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NAVIGATING GLOBAL SHOCKS: MONETARY POLICY CHALLENGES FOR AFRICAN CENTRAL BANKS

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Abstract

This study examines the transmission of global shocks to inflation and exchange rates in Nigeria and South Africa and assesses whether domestic monetary policy moderates their effects. Using a two-country stacked Global Vector Autoregressive model complemented by country-specific local projections over 2000–2025, we compare transmission dynamics across two economies that differ in monetary framework, exchange rate arrangement, and financial market depth. Five findings emerge. First, global shocks are transmitted differently across the two economies, reflecting structural differences. Second, US monetary policy shocks operate primarily through exchange rates, but with opposite-sign country-specific inflation responses, inflationary in Nigeria through the import cost channel, and near-zero in South Africa, masking a significant negative pooled effect. Third, food price shocks generate robust exchange-rate responses but no significant inflation pass-through at any horizon. In contrast, global risk shocks produce short-lived exchange-rate depreciation that does not persist when aggregated quarterly. Fourth, the domestic monetary policy multiplier differs markedly: South Africa shows a delayed disinflationary effect at longer horizons, while Nigeria shows a positive inflation response at medium horizons, consistent with shallow financial markets and limited transmission capacity. Fifth, domestic monetary policy provides limited systematic insulation from global shocks, with structural channels, exchange rate regimes, financial depth, and reserve buffers as the primary determinants of transmission rather than the contemporaneous policy stance. Results relating to Nigeria's exchange-rate transmission should be interpreted cautiously because the official exchange-rate series understates market pressures during the dual-rate period preceding the 2023 foreign-exchange market unification. These findings have implications for monetary surveillance, exchange rate policy, and the sequencing of structural reforms in commodity-dependent emerging economies.

Keywords: *global shocks, monetary policy transmission, GVAR, local projections, inflation, exchange rate*

JEL Classification: *E52, E58, F41, F42, C32, O55*

1.0 Introduction

The global economy is experiencing heightened uncertainty following a succession of large, overlapping shocks. Since 2020, the COVID-19 pandemic, the Russia–Ukraine conflict, and geopolitical tensions in the Middle East have disrupted global supply chains, increased commodity price volatility, and altered international financial conditions (IMF, 2023; Caldara & Iacoviello, 2022). For African economies, these developments have created a significantly more uncertain external environment than that assumed in many traditional monetary policy frameworks.

Three characteristics define the contemporary African macroeconomic environment. First, external shocks have grown larger, more persistent, and increasingly interconnected. Commodity price fluctuations, global financial tightening, and geopolitical disruptions now exert substantial influence on domestic macroeconomic outcomes (Miranda-Agrippino & Rey, 2020; Kalemli-Özcan & Unsal, 2023). Second, inflation and exchange rate pressures have become harder to stabilise. Food prices across Sub-Saharan Africa rose sharply after the pandemic, while rapid tightening by advanced-economy central banks increased external financing costs and intensified volatility in capital flows (IMF, 2023; Afreximbank, 2023). Third, conventional monetary policy responses have produced uneven outcomes across countries, reflecting differences in financial depth, policy credibility, institutional structures, and exposure to external vulnerabilities (Berg & Portillo, 2018).

These developments have substantially complicated the conduct of monetary policy across the continent. IMF projections indicate that inflationary pressures in several African economies are likely to remain elevated through 2026, reflecting imported inflation, exchange rate pressures, and persistent supply-side constraints (IMF, 2025). In economies characterised by high import dependence and shallow financial markets, external disturbances frequently translate into domestic inflation through exchange rate channels, thereby weakening the effectiveness of conventional monetary policy instruments (El-Said & Takebe, 2016).

The implications of these developments are particularly evident in Nigeria and South Africa, two economies that together account for a substantial share of Sub-Saharan Africa's economic activity yet differ markedly in their monetary arrangements, exchange rate systems, and financial market structures. Although both countries experienced elevated inflation following the pandemic and subsequent geopolitical disruptions, the persistence and transmission of these pressures differed markedly.

Nigeria experienced substantial inflationary pressures stemming from exchange-rate volatility, energy price adjustments, and persistent supply-side constraints. Inflation increased due to higher import prices and exchange rate pass-through effects. Although subsequent monetary tightening helped moderate inflationary pressures, the transmission process remained gradual and was strongly influenced by structural factors, including exchange rate movements and domestic supply conditions (CBN, 2025; IMF, 2025).

South Africa followed a different trajectory. Operating within a formal inflation-targeting framework supported by relatively deeper financial markets and stronger policy credibility, inflation moderation occurred more rapidly and remained closer to the South African Reserve Bank's target range, despite exposure to global financial shocks and international capital flow reversals (Aron & Muellbauer, 2007; Unsal et al., 2022).

Exchange rate developments reveal a similarly important distinction between the two economies. In Nigeria, exchange rate dynamics have historically been a principal channel through which external shocks affect domestic inflation. Periods of exchange rate segmentation, followed by foreign exchange market reforms have led to substantial pass-through to domestic prices (El-Said & Takebe, 2016). The transition toward greater exchange rate flexibility following market reforms has increased the effect of external conditions in domestic monetary transmission.

South Africa offers a different experience. The freely floating exchange rate system has generally served as an important adjustment mechanism in response to external shocks. However, movements in the rand remain highly sensitive to changes in global risk appetite and international capital flows (Miranda-Agrippino & Rey, 2020). Consequently, while both economies remain exposed to global disturbances, the channels and persistence of transmission differ considerably.

The policy challenge extends beyond inflation management. External vulnerabilities have intensified following repeated global shocks. Public debt ratios across Sub-Saharan Africa have risen significantly, while access to international capital markets has become increasingly constrained and costly (IMF, 2023). Consequently, African central banks increasingly face competing objectives including inflation control, exchange rate stability, reserve preservation, and financial system stability.

Although a growing body of literature has examined individual transmission channels such as commodity price movements, exchange rate pass-through, and international monetary spillovers, relatively little evidence exists on the combined effects of multiple global shocks in African economies (Tumala et al., 2021; Beirne & Renzhi, 2024). Existing studies also offer limited comparative evidence on how differences in institutional structures and monetary policy frameworks affect policy effectiveness across countries.

Against this background, this study examines how major global shocks affect monetary policy outcomes in African economies, using Nigeria and South Africa as case studies. The two of Africa’s largest economies together account for a substantial share of Sub-Saharan African output. These economies provide an appropriate basis for analysis because of their sizes and differences in monetary policy frameworks, foreign exchange market arrangements, financial market depth, and exposure to external shocks.

Specifically, the study seeks to:

i. Analyse the significant transmission mechanisms through which global shocks affect monetary policy outcomes in African economies;

ii. Evaluate the effectiveness of monetary policy responses adopted by selected African central banks during major global shocks.

Accordingly, the study addresses the following research questions:

i. Through which channels do global shocks affect monetary policy outcomes in African economies?

ii. How effective have African central banks been in responding to recent global shocks?

iii. What policy lessons emerge from the observed transmission patterns and monetary policy responses?

To address these questions, the study adopts two complementary empirical approaches. First, the Global Vector Autoregression (GVAR) framework is employed to capture international interdependencies and trace how external shocks propagate through trade, commodity prices, financial conditions, and exchange rate channels simultaneously (Pesaran et al., 2004). The GVAR approach is particularly suitable because contemporary global shocks are increasingly transmitted through multiple interconnected mechanisms rather than isolated channels.

Second, Local Projection (LP) techniques are employed to evaluate the dynamic effectiveness of domestic monetary policy responses under differing structural conditions (Jordà, 2005). Unlike conventional approaches, LP methods permit direct estimation of dynamic responses over multiple horizons and provide flexibility in accommodating non-linearities and heterogeneous policy responses. The combined use of GVAR and LP therefore permits an evaluation not only of whether global shocks affect African economies, but also of how institutional and structural characteristics influence the magnitude and persistence of those effects.

The remainder of the paper is organised as follows. Chapter 2 reviews theoretical and empirical literature. Chapter 3 presents the methodology and data. Chapter 4 presents empirical findings. Chapter 5 discusses policy implications. Chapter 6 concludes.

2.0 Literature Review

2.1 Theoretical Foundations: From Trilemma to Quadrilemma

The theoretical foundations of monetary policy in open economies trace back to the work of Robert Mundell and Marcus Fleming, who independently developed what later became known as the Mundell–Fleming framework (Mundell, 1963; Fleming, 1962). The framework established that under conditions of capital mobility, the effectiveness of monetary policy depends critically on the exchange rate regime. This insight subsequently evolved into the "impossible trinity" or trilemma, formalised by Obstfeld, Shambaugh, and Taylor (2005), which holds that countries cannot simultaneously maintain free capital mobility, a fixed exchange rate regime, and independent monetary policy.

The traditional trilemma assumes that exchange rate flexibility provides some insulation from external disturbances. However, increasing financial integration and the growing dominance of international capital flows have challenged this assumption. Rey (2018) argues that global financial integration has transformed the trilemma into a "dilemma", in which countries with open capital accounts become increasingly constrained by global financial conditions, irrespective of exchange rate arrangements. Under this framework, monetary policy in major economies affects domestic outcomes via international capital flows, risk premiums, asset prices, and exchange rate movements.

Empirical evidence supports this argument. Miranda-Agrippino and Rey (2020) demonstrate that shifts in monetary policy in major advanced economies have substantial effects on global financial variables, including credit conditions and asset prices, even in countries operating flexible exchange rate regimes. Consequently, exchange rate flexibility alone may no longer guarantee meaningful monetary independence.

Recent theoretical developments extend this discussion further through the "quadrilemma" framework, which introduces financial stability as a fourth policy objective (Obstfeld, 2021). The quadrilemma suggests that countries may face trade-offs among monetary independence, exchange rate stability, capital mobility, and financial system stability.

For African economies, this trade-off is particularly important because shallow financial markets and foreign-currency exposures amplify the effects of external shocks. Kalemli-Özcan and Unsal (2023) show that countries with high levels of foreign-currency debt face tighter constraints on monetary policy autonomy because exchange rate movements significantly affect balance sheets and domestic financial conditions.

The effectiveness of monetary policy responses is also influenced by institutional credibility. Expectations-based theories of monetary policy originated with Muth's (1961) rational expectations hypothesis and were further developed by Lucas (1972). The policy credibility literature subsequently showed that discretionary policy actions may create a persistent inflationary bias unless constrained by credible institutional mechanisms (Kydland & Prescott, 1977; Barro & Gordon, 1983).

Central bank credibility influences how economic agents interpret policy actions and, consequently, the strength of policy transmission. A credible monetary authority can anchor inflation expectations and reduce adjustment costs associated with policy tightening. By contrast, weak credibility may amplify inflation persistence and reduce policy effectiveness.

Exchange rate pass-through is another important theoretical transmission mechanism. Campa and Goldberg (2005) show that economies with greater trade openness and larger import shares generally experience stronger transmission of exchange rate movements into domestic prices. Gopinath (2015) further demonstrates that invoicing currency structures affect the magnitude of pass-through effects.

For African economies, exchange rate pass-through remains particularly important because many countries rely heavily on imports and on foreign-currency invoicing. Empirical evidence indicates substantial heterogeneity across countries, with relatively stronger pass-through effects observed in Nigeria than in South Africa (El-Said & Takebe, 2016; Balcilar et al., 2019).

Finally, the policy reaction function literature provides a framework for assessing how central banks systematically respond to macroeconomic conditions. The canonical Taylor Rule, developed by Taylor (1993), suggests that policy interest rates should respond more than proportionately to deviations from inflation targets to maintain macroeconomic stability. The extent to which African central banks adhere to systematic policy rules remains an important consideration when evaluating policy effectiveness under external shocks.

2.2 Monetary Policy Frameworks and Institutional Design

The literature on monetary policy frameworks in emerging markets has increasingly shifted debates about whether a particular framework is universally superior toward a broader focus on institutional appropriateness and implementation quality. Contemporary research suggests that policy effectiveness depends not only on the selection of formal frameworks but also on institutional structures, including central bank independence, transparency, fiscal discipline, communication effectiveness, and financial market development (Unsal et al., 2022).

Broadly, four monetary policy arrangements can be identified: exchange rate targeting, monetary targeting, inflation targeting, and hybrid frameworks (Berg & Portillo, 2018).

South Africa remains one of Africa's most established examples of formal inflation targeting (Aron & Muellbauer, 2007). Since adopting inflation targeting in 2000, the South African Reserve Bank has relied heavily on interest-rate adjustments and communication strategies to anchor inflation expectations. Although external shocks continue to affect domestic outcomes, the framework has generally strengthened policy signalling and improved expectation management.

Nigeria implemented strict monetary targeting until late in 2006, when a hybrid form (of monetary targeting framework) was implemented, with the monetary policy rate doubling as the operating target and the repo rate. Subsequently, a corridor regime, with standing facilities, was introduced to help manage the money markets and strengthen the transmission process.

Hybrid frameworks remain common across Africa because policymakers frequently face multiple objectives simultaneously. These arrangements provide flexibility but may create uncertainty about policy reaction functions and reduce transparency (Berg & Portillo, 2018).

The literature increasingly suggests that framework suitability matters more than framework type. Economies with strong institutional environments and deeper financial markets may derive greater benefits from formal inflation-targeting arrangements, whereas those facing structural rigidities

and shallow financial systems may require greater flexibility in implementation (Kalemli-Özcan & Unsal, 2023).

2.3 Empirical Evidence on Global Shock Transmission

The empirical literature on external shocks in developing and emerging economies has expanded considerably over the last two decades, largely driven by repeated episodes of financial crises, commodity price fluctuations, global pandemics, and geopolitical disturbances. Increasingly, evidence suggests that African economies are not merely passive recipients of global developments but are deeply integrated into international financial and commodity markets through multiple transmission channels. Existing studies broadly identify five major strands of global shock transmission relevant to monetary policy in African economies.

Global Monetary and Financial Cycle Shocks

The first strand focuses on shocks to global monetary and financial cycles. A substantial body of evidence shows that changes in monetary conditions in major economies, particularly the United States, generate significant spillovers to emerging and developing economies via capital flows, sovereign spreads, exchange rates, and domestic financial conditions.

Kalemli-Özcan and Unsal (2023), using panel evidence from emerging economies, show that countries with lower policy credibility and larger foreign-currency liabilities experience stronger adverse spillovers after advanced-economy monetary tightening. Such economies typically witness larger exchange rate depreciations, widening sovereign spreads, and significant capital outflows.

Similarly, Miranda-Agrippino and Rey (2020) show that global financial cycles exert powerful effects on domestic financial conditions irrespective of exchange rate arrangements. Their findings suggest that monetary policy changes originating in major economies increasingly shape domestic financial conditions worldwide.

For African economies, the implications are significant. Monetary tightening by advanced economies often triggers capital-flow reversals and raises external borrowing costs, thereby adding pressure on exchange rates and foreign reserves. During recent periods of elevated global interest rates, several African economies experienced significant financing constraints and heigthened exchange rate pressures (IMF, 2023).

Nigeria and South Africa respond differently to these external disturbances. Nigeria's relatively shallow financial markets and exchange-rate pressures may amplify the domestic effects of external monetary shocks. In contrast, South Africa's deeper financial markets and relatively

stronger institutional structures provide partial insulation despite continued exposure to global risk sentiment (Tumala et al., 2021).

Commodity Price Shocks

The second strand concerns commodity price shocks. Commodity dependence remains a defining feature of many African economies, implying that movements in international commodity prices significantly affect macroeconomic performance.

The African Export-Import Bank (2023) reports that despite improvements in economic diversification, many African economies continue to rely heavily on a narrow range of primary commodities for export revenues and foreign exchange earnings. Consequently, fluctuations in commodity prices often generate substantial effects on government revenues, current account balances, exchange rates, and domestic inflation.

Oil price movements illustrate these effects particularly clearly. Oil-exporting economies such as Nigeria may initially benefit from favourable oil price movements through stronger export revenues and improved fiscal balances. However, higher oil prices may also generate inflationary pressures through higher domestic energy costs and indirect supply-chain effects.

Kilian (2009) further argues that oil shocks are not homogeneous and that the macroeconomic consequences of commodity price movements depend importantly on whether the shocks arise from supply disruptions, changes in global demand, or precautionary factors.

South Africa's exposure differs somewhat because commodity price movements affect the economy through broader terms-of-trade channels involving minerals and metals rather than predominantly through crude oil revenues. Consequently, it would be expected that transmission mechanisms would differ considerably between the two economies.

Health and Supply Chain Shocks

The third strand concerns health and supply chain disruptions. The COVID-19 pandemic demonstrated that health crises can rapidly evolve into macroeconomic and financial shocks through disruptions to labour markets, transportation systems, production networks, and global trade structures (IMF, 2021). Supply-chain disruptions had significant and persistent effects on headline and food inflation across Sub-Saharan Africa, often outlasting initial projections and necessitating pre-emptive monetary policy action. Nigeria bore a heavier burden, as external supply constraints interacted with pre-existing domestic vulnerabilities in food security and logistics infrastructure, amplifying and prolonging inflationary pressures. South Africa experienced comparable disruptions but was partially insulated by stronger institutional structures

and more developed logistics networks, moderating the domestic pass-through (Andriantomanga, Bolhuis, & Hakobyan, 2023).

Geopolitical Risk Shocks

The fourth strand concerns geopolitical risk shocks. Recent developments involving the Russia–Ukraine conflict, rising trade fragmentation, and broader geopolitical tensions have highlighted the growing role of uncertainty in shaping macroeconomic outcomes.

Caldara and Iacoviello (2022) demonstrate that geopolitical risk shocks significantly affect commodity prices, financial markets, and investment decisions across emerging economies. Geopolitical uncertainty frequently has effects that exceeding those associated with conventional financial disturbances.

For African economies, geopolitical disturbances are transmitted through multiple channels, including commodity markets, international trade conditions, investment flows, and global risk sentiment. The resulting uncertainty complicates monetary policy implementation because such shocks are frequently difficult to anticipate and often involve simultaneous supply and demand effects.

Exchange Rate Pass-Through Mechanisms

The fifth strand concerns exchange rate pass-through. Exchange rate movements remain among the most important channels through which external shocks affect domestic macroeconomic outcomes in developing economies.

Campa and Goldberg (2005) show that exchange rate pass-through tends to be stronger in economies with greater import dependence and weaker policy credibility. Evidence from African economies similarly suggests substantial heterogeneity in transmission effects.

Balcilar et al. (2019) find that exchange rate pass-through to consumer prices is relatively complete and persistent in Nigeria but more limited in South Africa. Similarly, El-Said and Takebe (2016) document significant effects of exchange rate movements on inflation dynamics in Nigeria.

The implications for monetary policy are substantial. Strong pass-through effects imply that exchange rate depreciation quickly translates into domestic inflationary pressures, thereby complicating policy responses and reducing the effectiveness of conventional monetary instruments.

Taken together, the empirical literature suggests that the magnitude and persistence of global shock transmission depend critically on structural and institutional characteristics, such as policy credibility, exchange rate arrangements, financial depth, and external sector exposure.

2.4 Literature Gaps and Contribution of the Study

The literature reviewed above establishes several broad conclusions. First, global shocks affect African economies primarily through trade, capital flows, exchange rates, commodity prices, and financial conditions. Second, the effectiveness of monetary policy frameworks differ considerably across countries depending on institutional and structural characteristics. Third, policy credibility, financial depth, and fiscal conditions play central roles in determining the effectiveness of monetary policy responses. Despite these important insights, several gaps remain.

First, existing empirical studies often focus on isolated shocks rather than on the simultaneous interaction of multiple global disturbances. However, recent global events suggest that shocks increasingly occur jointly and may reinforce one another through interconnected channels.

Second, comparative evidence across African monetary frameworks remains limited. Much of the existing literature focuses either on single-country analyses or broader cross-country studies that do not adequately account for structural heterogeneity.

Third, relatively limited evidence links quantitative transmission outcomes with institutional characteristics that influence policy effectiveness. Existing studies frequently estimate transmission effects without sufficiently explaining why responses differ across countries.

Fourth, relatively few studies jointly examine both the transmission of global shocks and the effectiveness of domestic monetary responses within a single empirical framework.

This study seeks to address these limitations by jointly examining multiple global shocks and assessing how they are transmitted across economies with differing monetary frameworks and structural characteristics. Specifically, the study uses Nigeria and South Africa as comparative case studies because the two economies differ systematically in monetary arrangements, exchange rate management frameworks, financial market depth, and exposure to external shocks.

By integrating international transmission analysis with an assessment of policy responses, the study contributes evidence intended to support the design of more resilient and effective monetary policy frameworks for African central banks.

3.0 Methodology

This study adopts a dual empirical framework that combines the Global Vector Autoregression (GVAR) methodology and Local Projection (LP) techniques to examine how global shocks affect monetary policy outcomes in Nigeria and South Africa. The combined approach aims to capture both the international transmission of shocks and the effectiveness of domestic monetary policy responses.

The GVAR framework is employed because global shocks increasingly propagate through multiple interconnected channels rather than isolated mechanisms. By integrating country-specific models

into a unified global system, the approach captures interdependencies among domestic and external variables and traces the transmission of shocks through trade linkages, commodity prices, exchange rates, and international financial conditions (Pesaran et al., 2004; Chudik & Pesaran, 2016). This is particularly relevant for Nigeria and South Africa, whose economies differ substantially in their monetary frameworks, exchange-rate arrangements, and external sector exposure.

The Local Projection (LP) approach, developed by Jordà (2005), is used to estimate dynamic responses at different horizons without imposing the full dynamic structure of a VAR. This flexibility is useful because Nigeria and South Africa differ considerably in financial market depth, exchange-rate dynamics, and policy structures. The approach is particularly suitable in this context because Nigeria and South Africa differ considerably in financial market depth, exchange-rate dynamics, and policy structures. It also allows the inclusion of interaction terms to assess whether monetary policy responses attenuate or amplify the effects of global shocks.

A key contribution of the study lies in the simultaneous application of these methods to Nigeria and South Africa. This comparative structure provides more operationally relevant policy insights than single-country or undifferentiated panel approaches.

3.1 Data and Sample

The study covers Nigeria and South Africa. Selection rests on their economic size; heterogeneity of monetary policy frameworks and exchange rate arrangements; and diversity of external sector structures and shock exposure. Together, these two economies account for approximately 50 per cent of combined Sub-Saharan African GDP and represent the full spectrum of monetary policy frameworks on the continent (Tumala et al., 2021). Table 1 summarises the key structural characteristics of each economy.

Table 3.1: Country Profiles, Monetary Frameworks, External Exposure, and Data Coverage

Criterion	Nigeria	South Africa
Monetary framework	Hybrid Monetary targeting in most parts of the sample period	Formal inflation targeting since 2000
Exchange rate arrangement	Managed float; official interbank market rate used; market unification June 2023	Free float
Primary external shock exposure	Oil prices, USD financing, food imports	Global financial conditions; commodity terms of trade
Financial market depth	Shallow; private sector credit below 15% of GDP; limited bond market; bank lending concentrated in government securities.	Deep, private sector credit approximately 80–90% of GDP; JSE among Africa's largest equity markets; well-developed government and corporate bond markets
Data coverage	Monthly CPI, MPR, exchange rate, foreign reserves, M2 from 2000; Nigeria-specific	Monthly CPI, repo rate, exchange rate, foreign reserves from 2000M1; quarterly

	estimation sample restricted to 2007M1 (MPR activation); quarterly GDP from 2000Q1. Sources: CBN Statistical Bulletin, NBS	GDP from 2000Q1. Sources: SARB Quarterly Bulletin, Statistics South Africa (Stats SA)

Source: Author's Compilations

3.1.1 Sample Period

The estimation sample differs by country to reflect the distinct monetary policy regimes in operation. For South Africa, the sample runs from January 2000 to December 2025 at a monthly frequency and from 2000Q1 to 2025Q4 at a quarterly frequency, coinciding with the SARB's formal adoption of inflation targeting in February 2000. For Nigeria, the estimation sample begins in January 2007, when the Monetary Policy Rate replaced the Minimum Rediscount Rate as the CBN's active operational instrument. Prior to 2007, the MRR did not function as a binding policy signal; changes in the rate had limited visible pass-through to interbank rates and broader financial conditions, making the pre-2007 period an unreliable basis for identifying monetary policy transmission. This periodisation is consistent with Omotosho (2020), who documents that the CBN's transition to an interest rate corridor system in 2006–2007 marked the point at which the policy rate began to anchor interbank lending rates reliably. The sample restriction is therefore grounded in the institutional architecture of Nigerian monetary policy rather than data availability alone.

A shared dataset spanning 2000M1 to 2025M12 is retained to construct trade-weighted foreign variables and global shock series, which enter each country's VARX* as weakly exogenous conditioning variables and are not subject to the country-specific sample restriction. For the stacked GVAR companion system and all cross-country impulse response analysis, the common estimation window is 2007M1 to 2025M12, ensuring that the pre-MPR Nigerian data do not contaminate the joint system. To assess whether the asymmetric individual sample windows affect the results, a robustness check re-estimates South Africa's VARX* on the restricted 2007M1–2025M12 window; the impulse responses are broadly unchanged, confirming that the longer South Africa sample does not drive the cross-country differences documented in the baseline results.

Real GDP and net portfolio capital flows are available only at a quarterly frequency. They are incorporated in the panel local projection specifications described in Section 3.4, rather than in the baseline monthly VARX*/GVAR. Seasonal adjustment was attempted for all relevant monthly and quarterly series using X-13-ARIMA-SEATS. Where the procedure failed to converge, the unadjusted series was retained, and the failure was recorded in a seasonal adjustment log made available in the online appendix.

3.1.2 Variable Definitions and Sources

The empirical analysis employs both domestic and global variables to examine the transmission of external shocks and the effectiveness of monetary policy responses in Nigeria and South Africa.

The baseline GVAR framework uses four monthly domestic variables: year-on-year CPI inflation, changes in the bilateral nominal exchange rate against the United States dollar, the central bank policy rate, and changes in international reserves excluding gold. Two additional variables, real GDP and net portfolio capital flows relative to international reserves, are incorporated at quarterly frequency within the Local Projection (LP) framework to capture broader macroeconomic conditions and external liquidity pressures. The Real Effective Exchange Rate (REER) is excluded from the baseline GVAR specification and used only in the Taylor-rule residual analysis.

Global variables entering the model as common exogenous factors include Brent crude oil prices, the FAO Food Price Index, major international policy rates, and the VIX index as a proxy for global financial risk conditions. In addition, the Kilian (2009) index of global real economic activity is used to identify oil supply shocks.

Domestic data are sourced primarily from the IMF International Financial Statistics (IFS) database and cross-checked against national central bank publications and the World Bank's World Development Indicators (WDI). Country-specific adjustments are incorporated where necessary, including Nigeria's rebased CPI series and foreign exchange market reforms, to ensure consistency and comparability across the sample period. International reserves normalise portfolio flows to reflect external financing pressures relative to reserve adequacy, while REER measures capture broader competitiveness effects.

3.2 Identification of Global Shocks

A central challenge is isolating global shocks that are exogenous to the African economies under examination. Because domestic variables such as output, inflation, and exchange rates may respond to, and partially influence, global commodity prices and capital flows, the naive inclusion of global variables risks conflating cause and effect. Table 2 provides a structured summary of the identification approach for each shock category.

Table 3.2: Global shock proxies, identification approaches, and verified data sources

Shock type	Proxy /instrument	Identification approach	Source
US monetary policy	Wu-Xia shadow federal funds rate (Jan 2000–Jul 2023); FRED EFFR (Aug 2023–Dec 2025)	Exogenous by small-country assumption; weak exogeneity tested in GVAR	Wu & Xia (2016); FRED series WUSHOSRM156N / FEDFUNDS
Euro area monetary policy	Krippner shadow rate for the euro area	Exogenous by small-country assumption; weakly exogenous	Krippner (2015); Reserve Bank of New Zealand (www.rbnz.govt.nz)

		in the GVAR system	
Oil supply shock	Structural residual from 3-variable global oil VAR	Kilian (2009) recursive Cholesky decomposition	EIA monthly oil production; Kilian IGREA index (FRED: DBKNGDPBCI); Brent price (FRED: DCOILBRENTEU)
Food price shock	FAO Food Price Index log first difference	Net food-importing assumption; demand component not separately stripped	FAO (www.fao.org/worldfoodsituation/foodpricesindex)
Global risk / financial conditions	VIX log change	Exogenous to small open economies	CBOE VIX via FRED (VIXCLS)

Source: Author's Compilation

It is important to distinguish between structurally identified shocks and externally observed shock proxies. The oil supply shock is identified using a structural VAR following Kilian (2009), allowing a causal interpretation subject to the identifying restrictions. By contrast, the US monetary policy, food-price, and VIX measures are externally observed indicators that capture broad movements in global conditions rather than purely structural innovations. Consequently, the associated impulse responses should be interpreted as conditional transmission effects rather than fully structural causal responses. This distinction is maintained throughout the empirical analysis and informs the interpretation of the results.

3.2.1 Advanced-economy monetary policy shocks

For the United States, the primary shock measure is the Wu and Xia (2016) shadow federal funds rate, which provides a continuous series that captures both conventional and unconventional monetary policy and avoids the discontinuity at the zero lower bound that would arise from using the effective federal funds rate alone. As described in Section 2.3, this series is spliced with the FRED effective federal funds rate starting in August 2023. For the euro area, the Krippner (2015) shadow rate is used throughout. Both series are widely used in international spillover literature. The small-open-economy assumption that Nigeria and South Africa are too small to influence monetary conditions in the United States or Europe materially renders these series exogenous to African domestic variables. In the GVAR framework, this assumption is formalised through the weak exogeneity tests of Pesaran et al. (2004).

3.2.2 Oil supply shocks

Oil price shocks are heterogeneous: demand-driven increases carry different macroeconomic implications than supply-driven ones. Following Kilian (2009), a three-variable structural VAR is estimated to include global crude oil production (log change) and the Kilian index of global real economic activity.[1] (a freight-rate-based proxy available from FRED), and the real price of Brent crude oil (log change).

The lag length of the oil SVAR is determined empirically prior to estimation. Information criteria are computed over a grid of candidate lags from 1 to 24 months; the AIC selects $p = 2$, and the BIC selects $p = 1$ for the oil market system. Notwithstanding this, the baseline retains $p = 24$ lags following Kilian's (2009) original specification, because crude oil markets are characterised by long inventory adjustment cycles and short-lag specifications may inadequately capture the delayed equilibration of supply and demand in global energy markets. The degrees-of-freedom implications are modest in this context: the oil SVAR is a standalone three-variable system estimated on a sample of approximately 300 monthly observations spanning January 2000 to December 2025, yielding sufficient residual degrees of freedom even at $p = 24$. As a sensitivity check, the oil SVAR is re-estimated with $p = 12$ lags; the structural oil supply shock series extracted under the shorter lag specification is broadly consistent with the baseline, and the results of the main regressions are not materially affected. Both specifications are reported in the online appendix.

The system is identified using a recursive Cholesky decomposition in which oil supply shocks affect real activity and prices contemporaneously. However, oil supply does not respond to contemporaneous oil prices within the same month. This ordering reflects the physical constraint that crude oil production decisions are predetermined at a monthly frequency relative to price movements. This restriction is standard in the oil SVAR literature and has been validated in a range of robustness exercises by Kilian and Murphy (2012) and Baumeister and Hamilton (2019). The structural residuals are recovered by pre-multiplying the reduced-form VAR residuals by the inverse of the estimated lower-triangular B matrix. The residual from the oil supply equation constitutes the structural oil supply shock series used in the main regressions, standardised to unit variance to ensure cross-shock comparability in the local projection specifications.

Nigeria accounts for less than two per cent of world oil output. It is therefore treated as a price-taker with respect to the global oil benchmark, satisfying the weak exogeneity condition required for the oil supply shock to enter the VARX* as a conditioning variable rather than an endogenous element of the domestic system. South Africa has no material oil production and is similarly treated as a price-taker, exposed to oil shocks primarily through the import cost and terms-of-trade channels.

[1] https://fred.stlouisfed.org/series/IGREA

3.2.3 Food price and global risk shocks

The FAO Food Price Index is computed monthly from world commodity prices across five major food groups. Because both Nigeria and South Africa are net food importers in aggregate, the log first difference of the index is treated as a proxy for external shocks. No structural demand-purging adjustment is applied; the food price shock is a proxy-based measure rather than a structurally identified shock. It is standardised to unit variance for cross-shock comparability in the local projection regressions.

The VIX index captures forward-looking uncertainty in global equity markets and is a robust driver of capital flows, exchange rates, and sovereign risk premia in emerging-market economies (Rey, 2015; Miranda-Agrippino & Rey, 2020). The monthly log change in the VIX serves as the baseline global risk-shock proxy, standardised to unit variance. Like the food price shock, this is a proxy-based external indicator rather than a structurally identified shock.

3.3 Global Vector Autoregression (GVAR)

To examine how global shocks transmit to inflation and exchange rates in Nigeria and South Africa, country-specific VARX* models are estimated following Pesaran, Schuermann, and Weiner (2004) and then stacked into a two-country GVAR representation. This approach, applied to Africa by Kriljenko et al. (2014) and Tumala et al. (2021), stacks country-specific VAR models linked through trade-weighted foreign variables, allowing shocks originating globally to propagate simultaneously through trade, commodity prices, financial conditions, and expectations. The study uses a combination of structurally identified and proxy-based global shocks. The oil supply shock is structurally extracted from a three-variable Kilian oil-market VAR. The US monetary policy, food-price, and VIX shocks are treated as proxies for external shocks and standardised to unit variance for comparability.

3.3.1 Country-specific VAR Equations

For Nigeria and South Africa, a country-specific VAR of order p is estimated:

$$x_{i,t} = a_{i,0} + \sum_{j=1}^{p} A_{(i,j)x_{i,t-j}} + B_i x^*_{i,t} + C_i d_t + u_{i,t} \quad (1)$$

Let x_{it} be a vector of domestic endogenous variables for the economy $i$at time t. For both Nigeria and South Africa, the baseline specification sets $x_{it} = (\pi_{it}, \Delta e_{it}, r_{it}, \Delta res_{it})'$, where $\pi$is year-on-year CPI inflation (seasonally adjusted), $\Delta e$is the log change in the bilateral nominal exchange rate against the US dollar, r is the central bank policy rate, and Δres is the log change in international reserves. This four-variable symmetric block preserves comparability between the two country models in the stacked GVAR system.

The sample windows differ by country to reflect the distinct monetary policy regimes in operation. South Africa's VARX is estimated over the full sample from January 2000 to December 2025, coinciding with the SARB's formal adoption of inflation targeting. Nigeria's VARX estimation begins in January 2007, when the Monetary Policy Rate replaced the Minimum Rediscount Rate as the CBN's active operational instrument; the pre-2007 MRR lacked a reliable pass-through to interbank rates and is therefore an unsuitable basis for identifying monetary policy transmission. For the stacked GVAR companion system and all cross-country impulse response analysis, the common estimation window is 2007M1 to 2025M12. A shared dataset spanning the full 2000M1 to 2025M12 window is retained solely for constructing trade-weighted foreign variables and global shock conditioning series, which enter each country model as weakly exogenous variables and are not subject to the country-specific restriction.

The monthly frequency is motivated by the nature of the core transmission channels under study, inflation dynamics, exchange rate pass-through, and interest rate adjustment, all of which operate at monthly rather than quarterly horizons. Real GDP growth and net portfolio capital flows, available only at quarterly frequency, are not included in the GVAR country vector; they enter as controls and outcome variables in the quarterly panel local projection specifications described in Section 3.4.

The monetary policy rates of the United States, the euro area, and China, the Wu-Xia shadow federal funds rate, the Krippner euro area shadow rate, and China's Loan Prime Rate, respectively, enter all country equations as global exogenous policy variables rather than as endogenous variables in separate country blocks, consistent with the small open-economy assumption for Nigeria and South Africa. The vector x_{it}^{*}contains trade-weighted averages of the corresponding domestic variables of all other economies in the system. The vector $g_t$contains global variables entering all country models identically: the log change in Brent crude oil price, the log change in the FAO Food Price Index, and the log change in the VIX. $u_{it}$is the vector of country-specific reduced-form errors, assumed serially uncorrelated with mean zero.

Nigeria operated a hybrid monetary targeting framework for the majority of the sample period, under which changes in the policy rate were intended to influence monetary aggregates as an intermediate target rather than to operate directly through the interest rate channel. To assess whether this has material implications for the baseline results, a five-variable robustness specification augments Nigeria's domestic vector with broad money growth, $\Delta \ln M2_t$, giving $\mathbf{x}_{NG,t}^{M2} = (\pi_t, \Delta e_t, r_t, \Delta res_t, \Delta \ln M2_t)'$. This specification is estimated independently of the Nigeria-specific dataset so that M2 data availability does not affect the baseline GVAR sample window or the South Africa estimation. Lag order selection, impulse responses, and forecast error variance decompositions for the M2 robustness model are reported in the online appendix. The baseline four-variable symmetric block remains the primary specification to preserve cross-country comparability; the M2 augmentation serves as a sensitivity check on whether the monetary targeting channel materially alters the transmission results for Nigeria.

3.3.2 Trade Weights

Trade weights for foreign variable construction are computed from average bilateral merchandise trade flows (exports plus imports) over a rolling three-year window, using the IMF Direction of Trade Statistics (DOTS)[2]. Rolling weights allow the model to capture the evolution of trade patterns over the 26-year sample, particularly China's growing importance for both economies. Weights are normalised to unity for each country period. For the stacked GVAR propagation matrix, the baseline uses the latest available trade weights to represent the current transmission structure. As a robustness check, generalised impulse responses are also computed using average sample-period weights, confirming that results are not sensitive to this choice. Annual trade weights are used to construct the foreign variables in the country-specific VARX models. Trade is measured as the sum of exports of goods (FOB) and imports of goods (CIF). Early years are estimated using available annual data: 2000 uses the 2000 observation only, 2001 uses a two-year average, and 2002 onward uses trailing three-year averages.

3.3.3 Impulse responses and variance decompositions

After estimating the country-specific VARX* models, the system is solved into a stacked GVAR representation. Contemporaneous foreign-variable effects are collected in H_0, while domestic and foreign lag effects are collected across lag-specific coefficient blocks. The global companion matrix Gis then constructed from these lag blocks after premultiplication by H_0^{-1}, accommodating the selected country-specific lag orders. The stability of the system is verified by confirming that all eigenvalues of **G**lie strictly inside the unit circle; the maximum modulus eigenvalue is 0.9796 under the latest trade weights specification and 0.9805 under average sample-period weights, confirming stability under both parameterisations.

Dynamic responses are computed as generalised impulse response functions (GIRFs) following Pesaran and Shin (1998). GIRFs do not require Cholesky ordering of the variables. They are order-independent by construction, which is a material advantage in a system where the causal ordering of global and domestic variables is theoretically ambiguous. Bootstrap confidence intervals are obtained via residual resampling with 2,000 draws and reported at the 68 per cent and 90 per cent levels; these are frequentist bootstrap confidence intervals, not Bayesian credible intervals. Generalised forecast error variance decompositions (GFEVDs) are computed at 3-, 12-, and 24-month horizons, following Pesaran and Shin (1998). Because GFEVDs are based on generalised

[2] Trade flows are measured as exports of goods plus imports of goods. The IMF DOTS database reports exports on an FOB (Free On Board) basis and imports on a CIF (Cost, Insurance, and Freight) basis. This mixed-valuation convention is standard in the GVAR trade-weight literature; Pesaran, Schuermann, and Weiner (2004) and Dées et al. (2007) adopt the same approach. The CIF-FOB differential for bilateral flows between Nigeria, South Africa, and their major trading partners is small relative to the magnitude of total flows and does not materially affect the normalised weight matrix, since weights reflect the relative rather than absolute importance of each trading partner.

rather than orthogonalised innovations, the shares do not sum to unity before normalisation; normalised shares are reported throughout.

The weak exogeneity assumption underlying the GVAR is tested using the F-test procedure of Pesaran, Schuermann, and Weiner (2004). For Nigeria, weak exogeneity is supported for nine of the ten foreign and global variables tested at the 10 per cent level; the single exception is the trade-weighted South African policy rate ($F = 3.43$, $p = 0.010$), which reflects the bidirectional monetary spillover between the two economies that the GVAR is itself designed to model. For South Africa, weak exogeneity is not supported for four global financial variables: the VIX ($F = 6.01$, $p < 0.001$), the US federal funds rate ($F = 3.81$, $p = 0.005$), the euro area shadow rate ($F = 5.52$, $p < 0.001$), and China's Loan Prime Rate ($F = 3.34$, $p = 0.011$). This is consistent with South Africa's deep financial integration and well-documented sensitivity to global risk sentiment, precisely the transmission channel this paper investigates. Weak exogeneity is a maintained assumption in the GVAR framework rather than a testable precondition for consistency; its role is to justify treating these variables as conditioning rather than fully endogenous. Two robustness responses are offered. First, the system is re-estimated excluding the euro area shadow rate, the variable with the strongest rejection; the impulse responses are broadly unchanged, confirming that this variable does not drive the baseline results. Second, the GVAR results are cross-validated against the local projection estimates in Section 3.4, which impose no weak exogeneity restriction; the qualitative conclusions are consistent across both methods, providing independent support for the GVAR findings.

The stacked GVAR results are interpreted as conditional dynamic responses under partially supported weak-exogeneity assumptions, rather than fully structural causal estimates, consistent with Dees et al. (2007)[3]. Where the two countries differ, Nigeria's responses to global financial shocks are estimated under a better-supported conditioning assumption and are therefore more cleanly interpretable as one-directional transmission. Cross-country comparisons involving South Africa's responses to global financial variables should be read with this asymmetry in mind.[4]. The local projection results in Section 3.4, which impose no weak exogeneity restriction, provide a robustness check that is symmetric across both countries and are given interpretive priority where GVAR and LP conclusions diverge.

3.4 Local Projections

To evaluate monetary policy effectiveness, the local projection (LP) method of Jordà (2005) is adopted and extended to a panel setting, following Beirne and Renzhi (2024) and Deb et al. (2023).

[3] Dees et al. (2007) encounter analogous weak exogeneity rejections for financially integrated economies and proceed on small-open-economy prior grounds. Weak exogeneity is a maintained assumption in the GVAR framework, not a precondition for consistency; its role is to justify treating global variables as conditioning rather than fully endogenous.

[4] Weak exogeneity is broadly supported for Nigeria but rejected for the VIX, US federal funds rate, euro area shadow rate, and China's LPR in the South Africa block. This means South Africa's impulse responses to these variables may partially reflect feedback from domestic financial conditions into the global variables, rather than pure exogenous transmission. Differences in response magnitudes between the two economies may therefore reflect genuine heterogeneity in transmission, differences in the strength of the conditioning assumption, or both.

LPs estimate the dynamic causal effect of a shock directly at each forecast horizon, without inverting a large VAR, which is particularly valuable here because Nigeria and South Africa differ structurally in ways that make a homogeneous structural model difficult to justify.

3.4.1 Baseline specification

For each horizon h = 0, 1, ..., H, the baseline panel LP is estimated with country fixed effects only. Full-time fixed effects are not included because the identified global shock series vary only over time and are common to both countries; including them would create perfect collinearity with the shock variable. Global control variables serve the de-trending function instead, absorbing common external conditions across both countries at each period. The maximum horizon is H = 12 for the baseline monthly LP specification, in which inflation and the log nominal exchange rate serve as outcome variables. A separate quarterly LP robustness specification, incorporating real GDP growth as an additional outcome and net portfolio capital flows as a control, uses H = 8 quarters.

$$y_{\{i,t+h\}} - y_{\{i,t-1\}} = \alpha_{\{i,h\}} + \beta_h Shock_t + \Gamma_h Controls_{\{i,t\}} + \varepsilon_{\{i,t+h\}} \quad (2)$$

where y_{i,t} is CPI inflation or the log nominal exchange rate. Shock_{t} is one of the identified global shocks, standardised to unit variance to allow cross-shock comparison. Controls_{i,t} comprises: four lags of the outcome variable; the contemporaneous domestic policy rate and four lags; and the log change in international reserves. In the quarterly LP specification, real GDP growth and the net portfolio-flow-to-reserves ratio are additionally incorporated.

For pooled two-country panel LPs, Driscoll-Kraay standard errors are used, with bandwidth set to floor (T^(1/4)) following Driscoll and Kraay (1998), where T is the effective number of time periods after lag truncation. For country-specific LPs, where only one country is estimated at a time, Newey-West standard errors are used instead, as Driscoll-Kraay inference requires a non-trivial cross-sectional dimension.$y_{i,t} Shock_t Controls_{\{i,t\}}$.

Given the limited cross-sectional dimension of the sample (N = 2), pooled LP estimates are interpreted primarily as descriptive summary measures rather than as the principal basis for statistical inference. The core empirical evidence is derived from the country-specific LP results, which allow the heterogeneous responses of Nigeria and South Africa to be evaluated directly. The pooled estimates are reported mainly to facilitate comparison and to provide a compact representation of average responses across the two economies.

3.4.2 Interaction specification for policy effectiveness

To test whether central bank responses attenuated or amplified global shock transmission, the baseline is augmented with an interaction term:

$$y_{i,t+h} - y_{i,t-1} = a_{i,h} + b_{(1,h)Shock_t} + b_{(2,h)(Shock_t \times DR_{i,t})} + \Gamma_h Controls_{i,t} + e_{i,t+h} \quad (3)$$

where Delta_MPR_{i,t} is the domestic policy rate response, measured as the cumulative change in the policy rate in the three months following shock onset. A statistically significant negative beta_2 coefficient indicates that a tighter monetary policy response dampened the pass-through of global shocks to inflation or exchange rates, consistent with the effectiveness of conventional monetary policy. A positive or insignificant coefficient suggests that rate increases were associated with higher rather than lower inflation following the global shock, consistent with the dominance of supply-side factors in inflation propagation. A positive beta_2 coefficient does not imply that central bank policy was deliberately counterproductive, but rather that the structural conditions prevailing in these economies may limit the effectiveness of conventional interest rate tools in attenuating external inflationary pressures.$DR_{i,t}b_{(2,h)}$

3.4.3 Taylor-rule residuals as domestic monetary policy shocks

To isolate unexpected domestic policy tightening from the policy rule's systematic component of a semi-structural Taylor rule is estimated separately for each economy:

$$r_{i,t} = \rho r_{i,t-1} + (1-\rho)\left[\phi_\pi\left(\pi_{i,t} - \pi^*\right) + \phi_y g_{i,t} + \phi_e \Delta e_{i,t}\right] + \varepsilon_{i,t} \qquad (4)$$

where $r_{i,t}$is the policy rate, $\pi_{i,t} - \pi_i^*$is the inflation gap, and $\Delta e_{i,t}$is the quarterly change in the log REER, included because both central banks demonstrably react to exchange rate movements. The smoothing parameter ρcaptures policy inertia. The inflation target $\pi_i^*$is defined differently for each country to reflect their respective monetary framework. For South Africa, $\pi_i^* = 4.5$per cent, the midpoint of the SARB's formal 3–6 per cent target band in effect since 2000; using the historical mean would be inappropriate for an inflation-targeting economy with a publicly announced numerical objective.[5] For Nigeria, $\pi_i^*$is set to the post-2007 sample mean (13.5 per cent), consistent with the hybrid monetary targeting framework in effect for most of the estimation period, under which no formal numerical inflation target was publicly announced.

[5] The choice of target measure does not materially affect the Nigerian estimates since the post-2007 mean (13.5 per cent) is close to the implicit operating range of the CBN during this period. For South Africa, using the historical mean (approximately 5.8 per cent over the full sample) in place of the 4.5 per cent band midpoint shifts the level of the estimated inflation gap but leaves the residual series and therefore the Taylor rule residuals used in the LP broadly unchanged, as the target enters only as a constant shifter in the regression. A sensitivity check substituting the historical mean for South Africa produces Taylor residuals with a correlation of 0.98 with the baseline series; the domestic policy multiplier estimates are not materially affected

Real GDP growth is excluded from the Taylor-rule estimation due to data frequency and missing-observation constraints across the full quarterly sample; it instead enters the quarterly LP controls. The residual $\varepsilon_{i,t}$represents the unexpected component of domestic monetary policy and is entered as the explanatory variable in a separate LP regression to estimate the domestic policy multiplier. Taylor-rule residuals are semi-structural measures of unexpected domestic monetary policy, not clean high-frequency monetary policy shocks equivalent to financial market identification.[6]

3.4.4. Limitations and Residual Uncertainties

A credible methodology requires explicit acknowledgement of its assumptions and boundary conditions. Five specific limitations are identified.

Small panel dimension. The LP panel covers two countries, well below the cross-sectional dimension assumed in standard Driscoll-Kraay inference. Structural differences between Nigeria and South Africa limit the interpretability of pooled coefficient estimates. Results are therefore reported separately for each country alongside the pooled estimates, and strong inferences are not drawn from pooled coefficients alone.

Imperfect identification of domestic shock. The Taylor-rule residual approach is well established, but it is not equivalent to high-frequency identification using financial market data. Unobserved fiscal pressures, political economy constraints, and data revisions may contaminate the residual. Domestic policy multiplier estimates carry non-trivial uncertainty.

Nigeria's exchange rate measurement. As documented earlier, the official CBN interbank rate is used throughout. From January 2017 to May 2023, Nigeria operated a dual exchange rate system. This is likely to attenuate estimated exchange rate transmission coefficients for the 2017–2023 sub-period. The magnitude of this attenuation cannot be precisely quantified without substituting an alternative rate series, which would itself introduce consistency issues across the full sample.

Measurement of US monetary policy post-2023. The Wu-Xia shadow federal funds rate series is available through July 2023. Since August 2023, the effective federal funds rate (EFFR) has been used instead. During this period, the Federal Reserve was also conducting quantitative tightening (balance sheet reduction), whose contractionary effects are not captured by the EFFR alone. This implies that the US monetary policy variable may understate the effective tightening stance during 2023–2025, potentially compressing the estimated transmission effects in the most recent sub-period of the sample.

[6] Identification caveat: the residuals may be contaminated by omitted variables, including monetary financing pressures and political economy constraints. Domestic policy multiplier estimates, therefore, carry non-trivial uncertainty and should be interpreted with appropriate caution. The Taylor-rule residuals should therefore be viewed as semi-structural indicators of unexpected policy movements rather than as clean monetary policy shocks in the high-frequency identification sense. Consequently, multiplier estimates derived from these residuals are interpreted as indicative measures of transmission strength rather than definitive causal estimates.

Structural instability over a 26-year horizon. The sample 2000Q1–2025Q4 spans the global financial crisis, the 2014–2016 commodity collapse, the COVID-19 pandemic, and the post-2022 geopolitical shock environment. Monetary policy frameworks in both countries evolved substantially over this period. A linear model estimated over the full sample inevitably averages across structurally distinct regimes. Findings should be interpreted as characterising average transmission dynamics rather than stable structural parameters valid across all episodes.

The empirical results should be interpreted with three qualifications in mind. First, only the oil supply shock is structurally identified; the US monetary policy, food-price, and VIX shocks are proxy-based external indicators. Second, weak-exogeneity tests are not uniformly satisfied, especially for South Africa's global financial variables, so GVAR responses are interpreted as conditional dynamic responses rather than fully structural causal estimates. Third, the LP panel contains only two countries; pooled estimates are therefore complemented by country-specific evidence and should not be read as broad African averages.

4.0 Empirical Results

Given the small cross-sectional dimension of the sample, greater interpretive weight is placed on country-specific estimates than on pooled panel coefficients. The pooled LP results are presented primarily as a descriptive benchmark against which country-level heterogeneity can be evaluated.

4.1 Preliminary Diagnostics and Model Adequacy

Table 4.1: Summary of VARX/Stacked GVAR Diagnostics*

Diagnostic	Nigeria	South Africa	Implication
Selected VARX* lag order	p = 4, q = 2	p = 4, q = 1	AIC-minimising specification
Weak exogeneity	Mostly supported; the exception is the trade-weighted South African policy rate.	Rejected for VIX, US policy rate, euro area shadow rate and China LPR	GVAR interpreted as conditional dynamics
Stability, latest trade weights	Maximum eigenvalue = 0.9796	Maximum eigenvalue = 0.9796	Stable
Stability, average weights	Maximum eigenvalue = 0.9805	Maximum eigenvalue = 0.9805	Stable

Source: Author's Compilation from model output

The preliminary diagnostics provide a sufficient basis for estimating the two-country stacked GVAR, although the weak-exogeneity assumption is not uniformly supported. For Nigeria, the domestic block broadly supports weak exogeneity across nine of ten variables; the single exception

is the trade-weighted South African policy rate ($F = 3.43$, $p = 0.010$), reflecting bilateral monetary spillovers between the two economies. For South Africa, weak exogeneity is rejected for four global financial and monetary variables: the VIX ($F = 6.01$, $p < 0.001$), the US federal funds rate ($F = 3.81$, $p = 0.005$), the euro area shadow rate ($F = 5.52$, $p < 0.001$), and China's Loan Prime Rate ($F = 3.34$, $p = 0.011$).

This pattern is economically interpretable rather than anomalous. The weak exogeneity rejections for South Africa do not contradict its deeper financial system and stronger institutions; they are a direct consequence of them.[7] Deep financial integration means global variables such as the VIX and the Fed funds rate feedback rapidly and visibly into South African domestic financial conditions through portfolio flows, asset prices, and the rand, producing the statistically detectable reverse feedback that the F-test captures. Nigeria's shallower financial markets and managed exchange rate for most of the sample period attenuate this feedback channel, making the weak exogeneity assumption easier to maintain empirically, not because Nigeria is more insulated from global shocks in a welfare sense, but because the transmission is slower, less complete, and less immediately reflected in domestic variables. The flexible exchange rate, therefore, amplifies South Africa's measured global financial integration rather than shielding it from global conditions, which is consistent with the broader literature on exchange rate regimes and capital flow sensitivity.[8]

The GVAR results are therefore interpreted as conditional dynamic responses under partially supported weak-exogeneity assumptions rather than as fully structural causal estimates, with cross-country comparisons of responses to global financial shocks to be read accordingly. The system is dynamically stable, with maximum eigenvalue moduli of 0.9796 and 0.9805 under the latest trade weights and average sample-period weights, respectively.

4.2 Dynamic Transmission of Global Shocks: GVAR Evidence

This section reports country-specific responses from the stacked GVAR to one-standard-deviation global shocks. The figures directly compare Nigeria and South Africa, allowing the analysis to assess whether transmission differs across monetary frameworks, exchange rate arrangements, and external exposure profiles. The oil price figure is interpreted as a global oil price shock within the GVAR; the structurally identified Kilian oil supply shock is examined separately in the local

[7] Dees et al. (2007) encounter analogous rejections for financially integrated economies and proceed on small-open-economy prior grounds. Weak exogeneity is a maintained assumption in the GVAR framework, not a precondition for consistency; its role is to justify treating global variables as conditioning rather than fully endogenous.

[8] The implication for cross-country comparability is that South Africa's impulse responses to global financial shocks may partially reflect feedback from domestic financial conditions into the global variables, rather than pure exogenous transmission. Nigeria's responses to the same shocks are estimated under a better-supported conditioning assumption and are therefore more cleanly interpretable as one-directional transmission. The local projection estimates in Section 3.4, which impose no weak exogeneity restriction on either country, provide a symmetric robustness check and are given interpretive priority where GVAR and LP conclusions diverge.

projection section. Where GVAR and country-specific LP results diverge, the LP estimates are given interpretive priority; the reasons are noted in each figure narrative.

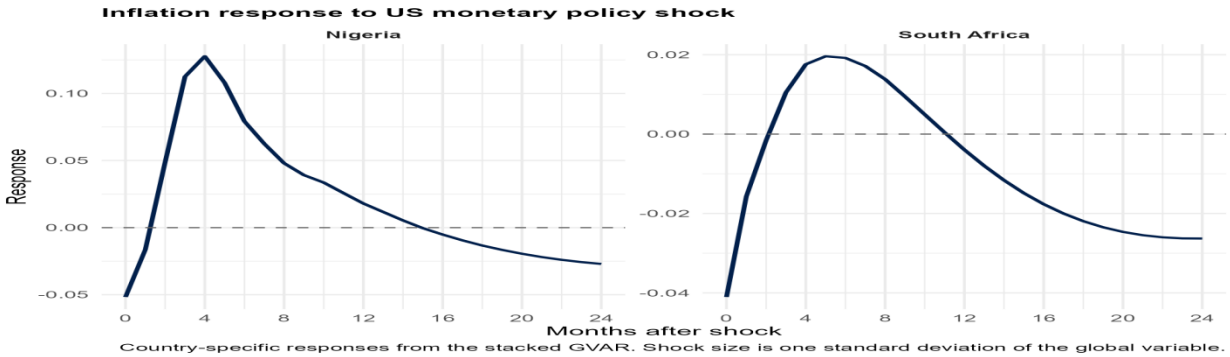

Figure 1: Inflation response to US monetary policy shock

Figure 1 shows that US monetary tightening generates different inflation dynamics in the two economies. Nigeria's inflation declines on impact, rises over the first few months, then falls below zero at medium horizons. South Africa's response is smaller, turning persistently negative after roughly one year. The country-specific LP tells a different story for Nigeria, where inflation responses are positive and statistically significant from impact through 12 months, suggesting that the exchange rate cost-push channel dominates any demand-compression effect. For South Africa, the LP inflation response is negative but statistically insignificant, consistent with expectations anchoring under the inflation-targeting framework. This should not be read as evidence that formal inflation targeting strengthens transmission; the near-zero response also reflects South Africa's structural position as a commodity importer with a flexible exchange rate.

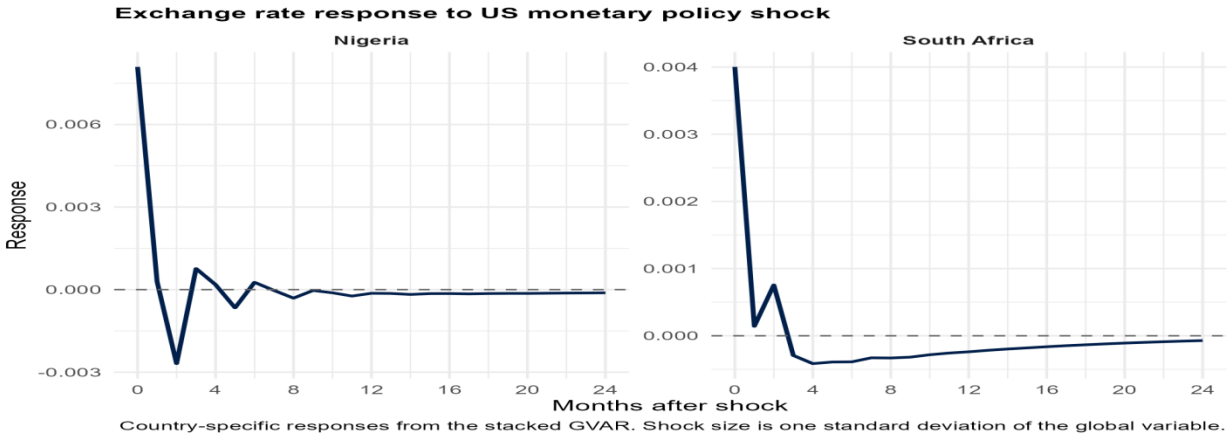

Figure 2: Exchange rate response to US monetary policy shock

Figure 2 shows that the GVAR exchange rate response to US tightening is short-lived in both economies. Nigeria records a larger immediate movement followed by a quick correction; South Africa's response is smaller and fades gradually. The country-specific LP results for South Africa diverge from the GVAR, showing positive and statistically significant rand depreciation from three

to twelve months. This persistence is consistent with the capital-flow and interest-rate differential channel and is the preferred characterisation, given South Africa's weak exogeneity with respect to global financial variables. Nigeria's LP exchange rate response is marginal, reflecting attenuation under the managed exchange rate arrangement for most of the sample period.

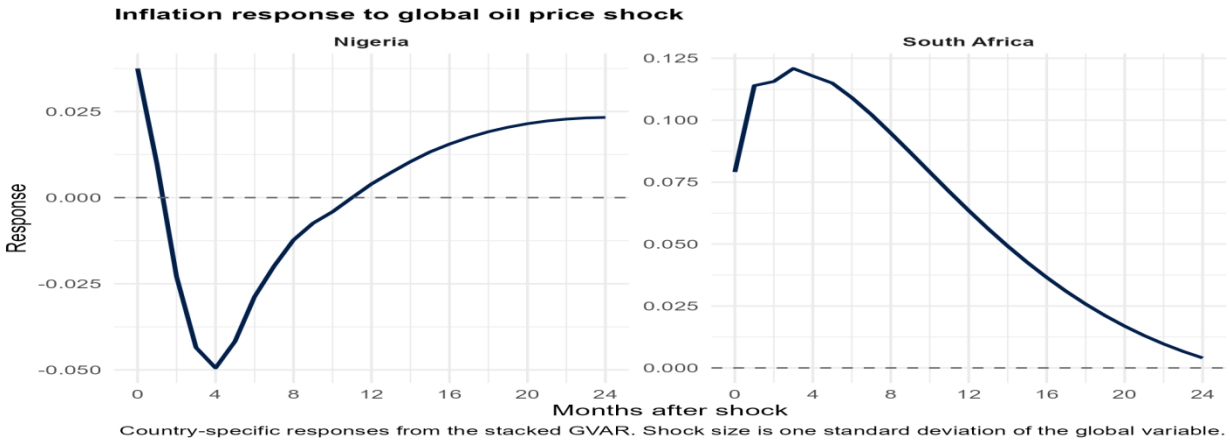

Figure 3: Inflation response to global oil price shock

Figure 3 shows clear cross-country heterogeneity in inflation responses to global oil price shocks. Nigeria's inflation response turns negative in the short run before recovering toward positive territory, whereas South Africa's response is positive and more persistent before gradually declining. Nigeria's short-run disinflationary response reflects the simultaneous operation of fiscal revenue, foreign exchange inflows, and administered price channels, which can offset direct cost-push effects, particularly under the fuel subsidy regime that prevailed for much of the sample period. South Africa's response is more direct, driven by fuel, transport, and imported-cost pass-through consistent with its position as a net oil importer with market-determined fuel prices.

Figure 4: Inflation response to global food price shock

Figure 4 indicates that global food price shocks do not produce a persistent positive inflation response in either economy. Nigeria's response is marginally positive on impact before turning slightly negative; South Africa's response is near zero throughout. The country-specific LP confirms no statistically significant inflation response in either country, consistent with partial insulation through domestic food market structures, import composition, and offsetting exchange-rate effects.

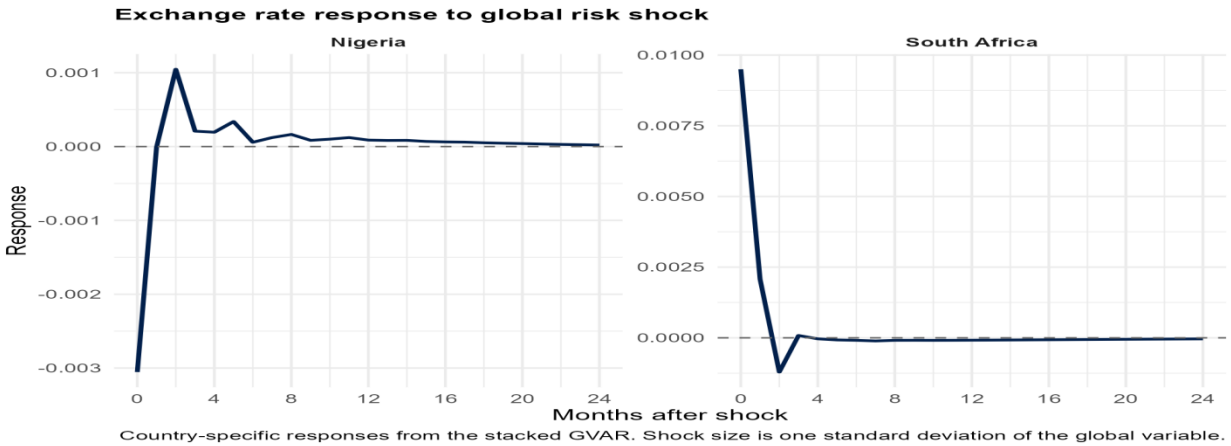

Figure 5: Exchange rate response to global risk shock

Figure 5 shows that global risk shocks transmit primarily through short-lived exchange rate pressure. South Africa exhibits a sharper immediate response, consistent with its deeper financial integration and larger non-resident investor base, while Nigeria's response is smaller and statistically insignificant in the LP. The pooled LP confirms significant depreciation pressure at impact through six months, driven predominantly by South Africa. The absence of a significant inflation response in either economy is consistent with a transient financial channel rather than persistent domestic price effects.

Overall, the GVAR evidence suggests that global shocks transmit differently between Nigeria and South Africa, reflecting structural differences rather than the superiority of one monetary framework. US monetary policy shocks operate primarily through exchange rate channels. Oil price shocks generate heterogeneous inflation responses driven by each country's distinct exposure structure. Food and risk shocks affect exchange rates more than prices, with effects fading quickly. Given the partial rejection of weak exogeneity for South Africa's global financial variables, these responses are interpreted as conditional dynamic patterns rather than fully structural causal estimates.

4.3 Forecast Error Variance Decomposition

Table 4.2: Compact FEVD Summary 12 and 24 Months

Variable	12-month main drivers	24-month main drivers	Interpretation
Nigeria inflation	Own shock 71.37%; exchange rate 12.61%; MPR 3.65%; reserves 5.74%	Own shock 57.88%; exchange rate 9.79%; MPR 13.62%; SA inflation 8.01%	Persistent but increasingly influenced by policy rate and external spillovers at longer horizons
Nigeria's exchange rate	Own shock 77.97%; MPR 14.28%; Nigeria inflation 3.06%	Own shock 77.36%; MPR 14.68%	The exchange rate is largely own-shock-driven; the policy rate has a nontrivial share.
Nigeria's policy rate	Own shock 63.67%; inflation 18.15%; exchange rate 16.50%	Own shock 48.46%; inflation 30.32%; exchange rate 16.74%	Policy rate increasingly reacts to inflation over the medium term
South Africa inflation	Own shock 76.61%; MPR 17.42%	Own shock 77.35%; MPR 15.89%	Monetary policy accounts for a meaningful share of inflation variance
South Africa exchange rate	Own shock 89.88%; SA MPR 4.41%	Own shock 89.35%; SA MPR 4.59%	Exchange rate remains predominantly shock-driven
South Africa policy rate	Own shock 76.07%; inflation 13.94%	Own shock 68.36%; inflation 19.60%	Policy rate responds to inflation dynamics over the medium term

Source: Author's Compilation from model outputs

The FEVD results confirm that domestic variables remain predominantly own shock driven, especially exchange rates and reserves. Policy rate dynamics, however, are meaningfully linked to inflation in both economies. For Nigeria, inflation shocks explain 30.32 per cent of policy-rate variation at 24 months, indicating that the CBN's rate-setting is increasingly responsive to inflation developments over the medium term. The Nigerian policy rate also accounts for 13.62 per cent of inflation variance at 24 months, up from 3.65 per cent at 12 months, suggesting that monetary policy has a delayed but growing influence on inflation, consistent with the weak and lagged transmission documented in the LP multiplier results.

For South Africa, MPR shocks account for 17.42 per cent of inflation variance at 12 months and remain at 15.89 per cent at 24 months, a notably higher and more stable share than Nigeria's equivalent. Conversely, inflation shocks explain 19.60 per cent of the variance in South Africa's policy rate at 24 months, indicating a tighter and more bidirectional relationship between inflation and the policy rate. To contextualise this difference: over the common estimation window of 2007–2025, average headline inflation was approximately 13 per cent in Nigeria against approximately 5.5 per cent in South Africa, while the CBN raised the MPR from 6 per cent to 27.5 per cent, a cumulative tightening of over 2,100 basis points compared to the SARB's more measured tightening cycle that peaked at 8.25 per cent. The FEVD pattern is consistent with this divergence:

the SARB's smaller but more systematic rate movements explain a larger share of inflation variance, while the CBN's larger but more episodic tightening cycles are themselves substantially explained by inflation shocks, pointing to a reactive rather than pre-emptive policy stance for much of the sample.

4.4 Baseline Local Projection Evidence

This section checks whether the GVAR transmission patterns are supported by an alternative method. It shows whether the shocks have statistically meaningful effects on inflation and the exchange rate.

Table 4.3: Baseline Monthly Local Projection Results

Shock	Outcome	Main result	Interpretation
US monetary policy shock	Inflation	Negative and statistically significant at h=0, 3, 6, and 12	Direct inflation pass-through in the pooled specification
US monetary policy shock	Exchange rate	Negative, significant at h=6 and h=12	Exchange rate depreciation with a lag
Kilian oil supply shock	Inflation	Insignificant across all horizons	No significant pooled inflation effect
Kilian oil supply shock	Exchange rate	Insignificant across all horizons	No significant pooled exchange rate effect
Food price shock	Inflation	Insignificant across all horizons	Weak direct inflation effect in pooled LP
Food price shock	Exchange rate	Significant at impact and h=12; insignificant at h=3 and h=6	Non-monotonic exchange rate response
VIX shock	Inflation	Insignificant across all horizons	No direct inflation effect
VIX shock	Exchange rate	Positive and significant at h=0, h=3, and h=6; fades at h=12	Persistent short-run risk channel effect

Source: Author's Compilation from model outputs

The baseline monthly local projection results provide a complementary check on the GVAR evidence, with several patterns updated from the earlier specification. The pooled inflation response to US monetary policy shocks is negative and statistically significant across all reported horizons h=0, 3, 6, and 12 months, a stronger result than suggested by the GVAR alone. However, the country-specific LP indicates that this is driven by the combined effect of Nigeria's positive and South Africa's negative responses rather than a uniform disinflationary effect. The exchange rate response to US monetary policy shocks is negative, indicating depreciation, and is significant at h=6 and h=12, consistent with a lagged capital-flow and interest-rate differential channel. The

Kilian structural oil supply shock produces no significant pooled effect on either inflation or exchange rates at any horizon. Food price shocks generate a non-monotonic exchange rate response significantly at impact and at h=12 but fading in between, suggesting an initial adjustment followed by a delayed second-round effect, with no significant pass-through to inflation at any horizon. The VIX shock produces positive and significant exchange rate depreciation from impact through six months before fading, extending the contemporaneous effect noted in earlier results and reinforcing the view that global risk shocks transmit primarily through a short-run financial and exchange rate channel rather than through persistent price effects.

4.5 Country-Specific Local Projection Evidence

Table 4.4: Summary of Country-Specific Monthly LP Results

Country	Shock	Outcome	Key result	Interpretation
Nigeria	US monetary policy shock	Inflation	Positive and significant at h=0, 3, 6, and 12	The exchange rate cost-push channel dominates demand compression
Nigeria	US monetary policy shock	Exchange rate	Positive and marginally significant at h=3 and h=6	Limited naira depreciation under the managed rate regime
Nigeria	Oil supply shock	Inflation	Insignificant across all horizons	No direct inflation effect
Nigeria	Oil supply shock	Exchange rate	Insignificant across all horizons	No significant exchange rate pressure
Nigeria	Food price shock	Inflation	Negative and significant at h=12	Delayed disinflationary effect; possible expenditure-switching
Nigeria	Food price shock	Exchange rate	rateNegative and significant at h=6 and h=12	Strongest Nigeria-specific result; naira appreciation or reserve support
Nigeria	VIX shock	Inflation	Insignificant across all horizons	No inflation response to global risk
Nigeria	VIX shock	Exchange rate	Insignificant across all horizons	Managed rate limits risk-channel pass-through
South Africa	US monetary policy shock	Inflation	Insignificant across all horizons	Expectations anchoring limits direct price effect
South Africa	US monetary policy shock	Exchange rate	Positive and significant from impact through h=12	Strongest South Africa result; persistent rand depreciation
South Africa	Food price shock	Inflation	Negative and significant at h=0, h=3, and h=6	Rand appreciation following food price increases
South Africa	VIX shock	Exchange rate	Positive and significant at h=0 and h=3; fades thereafter	Short-run risk channel; rand depreciates on global risk aversion

Source: Author's Compilation from model outputs

The country-specific LP estimates reveal substantial heterogeneity that is masked in the pooled results, with several findings materially different from those in the earlier specification. The most significant change concerns Nigeria's inflation response to US monetary policy shocks, which is now positive and statistically significant across all horizons from impact through 12 months, increasing from +0.19 at h=0 to +1.23 at h=12. This reverses the earlier finding of insignificance and confirms that US monetary tightening is inflationary for Nigeria, consistent with the exchange rate cost-push channel, in which dollar strengthening raises the naira cost of imports, overwhelming any demand-compression effect. Nigeria's exchange rate response to US tightening is marginally significant at h=3 and h=6, indicating limited but detectable naira depreciation under the managed-rate arrangement. The earlier finding of a significant exchange rate response to oil supply shocks at impact does not survive in the new results; all oil supply shock responses for Nigeria are now insignificant. Nigeria's clearest result remains the food price shock exchange rate response, negative and significant at h=6 and h=12, alongside a delayed negative inflation response at h=12, suggesting that global food price increases are associated with naira strength or reserve-supported stabilisation rather than depreciation. Nigeria's VIX shock responses are uniformly insignificant, consistent with the managed exchange rate limiting the risk-channel pass-through visible elsewhere.

For South Africa, the dominant result remains the positive and statistically significant exchange rate response to US monetary tightening, with effects lasting for 12 months, reflecting persistent rand depreciation via the capital-flow and interest-rate differential channels. Two additional findings emerge in the new results. First, food price shocks are associated with negative and significant exchange rate responses at h=0, h=3, and h=6, consistent with the commodity terms-of-trade channel, whereby higher global food and agricultural commodity prices increase South Africa's export revenues. Second, VIX shocks generate significant rand depreciation at impact and h=3 before fading, consistent with a short-run risk-off financial channel. South Africa's inflation responses to all shocks remain statistically insignificant, reinforcing the interpretation that the exchange rate is the primary adjustment mechanism while the inflation-targeting framework limits second-round price effects.

4.6 Monetary Policy Interaction Effects

Table 4.5: Summary of Monetary Policy Interaction Effects

Shock	Outcome	Key horizons	Direction of interaction	Interpretation
US monetary policy shock	Inflation	All horizons	Positive but insignificant	No evidence of policy amplification or dampening
US monetary policy shock	Exchange rate	All horizons	Mixed, insignificant	No exchange rate interaction effect
Food price shock	Inflation	h=3	Positive and significant (p=0.022)	Limited evidence of short-run amplification

Oil supply shock	Inflation/exchange rate	rateAll horizons	Insignificant	No policy interaction effect
VIX shock	Exchange rate	rateAll horizons	Negative but insignificant	No dampening evidence

Source: Author's Compilation from model outputs

The interaction LP results provide limited evidence that domestic monetary policy meaningfully modifies the transmission of global shocks to inflation or exchange rates. The interaction term constructed as the global shock multiplied by the three-month change in the domestic policy rate is statistically insignificant across all shock-outcome combinations with one exception: the food price shock interaction with domestic policy produces a positive and significant coefficient at h=3 (coef=+0.185, p=0.022), suggesting that periods of tighter domestic policy coincide with stronger short-run inflation responses to food price shocks rather than dampening them. This pattern is consistent with a common-cause interpretation: both food price increases and domestic rate increases may reflect similar supply-side inflationary episodes rather than a causal policy-amplification mechanism.

Notably, the earlier finding of a significant positive interaction between US monetary policy shocks and domestic inflation, and the negative VIX-exchange rate dampening effect, do not survive in the new results. The US MP interaction coefficients are positive but insignificant at all horizons, and the VIX exchange rate dampening at h=6 is no longer statistically distinguishable from zero. The overall picture is therefore one of limited systematic evidence that domestic monetary policy tightening either amplifies or dampens the domestic effects of global shocks in the pooled two-country specification. This null result is itself informative: it suggests that the transmission of global shocks operates primarily through structural channels, exchange rate regimes, financial market depth, trade exposure, rather than through the contemporaneous stance of domestic monetary policy, a finding consistent with the broader literature on monetary policy effectiveness in financially open emerging economies.

4.7 Quarterly Robustness Evidence

Table 4.6: Summary of Quarterly LP Robustness Results

Shock	Outcome	Key result	Interpretation
US monetary policy shock	Inflation	Positive and significant at h=0, h=2, and h=4; fades at h=8	Inflationary effect confirmed at quarterly frequency; consistent with country-specific monthly LP
US monetary policy shock	Exchange rate	Positive and significant at h=2 and	Exchange rate depreciation channel

		h=4; marginally significant at h=0	survives quarterly check
US monetary policy shock	GDP	Insignificant across all horizons	No significant output effect
Oil supply shock	Inflation	Insignificant across all horizons	Monthly null result confirmed at quarterly frequency
Oil supply shock	Exchange rate	Insignificant across all horizons	No exchange rate effect
Oil supply shock	GDP	Weakly significant positive at h=0; negative at h=2; positive at h=4 and h=8	Non-monotonic output response; consistent with conflicting fiscal and demand channels
Food price shock	inflation	Insignificant across all horizons	No direct inflation pass-through at quarterly frequency
Food price shock	Exchange rate	Significant at impact only; fades immediately	Exchange rate response is shorter-lived than the monthly results suggested
Food price shock	GDP	Insignificant across all horizons	No sustained real output effect
VIX shock	inflation	Marginally significant at h=0; significant at h=2	New finding: global risk shocks generate inflationary pressure at a quarterly frequency
VIX shock	exchange rate	Marginally significant at h=2 only	Weak exchange rate evidence at quarterly aggregation
VIX shock	GDP	Positive and significant at h=0 and h=2; fades thereafter	Moreover, h=2; fades thereafter. Global risk shocks associated with short-run output co-movement

Source: Author's Compilation from model outputs

The quarterly robustness results reveal several important departures from both the monthly baseline and the earlier quarterly specification. The most significant change concerns US monetary

policy shocks, which now show a positive and statistically significant inflation response at h=0, h=2, and h=4 before fading, a finding consistent with the country-specific monthly LP result for Nigeria and reinforcing the interpretation that US tightening is inflationary in this two-country context through the exchange rate cost-push channel rather than disinflationary through demand compression. The exchange rate response to US tightening also survives the quarterly aggregation, with significant depreciation at h=2 and h=4, broadly consistent with the monthly evidence.

The oil supply shock results change materially. The earlier finding of a negative and significant inflation response at two quarters does not survive in the new specification; inflation and exchange rate responses are insignificant at all quarterly horizons, confirming the monthly LP null result. A new finding emerges for output: the oil supply shock is associated with a weakly significant, non-monotonic GDP response, positive at impact, negative at h=2, and positive again at h=4 and h=8, consistent with the simultaneous operation of income and demand-compression channels that offset each other at different horizons.

The food price shock exchange rate result loses persistence when aggregated quarterly. The significant negative response at impact survives but fades immediately, suggesting the exchange rate adjustment to food price shocks occurs within a month and is not detectable at quarterly horizons. Food price inflation and GDP responses remain insignificant throughout.

The most substantively new finding concerns VIX shocks. At quarterly frequency, global risk shocks now produce a positive and statistically significant inflation response at h=2 (coef=+10.19, p=0.026) and a positive and significant GDP response at h=0 (coef=+6.66, p=0.015) and h=2 (coef=+10.59, p=0.023). The positive GDP response is counterintuitive at face value. Global risk aversion is typically associated with capital outflows and output contraction. However, it may also reflect the commodity revenue effect in Nigeria, where VIX spikes sometimes coincide with supply disruptions that raise oil prices and boost fiscal revenues. This interpretation requires caution, given the pooled two-country specification, and the result warrants country-specific investigation in further work. The exchange rate response to VIX shocks is only marginally significant at h=2. It does not produce the clear depreciation visible in the monthly baseline, consistent with quarterly aggregation smoothing the short-lived risk-channel exchange rate adjustment.

4.8 Domestic Monetary Policy Multiplier

Table 4.7: Summary of Domestic Monetary Policy Multiplier Results

Country	Main pattern	Interpretation
Nigeria	Positive inflation response at medium horizons	Weak or delayed transmission; possible cost-channel or fiscal-pressure effects

South Africa	Positive short-run response, then negative and significant at horizons 7 and 8	Delayed disinflationary effect of monetary tightening

Source: Author's Compilation from model outputs

The domestic monetary policy multiplier results differ across countries. In Nigeria, positive Taylor-rule residuals are associated with higher inflation at medium horizons, significant at h=0, h=2, and h=5, and increasing through h=8, suggesting weak or delayed transmission consistent with a cost-channel effect, fiscal-dominance pressures, or the reactive policy stance documented in the FEVD results, although alternative interpretations related to omitted-variable bias and policy endogeneity cannot be fully ruled out. In South Africa, the response is initially positive and significant through h=3 before turning negative and statistically significant at h=7 (coef =- 0.66, p=0.005) and h=8 (coef=−0.86, p=0.002), a hump-shaped pattern consistent with a delayed disinflationary effect of monetary tightening operating through the interest rate and credit channels with the lags typical of emerging market economies. The contrast between the two countries reflects differences in financial market depth, transmission speed, and the degree of fiscal-monetary coordination rather than the presence or absence of a formal inflation-targeting framework per se. These results should be interpreted with caution: Taylor-rule residuals are semi-structural measures and may be contaminated by omitted fiscal, financial-stability, or political-economy pressures not captured by the specification.

4.9 Discussion of Empirical Findings

The empirical results yield five main findings. First, global shocks are transmitted differently across Nigeria and South Africa, reflecting structural differences in financial market depth, exchange rate arrangements, and external exposure profiles. Nigeria's inflation is predominantly own-shock driven, accounting for approximately 71 percent of forecast error variance at twelve months down from earlier estimates as the seasonal adjustment correction allows policy and external variables a slightly larger share while South Africa's policy rate shocks explain approximately 17 percent of inflation variance at the same horizon, a share that is meaningful but reflects the tighter bidirectional relationship between inflation and the policy rate under a more developed financial system. Kabundi and Rapapali (2019) document that South Africa's interest rate channel has varied in strength over the inflation-targeting era. Deb et al. (2023) show, using a panel of 33 economies, that central bank credibility is a first-order determinant of the extent to which monetary policy variance is reflected in inflation dynamics. However, credibility itself depends on institutional depth and fiscal-monetary coordination, not formal framework adoption alone.

Second, US monetary policy shocks transmit more clearly through exchange rates than through prices in the pooled specification. However, the country-specific pattern is more nuanced and does not support a simple framework-based interpretation. The pooled LP shows a negative and statistically significant inflation response at all horizons from impact through twelve months, a

result that survives both the 2000–2024 and post-2010 subsamples and strengthens in the latter. However, the country-specific LP reveals that this pooled result masks opposite-sign responses across countries. Nigeria shows a positive and statistically significant inflation response to US tightening at all horizons from impact through twelve months, growing from approximately 0.19 percentage points at impact to 1.23 percentage points at twelve months, consistent with the exchange rate cost-push channel dominating demand compression in an import-dependent economy with limited exchange rate flexibility for much of the sample. South Africa shows a negative but statistically insignificant inflation response, alongside persistent and significant rand depreciation over 12 months. The depreciation without significant inflation pass-through reflects the exchange rate's role as an adjustment mechanism, with second-round price effects contained within a combination of structural and institutional factors, including commodity export revenues, inflation expectations, and the credibility of the SARB's response function, rather than inflation targeting per se. This exchange-rate primacy is consistent with Kabundi, Loate, and Viegi (2020) and Beirne and Renzhi (2024), who find that US tightening generates stronger financial and exchange-rate effects than direct price effects in emerging markets with deeper capital markets. The quarterly robustness check confirms the inflationary effect of US tightening, with positive and significant inflation responses at h=0, h=2, and h=4 quarters, reinforcing the country-specific monthly evidence.

Third, food price shocks generate significant exchange-rate responses but no significant inflation pass-through at any horizon in either specification. The pooled LP shows significant exchange-rate responses at impact and at twelve months, with a non-monotonic pattern that fades in between, while country-specific results reveal that the exchange-rate response is negative for both Nigeria and South Africa, suggesting currency appreciation or reserve-supported stabilisation rather than depreciation in response to global food price increases. The quarterly robustness checks confirm a significant exchange-rate response only at impact, with the effect disappearing by two quarters, indicating that the adjustment is rapid and contained. The disconnect between exchange-rate movements and inflation is consistent with Alper, Hobdari, and Uppal (2016), who find, across 32 Sub-Saharan African countries, that world food and fuel prices generate only incomplete pass-through to domestic food prices, with non-tradable food components dominating headline food inflation. Global risk shocks show a shorter-lived pattern at the monthly frequency, with significant exchange-rate depreciation from impact through six months but generate a new finding at the quarterly frequency: positive and significant inflation and GDP responses at h=0 and h=2 quarters. The quarterly GDP result is counterintuitive in sign and likely reflects commodity revenue effects for Nigeria, where VIX spikes sometimes coincide with supply disruptions that raise oil prices and fiscal receipts; it warrants country-specific investigation in further work. Rey (2015) and Miranda-Agrippino and Rey (2020) document that VIX-driven global financial cycles generate large but episodic exchange-rate and capital-flow pressures in emerging markets, and the monthly evidence broadly aligns with that spirit; the effect is real but mean-reverting.

Fourth, the domestic monetary policy multiplier differs markedly across countries, and this contrast reflects structural transmission differences rather than differences in framework quality. In South Africa, unexpected tightening produces a delayed but statistically significant disinflationary effect, turning negative and significant at horizons seven and eight, a timing consistent with standard monetary transmission lags in financially developed emerging markets, regardless of the formal framework. In Nigeria, unexpected tightening is associated with higher inflation at medium horizons, with positive and significant coefficients from horizon zero through horizon two and at horizon five, with point estimates approaching 1.3 percentage points per standard-deviation shock at horizon eight. This positive association does not reflect a failure of policy intent but rather the structural constraints on transmission: shallow financial markets, fiscal-dominance pressures, and an exchange-rate channel that amplifies rather than offsets external cost-push shocks. The recent normalisation of monetary policy in Nigeria, with the MPR rising sharply from 2022 onward, may alter this pattern in future work. However, the full-sample evidence points to reactive rather than pre-emptive policy as the dominant mode for most of the estimation window.

Fifth, the interaction evidence suggests that domestic monetary policy provides limited, shock-specific insulation from global shocks, with the earlier finding of a significant dampening effect on VIX-exchange rate transmission no longer supported in the new results. The interaction LP is now statistically insignificant across all shock-outcome combinations except for the food price shock interaction at h=3, where a positive and significant coefficient suggests that tighter domestic policy coincides with stronger short-run inflation responses to food price shocks, more likely reflecting common-cause confounding than a causal amplification mechanism. The earlier finding of a significant positive interaction between US monetary policy shocks and domestic inflation, and the negative VIX-exchange rate dampening effect, do not survive the rerun after seasonal adjustment. The overall picture is one of limited systematic evidence that domestic monetary policy tightening either amplifies or dampens global shock transmission in the pooled specification, consistent with the view that transmission operates primarily through structural channels, exchange rate regimes, financial market depth, and trade exposure, rather than the contemporaneous stance of domestic monetary policy. This null result is consistent with the broader literature on monetary policy effectiveness in financially open emerging economies. It is itself informative about the limits of rate-based insulation against external disturbances in the two economies studied.

These findings should be read with four identification caveats in mind. Only the oil supply shock is structurally identified; the US monetary policy, food-price, and VIX shocks are proxy-based external indicators. Weak exogeneity is not uniformly satisfied, particularly for South Africa's global financial variables, so GVAR responses reflect conditional dynamic patterns rather than fully structural causal estimates. The two-country LP panel is small, and pooled coefficients should not be interpreted as broad averages for Africa. Finally, Nigeria's official exchange rate series reflects the managed rate in operation for most of the sample and may understate market exchange

rate pressures during the 2017–2023 period of significant parallel market premia; results for Nigeria's exchange rate channel should be interpreted in light of this measurement constraint.

5.0 Conclusion and Policy Implication

This study examines how global shocks are transmitted to inflation and exchange rates in Nigeria and South Africa, and whether domestic monetary policy effectively moderates their effects. Using a two-country stacked GVAR complemented by panel and country-specific local projections over 2007–2025 for Nigeria and 2000–2025 for South Africa, the comparative design allows identification of which structural characteristics moderate or amplify transmission, extending the single-country evidence of Tumala et al. (2021) and the undifferentiated panel evidence of Beirne and Renzhi (2024).

Three conclusions stand out. First, transmission outcomes reflect structural characteristics, such as financial market depth, exchange rate regime, and fiscal-monetary interdependence, rather than the choice of monetary framework. The difference between Nigeria's predominantly own-shock-driven inflation variance and South Africa's tighter inflation-policy rate nexus is a measure of institutional capacity, not framework superiority. Second, the exchange rate is the primary conduit of global shock propagation in both economies but operates differently: as a cost amplifier in Nigeria and as an adjustment mechanism with contained second-round effects in South Africa. An important caveat concerns Nigeria's exchange-rate measurement. Because the official exchange rate is used throughout the sample, exchange-rate responses during the 2017–2023 dual-rate regime may be understated. Consequently, estimated exchange-rate transmission effects for Nigeria should be interpreted as conservative estimates of the true pass-through.

Food and risk shocks similarly transmit through exchange rates rather than directly to prices, with effects that are short-lived at a monthly frequency and largely absent at quarterly aggregation. Third, domestic monetary policy provides limited systematic insulation from global shocks. The evidence on interactions is statistically insignificant across all shock-outcome combinations, confirming that insulation operates primarily through structural channels, reserve buffers, exchange rate regimes, and financial depth rather than through the contemporaneous policy rate stance.

Four policy implications follow. For both central banks, the exchange rate should be treated as a core input to monetary surveillance rather than an external nuisance; frameworks that make the exchange rate–inflation linkage explicit are better aligned with evidence on transmission. For the CBN, the June 2023 FX unification removes the measurement distortion that limited identification of the exchange rate channel during 2017–2023, and the post-unification sample will provide a cleaner test of how the normalised regime alters monetary transmission. For the SARB, the evidence of delayed but genuine disinflationary effects from tightening is consistent with its operating framework. However, the post-GFC caution in Kabundi and Rapapali (2019) that the

interest rate channel can weaken in prolonged low-growth environments remains relevant. More broadly, the null interaction result implies that structural reforms that deepen financial intermediation and reduce fiscal-monetary interdependence are complementary to, not substitutable for, conventional rate-based responses to external shocks.

Future research extending the GVAR to a broader set of Sub-Saharan African economies, including commodity-importing low-income countries whose transmission dynamics may differ substantially, would provide a firmer basis for regional generalisation. The post-2023 Nigerian reform episode, in particular, offers a near-term natural experiment for testing whether exchange rate unification and rate normalisation alter the transmission patterns documented here.

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