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## Understanding Nigeria's Monetary Stance: Insights from Monetary Conditions Index (MCI)

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### Abstract

The study provides insights and revisits the construction of the Monetary Condition Index (MCI) for Nigeria to aid in evaluating the stance of monetary policy over time. The study covers periods from 2000Q2 to 2022Q4, coinciding with key reforms in the money and foreign exchange markets, the adoption of the I&E window as the official exchange rate of the CBN, and the adoption of a new monetary policy framework in 2006. The result of the long-run coefficients was applied as a weight to the deviations of the MCI components to derive the monetary conditions indices. The result of the deviation suggests that the Narrow MCI was more stable than the Broad MCI, and both have mimicked the actual policy stance of the CBN to a large extent. Also, the study found some level of convergence between the MCIs and the monetary policy stance, suggesting that monetary conditions are in line with the Bank's signaling instrument. In conclusion, the forecast of the MCIs suggests a tightening policy stance in the short to medium term. The study, thus, recommends that the CBN continue tightening its monetary policy rate for the next 12 quarters.

**Keywords:** *Credit, Interest rates, monetary condition index (MCI), output and monetary policy, real exchange rate, Nigeria.*

**JEL Classification:** *C32, G20, G21, G53*

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### 1. Introduction

Monetary policy is a major aspect of macroeconomics under the purview of central banks. It works by controlling the level of money supply through several mechanisms, determining the level of economic activities. Works by [Mishkin \(1995\)](#), [Monetary Policy Committee \(BOE\) \(1999\)](#), and [Kuttner and Mosser \(2002\)](#) identified six (6) channels of transmission

of monetary policy: the interest rate; the wealth effect; the exchange rate; the monetarist (relative asset price changes); the narrow credit (bank lending); and the broad credit (balance sheet) channels. These channels, particularly interest rate, exchange rate, and credit, are commonly compressed into three due to the significant effect of

monetary policy on these variables, especially in the short run ([Kannan, Sanyal & Binod, 2006](#)).

A Monetary Conditions Index (MCI) is an index number, relative to a base period, calculated from a linear combination of two or all three economy-wide financial variables relevant to monetary policy. It serves as a summary statistic of the monetary condition in an economy. The calculation includes short-term interest rates and exchange rates, termed narrow MCI, or all three variables, termed broad MCI ([Yaaba 2013](#); [Tule et al 2015](#)). The purpose is to provide information on the economy, inflation, and the general monetary environment in a country to guide monetary policy. A change in the index indicates the stance of monetary policy: how 'tight' or 'loose' monetary conditions are relative to the reference or base period.

Historically, the Bank of Canada was the pioneer of MCI, considering the weighted effect of the exchange rate and interest rate. Other central banks like the Bank of China, central banks of Turkey, Croatia, Tunisia, and the United Kingdom incorporated credit to the private sector as one of the key channels of monetary policy transmission, arriving at broad MCI ([Tule et al, 2014](#); [Ali & Moheddine, 2018](#)). The construction of MCIs is based on equilibrium conditions in the financial market, the exchange rate market, and the market for goods and services (IS-LM model).

The calculation of MCI is based on the identification of monetary policy transmission mechanisms ([Duguay, 1994](#)). It acts on the global demand through the effects of the interest rate on consumption and investment and those of the exchange rate on competitiveness and the external balance.

MCI serves as an indicator of monetary policy stance. Major central banks, including the Bank of Canada, its counterparts in New Zealand, Australia, Norway, Sweden, and the European Central Bank, and institutions like the International Monetary Fund (IMF), Goldman Sachs, JP Morgan, Deutsche Bank, and Merrill Lynch, use MCIs to appraise monetary conditions. Many monetary authorities use the index as a policy rule, providing supplementary information to identify divergence between actual monetary conditions and the desired policy stance ([Ali & Moheddine, 2018](#)).

Given recent developments in monetary policy decisions by the monetary policy committee (MPC), questions have been raised about the actual stance of monetary policy. From September 2020 to April 2022, the CBN maintained the monetary policy rate (MPR) at 11.50 percent to stimulate output recovery following the adverse impact of COVID-19. The ensuing liquidity injection put pressure on prices, leading to a switch to a tightening mode by the second quarter of

2022. Consequently, the CBN raised the MPR at the May 2022 MPC meeting, from 11.50 percent to 13.00 percent, further raised to 14.00 percent and 15.50 percent in July and September 2022, respectively. In addition to the MPR adjustment, the Bank increased the CRR from 27.50 percent to 32.50 percent to rein in rising inflation in the Nigerian economy.

This paper aims to re-examine and re-estimate the MCI for Nigeria in light of recent developments and updated data, providing regular information on the actual monetary policy stance to the MPC. The earlier efforts by [Oleka and Masha \(2003\)](#), [Yaaba \(2013\)](#), and [Tule et al. \(2014\)](#) will serve as a foundation for this endeavor. The MCI developed should offer additional insights on monetary conditions, disentangle the contribution of each channel of monetary policy transmission, provide flexibility for policymakers to respond to financial market dynamics, continuously rebalance priorities between output growth and price stability, identify the more important determinants of monetary conditions, complement the money demand function, and guide monetary policy decisions using MCI forecasts.

## 2. Literature Review

### 2.1 Theoretical Issues on Monetary Condition Index (MCI)<sup>1</sup>

The basic theory adopted across central banks to construct MCI is the Keynesian General Equilibrium Model RBI 2006; [Kannan, Sanyal & Binod 2006](#); and [Ali & Moheddine 2018](#)). Thus, in an open economy, general equilibrium is determined simultaneously in the money market, the foreign exchange market, and the market for goods and services. The effectiveness of monetary policy in an open economy depends on the efficiency of the monetary authorities' control over the level of interest rates. By modifying the behavior of economic agents, notably in terms of consumption, savings, and investment, the interest rate regulates economic activity and inflation. The calculation of MCI is essentially based on highlighting this mechanism. Assuming that the effects of the interest rate on economic activity may be counteracted or reinforced by those of the exchange rate, there is a need for an indicator that considers the net effects. In the same vein, the volume of credit to the economy has become prominent in the literature since it can be used to gauge the level of aggregate demand in the economy, eventually affecting output and inflation ([Ericsson, Jansen, Kerbeshian & Ragnar 2014](#); [Abubakar & Yaaba 2013](#); [Trung 2020](#)).

monetary policy transmission mechanism. See [Yaaba \(2013\)](#), [Abubakar & Yaaba \(2013\)](#).

<sup>1</sup> We construct this section to incorporate how narrow and broad MCI could be derived using the key channels of

## 2.2 Empirical Literature

Monetary Condition Index (MCI) was pioneered by the Bank of Canada. The Bank used a weighted average of short-term interest and exchange rates to assess the stance of monetary policy in the country (Hyder & Khan, 2007). The two variables were adopted because they were channels of transmission of monetary policy that significantly affected inflation (Qayyum, 2002). Since the emergence of MCI, it has been used by various banks, organizations, and firms, even in small open economies. Siklar and Dogan (2015) used a time-varying framework and the Kalman Filter algorithm to construct MCI using data from 1999 to 2013 and concluded that the interest rate has a more significant impact on monetary conditions than the exchange rate. Similar studies were carried out by Khan and Qayyum (2007), Hyder and Khan (2007), and Qayyum (2002) in Pakistan, as it also has the characteristics of a small and open economy, and their results were in line with Siklar and Dogan (2015).

Khan and Qayyum (2007) used the IS-Philips curve and the Bernanke and Mihov Overall Measure, concluding that the interest rate has a more impactful effect than the exchange rate on the economy. Hyder and Khan (2007) used the Johansen Cointegration Technique and arrived at the same conclusion. The results showed that out of fourteen periods, Pakistan had eight tight and six soft periods of monetary conditions, with the interest rate appearing to be more dominant than exchange rate channels during inflationary periods.

Qayyum (2002) employed the Full Information Maximum Likelihood Method of Johansen, and the results showed that a one-point movement in the interest rate is equivalent to a 2.79-point movement in the exchange rate in Pakistan. In Albania, Kodra (2011) also used the Full Information Maximum Likelihood method of Johansen and found that a one-point movement in the interest rate is equivalent to a 3.8 percent movement in the exchange rate in Albania. In the Philippines, a small and open economy, Poon (2010) employed the Augmented Monetary Condition Index (AMCI), ranging from 1982 to 2004 using the Unrestricted Error Correction Model (UECM) and Autoregression Distributed Lag (ARDL) bounds test. He concluded that the results of the AMCI aligned well with the inverse movement of real GDP growth.

For the Gulf countries - Bahrain, Iraq, Kuwait, Oman, Qatar, the Kingdom of Saudi Arabia, and the United Arab Emirates - Momen and Jabeen (2018) combined two transmission channels, interest rate and exchange rate, to create the Monetary Condition Index (MCI). They used Principal Component Analysis and the vector autoregression approach to develop MCI and examine its impulsive response on CPI and GDP. They concluded that MCI may be used as a long-term indicator for CPI and GDP of Bahrain and Qatar, as well

as a medium- and long-term indication for GDP of Oman, but cannot be utilized as a long-term indicator for CPI and GDP of Kuwait and KSA.

For four countries in Central and Eastern Europe (CEE), Nucu and Anton (2018) set out to create a Monetary Conditions Index (MCI) by incorporating changes in the short-term interest rate and the real effective exchange rate between August 2005 and December 2015. They applied a Vector Error Correction Model to evaluate the relative significance of real interest rates and real exchange rates for the monetary circumstances in a number of CEE nations. The analysis' findings offer fresh empirical proof of the MCI's capacity to track changes in monetary policy. Additionally, they use Granger causality to deduce the degree to which external influences have affected the overall monetary conditions of the studied countries. The findings show that the monetary policies of the Eurozone have a significant impact on the monetary conditions of CEE countries.

Guillaumin and Vallet (2017) aimed to create an index of the monetary and financial condition index to forecast inflation. They investigated several monetary and financial variables essential components of the monetary transmission mechanism to the inflation rate, with a particular emphasis on the Swiss scenario. They utilized an augmented index, used a multistep forecasting methodology, and compared the model's outcomes to those of a benchmark autoregressive model. Their findings are consistent with the notion that the price of financial assets should be taken into consideration when defining the central bank's monetary policy.

Three main channels of exchange rate and credit rate are included in the complex MCI. This indicator, which includes a credit channel, may be more useful in illuminating the financial situation of developing nations like Iran. The index for the years 1978 to 2012 was derived by Horry, Abadi, Nejati, and Naieini (2018). Using the self-explanatory Autoregressive Distributed Lag (ARDL) approach, the function of total economy demand is estimated in order to extract the variables' weight in this index. The exchange rate weights are greater than the interest rate channel in the MCI calculation, per the model estimation results. Both the nominal and real MCI have been determined using the weights derived from the model estimation. Eventually, it was discovered that the real MCI has a stronger predictive capacity for inflation than the nominal MCI by estimating the inflation equation and comparing the root mean squared errors (RMSE) of the two.

Hanseen (2000) developed the MCI for Thailand with an inflation function, using the autoregressive distributed lag model to derive the relevant weights for interest rates, exchange rates, import price index, government fiscal indicator, and agricultural price index. He made use of data

that ranges from January 1990 to July 1998. Though he found out that the ratio of exchange rate and interest rate in Thailand is 3.3:1. This means that if the exchange rate average has depreciated to 3.3%, the interest rate will rise by 1%. The Hong Kong monetary authority used the real interest rate and effective exchange rate to construct the MCI, after estimating the aggregate demand functions in the reduced form to obtain relevant weights. The ratio of weighted exchange rate to interest rate was 4.25:1.

**Batini and Turnbull (2000)** suggested an alternative MCI for the United Kingdom to be used as a coincident indicator after analyzing various indices on MCI and their performances. This alternative MCI is that MCI can be used as an operational target as an indicator of the monetary policy rule. They covered the scope of 1984 Q4 to 1999 Q3. Studies on MCI in Nigeria have been very scanty, and it is deduced that **Yaaba (2013)** and **Tule et al (2014)** have been the most prominent works done in the Monetary Condition Index in Nigeria.

In Nigeria, **Yaaba (2013)** constructed the MCI for Nigeria and concluded that MCI aligns with the policy direction of the Central Bank of Nigeria, and it can therefore serve as a lead indicator of the monetary policy stance of the Bank. **Tule et al (2014)** estimated Nigeria's Monetary Condition Index to aid the valuation of monetary policy stance in Nigeria. They made use of quarterly data for 91 days treasury bill rate, real exchange rate, inflation rate, real private sector credit, and real government domestic product, covering the period 2000 Q1 to 2014 Q1. Following some econometrics diagnostic tests and Johannsen cointegrating tests, they found out that the narrow and broad money condition indices suggest a relatively tight monetary environment, with the narrow being less volatile than the broad monetary condition Index.

### 3.0 Data and Methodology

#### 3.1 Data

Data for the study which covers the period from 2000Q1 to 2022Q4 was sourced from National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN). In tandem with literature, the variables employed in the estimation of narrow MCI are interest rate and exchange rate. However, the variables adopted in the estimation of broad MCI are interest rate (91-day treasury bill rate), real effective exchange rate, private sector credit, credit to the government, and real GDP (in logarithms). The inclusion of other variables was with a view of capturing the peculiarities of the Nigerian economy.

### 2.3 Theoretical Framework

We recognized the efforts of **Stevens (1998)**; **Peng and Leung (2005)**, adopted by **Yaaba (2013)** and **Tule et al (2014)**, that the transmission process of monetary policy can be viewed from the perspective of monetary condition index. The puzzle is whether to adopt narrow MCI or broad MCI to gauge the efficacy of monetary policy stance for a central bank. However, the appropriate measure of MCI for Nigeria is the broad MCI<sub>2</sub>, which encompasses of the three key channels of monetary policy transmission mechanisms. This specification will be used later in our empirical study.

**Stevens (1998)**; and **Peng and Leung (2005)** constructed narrow MCI to include only interest rate and exchange rate as key determinants of output and inflation in an economy, which guide central on the efficiency of its monetary policy rule. RGDP or inflation were the dependent variables in the model, while interest rate and exchange rate are the independent variables, and their coefficients are used to generate the weight of the MCI in whatever case. Accordingly, **Stevens (1998)**; and **Peng and Leung (2005)** further specified the broad MCI to incorporate another important channel of monetary policy transmission mechanism, which is the credit channel, although, some analyst with minority view that Assets price channel is also important.

### 3.2 Model Specification

For constructing NMCI, we consider four different econometric linear models, the first model considers aggregate demand or output as dependent variable while interest rate and exchange rate as the independent variables. While the second equation takes inflation as dependent variable, the models that best explains the economic situation of the country, would be employed. The respective coefficients of the selected model would then be used to generate the absolute weight of the NMCI. The third and fourth equations are used to derive the weight of the MCI using both aggregate demand equation and inflation model, and any of the two scenarios/models that best explains the economic condition of the country, should be adopted as the monetary policy framework of the central bank.

We start by generating the general model as well as the specific components of the respective parameters for generating the individual coefficient of NMCI;

<sup>2</sup> Note: we have not ignored the monetary aggregate framework of the CBN, which is the current operational framework of the Bank, however, there is need for an encompassing index that considers other important variables

not only money supply. By doing so, the index would indicate the monetary policy stance of the Bank, and whether the policy is tightening or loosening.

$$y_t = \alpha_0 + \beta_1 r_{t-p} + \theta_2 e_{t-p} + \nu_t \quad 5^3$$

Equation 5 above depicts the structural construction of NMCI taking into account of only two channels of monetary policy transmission mechanisms, this allows us to have two coefficients and two weights, which would be used to generate the MCI value and to know whether there is policy tightening or loosening comparing the MCI actual calculated value with its base period.

Now we move to the second part of MCI where inflation is taken as the dependent variable, in this situation, the target is to see whether inflation could truly be predicted by the behaviours of interest rate and exchange rate, and if so, what is the monetary policy implication of that.

$$\pi_t = \alpha_0 + \beta_1 r_{t-p} + \theta_2 e_{t-p} + \nu_t \dots \dots \dots 6$$

Equation 6 above explains how the coefficient of interest rate and exchange rate could be generated using a linear econometric model, this enables us to get the absolute weight of the MCI for policy analysis.

The derivation of weighted components of the NMCI is constructed using equation 7 & 8 below:

$$NMCI_{gdpw} = \alpha_0 + w_r(r_t - r_0) + w_e(e_t - e_0) + \vartheta_t \dots \dots 7$$

$$NMCI_{\pi w} = \alpha_0 + w_r(r_t - r_0) + w_e(e_t - e_0) + \vartheta_t \dots \dots 8$$

Where;

*NMCI* represnets narrow monetary condtion index

$\alpha_0$  represents the constant intercept of the model

$r_t$  represents the short – term current intrest rate

$r_0$  represents the base period value

$e_t$  represnts the current exchnage rate

$e_0$  represnets the base period exchnage rate

$y_t$  or *gdp* represents output or aggregate demand

$\pi$  represents inflation or general price level

$\vartheta_t$  or  $\nu_t$  represents the rmadom variable,

$\beta_1, \theta_2$  represent the coefficients of the parameters in the model, and

$w_r, w_e$  represnet the weights of interest rate and exchnage rate, respectively.

We now have the linearized weighted component model of the NMCI in equation 7 & 8 above, taking into account of the deviation of each variable from its base period, the base period is usually known to be 100, see; **Yaaba (2013)** and **Tule et al (2014)**. So, any deviation of the calculated from the base period indicates whether monetary policy is tightened or loosened. A higher NMCI index than the base period shows a monetary policy tightening, while a lower NMCI than its base period shows monetary policy loosening.

Note: with  $w_r + w_e = 1$ , NMCI represents the monetary conditions index

Now we move further to construct the model for the BMCI, taking into account of the role of interest rate, exchange rate and volume of credit to the economy, by so doing, we can derive the coefficient of each variable in the model as well as the respective and absolute weight of BMCI. Similar to the construction of NMCI, we also have four different models here. Equation 9 and 10 show the linear model of deriving the coefficient of the parameters of either output equation or inflation model, while equations 11 and 12 show how the respective weight of each variable is generated.

$$y_t = \alpha_0 + \beta_1 r_{t-p} + \theta_2 e_{t-p} + \delta_3 C_{t-p} + \nu_t \dots \dots \dots 9$$

$$\pi_t = \alpha_0 + \beta_1 r_{t-p} + \theta_2 e_{t-p} + \delta_3 C_{t-p} + \nu_t \dots \dots \dots 10$$

$$BMCI_{gdpw} = \alpha_0 + w_r(r_t - r_0) + w_e(e_t - e_0) + w_c(C_t - C_0) + \vartheta_t \dots \dots 11$$

$$BMCI_{\pi w} = \alpha_0 + w_r(r_t - r_0) + w_e(e_t - e_0) + w_c(C_t - C_0) + \vartheta_t \dots \dots 12$$

Note: with  $w_r + w_e + w_c = 1$ , BMCI represents the monetary conditions index

Where;

$\delta_3$  represents the coefficient of credit to the economy

$C_t$  represents volume of credit to the economy at time *t*

$C_0$  represents the base period volume of credit to the economy

$w_c$  represents the weight value of the credit to the economy

$BMCI_{gdpw}$  and  $BMCI_{\pi w}$  represent the aggregate weights of output and inflation for broad MCI, respectively.

<sup>3</sup> We have not specified so far, whether we are using real or nominal variables in constructing our MCI, this depends on

further thorough review and considering the peculiarities of the Nigerian economy.

We have now constructed the essential models to measure the monetary policy stance for Nigeria<sup>4</sup>, using the MCI. There is further contention regarding the nature of each variable in the models. Several studies alluded to the fact using real variables instead of nominal, captures the true picture of an economy, while some are of the view that nominal variables could also be used to capture the true nature of an economy. Thus, the need to further re-examine whether we should use real or nominal output, real or nominal interest rate, real or nominal exchange, real effective or nominal effective exchange rate. There is also the contention of whether to use absolute numbers or growth. Should we use volume of credit to the economy or credit growth, volume of output or GDP growth, this would also be informed by further investigation and intensive literature review.

Narrow MCI at a given period is the weighted sum of changes in the interest rate and exchange rate from their levels in a chosen base year. For broad MCI, we included other variables such as volume of credit in the economy to take account of other evolving channels of the monetary policy transmission mechanism. This study adopts [Tule et al \(2014\)](#) methodology with modification. The Justification of adopting the methodology of [Tule et al \(2014\)](#), is because they used Johanssen cointegration test due to the fact that most Nigerian variables are casually related because of an unknown third factor, which most times cannot be captured. The model is;

$$NMCI = \beta_r (r_t - r_0) + \beta_{reer} (reer_t - reer_0) \dots\dots\dots(8)$$

$$BMCI = \beta_r (r_t - r_0) + \beta_{reer} (reer_t - reer_0) + \beta_{cp} (cp_t - cp_0) + \beta_{cg} (cg_t - cg_0) \dots (9)$$

Where: NMCI is the Narrow Monetary Condition Index, BMCI is Broad Monetary Condition Index,  $\beta_r$ ,  $\beta_{reer}$ ,  $\beta_{cp}$ ,  $\beta_{cg}$  are the respective weights for the real interest rate, real effective exchange rate, credit to the private sector and credit to the government variables.

In deriving weights for the MCI, there is a choice between basing it on aggregate demand or inflation. The two models may be specified and estimated as follows:

#### Aggregate Demand model:

$$rgdp_t = \alpha + \beta_1 rgdp_{t-p} + \beta_2 cp_{t-p} + \beta_3 cg_{t-p} + \beta_4 reer_{t-p} + \beta_5 rtbr_{t-p} + \xi_t \dots\dots (10)$$

for:  $\beta_1, \beta_2, \beta_3, \beta_4 > 0$ ;  $\beta_5 < 0$

Where:  $rgdp$  = real GDP (in logarithms),

$rtbr$  = real interest rate (%),

$reer$  = real effective exchange rate,

$cp$  = credit to the private sector (growth rate, %)

$cg$  = credit to the government (growth rate, %)

$\xi_t$  = the residual term.

Thus, aggregate demand is represented by the real GDP, while inflation is represented by the year-on-year headline inflation rate. Theoretically, in equation 10, the coefficients  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  are expected to be positive, while  $\beta_5$  should be negative. The Johanssen co-integration estimation technique was applied to model the aggregate demand function specified in equation 10. The estimation of aggregate demand function to derive weights for the construction of the MCI is well documented in the literature (see [Freedman 1994](#), [Duguay 1994](#), [Abubakar and Yaaba \(2013\)](#) and [Tule et al \(2014\)](#), etc. The applicable weights were determined from the coefficients derived from the long-run equation in the Johanssen framework. Thus, we derived the respective weights based on the parameters of the real effective exchange rate, 91-day treasury bill rate and real growth in credit to the private sector and government. We then constructed the Narrow MCI and Broad MCI (BMCI) for Nigeria. The broad MCI offers some understanding of the sources of changes in the monetary conditions and the relative importance of the three channels of monetary policy transmission.

<sup>4</sup> This study intends to use the broad MCI as an index to gauge the monetary policy of CBN, this is essential because, interest

rate, exchange rate and credit are all important in determining the level of employment, output and inflation in Nigeria.

## 4.0 Results and Discussion

Table 4.1 summarizes the findings of the unit root test which indicates that the variables were all integrated of order one (i.e. I(1)).

**Table 4.1: Unit Root Test**

Variables	ADF		Order of Integration	
	5% level	1st Difference	level	
RGDP	-2.896	0.0013	0.6536	I(1)
REER	-2.894	0.0000	0.5633	I(1)
RCP	-2.894	0.0000	1.0000	I(1)
RCG	-2.894	0.0220	1.0000	I(1)
RTBR	-2.894	0.0000	0.2704	I(1)

**NB: Values are probability levels of significance**

The Schwarz information criterion reveals an ideal lag length of 1 (See appendix). The long-run co-integration of the variables was also demonstrated by the co-integration test. As a result, we applied the Johansen co-integration procedures to the aggregate demand function in equation 10. The estimated long-run coefficients are displayed in table 4.2.

The a priori expectation is that output is directly related to exchange rate and volume of credit to the economy but inversely related to interest rate for the computation of the monetary conditions index. Since this is a log-linear model, the coefficient of the treasury bill rate becomes -1.53 (Table 4.3).

**Table 4.2: Johansen Long-run coefficients**

LRGDP	RTBR	LRREER	LRCP	LRCG
	-0.0153	0.0592	-0.2491	0.0258
	(0.0054)	(0.0288)	(0.0053)	(0.0056)

**Table 4.3: Long-run coefficients/MCI Weights**

	Variables	Coefficients	MCI Weights	A priori Expectations	Estimated Coefficients/MCI Weights
1	Real Effective Exchange Rate (REER)	$\beta_3$	$\Theta_e$	$\beta_3 > 0$	0.0592
2	Real Treasury Bills Rate (TBR)	$\beta_2$	$\theta_c$	$\beta_2 < 0$	-1.53
3	Real Credit to Private Sector (RCP)	$\beta_4$	$\Theta_r$	$\beta_4 > 0$	-0.24
4	Real Credit to Government	$\beta_5$	$\Theta_d$	$\beta_5 > 0$	0.0258

**Authors computation**

The values of the estimated coefficient show that a one per cent depreciation in Real Effective Exchange Rate would increase output by 0.059 per cent. Similarly, a one per cent increase in credit to the government sector would increase output by 0.026 per cent. On the other hand, a per cent increase in credit to the private sector would contract output by 0.24 per cent.

Overall, the results indicated that movement in the interest rate had a dominant influence on real output in Nigeria. The diagnostic statistics do not indicate any serious problems in terms of model specification, stability and functional form. The estimated coefficients are within the given range, implying parameter consistency. The interaction among the coefficients would be transmitted into the Monetary Conditions Index as they are applied as weights to changes in the respective variables in the index. The values of the derived coefficients represent the weights applied for the corresponding variables relevant to the computation of the

MCI for Nigeria. The MCI was computed by calculating the deviations of the variables from their base period values. The deviations are then weighted with the coefficients of the Johansen estimation to compute the broad and narrow monetary conditions for Nigeria.

Figures 4.1 and 4.2 show movements in the different components of the Broad and Narrow Monetary Condition Indices, while figures 4.3 and 4.4 represent the Narrow and Broad Monetary Condition Indices for Nigeria plotted against the base period index, respectively. The above figure 4.1, shows the movement of the components of NMCI, which are real effective exchange rate (on the primary axis) and T-bills rate (on the secondary axis). The diagram shows that real effective exchange rate is above T-bills rate from 2000Q1 to 2013Q1, before dropping below T-bills rate and increased above T-bills rate from 2016Q3. The figure shows that at the latter part of the scope of study real effective exchange rate fell below the T-bills rate.

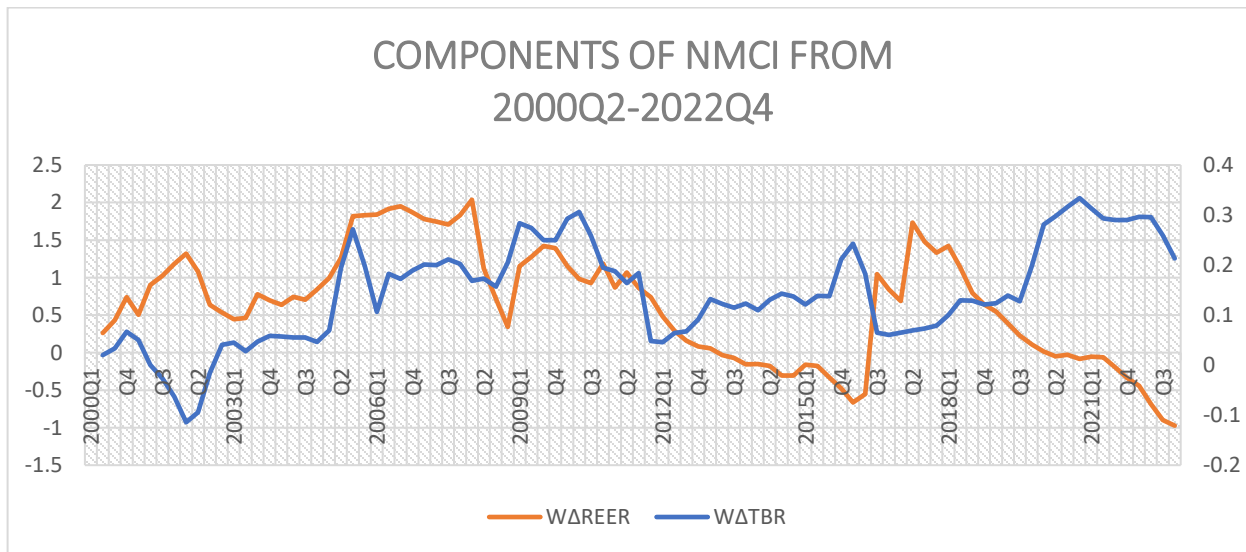
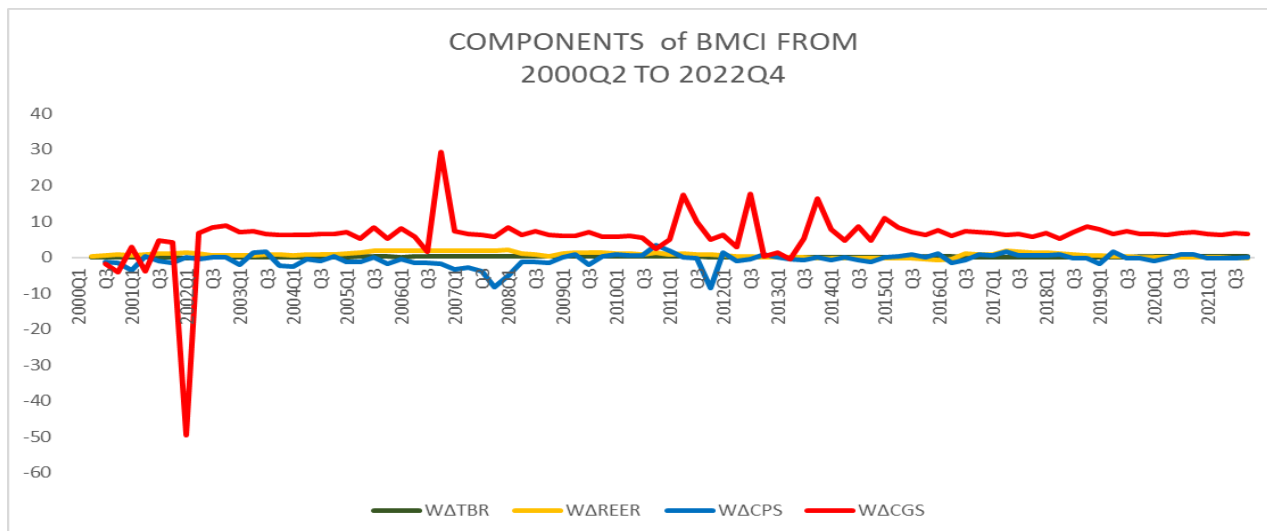
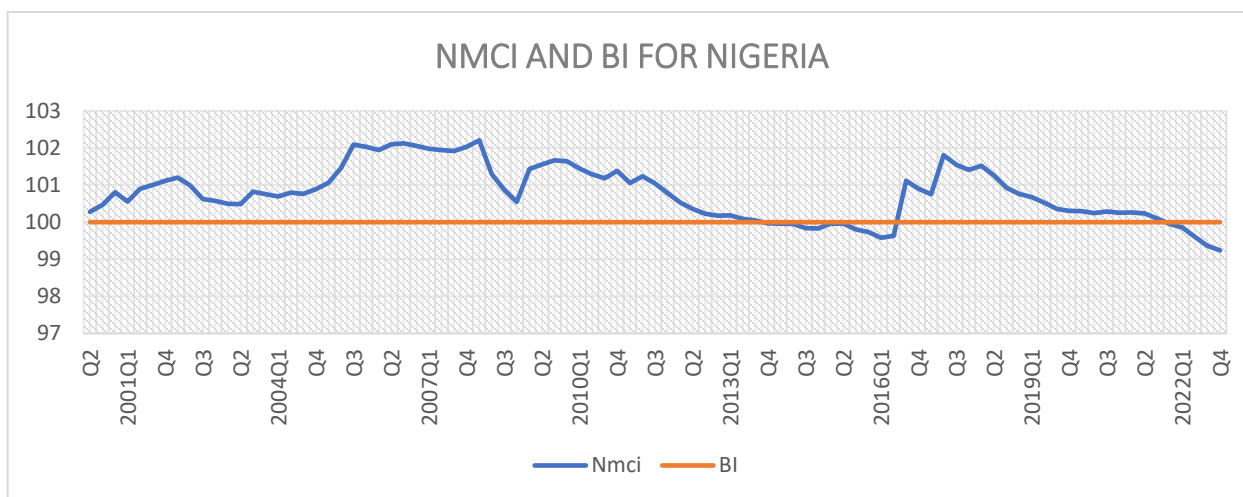


Figure 4.1: Components of NMCI (2000Q1 - 2022Q4)



**Figure 4. 2: Components of BMCI (2000Q1 - 2022Q4)**

**NB: 2000Q3 base period value is assigned an index of 100 (as in Yaaba 2013 and Tule et ' al 2014)**



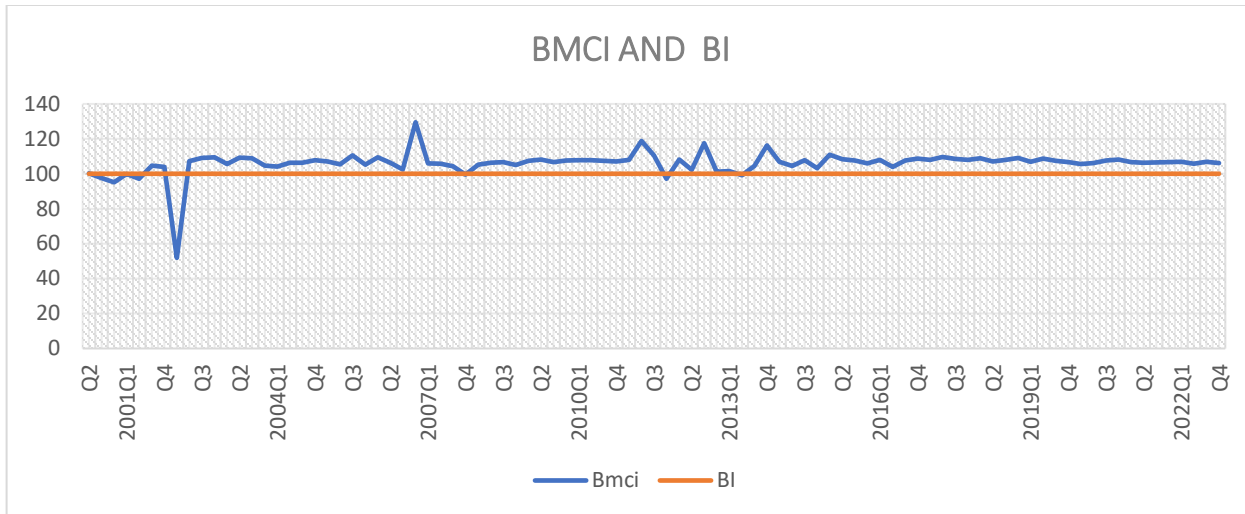
**Figure4.3: NMCI AND BI FOR NIGERIA**

**NB: 2000Q3 base period value is assigned an index of 100**

Figure 4.2 shows the movement of the components of Broad money condition Index (BMCI), the graph shows that credit to government sector showed to be very volatile amongst the variables used in computing the BMCI.

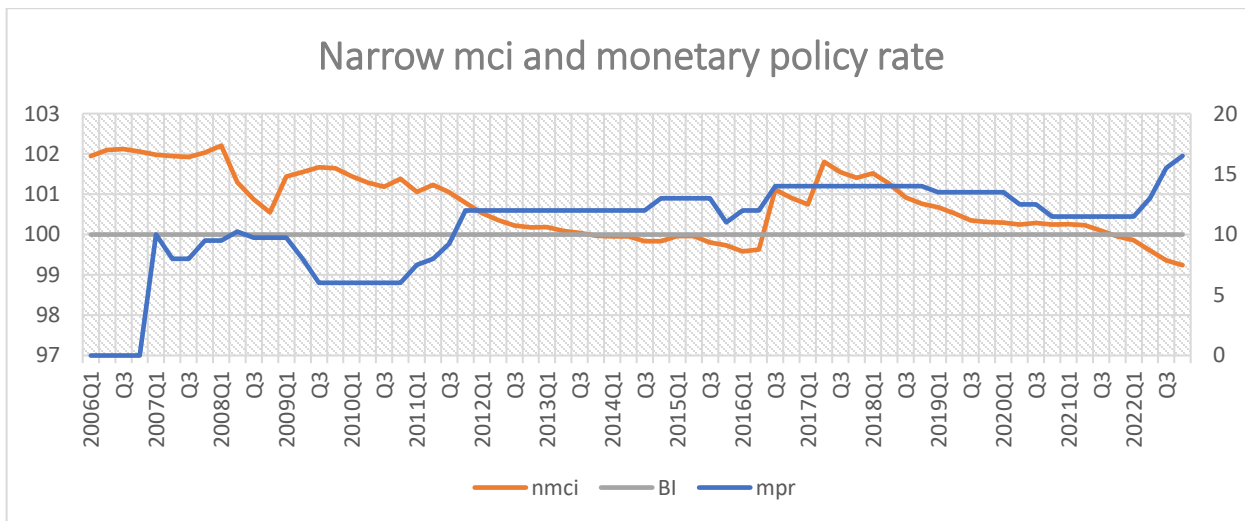
Figure 4.3 shows that NMCI, is tight on most of the time frame of the study, which means that the use of real effective exchange rate and T-bills rate is effective when used by the

central bank. Though at the end of the scope of study, it shows that NMCI is tightening this might be because of the sudden fall in treasury bill rate which is meant to be the transmission mechanism of monetary policy. Overall NMCI showed to be tight and adequate as an essential monetary condition index within the scope of study.



**Figure 4. 4: BMCI AND BI**  
**NB: 2000Q3 base period value is assigned an index of 100**

Figure 4.4 shows the movement of BMCI, with respect to BI is volatile and showed to be loosening compared to the broad monetary condition index of 2016.

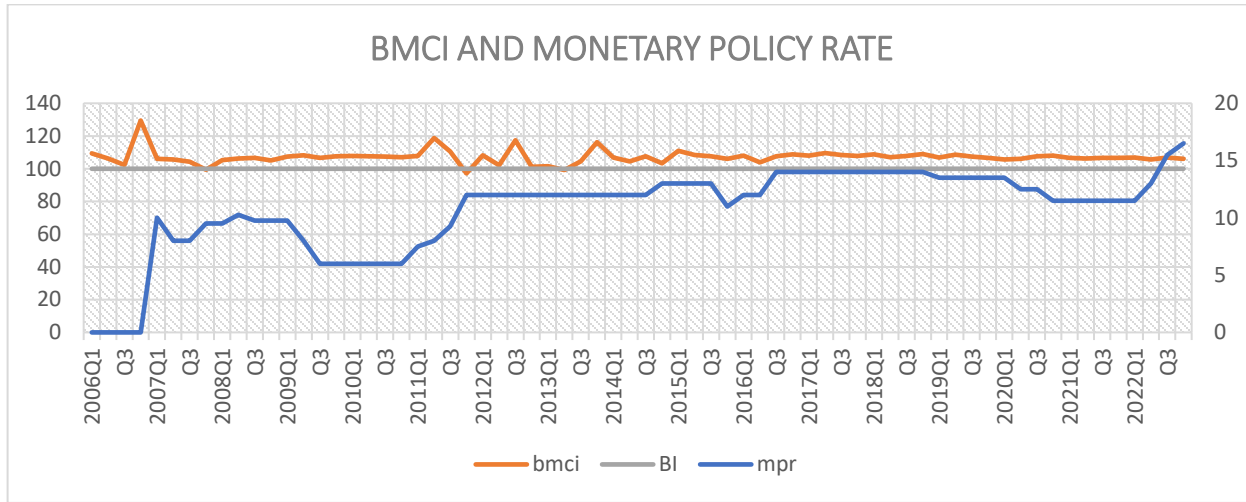


**Figure 4.5: NARROW MCI AND MONETARY POLICY RATE**  
**NB: base period value is assigned an index of 100**

Figure 4.5 shows the movement of narrow mci and mpr from 2006 q1 to date. The movement of the NMCI and MPR shows that NMCI has been a good monetary condition index to the mpr, because when NMCI is above the base index the mpr is being tight, except in later part of the study when the reverse was the case, this was because of the fall in T-bills rate which

is a significant transmission mechanism for the NMCI. Figure 4.6 shows that BMCI, does not really depict the stance of monetary policy. This is because at some points when BMCI is meant to tighten, mpr was loosening. The BMCI is also much volatile during the period of study.

**Figure 4.6: BMCI AND MONETARY POLICY RATE**

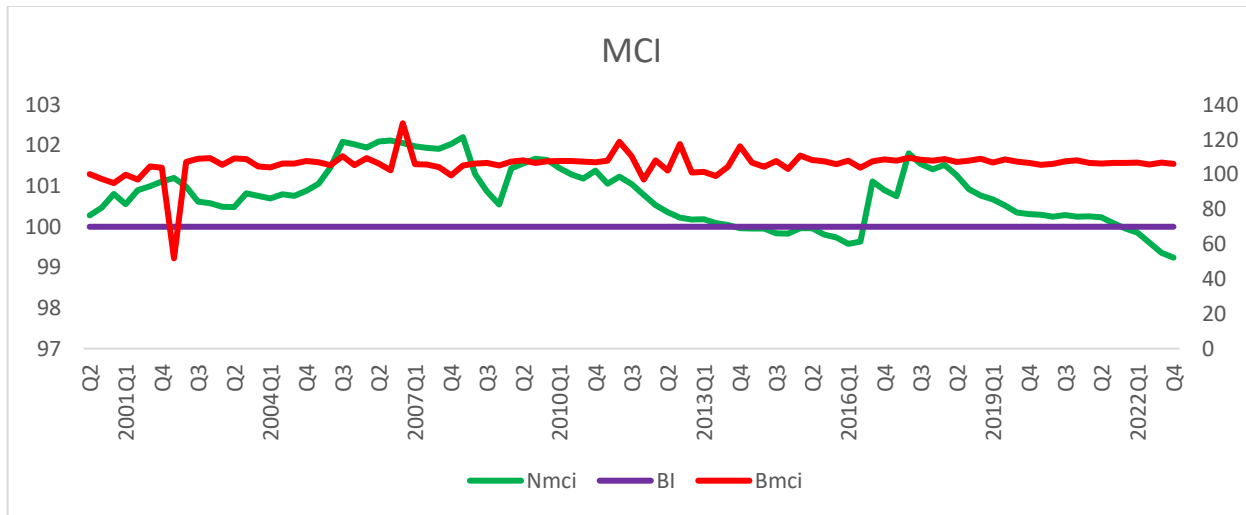


**NB: base period value is assigned an index of 100**

**4.1 The Narrow and Broad Monetary Conditions Index**

In conformity with the findings of Tule et al (2014), the BMCI in our study showed to be more volatile than the NMCI, this might be because of the credit component of both the private

sector and government sector, which has made the BMCI more volatile when compared to the NMCI.



**Figure 4.7: MCI**

**NB: 2000Q3 base period value is assigned an index of 100**

This paper extended the Data Bank to a more recent time; thus, we were able to capture the different phases of exchange rate regimes and changes in monetary policy operations. As part of improving from the previous studies, we also introduced banking system credit to government

sector, not only credit to private sector used in the previous studies. The chart depicts that broad and narrow MCIs suggest that monetary conditions, over time, have been tight relative to the base period (see figures 3 & 4).

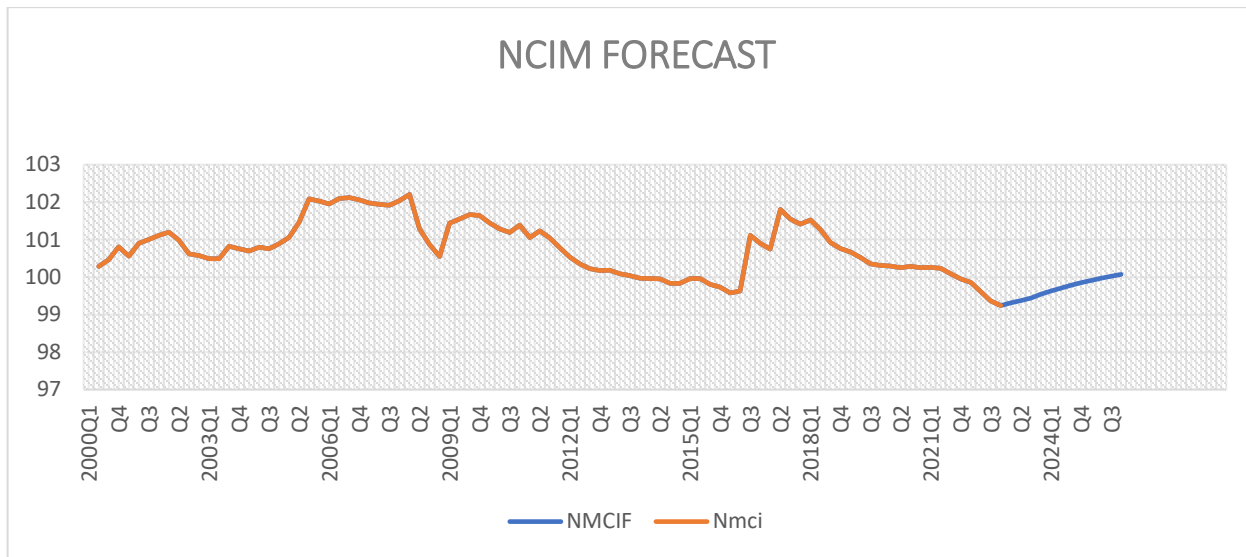
**5.0 MCI Forecast**

The second role of MCI is forecasting future monetary policy stance to guide monetary authorities appropriately on the decisions to take in the short to medium term. To forecast the behaviour of the MCI, a Box-Jenkins Autoregressive Integrated Moving Average (ARIMA) specification was set up (see [Tule et' al 2014](#)).

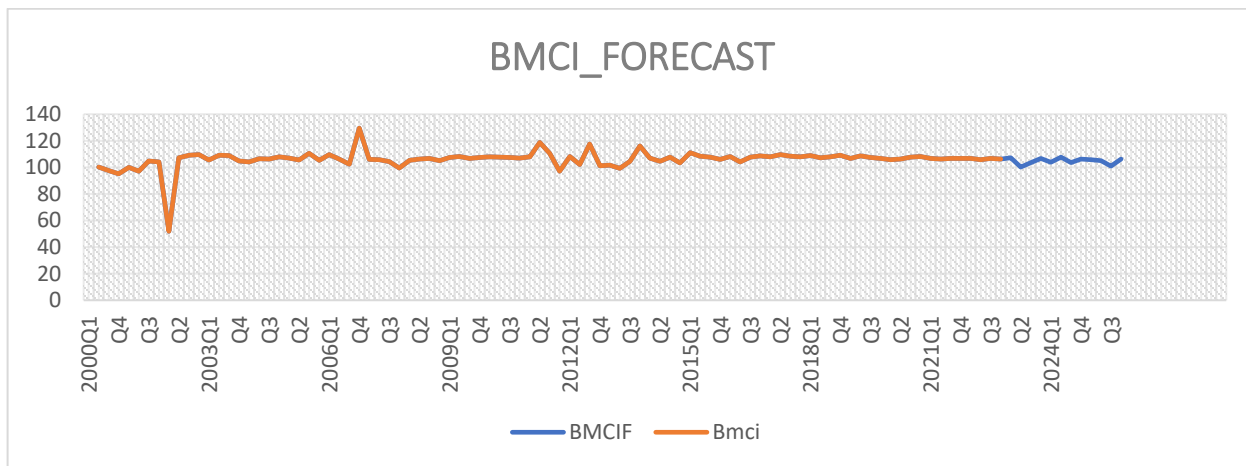
Figures 5.1 and 5.2 show short to medium term forecasts of the NMCI and BMCI from 2023Q1 – 2025Q4. The forecast

models, forecasts evaluation and residual graphs are shown in the appendix.

The graph above shows that tightening policy stance for twelve (12) quarters in the future although, NMCI relatively moves below its Base Index but in an upward trajectory, this suggests moderate monetary policy tightening by the CBN over the forecast horizon.



**Figure 5.1: NCIM FORECAST**



**Figure 5.2: BMCI FORECAST**

From figure 5.2, the narrow MCI is expected to be increase in the next twelve (12) quarters (suggesting a tighter monetary policy stance), if the real exchange rate and T-bills rate assume their current trends over the forecast horizon. On the other hand, the forecast of the BMCI shown in figure

9 indicates that the monetary conditions may still show signs of volatility over the forecast period, even though it moves above its Base Index. Thus, making it difficult to predict the future stance of the monetary policy. Therefore, careful

restrictions should be put in place, to avoid persistence in the volatility of BMCI relative to its baseline.

## 6.0 Conclusion and Policy Options

The study provides insights and revisits the construction of MCI for Nigeria to aid in the evaluation of the stance of monetary policy over time. The result of the deviation suggests that Narrow MCI was more stable than Broad MCI and both have mimicked the actual policy stance of the CBN to a large extent. Also, the study found some level of convergence between the MCIs and the monetary policy stance, suggesting that monetary conditions are in line with the CBN's signalling instrument - the MPR. In conclusion, the forecast of the MCIs suggests tightening policy stance in the short to medium term. The study, thus, recommends that the CBN to continue tightening its monetary policy rate for the next 12 quarters while continuously updating the MCI regularly for possible policy changes as done in the Federal Reserve Bank of Chicago and other central banks

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