

Monetary Policy Transmission Mechanism and Dynamics of Unemployment in Nigeria

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Abstract

As a key component of macroeconomic policy design, monetary policy has remained a strategic tool employed by the Central Bank of Nigeria (CBN) to control unemployment and achieve price stability. This paper examines the link between the transmission mechanism of monetary policy and unemployment rate in Nigeria. Specifically, the research efforts focused on examining how monetary policy transmission channels – money supply, real interest rate, private sector credits and cash reserve ratio affect unemployment. The Stock-Watson dynamic least squares method and Granger causality test were utilized in analyzing the time series data sourced from the CBN Statistical Bulletin and National Bureau of Statistics. The Phillips-Perron unit root test results reveal that all the variables are integrated of order one. It was found from the cointegrating regression result that broad money supply is positively linked to unemployment rate. On the contrary, private sector credit as a ratio of GDP has significant negative effect on unemployment rate. This finding is very welcoming as it explains the effectiveness of monetary policy transmission mechanism in reducing unemployment rate in Nigeria. However, it was found that real interest rate and cash reserve ratio are statistically insignificant in influencing unemployment in Nigeria. The Granger causality test results reveal that unidirectional causality flows from broad money supply and private sector credits to unemployment. This is indicative that broad money supply and private sector credits have predictive powers for unemployment in Nigeria. Given the findings, it is recommended for the monetary policy committee and other stakeholders in the Nigerian financial system to prioritise increase in private sector funding and monetary aggregates in order to enhance the effectiveness of monetary policy in reducing unemployment.

Keywords: *Monetary policy, unemployment rate, broad money supply, real interest rate, private sector credits and cash reserve ratio*

1. INTRODUCTION

The monetary transmission mechanism is the process through which monetary policy decisions impact on the economy wide aggregate such as output and employment. It is worthy of note that monetary policy conducted by central banks is very vital in shaping macroeconomic developments of any country. For instance, changes in bank rate by a central bank have a direct effect on deposit money banks loans and advances as well as on how financial assets are valued and their expected returns. It also shapes households and firms decisions concerning consumption, saving and investment spending in the economy. Traditionally, the crux of monetary policy is on the relationship between the price at which money can be borrowed and the total supply of money in the economy. It is broadly classified as being expansionary or restrictive. While expansionary monetary policy increases the total supply of money in the economy, restrictive monetary policy decreases the total money supply. Engler (2011) argues that expansionary monetary pursued by the central bank is mainly intended to stimulate

domestic economy and reduce unemployment, while restrictive or tight monetary policy involves raising interest rates to combat inflation.

The channels through which monetary policy affects macroeconomic outcomes include interest rate, bank credit, asset prices, exchange rates and expectations. Based on economic theory, expansionary monetary policy tends to generate high inflation and reduce unemployment temporarily. However, the ability of monetary policy to impact on the average level of unemployment in the long-run is limited (Soderstrom & Vredin, 2013). Evidences abound where economies in recession are advised to embrace monetary measures as a roadmap to recovery and eventual stabilization of economic activities. This is akin to Romer & Romer (1994) assertion that monetary policy is the most effective solution to recession. The proponents of job creation have advocated for central banks to effectively use monetary policy to reduce the rate of unemployment and facilitate economic development. In support of this, Bhattacharyya (2012) posits that the International Labour Organization (ILO) has in recent years increased its activity with central banks, emphasizing the role monetary policy can play in reducing the level of unemployment.

In Nigeria, the Central Bank of Nigeria (CBN) has employed monetary policy measures to reduce the unemployment rate and achieve other macroeconomic objectives. The apex monetary authority has been focusing on adjusting the monetary aggregates, the monetary policy rate, exchange rate and cash reserve ratio amongst others to stimulate the productive capacity of the economy and boost job creation. The CBN, apart from formulating and implementing policies with a view to help in the development and growth of the country always pursue her universal goals of maintaining monetary stability through strengthening the real sector. This is helpful in increasing the capacity of the Nigerian economy to create gainful employment of the teeming population. Despite monetary policy initiatives introduced by the CBN, Nigeria has continuously witnessed increasing levels of unemployment.

Available statistics from National Bureau of Statistics (NBS) reveal that the average unemployment rate stood at 12.78 percent during 2001-2005 and increased to 16.78 percent between 2006 and 2010. As of the third quarter of 2018, the calculated unemployment rate was 23.1 percent. This suggests that overtime; the Nigerian economy has been associated with weak labour absorption capacity. It is important to note that despite the existing monetary policy measures geared towards ensuring macroeconomic stability and real sector development, high inflationary pressures and unemployment rate continue to persist with adverse effect on the value of the naira and pace of economic growth and development. This has subsequently raised concern about the addressing the problem of unemployment and price instability. It is against this backdrop that this paper intends to appraise the effectiveness of monetary policy transmission mechanism in reducing unemployment in Nigeria.

2. LITERATURE REVIEW

2.1 Theoretical Framework

The classical theory postulates that changes in money supply or other aggregates will work through some intermediate variables through which some effects are transmitted to the ultimate goals of price stability, output, employment and external balance. The monetarists' theory assumes that a change in money supply is a key factor affecting the overall performance of the economy. For the classical economists, unemployment exist when the demand for labour decreases as a result of the decrease in the demand for the output of labour. Rodriguez (2015) asserts that the classical economist assume that there exist full employment at the labour market. The existence of full employment still allows for natural unemployment in the forms of frictional and voluntary unemployment. According to Friedman (1963), effective monetary policy is helpful in stabilising the economy. The Monetarists acknowledge that, in the short

run, expansionary monetary policy tend increase the level of real GDP and employment by increasing aggregate demand. However, they argue that increase in the quantity of money above the total output generates inflation in the economy.

Keyne (1936) believes that expansionary monetary policy increases the supply of loanable funds available through banking system, causing interest rates to fall. With lower interest rate, aggregate expenditures on investment and interest-sensitive consumption goods usually increase, causing real GDP and employment to rise. The Keynesian theory of unemployment has evolved overtime with the emergency of the New-Keynesianism. Blanchard and Gali (2005) assert that the New Keynesian model provides the baseline for monetary policy analysis in the presence of nominal rigidities. It is important to note that many central banks adopt the New Keynesian model as the bedrock of medium-scale models. Following New Keynesians postulations, the government can stimulate aggregate demand to generate employment through the activities of the central bank. The central bank through its indirect policy measures can reduce the level of interest rate to increase investment and in turn create employment opportunities.

2.2 Stylized Facts on Unemployment in Nigeria

The incidence of unemployment in Nigeria has remained a source of concern to the stakeholders in the economy. Its proportion has varied overtime as summarized in figure 1.

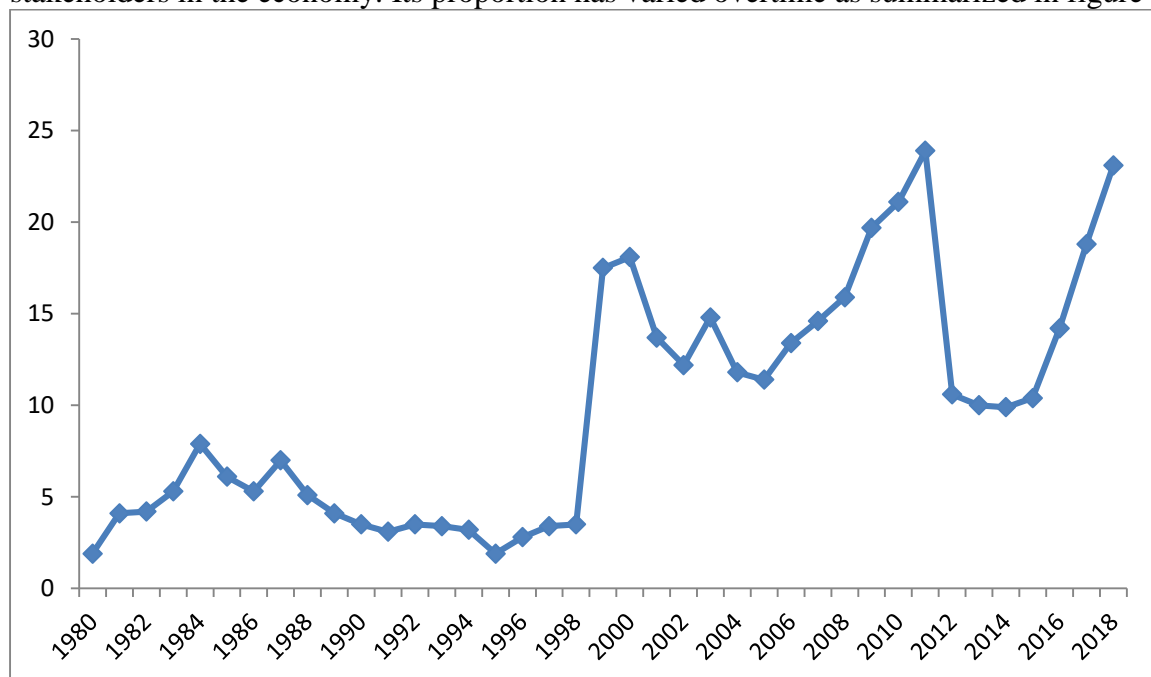


Figure 1: Unemployment rate in Nigeria, 1980-2018.

Source: Author's illustration based on data adapted from National Bureau of Statistics.

The unemployment rate in Nigeria rose from 1.9 percent in 1980 to 7.9 percent in 1985. It trended downward from 1987 to 1995. It however, witnessed rose to 18.1 percent in 2000 and reached a record high value of 23.9 percent in 2011. The increase in unemployment rate is an indication that Nigeria experienced a jobless growth over the period covered. With rise in unemployment rate from 10.6 percent in 2012 to 23.1 percent in 2018, it is obvious that growth in Nigeria is associated with growing unemployment.

2.3 Empirical Literature

A large body of literature has explored the effectiveness of monetary policy in influencing employment creation with varying results across various regions and estimation methods applied. Some of the studies are reviewed below:

Stockhammer & Sturn (2011) assessed the impact of monetary policy on unemployment hysteresis in 19 countries of Organization for Economic Co-operation and Development (OECD) between 1980 and 2009. The explanatory variables included in the model are monetary easing, standard labour market institution variables and terms of trade shock. The results indicate that monetary easing and terms of trade shock strongly influenced unemployment while labour market institution variables exerted weak effect on unemployment hysteresis. The study suggested that monetary policy should emphasize more on changes in real interest rate given its strong impact on unemployment via monetary easing.

Amassoma & Esther (2015) analyzed the efficacy of monetary policy variables in curtailing the rate of unemployment in Nigeria using time series data from 1970 to 2013. The study utilized the Ordinary Least Squares and error correction techniques for the analysis of the data obtained from the CBN Statistical Bulletin and NBS. It was evident from the result that exchange rate exerts significant influence on unemployment during the period under investigation. Additionally, it was found that exchange rate granger causes unemployment. Owing to the findings, the study suggested for the adoption of appropriate monetary policy stance that will help in ensuring the availability of investment-accommodating interest rate in the Nigerian economy.

Chicheke (2009) evaluated the effects of monetary policy on two fundamental economic problems - unemployment and inflation in South African economy between 1980 and 2008. The monetary policy variable incorporated into the model is broad money supply. The estimation technique adopted by the study is Vector Error Correction Model (VECM). Evidence from the result indicates that inflation is more sensitive to changes in monetary policy compared to unemployment. Therefore, the study recommended for monetary policy to be focused on achieving tolerable inflation rate which provides incentives for economic expansion and reduction of unemployment rate.

Kugler & Sheldon (2009) investigated the impact of changes in the monetary policy adopted by the National Bank of Switzerland in 1999 on the Swiss labour market. The study is anchored on the Philip's relationship. Based on the theoretical assumptions the adoption of a more inflation-targeted policy by the Swiss National Bank is expected to increase the flexibility of real wage rate and reduce Non-Accelerating Inflation Rate of Unemployment (NAIRU). The finding is consistent with the theoretical assumptions although some of the measured effects are insignificant. Thus, the study suggested for adequate control mechanism to be put in place to ensure successful transition from monetary targeting to inflation-targeting medium-term objective.

Elekwa, Aniebo & Ogu (2016) analyzed the nexus between portfolio investment and unemployment in Nigeria with the period of analysis spanning from 1980 to 2014. The focus on portfolio investment was driven by its perceived role in fostering the development of financial market. The study applied econometrics method with a focus on single equation, reduced form specification. It was found that in the long term, portfolio investment exerts significant positive impact on employment growth. This outcome is in tandem with the general view in the literature of a positive relationship between portfolio investment and economic growth. The study recommended for policy makers to improve on the investment climate so as to attract more portfolio investments for productive employment.

Essien *et al.* (2016) examines the link between unemployment and monetary policy in Nigeria using a vector autoregressive (VAR) framework for the period 1983q1 – 2014q1. The study specifically investigates the effect of structural change by identifying three structural breakpoints and incorporating them into the VAR model as dummy variables. The results show that a positive shock to policy rate raises unemployment over a 10 quarter period. In addition, all the variables used as proxy in the model jointly Granger cause unemployment, implying the existence of a dynamic relationship between monetary policy and unemployment in Nigeria.

3. MATERIALS AND METHODS

3.1 Model Specification

This paper adopts a dynamic which builds on the work Essien *et al.* (2016), but with an improvement following a broader measure of monetary policy initiatives and extension of the study sample. Specifically, unemployment rate was introduced as the dependent variable whereas monetary policy measures of broad money supply, real interest rate, credit to private sector and cash reserve ratio. The formal specification of the dynamic model is provided below:

$$UEM_t = b_0 + b_1BMS_t + b_2CPS_t + b_3RER_t + b_4CRR_t + \sum_{p=-y}^n \phi_1 \Delta BMS_{t-y} + \sum_{p=-y}^n \phi_2 \Delta CPS_{t-y} + \sum_{p=-y}^n \phi_3 \Delta RER_{t-y} + \sum_{p=-y}^n \phi_4 CRR_{t-y} + U_t \quad (1)$$

Where: UEM = unemployment, BMS = broad money supply, CPS = credit to private sector, RER = real interest rate and CRR = cash reserve ratio.

$b_0 = \text{Constant term}$ and $b_1 - b_4 = \text{Long run multipliers}$, n and $y = \text{Optimal lag length and lead lengths respectively}$ $\Delta = \text{First difference operator}$

3.2 Nature and Source of Data

Annual time series data for each of the variables were utilized in this study. While data for unemployment was sourced from the National Bureau of Statistics (NBS), data on the monetary policy measures were adapted from the Central Bank of Nigeria Statistical Bulletin.

3.4 Data Analysis Techniques

This paper relies on the Dynamic Least Squares (DOLS) developed Stock and Watson (1993) for estimating the cointegrating regression model. The DOLS is fully parametric, computationally convenient and has been adjudged to produce robust result while coping with small observations and dynamic sources of bias in large sample. The Stock-Watson DOLS is considered superior in small samples compared to a number of alternative estimators, as well as being able not only to accommodate higher orders of integration but also to account for possible simultaneity within the regressors. Descriptive statistics was also applied to gain insights into the distribution of each of the variables. The Phillips-Perron (PP) test was utilized to determine whether the variables used in the model are stationary or not. The PP model is expressed as:

$$\Delta F_t = \pi_0 + \pi_1 F_{t-1} + \sum_{i=1}^j \alpha_i \Delta F_{t-i} + \mu_t \quad (2)$$

Where: H_t = variables under investigation, π_0 = constant term, π_1 and α_i = parameter estimates j = lag length, Δ = First difference operator and μ_t = stochastic term

This cointegration test was used to ascertain whether or not long run equilibrium relationship exist between the variables. Specifically, the cointegration test for multivariate model proposed by Johansen & Juselius (1990) was applied in this paper to test the null hypothesis of no cointegration against the alternative hypothesis of cointegration at 5 percent level. The formalization of the Johansen-Juselius model based on Trace and Max-Eigen statistics are as follows:

$$\lambda_{\text{trace}}(r) = -T \sum_{i=r+1}^n \ln \left(1 - \hat{\lambda}_i \right) \quad (3.1)$$

$$\lambda_{\text{max}}(r, r+1) = -T \ln \left(1 - \hat{\lambda}_{r+1} \right) \quad (3.2)$$

where $\hat{\lambda}$ denotes the estimated values of the characteristic roots and T is the sample size. Basically, the Trace statistic tests the restriction $r < q$ ($q < n$) against the completely unrestricted model $r < n$ and the maximum Eigen value statistic makes the alternative more precise by specifying that only one additional cointegrating vector exists ($r \leq q + 1$). Evidence of at least one cointegrating vector at 5 percent indicates that the series have long run relationship.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The descriptive statistics for the variables is summarized in table 1.

	UEM	BMS	RER	CPS	CRR
Mean	10.39444	17.59972	18.23111	13.54361	6.961944
Median	10.20000	17.90000	17.69500	11.20000	6.550000
Maximum	23.90000	38.00000	31.65000	36.90000	20.30000
Minimum	1.900000	8.600000	9.430000	5.900000	1.000000
Std. Dev.	6.469884	5.798882	4.516185	6.657653	4.669539
Observations	36	36	36	36	36

Source: Author's computation using E-views software

The descriptive statistics reveal that unemployment in Nigeria averaged 10.39 percent during the study period. Its maximum value stood at 23.9 percent. This explains the growing incidence of joblessness despite monetary policy initiatives tailor towards increasing the potentials of the real sector to create employment opportunities. The results further indicate that broad money supply and credit to private sector account for 17.59 and 13.54 percent of the GDP respectively. Again, the mean value of real interest rate and cash reserve ratio are 18.23 and 13.54 percent respectively. The standard deviation for each of the variables reveals that the observations clustered around their respective mean values.

4.2 Unit Root Test

The Phillips-Perron unit root test results for the variables are summarized in table 2

Table 2: Phillips-Perron unit root test result

Variable	t-statistic		Probability Value		Order of integration
	Levels	1 st difference	Levels	1 st difference	
UEM	-2.706	-5.368	0.2405	0.0006	I (1)
BMS	-2.584	-5.954	0.2892	0.0001	I (1)
CPS	-2.674	-9.293	0.2529	0.0000	I (1)
RER	-2.452	-6.769	0.3483	0.0000	I (1)
CRR	-1.4288	-5.089	0.8344	0.0012	I (1)

Source: Author's computation using E-views software

It is observed from the results that all the variables under review are stationary at first difference. This is a pointer that they are integrated of order one I (1). Hence, the null hypothesis that each of the series has a unit root is cannot be rejected at 5 percent level. The

evidence of unit root in the variables prompted the test for co-integration in order to determine if the linear combinations of the nonstationary series will lead to long run relationship.

4.23 Cointegration Test Results

The test for cointegration between the underlying series focused on Johansen-Juselius procedure. The outcome of the test is presented in table 3.

Table 3: Johansen-Juselius cointegration test result

Series: UEM BMS RER CPS CRR				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.680396	95.93635	69.81889	0.0001
At most 1 *	0.589418	59.43487	47.85613	0.0028
At most 2 *	0.386677	30.94911	29.79707	0.0367
At most 3	0.311181	15.30548	15.49471	0.0534
At most 4	0.100143	3.376615	3.841466	0.0661
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.680396	36.50147	33.87687	0.0237
At most 1 *	0.589418	28.48577	27.58434	0.0383
At most 2	0.386677	15.64362	21.13162	0.2464
At most 3	0.311181	11.92887	14.26460	0.1133
At most 4	0.100143	3.376615	3.841466	0.0661

Source: Author's computation using E-views software

Note: * denotes rejection of the hypothesis at the 0.05 level

Table 3 shows the cointegration test results for the variables. The Trace statistic indicates that there exist three cointegrating equations at 5 percent level while Max-Eigen statistic shows evidence of two cointegrating equations at 5 percent level. Following the establishment of cointegrating equations, the null hypothesis of no cointegration equation is rejected at 5 percent level. Hence, long-run relationship equilibrium relationship exists between monetary policy initiatives and unemployment rate.

4.4 Estimation of Cointegrating Regression Model

The cointegrating regression model was estimated using DOLS and the results are summarized in table 4.

Table 4: Cointegrating regression results

Dependent Variable: UEM				
Method: Dynamic Least Squares (DOLS)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
BMS	2.243992	0.574797	3.903971	0.0013
RER	-0.031348	0.255747	-0.122573	0.9040
CPS	-0.921651	0.305841	-3.013497	0.0042
CRR	0.508656	0.346517	1.467913	0.1615
C	-19.44462	6.780762	-2.867615	0.0112
R-squared	0.825964	Mean dependent var		10.23939
Adjusted R-squared	0.651928	S.D. dependent var		6.301485
S.E. of regression	3.717724	Sum squared resid		221.1435
Long-run variance	13.82147			

Source: Author's computation using E-views software

As observed from the results, broad money supply is positively related to unemployment rate. It was found that 1 percent increase in aggregate money supply raises unemployment by 2.243 percent. This finding is consistent with the result of Essien *et al.* (2016) for Nigeria. On the contrary, private sector credit as a ratio of GDP has negative effect on unemployment. The result shows that a percentage in private sector lending reduces unemployment by 0.922 percent. This finding is very welcoming as it explains the effectiveness of monetary policy transmission mechanism in reducing unemployment rate in Nigeria. However, it was found that real interest rate and cash reserve ratio are statistically insignificant in influencing unemployment in Nigeria. The result further revealed that monetary policy measures jointly explain 82.59 percent of the systematic variations in unemployment rate as observed from the coefficient of determination. The model is associated with low long run variance which indicates that it can be relied upon for prediction with high level of certainty.

Table 4.1 Wald test Result

Test Statistic	Value	df	Probability
F-statistic	17.25488	(4, 16)	0.0000
Chi-square	69.01953	4	0.0000
Null Hypothesis: C(1)=C(2)=C(3)=C(4)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
C(1)	2.243992	0.574797	
C(2)	-0.031348	0.255747	
C(3)	-0.921651	0.505841	
C(4)	0.508656	0.346517	

Source: Author's computation using E-views software

The Wald test results reveal that the monetary policy measures are collectively significant in explaining changes in unemployment. It follows from the result that the entire model is statistically significant at 5 percent level of significance.

4.2 Serial correlation test result

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. **	. **	1	0.240	0.240	2.0749	0.150
. .	. * .	2	-0.010	-0.072	2.0788	0.354
. .	. .	3	-0.014	0.006	2.0864	0.555
. * .	. * .	4	-0.123	-0.130	2.6913	0.611
. * .	. .	5	-0.104	-0.045	3.1365	0.679
. .	. .	6	-0.050	-0.026	3.2430	0.778
. * .	. .	7	-0.069	-0.062	3.4552	0.840
. .	. .	8	0.005	0.023	3.4565	0.903

Source: Author's computation using E-views software

The correlogram-based serial correlation test result reveals that the corresponding probability values of the Q-statistics are greater than 0.05. This indicates that at 5 percent level of significance, the model is free from serial correlation. It therefore, follows from the outcome of the serial correlation test that the model can be relied upon for long term forecast.

4.5 Granger Causality Test

The pairwise Granger causality test was conducted to determine the direction of causality amongst the variables. The results are summarized in table 5.

Table 5: Pairwise causality test results

Null Hypothesis:	Study sample	F-Statistic	Probability value
BMS does not Granger Cause UEM	33	4.86946	0.0081
UEM does not Granger Cause BMS		1.20973	0.3259
RER does not Granger Cause UEM	33	0.21248	0.8868
UEM does not Granger Cause RER		0.55509	0.6493
CPS does not Granger Cause UEM	33	4.83219	0.0084
UEM does not Granger Cause CPS		0.58249	0.6318
CRR does not Granger Cause UEM	33	1.22110	0.3219
UEM does not Granger Cause CRR		1.78088	0.1755
RER does not Granger Cause BMS	33	0.07496	0.9729
BMS does not Granger Cause RER		1.15076	0.3473
CPS does not Granger Cause BMS	33	1.11675	0.3603
BMS does not Granger Cause CPS		1.25082	0.3117
CRR does not Granger Cause BMS	33	1.12627	0.3566
BMS does not Granger Cause CRR		1.22752	0.3197
CPS does not Granger Cause RER	33	0.88342	0.4626
RER does not Granger Cause CPS		0.49181	0.6910
CRR does not Granger Cause RER	33	0.53342	0.6634
RER does not Granger Cause CRR		0.18895	0.9030
CRR does not Granger Cause CPS	33	1.02191	0.3990
CPS does not Granger Cause CRR		3.05644	0.0460

Source: Author's computation using E-views software

As observed from the results, unidirectional causality flows from broad money supply and private sector credits to unemployment. The result further revealed that unidirectional causality

flows from private sector credit to cash reserve ratio. This is indicative that broad money supply and private sector credits have predictive powers for unemployment in Nigeria. In order words, they are the channels for mirroring the longer forecasting ability of monetary policy transmission mechanism on unemployment in Nigeria.

5. Concluding Remarks

The crux of this study is the empirical analysis of the effectiveness of the transmission mechanism of monetary policy in reducing the unemployment rate. The findings offered insights into the channels through which monetary policy initiatives drive job creation in Nigeria. It was specifically observed that credit creation through private sector lending is the most effective channel through which monetary policy reduces unemployment in Nigeria. The implication of this finding is that rapid and sustained allocation of credits to private sector as monetary policy measure has the capacity of increasing the employment creation ability of the Nigerian economy. The result further reveals that monetary aggregates has long term forecasting ability for unemployment rate in Nigeria. The conclusion drawn from the findings is that monetary aggregates and credit allocation to the private sector are the channels through which the effectiveness of monetary policy in reducing unemployment manifests. Thus, it is recommended for the monetary policy committee and other stakeholders in the Nigerian financial system including deposit money banks to prioritise increase in private sector funding and monetary aggregates in order to enhance the effectiveness of monetary policy in reducing unemployment in Nigeria.

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