External Shocks and Macroeconomic Volatility in Nigeria

Malachy Ashywel Ugbaka

Department of Economics,
University of Calabar, CRS, Nigeria

Abstract

This study investigates how the growth of the financial sector helps Nigeria's macroeconomic volatility by mitigating the impact of external shocks. The moderating role of financial development in the relationship between external shocks and macroeconomic volatilities in Nigeria between 1986 and 2022 is investigated using autoregressive distributed lag and completely modified ordinary least square. Market capitalization and domestic lending to the private sector serve as proxies for financial development, while the oil price shock serves as a proxy for external shock. Output and inflation volatility serve as proxies for macroeconomic volatility. Macroeconomic volatilities are generated using generalized autoregressive conditional heteroskedasticity (GARCH 1, 1). The findings show that both short- and long-term output and inflation volatility in Nigeria are considerably decreased by domestic lending to the private sector. Market capitalization, on the other hand, encourages macroeconomic instability. More precisely, measures of financial development have distinct functions in masking macroeconomic volatility. The findings also show that exogenous shocks both immediately and over time increase Nigeria's macroeconomic volatility. However, considering the function of financial development lessens the impact of foreign shocks on macroeconomic volatilities. Thus, this analysis submits that a robust financial sector helps to mitigate the negative impact of foreign shocks on the domestic economy.

Keywords: *External shocks, Macroeconomic volatility, Financial development*

Corresponding Author: *Malachy Ashywel Ugbaka*

Background to the Study

The rapid advancement of globalization over the last three decades has increased the economic interdependence of nations around the world. In certain nations, economic diversification and prosperity were the outcomes of growing global integration. However, it has made many nations more vulnerable to external shocks. This vulnerability primarily impacts developing economies because of their over-reliance on primary commodity exports as a major source of government revenue and foreign exchange earnings, as well as their inconsistent policy mix and structural problems (Dada, 2022; Ugbaka et al, 2022 and Abanikanda et al., 2023). An external shock is defined as an unforeseen change in external factors that affect domestic economic activities. Because external shocks can cause economic booms and busts and create macroeconomic volatility, it can be argued that a country's vulnerability to external shocks is determined by how dependent it is on foreign markets and external resources (Abere and Akinbobola, 2020). For this reason, managing external shocks becomes crucial to macroeconomic management in general, especially in less developed nations.

Nigeria's economy has grown increasingly open over time, relying on the rest of the world for economic sustainability through the import of manufactured goods and raw materials and the export of primary goods (Oyelami and Olomola, 2016). Consequently, volatility in the nation's macroeconomic indicators may result from any shock to the global economy. After a few years of strong economic performance, Nigeria experienced two severe recessions in a 5-year period due to the COVID-19 pandemic and a precipitous decline in global oil prices. This clearly illustrates how vulnerable Nigeria is to external shocks. Additionally, over the years, researchers in Nigeria have determined a number of ways that foreign shocks manifest. The Nigerian economy is susceptible to shocks to the global oil price, according to studies by Dada and Akinlo (2023b), Oyelami and Olomola (2016), Akanbi and Dada (2018), Ugbaka et al, (2024), Adefabi and Rasaki (2018), and Abere and Akinbobola (2020) showed that external financial shocks, foreign input price shocks, and external debt shocks are important factors that affect Nigeria's macroeconomic performance.

However, there is a significant flaw in the earlier research conducted in Nigeria because it did not consider the possibility that financial development, or FD, may increase or decrease the effect of external shocks on macroeconomic volatility. A deeper financial industry has been shown to be a key component in enhancing an economy's shock-absorbing ability, hence reducing the negative impact of external shocks on macroeconomic volatility. FD is thought to improve risk-sharing, which reduces financial constraints, increases households' and businesses' resilience to shocks, and facilitates better consumption smoothing, among other advantages (Bezooijen and Bikker, 2017; Ugbaka, 2025; Akinlo and Dada, 2023a; and Ugbaka and Nnnak,2020). According to Kpodar et al. (2018), a more robust financial sector would increase the efficacy of the nation's countercyclical policy implementation, hence reducing the impact of external shocks. According to these assertions, a healthy financial system would increase the economy's resilience and lessen the consequences of external shocks.

There are few empirical studies on the possible involvement of foreign direct investment (FDI) in the relationship between external shocks and macroeconomic volatility in Nigeria, despite the apparent prevalence of shocks. Furthermore, the data that is currently available on this topic has mostly focused on panel studies or cross-country analyses, with varying degrees of success (Dabla-Norris and Srivisal, 2013; and Kpodar et al., 2018). It is necessary to look at this topic from a country-specific perspective because developing nations have varying financial and economic frameworks as well as varying levels of shock exposure. Furthermore, a shallow financial system may spread external shocks, hence increasing macroeconomic volatility, whereas a deeper financial system may lessen the negative impact of external shocks on macroeconomic volatility. The current study is necessary due to the need for empirical investigation into the likelihood of these reversal connections. As a result, the moderating function of FD in the relationship between macroeconomic volatility and external shocks is investigated. The rest of the paper is divided into the following sections. Section 2 presents the literature review, while Section 3 explains the technique. Section 4 presents the results and discussion, and Section 5 brings the paper to a close.

Literature

With little consideration for other types of external shocks, previous research has mostly concentrated on the impact of oil price shocks on the macroeconomic performance of either oil-importing or oil-exporting nations. We looked at studies that study external shocks and macroeconomic volatility in Nigeria as well as studies that study other kinds of external shocks, such growth spillover, in order to conduct a thorough evaluation of the literature. Studies have demonstrated in theoretical literature that foreign direct investment (FD) can absorb external shocks and hence lower macroeconomic volatility in an economy. Financial deepening improves risk diversification opportunities, lessens financial limitations and informational asymmetries, and protects the economy from unanticipated global shocks.

Srivisal and Dabla-Norris (2013) investigate how financial depth affects macroeconomic volatility. In a dynamic panel analysis, the authors examine 110 developed and developing nations. According to the study's findings, the depth of the financial system reduces volatility in the business cycle of output growth, investment, and consumption. Kpodar et al. (2018) examine the link between FD, trade shocks, and production volatility in a similar study. The authors use fixed-effect estimate techniques, local projection, and the system generalized method of moments (GMM) to concentrate on low-income nations. According to the study, advancements in the banking industry improve the economy's capacity to withstand shocks, which reduces the impact of trade shocks on production volatility. The results also hold true when the sample is expanded to include new countries; however, as a country's economy develops, the financial sector's moderating effect as a shock absorber diminishes.

Gonzalez-Aguado (2018) examines how both local and external shocks affect output volatility and finds that foreign direct investment (FD) makes emerging economies less vulnerable to external shocks. Using cross-sectionally augmented autoregressive distributed lag (CS-ARDL), Kapingura et al. (2022) investigated how the growth of the financial sector affected macroeconomic volatility in the context of the southern African development

community from 1980 to 2018. The study's findings suggest that capital market development and banking factors significantly reduce growth volatilities; hence, financial development reduces macroeconomic volatilities.

In 45 African nations between 1997 and 2017, Avom et al. (2021) investigate the influence of FD and institutions in the relationship between terms of trade volatility and macroeconomic volatility. According to the authors, the region's financial institutions and development act as shock absorbers, reducing the impact of the terms of trade shock on macroeconomic volatility. Nonetheless, the outcome demonstrates that financial institutions have a greater influence than the financial market. In a different study, Ibrahim and Alagidede (2016) evaluate how the growth of the financial sector affects the relationship between shocks and economic volatility in 23 SSA nations between 1980 and 2014. The results of using the panel cointegration estimation approach indicate that FD has a nonlinear impact on business cycle volatility.

Goyal et al. (2021) investigated the effects of cross-border flows and external shocks on macroeconomic performance in a panel study of ten rising nations. The results of the study, which used panel vector autoregressive analysis, show that cross-border flows to emerging market economies are more impacted by changes in global risk perception than by changes in US monetary policy. Majeed and Noreen (2018) examine how foreign direct investment (FD) affected output volatility in 79 countries between 1961 and 2012. Results indicate that the growth of the financial sector lowers GDP volatility, however this effect is not very strong in many situations. Additionally, compared to other FD metrics, the data demonstrate that financial stability has a greater impact on reducing GDP volatility. Between 1975 and 2014, Bezooijen and Bikker (2017) investigate how foreign direct investment and financial structure affected the macroeconomic volatility of 55 nations. The authors concluded that cyclical factors and GDP instability are not considerably impacted by financial structure. According to the study, a larger stock market in relation to the banking system may encourage instability in the investment business cycle. The size of the stock market relative to the banking system, on the other hand, has little effect on the volatility of the investment business cycle.

Igwe-Kalu and Obasuju (2020) investigate how foreign direct investment (FD) contributed to the relationship between trade shock and output volatility in Nigeria from 1981 to 2017. Using the ARDL technique, the authors discover that Nigeria experienced a shock as a result of the FD aid deal, which increased production volatility. Ogbuagu and Ewubare (2017) investigate the relationship among economic growth, macroeconomic instability, and financial depth. As a stand-in for macroeconomic volatility, the authors employ exchange rate volatility. Results indicate that financial deepening has a long-term impact on exchange rate volatility. Olushola and Makwe (2018) examine how foreign direct investment (FD) affected Nigeria's economic expansion between 1981 and 2017. The results imply that foreign direct investment has a favorable impact on the Nigerian economy. Iheanacho (2016), on the other hand, looks into the relationship between foreign direct investment and economic growth between 1981 and 2011. The author argues that while FD has a short-term negative impact on economic growth, its long-term effects are not statistically significant. Adeniyi et al. (2015) examined the effect of foreign direct investment (FD) on economic growth in Nigeria from

1960 to 2010 from a non-linear perspective. According to the study's findings, foreign direct investment has a negative impact on economic growth. But when FD rises above a certain threshold, the relationship turns positive. This outcome validates Ihenacho's (2016) findings.

Data and Methodology

This study's main goal is to evaluate how foreign direct investment (FD) mediated the impact of external shocks on Nigeria's macroeconomic volatility from 1996 to 2022. The choice of this temporal dimension is supported by the variables' data availability. The generalized autoregressive conditional heteroskedasticity (GARCH 1,1) model is used to produce macroeconomic volatility. The generalized autoregressive conditional heteroskedasticity (GARCH 1,1) model is used to produce macroeconomic volatility. This method is beneficial to the study because it tackles the issues of negative variance of autoregressive conditional heterosecdacity (ARCH) and constant variance that the conventional measure of volatility (standard deviation) faces (Ibrahim and Alagidede, 2016; Dada, 2021). To get around the aforementioned issues, Bollerslev (1986) expanded the ARCH model to include more flexible lags. Equation (1) presents the ARCH (p) model:

$$\sigma_t^2 = \delta_0 + \sum_{j=1}^{\rho} \chi_j \, \ell_{t-j}^2 + v_t \qquad\qquad 1$$

Where e^2 is the error term and σ_t^2 is the macroeconomic variance. The GARCH (1,1) model is a concise representation of equation (1):

$$\sigma_t^2 = \delta_0 + \Psi\sigma_{t-1}^2 + \Psi\ell_{t-j}^2 \qquad\qquad 2$$

When volatility is represented by σ_v^2, equation (2) becomes:

$$Vol_t = \delta_0 + \Psi_1 Vol_{t-1} + \Psi_2\ell_{t-j}^2 \qquad\qquad 3$$
$$\delta_0 > 0; \Psi_1 > 0; \Psi_2 > 0$$

Where Vol_t represents the volatility of the output.

The reaction function for which external shocks are produced is expressed as follows:

$$\Delta EX = \emptyset(L)\Delta EX_{t-1} + \Gamma X_{t-1} + \varepsilon_t \qquad\qquad 4$$

Where L is a lag polynomial, Φ is a vector of parameters, X_{t-1} is a vector of exogenous regressor, ε_t is the residual series (external shocks), Δ is the initial difference, and EX is the measure of external policy.

This section outlines the empirical model for accomplishing the study's aim after establishing the mechanism that produces external shocks and macroeconomic volatility. In accordance with the empirical research of Ibrahim and Alagidede (2016), Dabla-Norris and Srivisal (2013), and Beck et al. (2006), this study expands the theoretical model of Bernanke et al.

(1999) to incorporate the interacting term of FD and external shocks. The model is expressed as follows:

$$MAvol_t = f(FD, EXS(FD * EXS), Z \qquad 5$$

The moderating impact of FD in the relationship between external shocks and macroeconomic volatility is captured by the interacting term of FD and external shocks, (FD*EXS), where MAvol stands for macroeconomic volatility, FD for financial development, and EXS for external shocks. The interaction term's negative coefficient indicates that robust financial sector growth absorbs external shock, reducing macroeconomic volatility, whereas the positive coefficient implies that FD fails to absorb external shock, increasing macroeconomic volatility. Z is an additional control variable that affects the correlation. Equation (5) is expressed in precise terms as follows:

$$MAvol_t = \alpha + \beta FD_t + \gamma EXS_t + \eta(FD * EXS)_t + \kappa Z_t + \mu \qquad 6$$

ARDL is utilized to take into consideration both short- and long-term projections, which are crucial for prescribing policies. This study benefits from ARDL's ability to accommodate I(1) and I(0) variables, provide unbiased estimates, and enable the limits test to verify long-term correlations (Fabiyi and Dada, 2017; Dada and Fanowopo, 2020).

$$\Delta MAvol_t = \alpha + \sum_{j-1}^{0} \rho_j \Delta MAvol_{t-j} + \sum_{j-0}^{\rho} \beta_j \Delta FD_{t-j} + \sum_{j-0}^{\eta} \beta_j \Delta EXS_{t-j}$$
$$+ \sum_{j-0}^{m} \eta_j \Delta (FD * EXS)_{t-j} + \sum_{j-0}^{m} \kappa_j \Delta Z_{t-j} + \lambda_1 MAvol_{t-j} + \lambda_2 FD_{t-j}$$
$$+ \lambda_3 EXS_{t-j} + \lambda_4 (FD * EXS)_{t-j} + \lambda_5 Z_{t-j} + \mu \qquad 7$$

The long-run coefficients are λj (j 5 1, 2...,5), but the short-run movements are preceded by Δ. Similarly, equation (7) compares the alternative hypothesis of long-run cointegration ∂λ₁ ≠λ₂ ≠λ₃ ≠λ₄ ≠λ₅ ≠0 to the null hypothesis of no long-run cointegration ∂λ₁ =λ₂ =λ₃ =λ₄ =λ₅ = 0.

However, fully modified ordinary least square (FMOLS) is utilized for sensitivity analysis in order to address the endogeneity issue brought on by the bidirectional relationship between external shocks and macroeconomic volatility in the literature, simultaneity, and omitted variables bias (Bruckner, 2013 $). As long as there is a cointegration relationship between the variables, FMOLS gives long-run parameters and addresses the aforementioned problems (Phillips and Hansen, 1990; Adusei, 2012; Olaniyi and Olladeji, 2020; Dada et al., 2022). FMOLS confirms the ARDL's long-term results.

Results and Discussion
The GARCH result for the two variables—economic growth and inflation, which are employed as proxy for macroeconomic variables—is shown in Table 1. Given that the

coefficients of the variance and mean equations in the two models are both significant at 1%, the result implies the presence of volatilities. According to Dada and Akanni (2017), the variance equation's results also show that macroeconomic volatility is clustering and continuous because the total of its coefficients is smaller than one. There is also a positive trend in the model's diagnostic statistics. The Box–Ljung (Q), Box–Ljung square (Q2), and Lagrange Multiplier (LM) test statistics, for example, demonstrate that there is no autocorrelation and ARCH disruptions among the errors in the models. Macroeconomic volatility can be produced as a result of the mean and variance formulae being precisely defined.

Table 2's stationary test demonstrates that all variables are stationary at first difference, with the exception of oil price shocks (OILS), which, according to the augmented Dickey-Fuller (ADF) test, are stationary at level. Adoption of ARDL as the estimation technique is justified as the dependent variables (inflation and output volatilities) are stationary at first level and the stationarity level is less than 2. In order to investigate the long-term cointegration between the variables, an ideal lag duration of four is enforced. Macroeconomic volatility (the dependent variable) and the private sector credit to GDP ratio are measured using two important volatility variables, namely output volatility and inflation volatility. The primary independent variable, FD, is measured using market capitalization, and the external shock is proxied by the oil price shock. Four models are shown, each utilizing a distinct set of financial data and macroeconomic volatility. Model 1 uses private sector domestic credit as a stand-in for foreign direct investment (FD); Model 2 uses market capitalization as a proxy and interacts with shocks to the price of oil. The study analyzes the impact of these interactive terms on output volatility in models 1 and 2. Models 3 and 4, on the other hand, show how market capitalization and the impact of credit on the private sector interact with the shock of the oil price to determine the impact on inflation volatility. In all models, the results of the ARDL bounds test in Table 5 verify that there is a long-term relationship between the series. It is being argued that there is no long-term cointegration between macroeconomic volatility and other variables, which is the null hypothesis.

Moderating Effect of FD
Once cointegration between the variables has been established, ARDL is used to analyze the short- and long-term impacts. Table 3 shows the results of the ARDL. The findings demonstrate that private sector domestic lending considerably lowers Nigeria's output and inflation volatility over both time periods. Nonetheless, market capitalization has a favorable impact on macroeconomic fluctuations. This result demonstrates that FD indicators have distinct functions in curtailing fluctuations in the macroeconomy. The fact that domestic credit has a greater impact than market capitalization, which is mostly controlled by huge corporations, is one factor contributing to its success in the private sector. Furthermore, private sector lending increases families' and businesses' capacity to withstand shocks, which eventually improves consumption smoothing (Sahay et al., 2015; Yang and Liu, 2016; Bezooijen and Bikker, 2017).

This study's findings corroborate the empirical arguments of Dabla-Norris and Srivisal

(2013), Loayza and Raddatz (2007), Gonzalez-Aguado (2018), Ma and Song (2017), and Ibrahim and Algidede (2016), who conclude that robust foreign direct investment (FD) lessens the adverse impact of external shocks on the domestic economy. This is to be expected since improved financial sector development lowers output volatilities and aggregate shocks through diversification and investment risk (Zilibotti, 1997), although Kpodar et al. (2018) also found that market capitalization amplifies macroeconomic volatility.

Short- and long-term macroeconomic volatility in Nigeria is positively impacted by external shocks, as measured by the oil price shock. In terms of direction, external shocks have the same impact on output volatility as they do on inflation volatility. Its coefficients are noticeably positive, indicating that Nigeria's macroeconomic volatility is increased as external shocks increase. According to this finding, one of the major causes and determinants of macroeconomic volatility in Nigeria is the shock to the oil price. A shock to the price of oil dramatically increases output and inflation volatility. Since Nigeria's economy is based on the price of crude oil, any changes in that price can be readily transferred to the country's internal economy through foreign revenues, leaving the country vulnerable to outside shocks. External shocks have a favorable effect on macroeconomic volatility, which is consistent with Ibrahim and Alagidede's (2016) argument.

Depending on the proxy employed, the interacting term of FD and oil price shocks has varying impacts on macroeconomic volatilities with regard to the moderating role of FD in the relationship between external shocks and macroeconomic volatilities. When combined, market capitalization and domestic lending to the private sector lower output volatility in Nigeria with short-term and long-term shocks to the price of oil. This implies that robust financial sector growth acts as a crucial shock absorber to lessen the negative impact of external impact on the country's economy. Stated differently, a robust financial sector protects the economy from the spread of external shocks. However, the combination of market capitalization and external shocks only short-term lowers macroeconomic volatility; over time, it increases. This suggests that external shocks that cause macroeconomic volatility, particularly inflation, cannot be absorbed by Nigeria's current market capitalization level. The reduction in external shock caused by the growth of the financial sectorThe sophistication of a country's financial system is indicated by macroeconomic volatility, which promotes risk diversification, trade diversification, uncertainty hedging, and the reduction of information asymmetry. This outcome is consistent with the Avom et al. (2021) submission. However, this result runs counter to research by Beck et al. (2006) and Igwe-Kalu and Obasuju (2020), which discovered a negligible interacting term between FD and terms of trade shock.

Conclusion
This study examines how financial development moderates the relationship between macroeconomic volatility and exogenous shocks from 1986Q1 to 2019Q4. Market capitalization and domestic lending to the private sector are the two financial development metrics used to achieve this goal. While output and inflation volatility serve as proxies for macroeconomic volatility, the price of oil serves as a proxy for external shock. Our findings unequivocally demonstrate that different FD metrics have distinct effects on macroeconomic

volatility. Macroeconomic volatilities are exacerbated by external shocks, but they can be mitigated by a strong financial system. In particular, the study's conclusions show that domestic lending to the private sector considerably lowers both the short- and long-term volatility of Nigeria's output and inflation. However, market capitalization encourages macroeconomic volatility and is also utilized as a stand-in for the development of the financial sector. This finding implies that financial development metrics have distinct functions in obscuring macroeconomic fluctuations.

Additionally, the findings demonstrate that exogenous shocks both immediately and over time increase macroeconomic volatility in Nigeria. However, when the function of financial development is considered, the impact of external shocks on macroeconomic volatilities decreases. This implies that robust financial sector growth acts as a significant shock absorber, mitigating the negative impact of external shocks on the domestic economy. The study concludes that exogenous shocks have a negative impact on macroeconomic volatility. However, a strong banking sector can lessen the negative consequences of outside shocks.

Policy Implications

The study's findings have significant policy ramifications. First, suitable financial sector reforms must be put into place in order to improve the financial system. In addition to reducing macroeconomic volatility, a robust financial sector will increase the nation's capacity to absorb shocks from the outside world. To do this, the governing body must strengthen the supervisory ability to ensure the system's efficiency and soundness and further reform the regulatory framework. The intermediation role of the financial industry requires greater innovation, especially when it comes to enhancing funding for the productive sector. Furthermore, the Central Bank ought to impose stricter capital requirements for banks. By implementing strict regulations that include the necessary capital quality, the system can withstand external shocks. A set of effective macroeconomic policies that can mitigate the detrimental effects of shocks on the domestic economy must also be developed by policymakers. Additionally, measures to increase the economy's base of production ought to be developed in order to mitigate the effects of outside shocks.

References

Abanikanda, E. O., Dada, J. T. & Ogunjumo, R. A. (2023). Fiscal deficit in sub-Saharan Africa: A new intuition from the institution and political drivers. *PLoS ONE, 18*(2).

Abere, S. S. & Akinbobola, T. O. (2020). External shocks, institutional quality, and macroeconomic performance in Nigeria, *Sage Open, 10*(2), pp. 1-18

Beck, T., Lundberg, M. & Majnoni, G. (2006). Financial intermediary development and growth volatility: do intermediaries dampen or magnify shocks. *Journal of International Money and Finance,* 25, pp. 1146-1167.

Bezooijen, E. F. S. & Bikker, J. A. (2017). *Financial structure and macroeconomic volatility: A panel data analysis*, Utrecht University School of Economics Tjalling C. Koopmans Research Institute, Discussion Paper Series 17-13.

CBN (2018). *Annual report.*

CBN (2020). *Annual report*

Dada, J. T. (2021). Asymmetric effect of exchange rate volatility on trade in sub-Saharan African countries, *Journal of Economics and Administrative Sciences*, 37 (2), pp. 149-162.

Dada, J. T. & Akinlo, T. (2023b). Asymmetric effect of oil prices on remittances in oil importing and exporting countries: evidence from sub-saharan Africa. *OPEC Energy Reviews, 47,* pp. 113-138.

Ugbaka, M. A. (2025). Macroeconomic aggregates and exchange rate in Nigeria, *International Journal of Innovative Research in Social Sciences and Strategic Management Techniques,* 2025, 11(1), 396-407.

Ugbaka, M. A., Abuh-Amasi, A. S. & Ndome, J. N (2022). Rising External Debt and Diminishing Exports: Concurrent Constraints to Economic Progress in Nigeria, *International Journal of Economics and Financial Issues,* 2022, 12(4), 13-18.

Ugbaka, M. A., Okoiarikpo, B. O. & Eyam, N. E. (2024). Inflation and joblessness in a vector error correction framework, *International Journal of Entrepreneurial Development, Education and Science Research.* 8(1), 385-397

Ugbaka, M. A., Nnnak, O (2020). Effects of oil price shocks on manufacturing sector output in Nigeria (1986 – 2019), *Babcock Journal of Economics.* 7, 87-98

Umoru, D., Effiong, S. E., Umar, S. S., Okpara, E., Ugbaka, M. A., Otu, C. A., Ofie, F. E., Tizhe, A. N., & Ekeoba, A. A. (2023). Reactions of stock returns to asymmetric changes in exchange rates and oil prices, *Corporate Governance and Organizational Behavior Review,* 7(3), 42–56.