MONETARY POLICY TRANSMISSION CHANNELS AND BANKING SECTOR DEVELOPMENT IN NIGERIA

[*1]ETUDAIYE-MUHTAR, O.F., [2]OYINLOYE, L. & [3]KOLAWOLE, K.D.
Department of Finance, University of Ilorin, Ilorin, Nigeria.
*[1]etudaiye.mf@unilorin.edu.ng

Abstract

An inappropriate monetary policy transmission channel impedes the intermediary role of the banking sector in an economy which may inadvertently affect the sector's development. This study, therefore, examines the effect of interest rate, exchange rate, and equity price transmission channels on banking sector development in Nigeria. The autoregressive distributive lag technique is used on annual time series data obtained from World Bank Development Indicators and the Central Bank of Nigeria Statistical Bulletin for the period 1986 to 2019. The findings show that interest rate and exchange rate channels have positive and significant effects on banking sector development in the short and long run, while equity price channel has no significant effect on banking sector development. Based on the findings and given the importance of banks in bank-based economies like Nigeria, it is important that monetary authorities utilise interest rate and exchange rate channels, to promote banking sector development as well as to achieve desired monetary policy objectives.

Keywords: Banking Sector Development, Equity Price, Exchange Rate, Interest Rate, Monetary Policy.

1. Introduction

Banks as financial intermediaries, are important elements that contribute significantly to the development of the economy (Combey & Togbenou, 2017). They are also vessels through which the government implements and transmits monetary policy objectives such as full employment, price stability, stable exchange rate etc. to targeted areas thus, serving as an interface that links the central banks with the real sector of the economy (Mishra & Montiel, 2013). However, literature shows that the effectiveness of transmission channels depends on the policy being implemented as well as the financial structure of the economy (Effiong *et al.*, 2020; Fiador *et al.*, 2022). This suggests that the response to shocks from transmission channels in bank-based systems would differ from market-based systems. The size of the banking sector in a developing economy like Nigeria unlike those in developed ones, is small hence restricted banking competition and skyrocketing marginal lending costs would affect central bank's policy measures aimed at achieving efficiency and low commercial bank loan rates (Mishra & Montiel, 2013). This infers that development in the banking sector may be conditioned upon inefficiencies in monetary policy transmission channels because banks'

activities are expected to respond to shocks associated with monetary channels given the shift in government monetary policy, external influences, and business cycle movement. Additionally, given that Banking Sector Development (BSD)[1] has four main dimensions[2] (Cihák et al., 2013), there is a possibility that their presence may affect the effectiveness of the transmission mechanism employed.

Monetary policy transmission mechanism is the means by which monetary policy objectives are passed across many channels into an economy. Decisions on monetary policy impact the transmission process by affecting prices and general macroeconomic conditions in a number of ways. For instance, contractionary monetary policy decisions introduced during high and volatile inflationary periods to effectively keep prices stable and influence output and inflation levels can negatively affect financial development, impede the optimum allocation of resources and ultimately affect BSD because financial development encompasses BSD. In this instance, central banks would adopt a transmission channel that appropriately conveys the desired policy objective (Abbas *et al.*, 2019; Abdul Karim *et al.*, 2021; Li *et al.*, 2021).

Although monetary policy transmission mechanisms tend to differ across countries, exchange rate, interest rate, and equity price are common transmission channels used in developing economies (Tran, 2018). The interest rate channel transmits monetary policy via market interest rates to production and inflation while equity price channel is the avenue monetary policy decisions affect stock markets and has an overall effect on the whole economy through fluctuations in stock prices (Vo & Nguyen, 2016). In addition, less developed economies have less interconnectedness with global financial markets with lots of interventions in the forex market to stabilise the domestic currency (Effiong, et al., 2020). Accordingly, these features could make the effectiveness of monetary policy short-lasting or, in some cases, unsuccessful thus limiting development in the banking sector (Buigut, 2009). Although the Nigerian banking sphere is changing and growing, its evolving nature make it lag behind some other developing countries. For instance, Oyadeyi and Akinbobola (2020) argue that there is an absence of diversification and specialisation, which cause an overlap in other sector's functions. Furthermore, Nigeria's domestic credit to the private sector by banks (an indicator of BSD) is low compared to countries like South Africa and Kenya. Data obtained from the World Bank Development Indicator for 2020 and 2019 show that Kenya had 32.006% and 30.744% while South Africa was 62.40% and 60.438%. Nigeria's figure of 11.228% and 10.43% for

[1] Thereafter referred to as BSD

[2] Access, depth, efficiency and stability.

the same period can be said to be abysmally low given the size of its economy.

Given that the main channel through which monetary authorities implement monetary policy objectives are banks, it becomes imperative that monetary authorities select the appropriate transmission channel that would achieve the desired objective while also developing the banking sector. More importantly, the development of the sector should be all encompassing to capture the various dimensions of banking sector development. However, an overview of extant literature suggests the absence of research on informative policy implications that may guide monetary authorities and regulators on selecting appropriate channels that would contribute to BSD while also achieving the desired monetary policy objective. Furthermore, the previous studies such as Oyadeyi and Akinbobola (2020); Apanisile and Osinubi (2020) and Igharo et al. (2020) examined monetary policy transmission channels on economic growth. Most of these studies considered monetary policy transmission channels using variables such as credit to private sector; neglecting some important monetary policy transmission channels' variables such as interest rate exchange rate and equity price; thereby creating a gap that this study filled. The previous studies (see Okey *et al.,* 2022 and Choi *et al.,* 2022) also neglected the role of institutional quality in enhancing monetary transmission. Our study uniquely developed an index that captured the various dimensions of banking sector development as well as an institutional quality index using variables such as rule of law, regulatory quality, political stability, government effectiveness, voice and accountability and control of corruption. Furthermore, our study takes a different approach by investigating specifically, the direct effect of monetary policy transmission channels on BSD in Nigeria using the Autoregressive Distributive Lag (ARDL) estimation technique that does not require any form of identification.

2. LITERATURE REVIEW

2.1 THEORETICAL AND CONCEPTUAL REVIEW

Theoretically, monetary policy objectives transmit to the real economy via various channels. In most bank-based developing economies, the credit channel theory that attaches importance to the role played by the credit market (banks in this case) in the financial system in reducing asymmetric information issues of moral hazard and adverse selection best describes how monetary policy objectives cascade to economic units via the banking sector (Bernanke & Gertler, 1995). These issues lead to financial frictions in the market and give rise to differences in the price of external and internal finance. Nevertheless, the usefulness of the credit channel is hinged upon the level of frictions in the system such that increased levels magnify the effectiveness via higher effect on the external finance premium. Thus, countries in bank-based less developed financial systems would have higher

efficacy levels using the credit channel mechanism. The expectation here is that a reduction in information asymmetry would lead to a rise in credit availability and subsequent development in the sector.

Another related theory that is also considered in this study is the financial accelerator theory where temporary shocks to corporate wealth are amplified with long-term economic consequences (Bernanke *et al.*, 1999). Here, credit expansion fuels asset demand and drives asset (equity) prices higher. A borrower's ability to obtain credit is contingent on the value of his or her net equity thereby creating a credit limit for borrowers with an amplifying effect on prices and where borrowers' collateral plays a crucial part. Due to credit market inefficiencies and the dual role of assets in the economy, credit limitations have been demonstrated to interact with overall economic activity.

Conceptually, monetary policy transmission channels create financial shocks that affect the entire financial sector's activities and development, particularly the banking sub-sector. Banks are expected to respond to these shocks via channels such as the interest rate, exchange rate, credit, and equity prices (Özcan, 2016). Interest rate channel, also viewed as the traditional approach to monetary policy, is where the Central Bank employs its policy rate in influencing changes in interest rates through spending and saving behaviour of economic agents which affect other macroeconomic variables in the economy (Central Bank of Nigeria, 2016). Exchange rate (price at which one currency exchanges for another) fluctuation is expected to impact banks through their role as major players in the forex market and as financial intermediaries (Ngerebo, 2012). An increase in domestic interest rates, relative to foreign rates leads to an appreciation in the local currency which is expected to reduce net exports and overall aggregate demand because foreign goods would become more expensive (Ajayi, 2007). The equity price channel is more focused on stock markets where the transmission process is through changes in stock price and is linked to banks via their complementary roles. Sharp decline in equity prices could lead to systemic shocks and price fluctuation which may trigger bank failure going hand in hand with credit cycle financial stability with adverse impact on the real economy (Goetz, 2017). BSD refers to the ease at which bank services are accessible and available to economic units usually measured in terms of quality, quantity and efficiency (Touny, 2014). Higher levels according to Saci and Holden (2008) indicates an increase in financial services and financial intermediation. We capture the different dimensions of BSD by constructing an index following Aluko and Ajayi (2018).

2.2 EMPIRICAL REVIEW

Literature shows that monetary policy transmission channels tend to influence financial development when examined within the context of BSD. Our focus for this study is on banks hence, this section reviews empirical evidence from studies that investigated BSD as a subset of financial development. For instance, Islam and Lee (2020) analysed the effect of monetary policy on BSD (measured as domestic credit to the private sector) using the fixed effects model regression and data from 1960 to 2013 in 126 countries (38 advanced and 88 developing). The study found that the use of conventional monetary policy to manage base money caused a change in private credit to GDP thus confirming the existence of a credit channel that enhances BSD. An earlier study by Tayssir and Feryel (2017) examined how central banks' monetary policies promote bank's credits to the private sector using a panel framework of 22 countries from 1980 to 2010. Employing a Vector Auto Regressive (VAR) technique, the estimation results showed that monetary policy and other central bank variables were important for financial development to occur, particularly in the banking sector. Adopting the VAR method, Patrick and Akanbi (2017) evaluated the influence of different monetary policy transmission mechanism channels in Zambia from 1993 to 2015. Their results showed that the credit and exchange rate channels work well in the monetary policy transmission process. Chileshe (2018) also studied the bank-lending channel of monetary policy in Zambia from 2005 to 2016. Employing the Arellano-Bond generalised method of moments technique, the results showed the existence of the bank-lending channel and a contractionary monetary policy that reduced loan supply. The finding of a weak association between BSD and monetary policy effectiveness in a cross-country study of 39 African countries, prompted Effiong *et al.,* (2020) to argue for a strengthened monetary policy transmission mechanism for African countries through a deepening of the financial system. Investigating monetary policy transmission channels' effectiveness in Ghana, Nyumuah (2018) found that money supply was most relevant in the long-run while exchange rate channel was most relevant in the short-run.

In the Nigerian context, extant literature is few. One of such is Apanisile and Osinubi (2020) who examined the effect of BSD (proxied with commercial bank credit to private sector) on monetary policy transmission channels' effectiveness in Nigeria over the period 2004 to 2016 using the Bayesian estimation approach. The results showed that while commercial bank credit to private sector positively affects the transmission channels, the credit channel was the most important for growth. Similarly, Oyadeyi and Akinbobola (2020) concluded that indicators of BSD have more effect than capital market indicators on monetary policy transmission channels. However, these two studies investigated the effect of BSD on monetary policy transmission channels while studies such as Ezeaku et al. (2018) and Igharo et al. (2020)

examined monetary transmission channels and different sectors of the economy such as industrial sector and economic growth respectively.

Given the importance of banks in the financial system, our study takes a different approach by investigating specifically, the direct effect of monetary policy transmission channels on BSD in Nigeria using the Autoregressive Distributive Lag (ARDL) estimation technique that does not require any form of identification. We also construct an index that captures the various dimensions of BSD.

3. METHODS

3.1 MODEL SPECIFICATION AND METHOD OF ANALYSIS:

We re-modify the model of Yu and Pei-Tha (2010) who modelled BSD as a function of real Gross Domestic Product (GDP), financial liberalisation, trade openness and real interest rate. We adjust the model by including variables[3] that captures monetary policy transmission channels and other control variables such as institutional quality, inflation, and GDP. The adapted model from Yu and Pei-Tha (2010) for BSD with our modifications is expressed in Eq. (1) as:

$$BSD_t = \beta_0 + \beta_1 MPTC_t + \beta_2 INSQ_t + \beta_3 INF_t + \beta_4 GDPGR_t + \epsilon_t \qquad (1)$$

BSD is banking sector development, MPTC is monetary policy transmission channel, INSQ is institutional quality, INF is inflation rate, GDPGR is economic growth, $\beta$are coefficient estimates, ε is error term and *t* is time / year. MPTC consists of the various transmission channels; interest rate (IR), exchange rate (ER), and equity price (EC) channels; examined in this study. The inclusion of the MPTC and control variables (INSQ, INF and GDPGR) in the model are based on previous literature on the topic as reviewed in Section 2.

The augmented Dickey-Fuller (ADF) unit root test is used to determine the stationarity or otherwise of the variables and the Autoregressive Distributive Lag (ARDL) technique is used to estimate regression estimates. ARDL bounds test is used to test for cointegration because the variables in the equation do not have to be in the same of order of integration, and could either be I (0) or I (1) or fractionally co-integrated (Pesaran *et al.,* 2001). The generalized ARDL model is specified as:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q} \beta_j \Delta X_{t-j} + \lambda_1 Y_{t-1} + \lambda X_{t-1} + \varepsilon_t \qquad (2)$$

[3] The variables selection is based on the literature reviewed in Section 2.

where Y is the response variable, X is a vector of explanatory variables, β are the parameters to be estimated, Δ represents the first difference operator, λ are the long-run coefficients of the variables, t is the time component, and ε_t is the error term.

The generalised form of the error correction mechanism that estimates the short run relationship is specified in Eq. (3) as:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q} \beta_j \Delta X_{t-j} + \delta ECM_{t-1} + \varepsilon_t \quad (3)$$

where, δ is the coefficient of the error-correction term, ECM_{t-1}. This study expects δ to be negative signifying the variables in the model quickly adjust back to their equilibrium levels when there is deviation in the short-run (Pesaran *et al.,* 2001). It also confirms the existence of a stable long-run relationship specified in Eq. (2).

Eq. (1) is further broken down into 3 different models in their ARDL form to capture each transmission channel and to prevent multicollinearity issues. These models are given in Eq. (4) to Eq. (6) as:

$$\Delta BSD_t = \beta_0 + \sum_{i=1}^{n} \beta_i \Delta BSD_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta IR_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta INSQ_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta INF_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta GDPGR_{t-i} + \lambda_1 BSD_{t-1} + \lambda_2 IR_{t-1} + \lambda_3 INSQ_{t-1} + \lambda_4 INF_{t-1} + \lambda_5 GDPGR_{t-1} \quad (4)$$

$$\Delta BSD_t = \beta_0 + \sum_{i=1}^{n} \beta_i \Delta BSD_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta ER_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta INSQ_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta INF_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta GDPGR_{t-i} + \lambda_1 BSD_{t-1} + \lambda_2 ER_{t-1} + \lambda_3 INSQ_{t-1} + \lambda_4 INF_{t-1} + \lambda_5 GDPGR_{t-1} \quad (5)$$

$$\Delta BSD_t = \beta_0 + \sum_{i=1}^{n} \beta_i \Delta BSD_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta EC_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta INSQ_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta INF_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta GDPGR_{t-i} + \lambda_1 BSD_{t-1} + \lambda_2 EC_{t-1} + \lambda_3 INSQ_{t-1} + \lambda_4 INF_{t-1} + \lambda_5 GDPGR_{t-1} \quad 6)$$

3.2 NATURE AND SOURCES OF DATA

Relevant annual time-series data were obtained from the World Bank Development Indicator (WDI) database, Global Financial Development Database, World Governance Indicator, and Central Bank of Nigeria (CBN) Statistical Bulletin from 1986 to 2019. An index was constructed to capture the different dimensions of banking sector dimension namely depth, size, efficiency and stability following the study of Aluko and Ajayi (2018).[4]Table 1 gives a summary of variable's description and measurement as extracted from literature.

Table 1: Variable measurement and description

Variable	Description and Measurement
Banking Sector Development (BSD)	Banking sector development is an aspect of financial development that highlights the intermediary role banks play in an economy via the provision of financial services. We construct an index using the Principal Component Analysis (PCA) that captures the dimension of depth, size, efficiency, and stability of the banking sector.
Interest Rate Channel (IR)	This captures the interest rate transmission mechanism for monetary policy and is measured by the lending interest rate that is adjusted for inflation.
Exchange Rate Channel (EX)	This serves as a proxy for the exchange rate channel of monetary policy transmission and is measured as official Naira to Dollar exchange rate as given by the Central Bank of Nigeria.
Equity Price Channel (EC)	It serves as a proxy for the asset price transmission mechanism of monetary policy and is measured as the All-share index of the Nigerian stock exchange.
Institutional Quality (INSQ)	This denotes quality of institutions that bothers on governance and is based on six different dimensions (rule of law, voice and accountability, control of corruption, political stability, government effectiveness and regulatory quality). The arithmetic mean of the indicators is used to measure institutional quality with a value between 0 and 100.
Inflation (INF)	This is the annual change in general price level and measured as an annual rate of change of consumer price index.
Economic Growth (GDPGR)	This is the annual growth rate of real economic activities in the country which is measured as annual growth rate of real GDP at constant prices

Source: *Author's compilation from Literature review*

[4] Components of the dimensions include money supply, credit to private sector, bank branches per 100,000 adults, ATM per 100,000 adults, banking sector net interest margin, lending-deposit spread, non-interest income to total income, overhead costs to total assets, return on assets and return on equity.

4.0 RESULTS

4.1 DESCRIPTIVE ANALYSIS

Table 2: Summary Statistics

Variable	Mean	Std. Dev.	Maximum	Minimum
BSD	8.82e-09	1.00	0.92	-1.04
IR	13.76	3.83	26.00	6.00
ER	107.88	91.67	306.92	1.75
EC	17084.06	15066.88	57990.20	163.80
INSQ	0.62	1.00	1.22	-1.32
INF	19.69	18.06	72.84	5.39
GDPGR	3.18	5.40	15.33	-13.13

Source: Author's computation (2022)

The mean and maximum values (8.82e-09 and 0.92% respectively) of BSD in Table 2 suggests that development in the Nigerian banking sector is low, given the higher means in Kenya (25.04) and South Africa (58.18) for the same period[5]. Table 2 also shows that the mean and maximum values of interest rate at 13.76 percent and 26.00 percent respectively implies that interest rate has not been too high within the period under consideration. Additionally, summary statistics of exchange rate show that the naira depreciated (mean and maximum value of 107.88 and 306.92 respectively) considerably in relation to US dollar while statistics for equity price channel show there is observable growth in the value of equities which is expected to positively impact the economy as well as the banking sector.

Inflation's mean value of 19.69 suggests that the economy has experienced a moderate inflationary rate while the maximum value of 72.84 infers there was a period when inflation was out of control (the period between 1991 to 1995 where it rose from 13.01% to 72.83%). Summary statistics for GDPGR implies that the economy was prone to cyclical changes resulting from various financial and economic crisis that occurred during the period (for example, the 1990 oil price shocks and the 2007/2008 global financial crisis).

4.2 CORRELATION ANALYSIS

Values of variables in Table 3 for pairwise correlation show values below 0.8 implying the absence of multicollinearity issues while estimating the equations (Studenmund, 2006).

[5] Values obtained from World Bank Development Indicators.

Table 3: Pairwise Correlation Matrix of Variables

Variable	IR	ER	EC	OPEN	INF	GDPGR
IR	1					
ER	-0.262	1				
EC	-0.476	0.757	1			
INSQ	0.428	-0.651	-0.701	1		
INF	0.376	-0.423	-0.464	0.505	1	
GDPGR	-0.366	0.698	0.633	-0.602	-0.351	1

Source: Author's computation (2022)

4.3 INFERENTIAL ANALYSIS

Table 4 presents the Augmented dickey-fuller (ADF) and Philip-Perron (PP) unit root test result and shows a mixed order of integration i.e. a combination of I(0) and I(1) variables. This further justifies the use of the ARDL procedure as noted in Section 3 and suggests the presence of cointegration among the variables.

Table 4: Unit Roots Results

Variables	Augmented dickey-fuller (ADF)	5% Critical level	Philip-Perron (PP)	5% critical level	Order of integration	
					ADF	PP
BSD	-6.189750	-3.557759	-10.54360	-3.557759	I(1)	I(1)
IR	-3.768794	-3.552973	-3.765461	-3.552973	I(0)	I(0)
ER	-4.158924	-3.557759	-3.910980	-3.557759	I(1)	I(1)
EC	-5.728925	-3.562882	-7.462893	-3.557759	I(1)	I(1)
INSQ	-18.22379	-3.557759	-6.249952	-3.552973	I(1)	I(0)
INF	-6.160062	-3.612199	-6.338847	-3.557759	I(1)	I(0)
GDPGR	-8.033305	-3.557759	-13.80907	-3.557759	I(1)	I(1)

Source: Author's computation (2022).

Consequently, we use the ARDL bounds test procedure to cointegration to verify the presence of long-run relationships among the variables because of the different order of integration. The results are presented in Table 5 together with the critical value bounds at 5% significance level (the significance level adopted in this study).

Table 5: ARDL Bounds Cointegration Test Results

Interest Rate Channel			Exchange Rate Channel			Equity Price Channel		
Test Statistic	Value	K	Test Statistic	Value	K	Test Statistic	Value	K
F-statistic	5.14	4	F-statistic	4.55	4	F-statistic	5.85	4
Critical Value Bounds			Critical Value Bounds			Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound	Significance	I(0) Bound	I(1) Bound	Significance	I(0) Bound	I(1) Bound
5%	2.86	4.01	5%	2.86	4.01	5%	2.86	4.01

Source: Author's computation (2022)

The cointegration test's null hypothesis states that there is no long run cointegration (or relationship). This is verified by comparing the F-statistic value with the critical bounds. If the value is greater than the I(1) bound, the null hypothesis is rejected implying the presence of a long run relationship. If the F-statistic value is less than the I(0) critical bound then the null hypothesis is not rejected and the conclusion is that there is no long run relationship (Pesaran *et al.*, 2001). The F-statistic value of 5.14, 4.55 and 5.85 in Table 5 is greater than the I(1) critical value of upper bound of 4.01 at 5% significance level, thus the test's null hypothesis of no cointegration is rejected. This suggests the existence of a long run relationship and we consequently use the ARDL regression technique to generate short and long-run estimates for each of the monetary policy transmission channels as reported in Table 6.

Table 6: Regression Estimates (Long and Short-run)

	Dependent Variable: Banking Sector Development		
Independent Variables	Interest Rate	Exchange Rate	Equity Price
Long-run coefficients (Panel A)			
IR	0.0951** (0.0298)	-	-
ER	-	0.0126** (0.0044)	-
EC	-	-	-0.00006 (0.00004)
INSQ	-0.0873 (0.2783)	1.0844*** (0.2272)	-0.3864 (0.7350)
INF	0.0139 (0.0109)	-0.0116 (0.0056)	0.0130 (0.0164)
GDPGR	0.00017*** (0.00002)	0.00004 (0.00004)	0.00033*** (0.00008)
C	-2.193*** (0.578)	-0.9738*** (0.2218)	-0.2797 (0.4353)
Short-run Coefficients (Panel B)			
ECT(-1)	-1.304*** (.1939)	-2.2161*** (.5387)	-0.8751** (0.2712)
D(IR)	0.0821** (.0279)	-	-
D(ER)	-	0.07547*** (.00004)	-
D(EC)	-	-	0.00005 (0.0001)
D(INSQ)	0.6540*** (0.1564)	1.5262** (0.4668)	0.7004*** (0.1566)
D(INF)	-0.0459** (.009)	-0.0265 (0.0184)	-0.0220 (0.0081)
D(GDPGR)	0.00085** (.00004)	0.00029*** (.00007)	0.00003 (0.00005)
R-Squared	0.88	0.89	0.94
F-statistics	4.85***	4.27***	6.96***
P-value of F-statistics	0.00	0.01	0.00

Source: Author's computation (2022)

*Note: **, *** indicates significance at least at 5% and 1% respectively; Δ indicates first difference; ECT is error correction term and standard errors are in parenthesis.*

Table 6 presents the regression estimates of the impact of interest rate, exchange rate and equity price channels on BSD in Nigeria. The reported F-statistic for each model has a p-value less than 0.01 indicating that the models for the transmission channels are all statistically significant at 1% level of significance. The R-Squared values show that of all the channels, equity price best explains variations in BSD with a value of 94% while the interest rate least explains the variations at 88%. The error correction mechanism (ECT(-1)) with negative and statistically significant coefficients across all the models, suggests that there is adjustment to equilibrium position when deviations occur. Furthermore, it confirms the existence of a stable long-run relationship between the transmission channels and BSD.

Panel A of Table 6 reports long-run estimates for interest rate model which are in line with the credit theory channel of monetary policy transmission (β=0.0951, $p<0.05$). This suggests that an effective interest rate policy may lead to improved BSD through an appropriate market level of interest rate that is required for the demand and supply of credit activities in an economy. Higher interest rates charged by banks imply increased costs to economic units who may not be willing to borrow from banks due to higher charges. Nevertheless, banks would need to develop new innovative ways to provide credit products and facilities to economic units in need to encourage them to borrow. It is the development of these products that contributes to banking sector development (Jiang *et al.,* 2022). Earlier studies with similar results are Tayssir and Feryel (2017) and Oyadeyi and Akinbobola (2020). The findings for interest rate are not surprising given that financial liberalisation, including interest rate liberalisation, which had the objective of developing the financial system, came into being in 1985 (the commencement period of our study). A similar result is observed in Panel B for short-run estimates (λ=0.0821, $p<0.05$).

The exchange rate model in Table 6 also shows that the transmission channel positively and significantly affects BSD (β=0.0126, $p<0.05$). This suggests that monetary policy objectives implemented via the exchange rate channel have positive implications for BSD through investment behaviour of firms and individual spending behaviour of economic units which affects the overall aggregate demand with attendant effect on the banking sector. Policies that target exchange rate appreciation make the price of foreign goods and services more expensive thus discouraging importation (Ajayi, 2007). This implies that alternatives for the products and services would have to be sourced locally and firms would need to invest in the alternatives (CBN, 2016). Resultantly, banks would also have to develop innovatively to meet the demands of customers. In Panel B for short-run estimates, a positive and significant result was also obtained (λ=0.07547, $p<0.01$).

All control variables (institutional quality, inflation and gross domestic product) are observed to positively and significantly enhance BSD. This

highlights the importance of having strong economic institutions to support BSD. Inflation coefficients in the short-run panel for interest rate model suggest that lower rates would boost development in the banking sector.

Results of post estimation tests to validate regression estimates are presented in Table 7. The results show that all variables and models were free from serial corelation and heteroskedasticity issues. Breusch-Godfrey autocorrelation statistics of with non-significant p-values suggest that the absence of serial correlation in the models. Breusch-Pagan heteroskedasticity statistics also with insignificant p-values suggest that the absence of heteroskedasticity in the models.

Table 7: Post Estimation Tests

Breusch-Godfrey Serial Correlation LM Test (Panel A)		
Model	F-statistic	p-value
Banking sector development and Interest Rate Channel	1.1965	0.1490
Banking sector development and Exchange Rate Channel	2.5604	0.2024
Banking sector development and Equity Price Channel	1.8012	0.1137
Breusch-Pagan-Godfrey Heteroskedasticity Test (Panel B)		
Model	F-statistic	p-value
Banking sector development and Interest Rate Channel	1.2088	0.4116
Banking sector development and Exchange Rate Channel	0.9624	0.5668
Banking sector development and Equity Price Channel	0.9202	0.6005

Source: Author's computation (2022)

Stability of long-run coefficients through CUUM tests are presented in Figures 1 to 3. The figures show that the CUSUM plots are within the two critical bounds and, suggests stability of parameters across the three models.

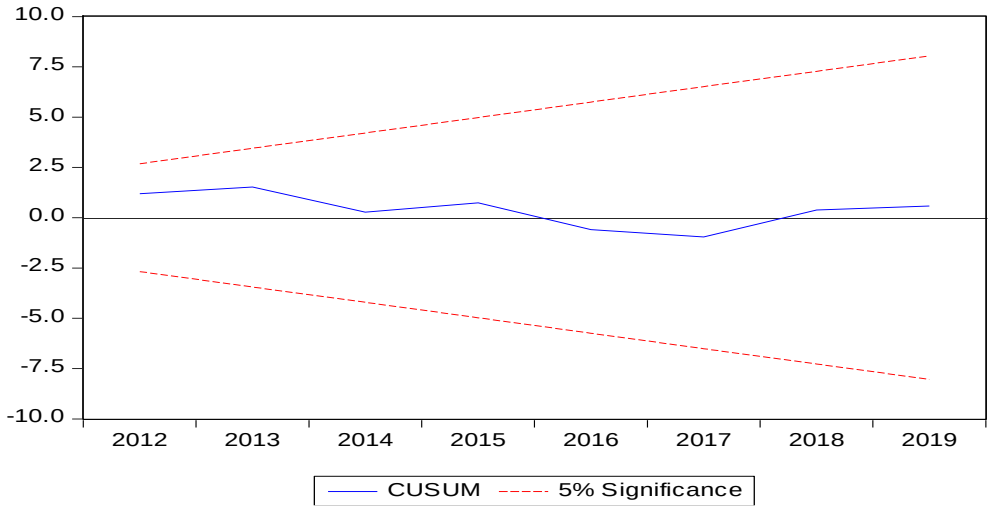

Figure 1- Plot of cumulative sum of recursive residuals for Banking sector development and Interest Rate Channel

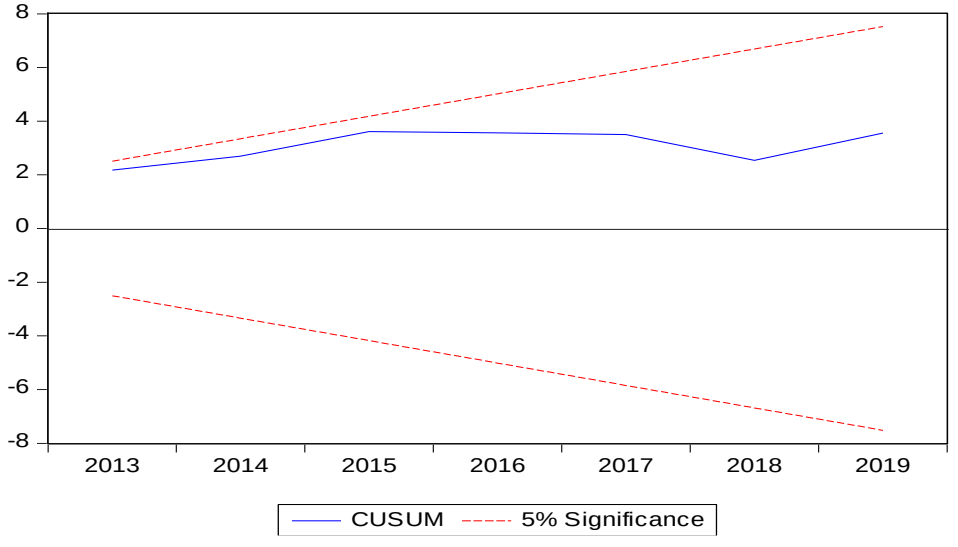

Figure 2- Plot of cumulative sum of recursive residuals for Banking sector development and Exchange Rate Channel

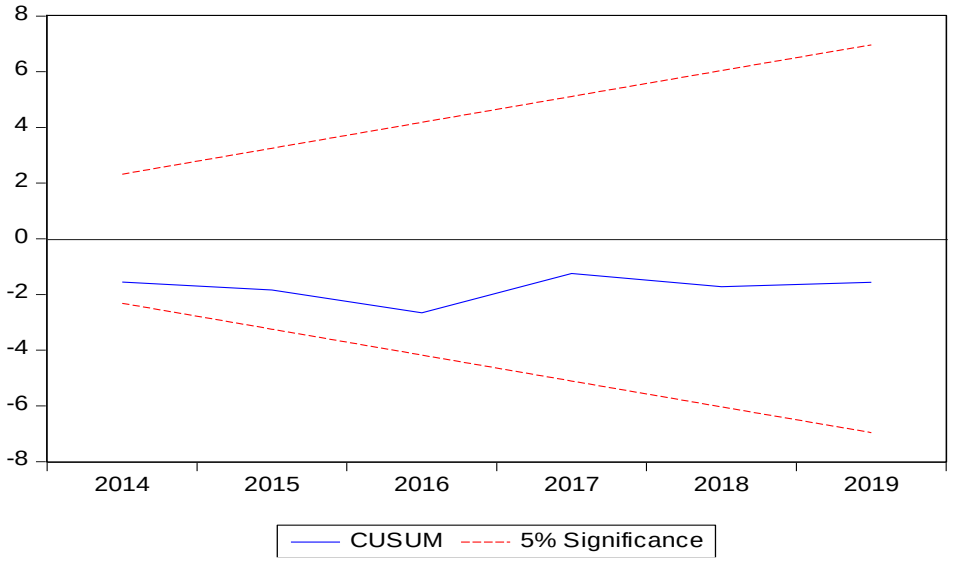

Figure 3- Plot of cumulative sum of recursive residuals for Banking sector development and Equity Price Channel

5.0 CONCLUSION AND POLICY RECOMMENDATIONS

The banking sector serves as an important medium through which monetary authorities transmit policy objectives to the real economy. However, an inappropriate policy transmission mechanism may hinder development in the sector given the ever-evolving nature of the banking sector. This study investigates the extent to which interest rate, exchange rate, and equity price channels of monetary policy transmission channels affects banking sector development in Nigeria. The results from the ARDL estimation technique show that the interest and exchange rate channels of monetary policy transmission positively and significantly enhances banking sector development while equity price channel does not. The overall result supports the credit channel theory of monetary policy transmission but find no support for the financial accelerator theory linked to the stock market via the equity price channel.

The findings from this study draw out some policy implications. One is that interest rate and exchange rate monetary policy transmission mechanisms are the channels that promote banking sector development in Nigeria suggesting lesser inefficiencies than the equity price channel. Therefore, monetary authorities should implement policies aimed at having a stable interest rate as well as an exchange policy that supports economic activities to develop the banking system while achieving the desired monetary policy objective. For instance, the continuous adoption of flexible interest rates would help the system in achieving an economically viable interest rate. Secondly, innovative

credit creation processes and initiatives aimed at reducing information asymmetries in the sector should be employed. The adoption of effective credit creation through flexible and innovative products in the financial system would facilitate development of the banking sector. This could be made possible through adoption of financial technology products. Thirdly, the continued management of exchange rates by the CBN as currently being done should be continued to prevent impediments slowing down development in the banking sector. The study also recommends that stronger financial regulatory framework should be implemented in banking sector which would help improve the governance of banks and other financial institutions in Nigeria.

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