The Durbin Watson Statistic of 2.089498 shows that the variables do not suffer autocorrelation problem while the F-Statistic (11.16677) and its corresponding probability (0.000445) reveal that the research model is not only significant but also reliable.

4.3 Discussion and Implication of Findings

This study achieves a three-in-one objectives by examining the how Nigeria's monetary policy has affected the welfare of her people from three perspectives: economic wellbeing, health wellbeing and education. We captured economic wellbeing in terms of the gross domestic product per capita, health wellbeing in terms of child mortality rate and education in terms of primary and secondary school enrolment. The monetary policy variables analyzed include interest (lending) rate, savings deposit rate, monetary policy rate, liquidity ratio, loan deposit ratio, and private sector credit. The rate of inflation is used as a control variable in each of the three models expressed to address each of the three research models. The study covered a period of 29 years.

4.3.1 Effect of Monetary Policy on Gross Domestic Per Capita Income (GDPC)

With respect to the effect of monetary policy on the economic welfare of Nigerians (GDPC), findings from the results of the ARDL revealed that during the short run, interest rate, liquidity rate and private sector credit have negative and significant effect on the per capita income of the people. Among the three, the effect of private sector credit is unexpected theoretically. Usually, interest rate and liquidity ratio could have declining effect on the per capita income as increase in them could shrink available credits to the economy. However, as revealed by our results, it appears that increase in private sector credit has not been productively deployed to spur real economic growth. One possible reason is that such increase might have been plugged into commerce or expenditures other rather than the real productive sector.

Secondly, the positive and significant effect of savings deposit, monetary policy rate, loan deposit rate and inflation on GDPC is also unexpected. These variables are theoretically expected to reduce investment and the GDP, but the reverse is the case here on the short run. However, as the results show, increases in these variables also significantly increased the GDPC. This agrees with the position of the quantity theory of money which infer that the negative effect of monetary policy variables (money market) may be offset by the positive effect of goods market such that the latter can even outstrip the former as the goods market grows.

On the long run, interest rate and loan deposit ratio have negative but insignificant effect on GDPC as theoretically predicted. Rising interest rate should naturally impair investment and income although the effect is not significant enough in this study. The effect of savings deposits' rate on GDPC is positive though insignificant, implying that returns on savings did not significantly improve the income of the people during the period. Liquidity ratio and monetary policy rate (as in short-run) have significant positive effect on GDPC, again contrary to the theoretical expectation. These results are a pointer to efficient management of the monetary policy variables to contribute to national income on the long run. On its part, the ratio of private sector credit to GDP has a significant negative effect on GDPC as it was in the short run. Inflation, similar to the short run, has a positive but insignificant effect on GDPC on the long run.

4.3.2 Effect of Monetary Policy on Health Welfare (MORT)

In the short run, all the monetary policy variables have significant effects on MORT. While the effect of interest rate, liquidity ratio and monetary policy rate are negative, that of savings deposit rate, loan deposit ratio, private sector credit and inflation is

positive. The negative effect of interest rate, liquidity ratio and monetary policy rate on health welfare is expected as the higher these rates, the less the populace will have to take care of their health needs. The positive effect of the other variables on health welfare implies that savings deposit rate, loan deposit ratio, private sector credit and inflation have contributed to higher mortality (deaths) in Nigeria in the years under study.

On the long run, interest rate, private sector credit and inflation have positive effect on MORT but whereas the effect of interest rate is insignificant, the other two have significant effect. Savings deposit rate, liquidity ratio, monetary policy rate and loan deposit ratio have significant negative effect MORT. These effects are expected as their increases will reduce the mortality rate of the people.

4.3.2 Effect of Monetary Policy on Educational Welfare (PSCE)

In the short run, the higher the interest rate, the lower the number of primary and secondary school enrolment, the effect is significant. On the other hand, the higher the liquidity ratio, loan deposit ratio and inflation, the more the primary and secondary school enrolment. On its part savings deposit rate has an insignificant positive effect on PSCE while private sector credit has a negative insignificant effect on it.

On the long run, interest rate, private sector credit and inflation have an insignificant positive effect on PSCE while savings deposit rate, monetary policy rate and loan deposit ratio have insignificant negative effect PSCE. The effect of liquidity ratio is significantly positive. Comparatively, monetary policy has more significant effect on mortality rate (health welfare) than income and school enrolment in Nigeria during the study years.

4.4 Post Estimation Tests

Four post -estimation tests were carried out on the study results, including, Jarque-Bera (J-B) residual normality, serial autocorrelation, heteroscedasticity tests. Figure 4 shows the summarized results of the J-B of residual normality for models 1-3.

Table 4 Summarized Results of J-B Tests on Models 1 – 3.

Model	J-B Statistics	Prob (J-B Stat)	Conclusion
1	3.377583	0.184743	Normally distributed
2	2.659912	0.264489	Normally distributed
3	33.70158	0.140032	Normally distributed

Source: Author’s Computation (2023).

The decision rule on whether residuals are normally distributed or not is to compare the probability of J-B statistics with the 0.05 level of significance. For model 1, the residuals are normally distributed if the probability of J-B statistics is greater than the 0.05 then the residuals are normally distributed and vice-versa. From Figure 4.1, the J-B statistics (3.377583) and its corresponding probability (0.184743) for model 1 reveals that the residuals are normally distributed. For model 2, the J-B statistics (2.659912) and its corresponding probability (0.264489) for model 2 also reveals that the residuals are normally distributed. For model 3, the J-B statistics (33.70158) and its corresponding probability (0.140032) for model 3 also reveals that the residuals are normally distributed.

Table 5 summarizes the results of the serial correlation and heteroscedasticity tests which follow the standard F-distribution criterion.

Table 5: Serial Correlation and Heteroscedasticity Tests

Test	F-Statistics	Probability	Decision
Model 1			
Breusch-Godfrey Serial Correlation LM Test	31.02810	0.1131	No serial correlation
Breusch-Pagan-Godfrey Test of Heteroscedasticity	4.782436	0.1870	Heteroscedastic
Model 2			
Breusch-Godfrey Serial Correlation LM Test	3.267925	0.0603	No serial correlation

Breusch-Pagan-Godfrey Test of Heteroscedasticity	0.294271	0.9486	Heteroscedastic
Model 3			
Breusch-Godfrey Serial Correlation LM Test	5.975378	0.1108	No serial correlation
Breusch-Pagan-Godfrey Test of Heteroscedasticity	1.886614	0.1323	Heteroscedastic

Source: Author’s (2023)

Given the estimated values of F-distribution and their respective probabilities (>0.05)for models 1 – 3, the residuals of the results are free from serial correlation problem and heteroscedastic.

V. Conclusion and Recommendations

This study examined the effect of monetary policy on Nigerians’ socio-economic welfare from three perspectives: per capita income (economic), mortality rate (health) and school enrolment (education). Threemodels were formulated for the purpose of analysis. First, in the short run, interest rate, liquidity rate and private sector credit have negative and significant effect on the per capita income. Furthermore, there is a positive and significant effect of savings deposit, monetary policy rate, loan deposit rate and inflation on per capita income. In the long run liquidity ratio and monetary policy rate have significant positive effect on income per capita while the ratio of private sector credit to GDP has a significant negative effect on it. Inflationhas a positive but insignificant effect on per capita income.

Second, in the short run, all the monetary policy variables have significant effects on child mortality rate. While the effect of interest rate, liquidity ratio and monetary policy rate is negative, that of savings deposit rate, loan deposit ratio, private sector credit and inflation is positive. On the long run, interest rate, private sector credit and inflation have positive effect on child mortality but whereas the effect of interest rate is insignificant, the other two have significant effect

Finally, in the short run, interest rate has a negatively significant effect on the number of primary and secondary school enrolment while liquidity ratio, loan deposit ratio and inflation have direct positive effect on it. Savings deposit rate has an insignificant positive effect on it while private sector credit has a negative insignificant effect on it. On the long run, interest rate, private sector credit and inflation have an insignificant positive effect on the number of primary and secondary school enrolment. Savings deposit rate, monetary policy rate and loan deposit ratio have insignificant negative effect on it. The effect of liquidity ratio is significantly positive. Given these findings, we conclude that monetary policy significantly affects the socio-economic life of Nigerians in the directions and degrees already discussed both in the short and long run.

Our recommendations are broadly categorized into three, focusing on each of the research models. First, we recommend the sustenance of the liquidity ratio and monetary policy rate as they have been instrumental to increases in per capita income as shown in our results. Second, liquidity ratio and monetary policy rate also reduced mortality rate which further gives credence to the first recommendation. The “good” effect of liquidity rate is also reflected on the number of primary and secondary school enrolment.

Although the loan-deposit ratio reduced mortality rate, its effect in per capita income and school enrolment was not favourable, which calls for a re-appraisal and re-design of the loan-deposit ratio policy. In all the three models, the ratio of private sector credit, inflation and savings deposit rate (except in reducing mortality rate) do not have favourable effect signifying the need for effect appraisal and re-design of the policies on these variables so that they can achieve the desired purpose. Such re-design can take the form of type of welfare into consideration. This means that the policies can be designed on the basis of economic, health and education differently.

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