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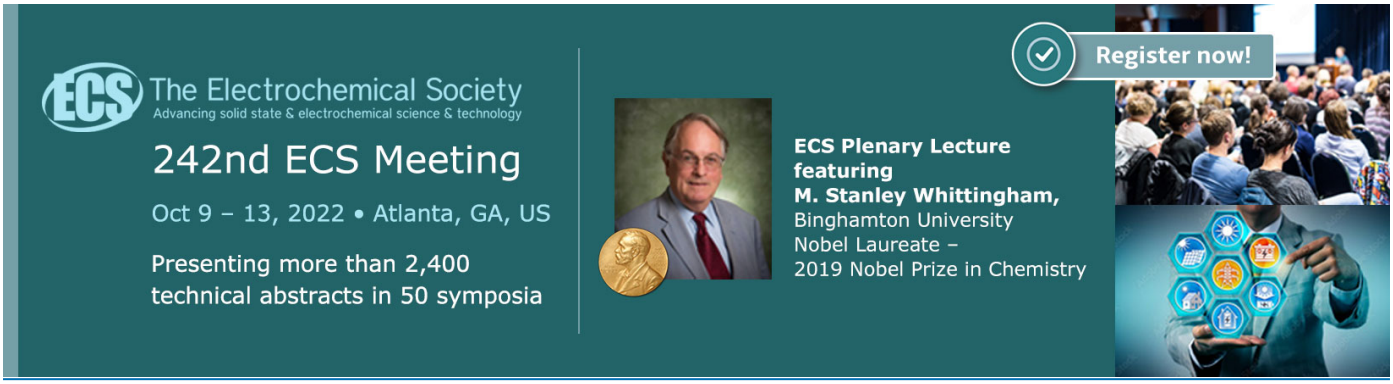

Real Sector Business Outlook and the Effectiveness of Monetary Policy on the Real Sector in Nigeria

Ebenezer O. Oladimeji[1*], Ebenezer K. Bowale[1], Henry Okodua[1]
[1]Department of Economics and Development Studies, Covenant University, Ota, Nigeria
[*]Corresponding Email: ebonyseyai@yahoo.com

Abstract

The effectiveness of monetary policy on the real sector has been a major concern of the monetary authority in Nigeria, over a few years ago. This has resulted in series of regulatory actions of the Central Bank of Nigeria (CBN) to ensure more funds/credit are channeled to the sector, in line with the policy objectives of the government to improve the sector. The inability of the real sector investors to meet up with their loan repayment obligations sometimes restricts the flow of this credit from the banking system to the sector, thereby jeopardizing the efforts of the monetary authority. This study, while investigating this concern, observed a similar trend pattern between real sector business outlook and real productive activities; this warranted the inclusion of this variable in the model that was estimated with SVAR. The results revealed a significant estimate of 7.95583; which is a contemporaneous response of credit to real sector to shocks from real sector business outlook. Also, an average of 0.21% variation in real output is explained by structural innovations from real sector business outlook. This means that as business or macroeconomic environment improves, the real investors invest more by accessing credit from the banking system; also, the banks are more confident of loan repayment, as the improved macroeconomic environment is expected to support business growth.

Keywords: Real Sector, Monetary Policy, Business Outlook, Structural VAR (SVAR)

1. Introduction

The real sector of the Nigerian economy, in the past few years, has attracted greater attention from the government. The focus on this sector is to largely reduce the nation's reliance on oil and create a more diversified economy, capable of solving some economic issues that have characterized the country over the years. This decision to boost the real sector is majorly carried out, using the fiscal policy or the monetary policy or both. From the monetary policy angle, the CBN usually influences the banking system with its monetary policy tools to channel more credit to the sector. This process is however not automatic and largely affected by some other factors, including the business environment outlook. The perception of real sector investors about the business or macroeconomic environment informs their confidence and this largely determines their risk appetite. This is the degree of investors' sentiment towards risk-taking, according to Pellissier [1], and it is in reaction to investors' perception and evaluation of their current economic environment and expectations of future eventualities. When the real sector confidence is low, investors become cautious in their investment strategy and reduce their level of investment in the real sector. This is because uncertainty about the macroeconomic environment threatens real investors' return on investment and income projection. This is to the extent that during the period of a tensed macroeconomic environment, demands for goods and services are usually low and investors are faced

with high stocks of unsold goods. In this instance, the real investors either reduce the prices of goods and services or cut down on production. So, little OMO case of business expansion is witnessed during this period. Therefore, investors do not increase their investments either by committing more of their financial resources or borrow from the banking system to finance investments.

As a result of this, the total real sector output is reduced not because there is no money to invest, but due to low demand and the possibility of loss on investment. From the perspective of the lenders of funds in the banking system, they are also very careful to lend to the real sector during this period of economic downturn, as the probability of getting investors to pay back their borrowed funds becomes very low. If the probability becomes low, then the probability of increased accumulation of nonperforming loans becomes high. Poor and uncertainty around the business outlook hinders the flow of credit to the real sector and affect the effectiveness of the monetary policy on the real sector. When banks' reserves are increased as a result of expansionary monetary policy, thereby creating more liquidity in the banking system, this liquidity may not flow to the targeted real sector, if real investors do not demand for it or the banks are skeptical about the ability of the real investor to pay back the borrowed funds. Also, a low interest rate which lowers the cost of funds may not effectively increase the flow of credit to the real sector during this period of gloomy economic outlook. This is because the reduction in interest rate, in response to monetary policy action of the monetary authority, may not cover the loss from low demand of real sector output.

Evidence of the relationship between the real output and real sector business outlook is considered in Figure 1. The two graphs exhibit a similar pattern of movement. In 2008, the business outlook index was -1.3, while the real output growth rate was 10.48; in 2009, the business outlook declined to -1.7 and real output also decreased to 10.00. In 2010, there was an improvement in business outlook, as the index increased to 30.5; an improvement was also witnessed in the real sector, as the growth rate increased to 10.35. From 2011 to 2012, there was a decline in the business outlook index to 27.5 and 11.4 respectively. This trend was also recorded in real output growth, as the rate decreased to 5.83 and 5.79. The business outlook indexes for 2013 and 2014 were 16.0 and 16.1; the real output also increased to 8.40 in 2013 but declined to 7.16 in 2014. The outlook index reduced to 8.3 in 2015 and -29.0 in 2016, with a similar upward pattern in real output growth rate. In 2017 the business outlook index returned to positive of 17.7 and further increased to 25.9. The same scenario was witnessed in the real sector as the growth rate move from -0.19 it was in 2016 to 0.47 in 2017 and 1.98 in 2018.

Figure 1: Aggregate Real Sector growth and Business Outlook. **Source:** Computed from CBN, 2018 Statistical Bulletin.

2. Literature Review

Lucky and Uzah [2] using Granger causality, Johansen co-integration, and vector error correction method, examined how monetary policy transmission impacts the domestic real investment in Nigeria. Fixed capital formation, maximum lending rate, naira/US dollar exchange rate, credit to private sector, prime lending rate, monetary policy rate, net domestic credit, treasury bill rate, and savings rate were the variables that were considered in their model. The results of their study showed that credit to private, monetary policy rate, maximum lending rate, savings rate, and net domestic credit had a positive relationship with real domestic investment, while treasury bill rate, exchange rate, and prime lending rate had a negative relationship with domestic real investment. A long-run relationship was also established between monetary policy variables and real investment. However, [2] used the treasury bill as a proxy for the asset price channel but failed to justify it. The Tobin's (1969) q-theory of investment and Ando and Modigliani's [4] life-cycle theory of consumption are the two famous theories of asset price channel. The theories used the price of bonds and equities to model asset prices in their analyses, which most empirical studies have followed. So, it is expected that the authors should acknowledge this and justify any variation from theoretical underpinnings.

Adekunle, Baba, Stephen, Ogbuehi, Idris and Zivoshiya [5] studied the monetary policy transmission in Nigeria with a multi-model approach, Johansen and autoregressive distributed lag models. Four sets of regressions were modeled to account for the four main channels, which include the exchange rate, interest rate, equity, and credit channels. The variables in the model were consumer price index, all-share index, monetary policy rate, credit to private sector, and exchange rate. According to the results, the exchange rate channel is the most prevalent, followed by the credit channel; the asset price channel occupied the third position. The Interest rate channel was statistically insignificant with a negative coefficient, while the credit, equity, and exchange rate channels were statistically significant with positive coefficients. However, the authors failed to properly capture the interest rate channel, so the result of statistically insignificant of the interest rate channel was not unexpected. This is because [5] used only the official

interest rate without any short term interest rate. Usually, the short term interest rate should complement the official interest rate because when the official interest rate is held stable for a long period, it does not automatically mean the short term interest rate will equally remain stable, as other factors like activities in the open market can affect the short term interest rate, with a resultant transmission effect to the real sector. This may happen if the monetary authority decides to influence the short term interest rate by buying securities in the open market.

Abeygunawardana, Amarasekara and Tilakaratne [6], between 2003 and 2012, assessed the impact of monetary policy on output, interest rate, and price in Sri Lanka. The variables in their model were credit to private sector, consumer price index, gross domestic product, trade deficit, and weighted average auction rate. The recursive and non-recursive structural vector autoregressive method used for the study revealed a strong and statistically significant transmission of policy rate shocks on the short-term interest rate, while the impact on commercial banking rates was small, with output and inflation not responding significantly to monetary policy shocks. According to the authors, the existence of a large informal economy, fiscal dominance, the shallowness of the financial market, market excess liquidity, and long tenure of deposit and loan types may have accounted for the weak transmission. However, [6] failed to consider the exchange rate in their study. Sri Lanka is not a closed and self-sufficient economy, so is a possibility that trade between this country and other countries of the world will affect the gross domestic product, through the exchange rate

Nyumuah [7] used the Ghanaian economy as a case study to investigate the effect of the monetary policy transmission mechanism of the developing economies to determine their effectiveness. Using a vector autoregressive model, the author considered the exchange rate, money supply, the policy rate, credit to private sector, real output, and consumer price index. The results of the study showed that the money supply channel is the strongest in the long run. The exchange rate channel was established to be the strongest in transmitting monetary impulses in the short run; while the interest rate and credit channels were very weak channels in the monetary policy transmission process. The author concluded that since the interest rate and credit channels were very weak, inflation targeting monetary policy will be ineffective macroeconomic stability tools in developing countries and recommended reserve requirements, quantitative targets, and taxing of excess reserves as better tools of macroeconomic stability. However, [7] used the results of one country to generalize the economic happenings in all the developing nations; he also recommended a blanket policy tool. This is a big limitation.

Choi, Kang, Kim, and Lee [8] used a panel factor-augmented vector autoregressive model to examine the effect of the United States and domestic monetary policies on emerging market economies. The countries in this category were Argentina, Brazil, Chile, India, Bulgaria, Czech Republic, Israel, Hungary, Indonesia, Republic of Korea, Malaysia, Mexico, Romania, Philippines, Poland, South Africa, Thailand, Turkey, and Russian Federation. The variables in the model were capital inflows as a percentage of gross domestic products, real gross domestic product growth, consumer price index, current account balance as a percentage of gross domestic product, stock price growth and nominal effective exchange rate growth, overnight call rate and foreign reserves as a percent of gross domestic product. According to the study, an increase in the United States policy rate caused a resultant increase in emerging market economies' policy rates; the bond flows were more sensitive to interest rate differentials than the equity flows. A tighter

United States or emerging market-specific policy caused divergent responses of growth and inflation in the emerging markets, but the output loss is greater in emerging markets with higher inflation. The bond and equity markets in emerging markets were subject to outflows, each time the United States tightened its monetary policy. However, [8] did not discuss the possible reasons for this, but only emphasised that the domestic policy alone was not enough to counteract the effects of the United States or global policy shocks on capital flows in emerging markets.

Dina and Selin [9] examined the monetary policy transmission mechanism for some selected European Union countries, using a panel vector autoregressive model. These countries were Austria, Belgium, Denmark, Germany, Bulgaria, France, Greece, Ireland, England, Litvania, Portugal, Sweden, Spain, Slovakia and Poland. The variables included in the panel analysis were private industry credit flow, country share price indices, industrial production index, and bond yield. The industrial production index was used to establish if the production of the countries affected the monetary policy transmission mechanism in different channels. According to the findings, out of the four monetary policy channels considered, the credit channel had the highest change resulting from the stock market variable. The exchange rate was the second-highest change, arising from industry production index. The result further showed that the credit channel had a strong effect on the interest rate channel and also transmitted to the exchange rate. However, the authors did not state the countries specifics in their analyses. At least, it is worthy of mentioning in the analysis, if these links among all the four transmission channels were the same for all the fifteen countries

Punzi and Mendicino [10] examined the relationship between confidence and economic activity in the Portuguese economy. With a vector autoregressive model, they used a monthly data spanning from 1987 to 2013. The result of their study showed an increase in industrial production as a result of high confidence. According to Van Aarle and Kappler [11], real sector business confidence and consumer confidence play a key role in explaining economic fluctuations. Afshar [12] examined the effect of consumers' and investors' confidence on the gross national product (GNP) fluctuations in the US, using Granger causality econometric model with quarterly data from 1980 to 2005. The author found evidence of causality running from confidence to GNP. Further findings revealed that consumer confidence and real sector business confidence plays an important role in macroeconomic fluctuations. Gelper, Lemmens and Croux [13] also established the important role of confidence in predicting investment and future consumer spending. [11] investigated the effect of confidence indicator on industrial production for 1990 to 2011in the European zone. Using a vector autoregressive model, the study showed that confidence shocks impact on industrial production, employment, retail sales, and GDP.

3. Methodology

A quarterly data, which spanned from 2008Q1 to 2018Q4 was utilized for this study. These data were sourced from the CBN statistical bulleting and adjusted for seasonal variation using Census X-13. They are monetary policy rate (mpr), asset price (Pe), credit to real sector (crs), broad money supply (m2), maximum lending rate (mlr), exchange rate (er), interest rate (r) and real output (xt). The study employed a non-recursive structural VAR econometric model to estimate the response of real output to monetary policy impulses and the various channels of transmission. The business outlook variable was included in the model to account for the variability in real output that is associated with shocks from real business outlook. All the variables take their log forms during estimation; the data were adjusted for seasonal

variation, using census X-13. The diagnostic tests are carried out, which includes the stationarity test, stability test, and normality test.

The Nigerian economy is assumed to be represented by the following structural form in equation (1)

$$\Gamma x_t = \delta_0 + C(L)x_{t-i} + A\varepsilon_t \quad (1)$$

Where:

x_t is a vector of endogenous variables in the system; Γ is a matrix of n x n dimension and represents the coefficients of the vector x_t. x_{t-i} is a vector of lagged values of endogenous variables. $C(L)$ is a matrix in the lag operation L of lag length p. A is a column vector that contains the contemporaneous response of the variables to shocks; ε_t is a vector of error terms, while n is the number of variables in the system.

The matrix form of equation (1) is represented in equation (1A) below:

$$\begin{pmatrix} 1 & h_{12} & h_{13} & h_{14} & h_{15} & h_{16} & h_{17} & h_{18} & h_{19} \\ h_{21} & 1 & h_{23} & h_{24} & h_{25} & h_{26} & h_{27} & h_{28} & h_{29} \\ h_{31} & h_{32} & 1 & h_{34} & h_{35} & h_{36} & h_{37} & h_{38} & h_{39} \\ h_{41} & h_{42} & h_{43} & 1 & h_{45} & h_{46} & h_{47} & h_{48} & h_{49} \\ h_{51} & h_{52} & h_{53} & h_{54} & 1 & h_{56} & h_{57} & h_{58} & h_{59} \\ h_{61} & h_{62} & h_{63} & h_{64} & h_{65} & 1 & h_{67} & h_{68} & h_{69} \\ h_{17} & h_{72} & h_{73} & h_{74} & h_{75} & h_{76} & 1 & h_{78} & h_{79} \\ h_{81} & h_{82} & h_{83} & h_{84} & h_{85} & h_{86} & h_{87} & 1 & h_{89} \\ h_{91} & h_{92} & h_{93} & h_{94} & h_{95} & h_{96} & h_{97} & h_{98} & 1 \end{pmatrix} \begin{pmatrix} mpr_t \\ r_t \\ er_t \\ p_{et} \\ mlr_t \\ rbo_t \\ crs_t \\ m2_t \\ x_t \end{pmatrix} = \begin{pmatrix} \delta_{10} \\ \delta_{20} \\ \delta_{30} \\ \delta_{40} \\ \delta_{50} \\ \delta_{60} \\ \delta_{70} \\ \delta_{80} \\ \delta_{90} \end{pmatrix} + \begin{pmatrix} \upsilon_{11} & \upsilon_{12} & \upsilon_{13} & \upsilon_{14} & \upsilon_{15} & \upsilon_{16} & \upsilon_{17} & \upsilon_{18} & \upsilon_{19} \\ \upsilon_{21} & \upsilon_{22} & \upsilon_{23} & \upsilon_{24} & \upsilon_{25} & \upsilon_{26} & \upsilon_{27} & \upsilon_{28} & \upsilon_{29} \\ \upsilon_{31} & \upsilon_{32} & \upsilon_{33} & \upsilon_{34} & \upsilon_{35} & \upsilon_{36} & \upsilon_{37} & \upsilon_{38} & \upsilon_{39} \\ \upsilon_{41} & \upsilon_{42} & \upsilon_{43} & \upsilon_{44} & \upsilon_{45} & \upsilon_{46} & \upsilon_{47} & \upsilon_{48} & \upsilon_{49} \\ \upsilon_{51} & \upsilon_{52} & \upsilon_{53} & \upsilon_{54} & \upsilon_{55} & \upsilon_{56} & \upsilon_{57} & \upsilon_{58} & \upsilon_{59} \\ \upsilon_{61} & \upsilon_{62} & \upsilon_{63} & \upsilon_{64} & \upsilon_{65} & \upsilon_{66} & \upsilon_{67} & \upsilon_{68} & \upsilon_{69} \\ \upsilon_{71} & \upsilon_{72} & \upsilon_{73} & \upsilon_{74} & \upsilon_{75} & \upsilon_{76} & \upsilon_{77} & \upsilon_{78} & \upsilon_{79} \\ \upsilon_{81} & \upsilon_{82} & \upsilon_{83} & \upsilon_{84} & \upsilon_{85} & \upsilon_{86} & \upsilon_{87} & \upsilon_{88} & \upsilon_{89} \\ \upsilon_{91} & \upsilon_{92} & \upsilon_{93} & \upsilon_{94} & \upsilon_{95} & \upsilon_{96} & \upsilon_{97} & \upsilon_{98} & \upsilon_{99} \end{pmatrix} * \begin{pmatrix} mpr_{t-i} \\ r_{t-i} \\ er_{t-i} \\ p_{et-i} \\ mlr_{t-i} \\ rbo_{t-i} \\ crs_{t-i} \\ m2_{t-i} \\ x_{t-i} \end{pmatrix} + \begin{pmatrix} \varepsilon_t^{mpr_t} \\ \varepsilon_t^{r_t} \\ \varepsilon_t^{er_t} \\ \varepsilon_t^{p_{et}} \\ \varepsilon_t^{mlr_t} \\ \varepsilon_t^{rbo_t} \\ \varepsilon_t^{crs_t} \\ \varepsilon_t^{m2_t} \\ \varepsilon_t^{x_t} \end{pmatrix} \quad (1A)$$

The first step in estimating a SVAR is to estimate the VAR in its reduced form by multiplying equation (1) by the inverse of matrix Γ:

$$\Gamma^{-1}\Gamma x_t = \Gamma^{-1}\delta_0 + \Gamma^{-1}C(L)x_{t-i} + \Gamma^{-1}A\varepsilon_t \quad (2)$$

This is further represented in equation (3) as:

$$x_t = \Gamma^{-1}\delta_0 + \Gamma^{-1}C(L)x_{t-i} + \Gamma^{-1}A\varepsilon_t \quad (3)$$

Where:

$$\psi = \Gamma^{-1}\delta_0;\ D(L) = \Gamma^{-1}C(L);\ u_t = \Gamma^{-1}A\varepsilon_t$$

Hence:

$$x_t = \psi + D(L)x_{t-i} + u_t \tag{4}$$

The equation (4) is represented in a matrix form in equation (5) below:

$$\begin{pmatrix} mpr_t \\ r_t \\ er_t \\ p_{et} \\ mlr_t \\ rbo_t \\ crs_t \\ m2_t \\ x_t \end{pmatrix} = \begin{pmatrix} \psi_{10} \\ \psi_{20} \\ \psi_{30} \\ \psi_{40} \\ \psi_{50} \\ \psi_{60} \\ \psi_{70} \\ \psi_{80} \\ \psi_{90} \end{pmatrix} + \begin{pmatrix} D_{11} & D_{12} & D_{13} & D_{14} & D_{15} & D_{16} & D_{17} & D_{18} & D_{19} \\ D_{21} & D_{22} & D_{23} & D_{24} & D_{25} & D_{26} & D_{27} & D_{28} & D_{29} \\ D_{31} & D_{32} & D_{33} & D_{34} & D_{35} & D_{36} & D_{37} & D_{38} & D_{39} \\ D_{41} & D_{42} & D_{43} & D_{44} & D_{45} & D_{46} & D_{47} & D_{48} & D_{49} \\ D_{51} & D_{52} & D_{53} & D_{54} & D_{55} & D_{56} & D_{57} & D_{58} & D_{59} \\ D_{61} & D_{62} & D_{63} & D_{64} & D_{65} & D_{66} & D_{67} & D_{68} & D_{69} \\ D_{71} & D_{72} & D_{73} & D_{74} & D_{75} & D_{76} & D_{77} & D_{78} & D_{79} \\ D_{81} & D_{82} & D_{83} & D_{84} & D_{85} & D_{86} & D_{87} & D_{88} & D_{89} \\ D_{91} & D_{92} & D_{93} & D_{94} & D_{95} & D_{96} & D_{97} & D_{98} & D_{99} \end{pmatrix} * \begin{pmatrix} mpr_{t-i} \\ r_{t-i} \\ er_{t-i} \\ p_{et-i} \\ mlr_{t-i} \\ rbo_{t-i} \\ crs_{t-i} \\ m2_{t-i} \\ x_{t-i} \end{pmatrix} + \begin{pmatrix} u_t^{mpr_t} \\ u_t^{r_t} \\ u_t^{er_t} \\ u_t^{p_{et}} \\ u_t^{mlr_t} \\ u_t^{rbo_t} \\ u_t^{crs_t} \\ u_t^{m2_t} \\ u_t^{x_t} \end{pmatrix} \tag{5}$$

One major point here is to recover the parameters of the structural equation, including the structural disturbances, from the estimated reduced-form VAR, because the standard VAR cannot explain the structure of the economy. Hence:

$$u_t = \Gamma^{-1}A\varepsilon_t \tag{6}$$

Equation (6) can be reformulated as:

$$\Gamma^{-1}A\varepsilon_t\varepsilon_t^{'}A'\Gamma^{-1'} = u_t u_t^{'} \tag{7}$$

Since $\varepsilon_t\varepsilon_t^{'} = \mathrm{I}$, then

$$\Gamma^{-1}AA'\Gamma^{-1'} = u_t u_t^{'} \tag{8}$$

The second step is to identify the structural model from the estimated VAR. This can be achieved by placing restrictions on the structural model. This can take the form of a short-run zero recursive (Cholesky identification), a short run zero non-recursive, a long-run zero restriction, and a sign restriction. The restriction is underpinned by theoretical/empirical justifications. This study aligns with the zero short-run non-recursive restriction used by Babajide, Lawal, Amodu, Asaleye, Ewetan, Olokoyo and Matthew [14] and Matthew, Ufua, Osabohien, Olawande and Edafe [15] because restrictions are not limited to a triangular form, as long as it is theory-based. For a n variable equation, n(n+1)/2 restrictions are imposed on $2n^2$ unknown elements in Γ and A. This brings additional restrictions of n(3n-1)/2 to be imposed. In the third step, the innovation accounting is used to trace the link from the monetary policy variables to the real output. This is the impulse response function and the forecast error variance decomposition.

In the first row of the matrix Γ in equation (9), h_{12} represents the contemporaneous response of the monetary policy rate to a shock from the interest rate. It is expected that the monetary authority will respond to changes in the short term interest rate, depending on the policy objectives. h_{17} represents the contemporaneous response of the monetary policy rate to innovations from credit to the real sector. The monetary authority may respond to a reduction in the quantity of credit given to the real sector by reducing the official interest rate, leading to a similar reduction in the short term interest rate; and more access to credit facilities. h_{21} is the contemporaneous response of short term interest rate to a shock from the monetary policy rate. Theoretically, the short term interest rate responds to changes in the monetary policy rate. h_{23} is the contemporaneous response of the interest rate to an innovation from the exchange rate. A fall in exchange rate leads to a fall in the prices of domestic assets; a higher interest rate will be required by foreign investors to invest in domestic assets. h_{29} represents the contemporaneous response of interest rate to shocks from the real output. More money is required to exchange an increase in output; as owners of financial and real assets offer them for sale, the prices of these assets come down, leading to an increase in interest rate. h_{59} is the contemporaneous response of maximum lending rate to shocks from the real output. This is plausible as an expansion in the real sector will require more requests for credit facilities from the banking system. h_{65} represents the contemporaneous response of real sector business outlook to shocks from the maximum lending rate.

During a tensed business environment, investors' confidence is reduced and the risk of default is increased; therefore, banks increase the maximum lending rate to incorporate the risk premium. h_{75} represents the contemporaneous response of credit to the real sector to shocks from the interest rate. A decrease in interest rate leads to an increase in investment, which is financed by credit from the banking system. h_{76} is the contemporaneous response of credit to the real sector to innovations from the real sector business outlook. An increase in the business outlook index is evidence of improved macroeconomic environments; this is mostly accompanied by loan requests to finance more productive activities. h_{89} represents the contemporaneous response of money supply to shocks from the real output. Theoretically, an increase in real output will require more money to exchange it, all things being equal. h_{91} is the contemporaneous response of real output to shocks from monetary policy rate; h_{92} indicates the contemporaneous response of real output to the interest rate; h_{93} is the contemporaneous response of real output to exchange rate; h_{94} represents the contemporaneous response of real output to asset price; h_{95} represents the contemporaneous response of real output to maximum lending rate; h_{96} represents the contemporaneous response of real output to real sector business output; h_{97} represents the contemporaneous response of real output to credit to the real sector, while h_{98} indicates the contemporaneous response of real output to the broad money supply. All of these show their respective effects on the real output.

$$\Gamma x_t = \begin{pmatrix} 1 & h_{12} & 0 & 0 & 0 & 0 & h_{17} & 0 & 0 \\ h_{21} & 1 & h_{23} & 0 & 0 & 0 & 0 & 0 & h_{29} \\ 0 & h_{32} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & h_{59} \\ 0 & 0 & 0 & 0 & h_{65} & 1 & 0 & 0 & 0 \\ 0 & h_{72} & 0 & 0 & h_{75} & h_{76} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & h_{89} \\ h_{91} & h_{92} & h_{93} & h_{94} & h_{95} & h_{96} & h_{97} & h_{98} & 1 \end{pmatrix} \begin{pmatrix} mpr \\ r_t \\ er_t \\ P_{et} \\ mlr_t \\ rbo_t \\ crs_t \\ m2_t \\ x_t \end{pmatrix} \quad (9)$$

4. Results and discussions

The Augmented Dickey-Fuller and Phillips Perron unit root tests were conducted; all the variables included in the study were stationary at first difference, as detailed in Table 1. The lag length criteria indicate lag three as the optimum lag; three out of the five lag length information criteria showed by an asterisk (*) in Figure 2, lag three as the optimum. As evidenced in Figure 2, the reduced form VAR is stable; all the roots have modulus less than one and lie inside the unit circle. Also, the residuals in the model satisfy the normality condition, as shown in Table 2; the probability value corresponding to the Jarque-Bera statistics is more than 5%, meaning that the residuals are multivariate normal

Table 1:Summary of Unit Root Test

	Augmented Dickey-Fuller						**Philips-Perron**					
	Level			1st Difference			Level			1st Difference		
Variables	Observed Values	Critical Values	Remark	Observed Values	Critical Values	Remark	Observed Values	Critical Values	Remark	Observed Values	Critical Values	Remark
lmpr_d11	-1.45740	-2.9332	Non Stationary	-3.736655	-2.933158	Stationary	-1.22240	-2.9314	Non Stationary	-3.73633	-2.93316	Stationary
lr_d11	-1.86599	-2.9314	Non Stationary	-5.605062	-2.933158	Stationary	-2.21950	-2.9314	Non Stationary	-5.63109	-2.93316	Stationary
ler_d11	-0.41333	-2.93140	Non Stationary	-5.756282	-2.933158	Stationary	-0.48502	-2.9314	Non Stationary	-5.7443	-2.933158	Stationary
lPe_d11	-3.25354	-2.9332	Stationary	-4.29891	-2.933158	Stationary	-3.05610	-2.9314	Stationary	-4.26058	-2.93316	Stationary
lmlr_d11	-1.83314	-2.93316	Non Stationary	-3.429799	-2.933158	Stationary	-2.05062	-2.9314	Non Stationary	-3.2746	-2.933158	Stationary
lrbo_d11	-2.924	-2.9331	Non Stationary	-7.9613	-2.9350	Stationary	-3.1097	-2.933	Stationary	-7.981	-2.9350	Stationary

	6	6	nary	59	0		6	16		8	01	
lcrs_d11	-2.7839	-2.93316	Non Stationary	-4.177982	-2.933158	Stationary	-2.708386	-2.9314	Non Stationary	-4.1233	-2.933158	Stationary
lm2_d11	-1.1491	-2.93140	Non Stationary	-6.024523	-2.938987	Stationary	-3.435938	-2.9314	Stationary	-8.3387	-2.933158	Stationary
lxt_d11	-4.1837	-2.94840	Stationary	-10.30016	-2.951125	Stationary	-2.358127	-2.9314	Non Stationary	-6.1734	-2.933158	Stationary

Source: Author's Computation using Eviews 10, 2020.

Figure 2 Stability Condition Graph

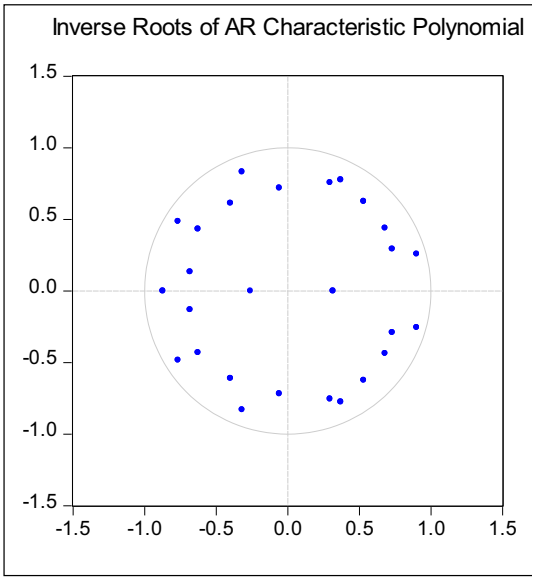

Table 2: Summary of Normality Test Result

Component	Jarque-Bera	df	Prob.
1	6.577074	2	0.0373
2	1.803568	2	0.4058
3	3.277468	2	0.1942
4	7.693575	2	0.0213
5	1.391166	2	0.4988
6	3.069322	2	0.2155
7	2.559936	2	0.2780
8	0.219688	2	0.8960
9	1.371457	2	0.5037
Joint	27.96325	18	0.0626

*Approximate p-values do not account for coefficient estimation

Table 3: Lag Selection-Order Criteria

VAR Lag Order Selection Criteria
Endogenous variables: DLOG(MPR_D11) DLOG(R_D11) DLOG(ER_D11) LOG(PE_D11) DLOG(MLR_D11) DLOG(RBO_D11) DLOG(CRS_D11) DLOG(M2_D11) DLOG(XT_D11)
Exogenous variables: C
Date: 06/06/20 Time: 11:12
Sample: 2008Q1 2018Q4
Included observations: 39

Lag	LogL	LR	FPE	AIC	SC	HQ
0	338.7198	NA	3.67e-19	-16.90871	-16.52481*	-16.77097
1	441.1303	152.3028	1.36e-19	-18.00668	-14.16769	-16.62928
2	549.7620	111.4171*	6.69e-20	-19.42369	-12.12961	-16.80664

3	699.2494	84.32622	2.49e-20*	-22.93586*	-12.18670	-19.07916*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Contemporaneous Structural Coefficients

Table 4: Summary of SVAR Results – With Effects of Credit Risk

mpr_t	r_t	er_t	p_{et}	mlr_t	rbo_t	crs_t	$m2_t$	x_t	
1	0.95849 (0.1437)	0	0	0	0	-21.6315 (0.0000) **	0	0	mpr_t
7.87321 (0.0017) **	1	-18.1629 (0.0000) **	0	0	0	0	0	-0.73821 (0.0778) *	r_t
0	3.94088 (0.0000) **	1	0	0	0	0	0	0	er_t
0	0	0	1	0	0	0	0	0	p_{et}
0	0	0	0	1	0	0	0	2.35263 (0.0000) **	mlr_t
0	0	0	0	-65.5250 (0.0000) **	1	0	0	0	rbo_t
0	-1.71400 (0.0207) **	0	0	24.4925 (0.0467) **	7.95583 (0.0000) **	1	0	0	crs_t
0	0	0	0	0	0	0	1	0.04845 (0.8978)	$m2_t$
15.0107 (0.0000) **	-1.17346 (0.2450)	9.63010 (0.0797) *	-3.1157 (0.3790)	-83.7639 (0.0000) **	-1.37479 (0.4450)	18.0504 (0.0001) **	0.49921 (0.9420)	1	x_t

Note: ** indicates significant at 5% level, while * indicates significant at 10%. **Source:** Author's computation using Eviews 10

Table 4 shows the summary of the SVAR estimates of the contemporaneous response of the variables within the model, while the detailed result is in appendix 1. Most of the estimates are significant at 5% level. Our major target is the contemporaneous response of credit to the real sector to shocks from real

business outlook. This is shown in Table 4 as 7.95583; this estimate is also significant at a 5% level. Which means that real business outlook affects the real sector through credit to the real sector. This response shows that as business or macroeconomic environment improves, the real investors invest more by accessing credit from the banking system; also, the banks are more confident of loan repayment, as the improved macroeconomic environment is expected to support business growth.

Structural Impulse Response Function Table

Table 5: Impulse Response Function of Real Output

Response of DLOG(XT_D11): Period	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8	Shock9
1	-2.85E-05	-1.32E-05	-0.000325	2.75E-05	0.425048	0.006185	-0.000776	-4.40E-06	8.82E-06
2	0.132918	0.135806	0.169988	-0.947824	0.043849	0.080244	0.021144	-1.496405	0.187240
3	-0.412306	-0.193653	0.203838	-1.766166	-0.148319	0.104844	0.183922	-2.757894	-0.241966
4	0.027074	0.058419	-0.101793	-1.446530	-0.000463	0.118922	-0.053913	2.363809	-0.074348
5	0.055423	-0.077062	-0.033065	-0.753212	0.061555	-0.076841	0.093803	0.043346	0.054403
6	0.006496	0.057123	-0.156649	-1.067768	-0.080376	-0.286386	0.037199	-2.979379	0.015312
7	0.061383	-0.026764	0.004239	-0.356475	-0.072671	0.080814	0.002639	3.302361	0.022483
8	0.014601	-0.005859	-0.041361	0.580699	0.018979	-0.025331	0.004250	-1.067386	0.036380
9	-0.033344	-0.008735	0.000786	-0.170200	-0.068119	-0.013622	0.009323	-0.548513	-0.028911
10	0.009038	-0.012757	-0.088244	1.013413	-0.028752	0.010227	-0.030444	1.350580	0.011254

Factorization: Structural

As evident in Table 5, aggregate real output positively responds to shocks from real business outlook from quarter one to quarter four. This response reversed to negative in quarter five up to quarter six but changed to positive in quarter seven. It returned to negative in quarter eight and nine but later came back to positive in quarter ten.

Table 6: Variance Decomposition of Real Output

Variance Decomposition of DLOG(XT_D11):	mpr	r	er	P_{et}	mlr	rbo	crs	m2	Xt

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8	Shock9
1	0.425094	4.50E-07	9.63E-08	5.83E-05	4.18E-07	99.97843	0.021173	0.000333	1.07E-08	4.30E-08
2	1.851264	0.515505	0.538148	0.843141	26.21314	5.327670	0.188999	0.013063	65.33738	1.022962
3	3.811419	1.291834	0.385110	0.484932	27.65703	1.408333	0.120257	0.235941	67.77220	0.644366
4	4.716358	0.846953	0.266846	0.363277	27.46876	0.919741	0.142115	0.167153	69.37949	0.445666
5	4.779623	0.838126	0.285824	0.358509	29.22980	0.912140	0.164224	0.201274	67.56320	0.446902
6	5.742784	0.580694	0.207883	0.322744	23.70443	0.651424	0.362447	0.143617	73.71648	0.310278
7	6.635439	0.443522	0.157340	0.241789	18.04420	0.499938	0.286321	0.107591	79.98574	0.233559
8	6.746101	0.429559	0.152296	0.237681	18.19803	0.484462	0.278414	0.104130	79.88656	0.228867
9	6.771015	0.428828	0.151344	0.235936	18.12754	0.491025	0.276774	0.103555	79.95599	0.229009
10	6.979093	0.403807	0.142788	0.238065	19.17124	0.463879	0.260731	0.099375	79.00430	0.215817
Average		0.577882	0.228757	0.332613	20.78141	11.11370	0.210145	0.117603	66.26013	0.377742

Factorization: Structural

About an average of 0.21% variation in real output is explained by structural innovations from real business outlook. This is significant at a 5% level, as indicated in Table 6. This means that the real sector business outlook contributes to the changes in the real output. Considering the order of transmission channels through which monetary policy pass-through to the real sector, the credit channel is the most effective through the money supply. It accounted for an average of 66.26% variation in the real output. This is followed by asset price channels, that contributed about 20.78% variation in the real output. The structural shocks from the exchange rate and interest rate respectively explained about 0.33% and 0.22% variation in the real output. In summary, when the real business outlook was accounted for in the monetary policy effects and channels to the real sector, the order of effectiveness was credit, asset price, exchange rate, and interest rate channels.

5. Conclusion

In the past few years in Nigeria, one of the major concerns of the government, through the monetary authority, has been to make the monetary policy more effective to grow the real sector. As a result, the CBN has used real sector targeted monetary policy instruments to influence the banking system to make more credit available to the real sector. However, this objective is sometimes not achieved due to real business outlook swings, which makes the banks to reduce lending to the real sector and the real investors to also cut down on their investment project. Using a structural VAR econometric model, the result of this

study established a more credit flow to the real sector during positive business outlook and a low credit flow during an uncertain business outlook.

Recommendations

According to the result of the study, improved business/macroeconomic outlook supports growth in productive activities, but low or tensed business/macroeconomic outlook behave otherwise; thereby hindering the flow of credit to the real sector. The study, therefore, recommends that the government should always embark on policies that will create a more business-friendly environment because a business-friendly environment supports the effectiveness of monetary policy.

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