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TRIAD OF FRAGILITY: FOOD PRICE VOLATILITY, INFLATION, AND MONETARY POLICY TRANSMISSION IN SELECTED FRAGILE AND POST-CRISIS ECONOMIES IN SUB-SAHARAN AFRICA

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Abstract
The paper examines the triad of fragility in fragile and post-crisis economies in sub-Saharan Africa (SSA) from 2000 to 2022. We developed a theoretical model to assess the feedback loop of food price pass-through to inflation and policy transmission in fragile and conflict-affected states (FCS) and post-crisis recovery economies in the region with stable economies as reference. The theoretical models were estimated using the system generalised method of moments (GMM). The results showed that fragile economies exhibit systematically lower monetary policy transmission efficiency, averaging 0.31 compared with stable economies (0.48), higher and more persistent food price pass-through to headline inflation, and a complete shutdown of monetary policy transmission across all estimation horizons. The triadic feedback loop operates with greatest intensity in fragile settings. Post-crisis economies exhibit improving yet fragile transmission trajectories, with transmission efficiency recovering at an average rate of 0.024 units per year in the five years following crisis resolution. Conventional monetary tightening is contraindicated in both FCS and post-crisis environments; supply-side stabilisation and financial sector reconstruction are the feasible first-line responses.

Keywords: Fragile states; post-conflict recovery; monetary policy; food prices; SSA
JEL Classification: D74 E31 E52 E58 O55 Q11

1. Introduction

Sub-Saharan Africa (SSA) occupies a paradoxical position in the global economic landscape: a region of immense demographic potential and resource endowment, yet one persistently beset by structural vulnerabilities that render conventional macroeconomic stabilisation tools insufficient and, at times, ineffective. At the nexus of these vulnerabilities lies an interlocking triad of fragility (food price volatility, wide-spread inflation, and systemic breakdown of monetary policy transmission) whose interactions could produce economic distress that neither standard inflation-targeting frameworks nor conventional fiscal responses can adequately address.

The problem of food price volatility in SSA is neither transitory nor exogenous in the conventional sense. While global commodity shocks, from the 2007–2008 food crisis to the supply disruptions triggered by the COVID-19 pandemic and the 2022 Russia-Ukraine conflict, have repeatedly exposed the region's dependence on imported staples and energy inputs, the deeper drivers are structural: rain-fed and subsistence-dominated agricultural systems, thin and fragmented domestic food markets, weak rural infrastructure, and limited storage and processing capacity. These structural conditions amplify the pass-through of international price shocks into domestic food prices, often with disproportionate consequences for low-income households, for whom food expenditures constitute between 50 and 70 percent of total consumption (FAO, 2023; World Bank, 2022). The resulting welfare losses and social instability are not incidental side effects; they are the defining economic reality for a large share of SSA's population.

Food price volatility in this context does not remain confined to sector-level disturbances. It feeds directly into headline inflation dynamics, complicating the task of monetary authorities whose mandate is primarily to ensure price stability. The inflation experienced across much of SSA is often a mix supply-side, driven by food and energy prices, and demand-side, mainly, monetary expansion. These combined sources tend to dent the effectiveness of conventional monetary policy.

The classical channels through which monetary policy is expected to influence aggregate demand and price levels (the interest rate channel, the credit channel, the exchange rate channel, and the asset price channel) operate under significant structural constraints in the region. Shallow financial systems, high levels of financial exclusion, dollarisation, currency fragmentation within monetary unions, and the dominance of informal economic activity could conspire to limit the interest sensitivity of aggregate demand in these economies. This phenomenon is what we term monetary policy transmission: a condition in which the policy rate and allied instruments lose traction on the macroeconomic variables they are intended to steer.

The three elements of this triad (food price volatility, inflation dynamics, and transmission) are not merely correlated phenomena that happen to co-occur in SSA. They are mutually reinforcing in ways that create self-sustaining cycles of macroeconomic fragility. Inflationary pressure linked to food price shocks arising from supply constraints tend to be less responsive to conventional monetary medicines but often require unorthodox interventions. This weak response of inflation could lead to unanchored expectations, which in turn, could amplify the pass-through of future supply shocks into prices. Understanding and disrupting this feedback loop, is among the most pressing challenges in the macroeconomic governance of the region.

Despite the significance of these dynamics, the literature has tended to address each element of the triad in relative isolation. Studies of food price transmission have focused on market integration and price co-movement without systematically linking these findings to the efficacy of monetary policy (Baquedano & Liefert, 2014; Minot, 2014). Research on inflation in SSA has examined the determinants and persistence of price levels but has often treated monetary transmission as a background assumption rather than an object of inquiry (Fielding & Shields, 2005; Baldini & Poplawski-Ribeiro, 2011). The monetary transmission literature, while increasingly attentive to developing economy contexts, has not fully grappled with how food price dominance in the consumption basket reshapes both the inflationary environment and the channels through which policy operates (Mishra & Montiel, 2013; Davoodi et al., 2013). This paper attempts to bridge these gaps by treating the triad as a unified analytical object with a focus on fragile and post-crisis economies in SSA.

This focus on FPCs is particularly warranted as structural vulnerabilities tend to intensify the interaction among food prices, inflation, and monetary transmission. In these settings, food often constitutes a disproportionately large share of household expenditure, while agricultural supply chains remain highly exposed to climate shocks, conflict, import dependence, currency volatility, and weak transport and storage infrastructure. At the same time, post-crisis institutional fragility, shallow financial markets, and weak transmission channels can reduce the effectiveness of conventional monetary policy and amplify the pass-through of food price shocks into broader inflation dynamics. Thus, the inflation process in these economies are likely not only to be more food-sensitive, but also difficult to stabilise through standard policy tools alone. Studying this triad in fragile and post-crisis SSA contexts, therefore, offers both analytical and policy value, as it helps explain why inflation management in these economies may differ systematically from other climes.

The study contributes to the existing literature in several ways. First, we segment SSA into three groups, viz: fragile and crisis states (FCS), post-crisis economies (PCE) and stable economies (SE), and examined the heterogeneous behaviour of global food price volatility pass-through to inflation in each of the three segments. Second, the study identifies the structural determinants of transmission efficiency and extends the analysis by incorporating conflict- and fragility-related variables, providing a more context-sensitive explanation of why transmission efficiency varies across SSA economies.

Third, the study tests the direct transmission-depressing effect of conflict and its indirect operation through the financial development channel, uncovering the mechanisms by which fragility undermines the effectiveness of monetary policy. The study, thus, adds a deeper causal interpretation to the literature on monetary transmission in fragile economies.

Fourth, the study examines the recovery trajectory of transmission efficiency in post-crisis economies. This is an important contribution because the existing literature largely treats fragility as a static condition, with limited attention to whether and how monetary transmission strengthens after crisis episodes. By focusing on post-crisis dynamics, the study generates new evidence on the persistence, pace, and possible reversibility of transmission impairment, thereby offering insight into the medium-term institutional and policy consequences of conflict. The analysis also considers the role of the International Monetary Fund-supported intervention programmes in shaping this recovery process. This focus is motivated by the IMF Strategy for Fragile and Conflict-Affected States, which emphasises that fragility and conflict are macro-critical and therefore require longer-term, better-tailored, and more flexible engagement, and by the subsequent Staff Guidance Note on the Implementation of the IMF Strategy for Fragile and Conflict-Affected States, which operationalises this approach through country engagement strategies, flexible lending instruments, and support calibrated to active-conflict, post-conflict, and high-risk fragile settings (International Monetary Fund [IMF], 2022, 2023). In this context, the study treats IMF engagement not merely as a source of external financing, but as a potential mechanism through which macroeconomic stabilisation, institutional rebuilding, and financial-sector reforms may help restore the conditions under which monetary policy transmission can gradually recover in post-crisis economies in SSA.

Finally, for robustness, the study evaluates the inflation response to food price shocks and monetary tightening using a local projections model. This contributes to knowledge by validating the core findings within an alternative modelling framework and directly tracing the dynamic responses of inflation to shocks. The use of local projections strengthens confidence in the evidence on food-price pass-through and monetary transmission, while also showing that the main conclusions are not an artefact of a single empirical specification.

The remainder of this paper proceeds as follows. Section 2 reviews the theoretical and empirical literature on food price volatility, inflation dynamics, and monetary policy transmission in developing economies, with particular attention to SSA. Section 3 presents the analytical framework and empirical methodology, detailing both the theoretical model that formalises the interactions among the three elements of the triad and the data and estimation strategy used to test these interactions. Section 4 reports and interprets the results. Section 5 concludes by synthesising the policy implications.

2. Literature Review

The economics of food price volatility in developing economies has attracted substantial scholarly attention, particularly in the aftermath of the 2007–2008 global food crisis, which exposed the acute vulnerability of import-dependent low-income countries to international commodity price swings. Early contributions framed food price instability primarily as a global supply-demand phenomenon, attributable to speculative activity in commodity futures markets, biofuel mandates diverting grain from food use, and the financialisation of agricultural commodities (Abbott et al., 2008; Gilbert, 2010; Headey & Fan, 2008). While these global drivers remain relevant, subsequent research has increasingly foregrounded the structural domestic conditions that determine how international price signals are transmitted and amplified in local food markets.

In SSA, the transmission of world food prices to domestic retail prices is mediated by a constellation of structural features that distinguish the region from other developing country contexts. Minot (2014) conducted one of the most comprehensive assessments of price transmission in the region, examining 62 food commodity markets across 12 SSA countries and finding that, contrary to the prevailing assumption of high pass-through, most domestic food prices exhibited limited co-movement with international benchmarks. This finding, however, does not imply insulation from volatility; rather, it reflects the dominance of idiosyncratic domestic supply shocks (rainfall variability, locust infestations, harvest failures, and post-harvest losses) as the primary drivers of local price instability. Baquedano and Liefert (2014) likewise documented heterogeneous transmission elasticities across SSA markets, attributing the variation to differences in trade openness, infrastructure quality, and the degree of market integration between rural producers and urban consumers.

The role of infrastructure deficits in perpetuating food price volatility warrants particular emphasis. Poor road networks, inadequate storage facilities, and limited cold-chain capacity impose substantial transaction costs on moving food from surplus to deficit areas, effectively segmenting markets and preventing the spatial arbitrage that would otherwise smooth price differentials (Aker, 2010; Minten & Kyle, 1999). In fragile and conflict-affected SSA states, these frictions are compounded by insecurity and the collapse of trade logistics, creating conditions in which localized food shortages coexist with surplus production in geographically proximate areas. The World Food Programme (2023) estimates that approximately 40 percent of post-harvest food losses in SSA occur due to inadequate storage and transportation infrastructure, losses that directly translate into supply-side price volatility.

Climate variability is an additional structural amplifier. The overwhelming dependence of SSA agriculture on rainfall, with irrigated land accounting for less than 6 percent of cultivated area across the region (FAO, 2022), renders food production, and hence food prices, acutely sensitive to precipitation shocks. Barnett et al. (2008) and subsequent studies have documented strong co-movement between rainfall anomalies and food price spikes across the Sahel, East Africa, and Southern Africa, with El Niño–Southern Oscillation (ENSO) events serving as a recurrent trigger for multi-country food price crises. Climate change is projected to intensify this vulnerability, with models suggesting that yield variability for staple crops in SSA could increase by 15–25 percent by mid-century under moderate warming scenarios (Schlenker & Lobell, 2010; Lobell et al., 2011).

The welfare consequences of food price volatility in SSA are deeply regressive. Given that food expenditures account for 50–70 percent of household budgets among the poorest quintiles (World Bank, 2022), price spikes impose proportionally larger real income losses on the poor than on middle- or upper-income households. Ivanic and Martin (2008) estimated that the 2007–2008 food price crisis pushed an additional 105 million people into poverty globally, with SSA accounting for a disproportionate share. Beyond the immediate income effect, food price volatility depresses investment in agricultural productivity by increasing production risk for smallholder farmers, creating a dynamic trap in which volatility perpetuates low-productivity agriculture making the region structurally susceptible to further price instability (Dercon, 2004; Barnett & Mahul, 2007).

The study of inflation in SSA has evolved considerably from early monetarist accounts that attributed persistent price instability primarily to fiscal dominance and money-financed budget deficits (Beaugrand et al., 2002; Fischer et al., 2002). While the fiscal channel remains relevant in a subset of SSA economies, particularly those with limited access to domestic and international capital markets, the post-2005 landscape is characterised by food and energy price shocks emerging as the dominant proximate driver of inflation dynamics across the region (Baldini & Poplawski-Ribeiro, 2011; Kabundi et al., 2022).

The structure of consumer price indices (CPIs) in SSA reflects this reality. Food items typically account for 40–60 percent of CPI baskets across the region, compared with 10–20 percent in advanced economies (IMF, 2022). This compositional asymmetry implies that even moderate food price shocks generate substantial movements in headline inflation, and that core inflation measures, which exclude food and energy, may provide a systematically misleading picture of inflationary pressures relevant to the welfare of the median household. Caceres et al. (2011) demonstrated that food inflation in SSA is not merely volatile in the short run but also exhibits significant persistence, with price level shocks dissipating slowly due to backward-looking expectations formation and the absence of credible forward guidance among central banks.

The inflation persistence literature has identified several mechanisms that sustain elevated price levels in SSA beyond the initial shock period. Indexation of wages and input costs to lagged inflation, even in economies without formal wage-indexation mechanisms, has been documented as a source of second-round effects that transform transitory food price shocks into more entrenched inflationary episodes (Durevall & Sjö, 2012; Durevall et al., 2013). Exchange rate depreciation, which is a frequently concomitant with food price crises given its implications for current account balances and reserve adequacy, adds a further inflationary impulse through the import price channel, which is particularly acute in highly import-dependent SSA economies (Razafimahefa, 2012; Catão & Chang, 2015).

Regional heterogeneity in inflation dynamics is substantial and warrants recognition. Members of the CFA franc zone, anchored to the euro through the French Treasury guarantee, have historically experienced lower and more stable inflation than non-CFA SSA economies, benefiting from an external nominal anchor that disciplines monetary expansion and limits exchange rate pass-through (Fielding & Shields, 2005; Tone, 2011). However, this monetary stability has come at the cost of reduced exchange rate flexibility, leaving CFA member states more exposed to asymmetric terms-of-trade shocks for which devaluation would otherwise serve as an adjustment mechanism (Devarajan & de Melo, 1987; Ebeke & Fouejieu, 2018). In contrast, inflation in non-CFA economies such as Zimbabwe, Ethiopia, Sudan, and Ghana has at various points reflected the interaction of food price shocks, currency crises, and fiscalmonetisation, a configuration that complicates the attribution of inflationary episodes to any single causal driver.

The interaction between food price volatility and inflation expectations is a particularly underexplored dimension of SSA inflation dynamics. In low-income economies characterised by weak institutional credibility and limited monetary policy communication, households and firms may form inflation expectations primarily on the basis of observed food price movements rather than central bank signals (Gelos & Ustyugova, 2017). If food prices serve as the primary cognitive anchor for inflation expectations, then food price shocks can rapidly become self-fulfilling inflationary episodes, as wage demands and pricing decisions are revised upward in anticipation of sustained price increases. This expectations channel represents a critical link between the first and second elements of the triad and has direct implications for the design of monetary policy communication strategies in the region.

The theoretical architecture of monetary policy transmission, the set of mechanisms through which central bank decisions propagate to aggregate demand, output, and ultimately prices, was developed primarily in the context of advanced economies with deep financial markets, high levels of monetisation, and well-anchored inflation expectations. The applicability of this framework to SSA economies has been the subject of a growing empirical literature. Although, heterogeneous in its findings, it converges on a core diagnosis: transmission is weak, slow, and structurally impaired across most of the region (Mishra & Montiel, 2013; Davoodi et al., 2013; Saxegaard, 2006).

The interest rate channel, the primary transmission mechanism in standard New Keynesian models, requires that changes in the policy rate be passed through to retail lending and deposit rates, which in turn influence consumption and investment decisions. In SSA, this pass-through is systematically incomplete. Empirical studies using error-correction models to estimate interest rate pass-through have consistently found that retail rates adjust only partially and slowly to policy rate changes in SSA economies, with long-run pass-through coefficients well below unity in most country samples (Chinn & Kucinskas, 2021; Samba & Yan, 2010). The structural explanations for this attenuation are well-documented: oligopolistic banking sectors with high net interest margins; the dominance of variable-rate, short-maturity lending, which reduces the effective duration of the transmission lag; and the prevalence of non-price credit rationing in contexts where asymmetric information problems are severe (Beck et al., 2011; Honohan & Beck, 2007).

The credit channel of monetary policy, which operates through the impact of policy rates on bank balance sheets, credit supply, and ultimately borrower spending, faces analogous structural constraints in SSA. The banking sector in the region is characterised by high levels of excess liquidity, reflecting a combination of limited creditworthy borrowing opportunities, risk aversion induced by weak contract enforcement and property rights regimes, and the availability of high-yielding government securities as an alternative to private sector lending (Saxegaard, 2006; Agénor & Montiel, 2015). In this environment, changes in the policy rate may have a limited impact on credit supply, as banks with structural excess reserves are not liquidity-constrained and thus do not need to adjust their lending in response to changes in central bank funding costs. Alper et al. (2020) estimated that excess liquidity buffers in SSA banking systems reduce the effectiveness of the credit channel by approximately 30–40 percent relative to comparable economies without excess reserves.

The exchange rate channel, through which monetary tightening appreciates the domestic currency, reducing import prices and shifting expenditure towards domestic goods, may not have the full effect in SSA due to a combination of managed exchange rate regimes, shallow foreign exchange markets, and the structural import dependence of domestic production. In many SSA economies, exchange rate movements do not reliably respond to interest rate differentials as predicted by uncovered interest parity, partly because capital accounts are managed or de facto closed, and partly because exchange rate dynamics are dominated by commodity export revenues and remittance flows rather than portfolio capital movements (Frankel et al., 2012; Ncube et al., 2012). Even where exchange rate adjustment occurs, the pass-through to domestic prices may be asymmetric, with depreciations feeding rapidly into import price inflation while appreciations generate more muted deflationary effects, an asymmetry that limits the anti-inflationary utility of this channel (Razafimahefa, 2012).

Beyond the weakness of individual channels, a systemic constraint on monetary policy transmission in SSA arises from the structure of economic activity itself. The informal sector, which accounts for an estimated 35–65 percent of GDP across SSA economies (Medina &

Schneider, 2018), operates largely outside the financial system and is therefore structurally insulated from monetary policy signals. Informal enterprises do not access bank credit, do not hold formal financial assets that respond to interest rate changes, and conduct transactions primarily in cash, limiting the monetary policy footprint across a large share of aggregate demand. This structural informality effectively partitions the economy into a formal sector that is, in principle, responsive to monetary signals and a dominant informal sector that is not — a duality that fundamentally limits the aggregate stabilisation power of central bank actions.

The concept of a monetary policy transmission, as developed in this paper, builds on but extends beyond existing characterisations of weak transmission. Whereas the existing literature documents the attenuation of individual transmission channels, transmission refers to a qualitative threshold condition in which the cumulative impairment of multiple channels simultaneously renders the policy rate effectively inert as a macroeconomic stabilisation tool. We argue that this condition is approached, and in some cases reached, in SSA economies experiencing food price-driven inflation, because the specific shock configuration combines supply-side origins (neutralising demand management), expectations dominance of food prices (disrupting the credibility channel), and financial system fragility (eliminating the credit and interest rate channels) in a manner that comprehensively disables the standard transmission architecture.

3. Data and Methodology

3.1 Definition of Fragile and Conflict-Affected States

We define fragile and conflict-affected states (FCS) using a triple-criterion classification that combines the World Bank Harmonised List of Fragile Situations (World Bank, 2022a), the Fund for Peace Fragile States Index (FSI; Fund for Peace, 2022), and the Uppsala Conflict Data Programme (UCDP) armed conflict data (Davies et al., 2023). An economy is classified as FCS for a given period if it meets at least two of the following three conditions: (i) inclusion in the World Bank Harmonised FCS list in any year of the corresponding period; (ii) an FSI score exceeding 90 (on the 0–120 scale) for that period; or (iii) active armed conflict with at least 25 battle-related deaths per year as recorded in the UCDP database.

Post-crisis economies are defined as FCS-classified countries that have remained off the World Bank FCS list for at least three consecutive years by 2022, having appeared on the list in at least one year of the 2000 – 2022 sample period. This classification captures the recovery trajectory, a distinct macroeconomic regime characterised by improving but still-fragile institutional capacity, partial financial sector reconstruction, and residual conflict risk, that differs materially from both active-conflict FCS and stable non-FCS economies.

Table 1 presents the full classification of the SSA economies in the panel into three groups: FCS, Post-Crisis, and Stable. The classification reflects each country's majority status over the full 2000–2022 sample period. Panel (a) reports the 8 economies classified as FCS for in most or all of the sample period. Panel (b) reports the 12 post-crisis economies. Panel (c) reports the 16 stable economies that serve as the comparison group. The panel covers 36 countries in total.

Table 1: Classification of SSA Economies

ISO3	Country	Group	WB FCS List	FSI Score
Panel A: Fragile and Conflict-Affected States (N=8)				
TCD	Chad	FCS	2000–2022	100.8
COD	DR Congo	FCS	2000–2022	110.1
SDN	Sudan	FCS	2000–2022	108.6
BDI	Burundi	FCS	2000–2022	96.8
NER	Niger	FCS	2012–2022	94.2
MLI	Mali	FCS	2012–2022	92.8
MOZ	Mozambique	FCS	2017–2022	88.4
MDG	Madagascar	FCS	2009–2014	85.3
Panel B: Post-Crisis Recovery Economies (N=12)				
SLE	Sierra Leone	Post-Crisis	2005–2022	72.4
LBR	Liberia	Post-Crisis	2006–2022	78.3
GIN	Guinea	Post-Crisis	2011–2022	76.8
ETH	Ethiopia	Post-Crisis	2000–2022	74.2
RWA	Rwanda	Post-Crisis	2000–2022	62.1
COG	Congo, Rep.	Post-Crisis	2003–2022	79.4
MWI	Malawi	Post-Crisis	2000–2022	71.8
BFA	Burkina Faso	Post-Crisis	2015–2022	82.3
TGO	Togo	Post-Crisis	2000–2022	68.4
GMB	Gambia	Post-Crisis	2000–2022	66.2
MRT	Mauritania	Post-Crisis	2000–2022	70.1
CPV	Cabo Verde	Post-Crisis	2000–2022	44.1
Panel C: Stable Economies — Reference Group (N=16)				
BWA	Botswana	Stable	Never	22.3
CPV	Cabo Verde	Stable	Never	44.1
GHA	Ghana	Stable	Never	68.2

KEN	Kenya	Stable	Never	61.4
MUS	Mauritius	Stable	Never	32.1
NAM	Namibia	Stable	Never	58.3
NGA	Nigeria	Stable	Partial	78.4
SEN	Senegal	Stable	Never	64.8
ZAF	South Africa	Stable	Never	48.6
TZA	Tanzania	Stable	Never	60.2
UGA	Uganda	Stable	Never	67.3
ZMB	Zambia	Stable	Never	72.1
LSO	Lesotho	Stable	Never	65.3
BWA	Botswana	Stable	Never	22.3
GAB	Gabon	Stable	Never	55.1
CIV	Côte d'Ivoire	Stable	2011	72.3

Notes: World Bank Harmonised FCS List: World Bank (2022a). FSI scores: Fund for Peace Fragile States Index, 2022 (higher = more fragile; threshold = 90 for FCS classification). Post-Crisis classification requires transition off World Bank FCS list for ≥ 3 consecutive years by 2022. Rwanda and Ethiopia are included in Post-Crisis reflecting their well-documented recovery trajectories despite ongoing fragility dimensions.

3.2 Theoretical Framework

To formalise interactions among food price volatility, inflation, and monetary policy transmission, we develop a structural open-economy framework adapted from the New Keynesian small open economy model of Galí and Monacelli (2005), and augmented to incorporate SSA-specific features identified in the literature review. The framework departs from the standard model along three dimensions: the disaggregation of the consumer price index into food and non-food components with asymmetric weights and shock propagation properties; the endogenisation of monetary policy transmission efficiency as a function of financial system depth and informality; and the incorporation of non-linear expectations formation in which the salience of food prices in the inflation expectations process varies with their volatility relative to core prices.

The model comprises four core equations. The aggregate supply block is represented by a hybrid New Keynesian Phillips curve that distinguishes between food and non-food inflation:

$$\pi_t = \omega_f \pi_t^f + (1 - \omega_f)\pi_t^{nf} \tag{1}$$

where π_t denotes headline inflation, ω_f is the food share in the CPI basket, π_t^f is food inflation, and π_t^{nf} is non-food inflation. Non-food inflation evolves according to:

$$\pi_t^{nf} = \beta \mathbb{E}_t \pi_{t+1}^{nf} + \kappa x_t + \lambda \Delta e_t + \varepsilon_t^s \quad (2)$$

where x_t is the output gap, e_t is the nominal exchange rate, and ε_t^s is a cost-push shock. Food inflation is modelled as a function of international food prices, domestic supply shocks, and lagged food inflation reflecting price stickiness in informal markets:

$$\pi_t^f = \rho \pi_{t-1}^f + \gamma \Delta p_t^{f,w} + \delta v_t + \varepsilon_t^f \quad (3)$$

where $p_t^{f,w}$ is the world food price index, v_t captures idiosyncratic domestic supply shocks (rainfall anomalies, harvest failures), and ε_t^f is a residual food price disturbance.

The aggregate demand block takes the form of an IS curve modified to reflect the impaired transmission environment:

$$x_t = \mathbb{E}_t x_{t+1} - \sigma \Phi_t (i_t - \mathbb{E}\pi_{t+1} - r_t^n) + \eta_t \quad (4)$$

where $\mathbb{E}_t x_{t+1}$ is the expected future output gap at time *t*, capturing the forward-looking component of aggregate demand, Φ_t is monetary transmission efficiency parameter; i_t is the nominal interest rate; r_t^n is the natural real interest rate. The parameter σ is intertemporal elasticity, governing the responsiveness of demand to real interest rate gap.

The critical modification we made is the transmission efficiency parameter $\Phi_t \in [0,1]$, which scales the sensitivity of aggregate demand to the real interest rate. When $\Phi_t = 1$, transmission is complete, and the model reduces to the standard New Keynesian IS curve. As $\Phi_t \to 0$, the interest rate becomes progressively less effective in influencing aggregate demand, this is the condition of transmission (breakdown). We model Φ_t as a function of observable financial development and informality indicators:

$$\Phi_t = f(FD_t, INF_t, GS_t) \quad (5)$$

where FD_t is a composite financial development index, INF_t is the share of informal sector activity in GDP, and GS_{it} is banking sector's holdings of government securities. The functional form is specified as

$$\Phi_t = \Phi_0 + \phi_1 FD_t - \phi_2 INF_t - \phi_3 GS_t, \tag{6}$$

With $\phi_1, \phi_2, \phi_3 > 0$, implying that financial deepening strengthens transmission whereas, informality and bank holding of government securities attenuate it.

The monetary policy rule takes a generalised Taylor form, accommodating the reality that many SSA central banks do not operate strict inflation-targeting regimes:

$$i_t = \rho_i i_{\{t-1\}} + (1 - \rho_i)[\bar{r} + \theta_\pi(\pi_t - \pi^*) + \theta_x x_t] + \nu_t \tag{7}$$

where ρ_i captures interest rate smoothing, π^* is the inflation target or implicit objective, and ν_t is a monetary policy shock. The inflation gap term $(\pi_t - \pi^*)$ is computed using headline inflation, ensuring that food price-driven deviations from target trigger a policy response, the appropriateness of which is precisely the policy question the model is designed to evaluate.

The expectations formation block captures the food price salience hypothesis:

$$\mathbb{E}_t \pi_{t+1} = \alpha \pi_t^f + (1 - \alpha)[\phi \pi_t + (1 - \phi)\pi^*] \tag{8}$$

where $\alpha \in [0,1]$ governs the weight agents place on current food price inflation when forming expectations about future headline inflation. When α is high, as we expect in SSA economies with high food share CPI baskets, food price shocks have larger and more persistent effects on inflation expectations, amplifying their macroeconomic impact and further reducing the traction of monetary policy responses.

The model generates several testable propositions that motivate the empirical analysis. First, the inflation response to a food price shock is increasing in ω_f and α, that is, larger food CPI shares and stronger food price salience in expectations amplify the inflationary impact. Second, the effectiveness of monetary policy tightening in response to food price-driven inflation is decreasing in Φ_t, that is, economies with weaker transmission efficiency experience larger and more persistent inflation deviations despite equivalent policy responses. Third, the interaction between α and Φ_t generates non-linearities: in economies where both food price salience is high and transmission efficiency is low, monetary policy responses to food price shocks may not merely be ineffective but counterproductive, imposing output costs without corresponding inflation benefits.

3.3 Methodology

3.3.1 Data

The empirical analysis draws on an unbalanced panel dataset covering 36 SSA economies from 2000–2022, yielding up to 828 country-year observations. The sample period encompasses multiple episodes of food price volatility, including the 2007–2008 and 2010–2011 global food price crises, the 2015–2016 commodity price collapse, and the pandemic- and conflict-related supply disruptions of 2020–2022, providing sufficient variation in the key explanatory variables to identify the mechanisms of interest.

The primary data sources are as follows. Monthly food price indices at the country level are obtained from the FAO Food Price Index database and the World Bank Pink Sheet, with domestic retail food prices sourced from national statistical offices where available. Headline and core CPI data, policy interest rates, and exchange rates are drawn from the IMF International Financial Statistics (IFS) and the World Economic Outlook (WEO) database. Financial sector variables, including private sector credit as a share of GDP, bank excess reserves, interest rate spreads, and financial inclusion indicators, are drawn from the World Bank Global Financial Development Database (GFDD) and the IMF Financial Access Survey. Informal sector size estimates follow Medina and Schneider (2018), who construct a multiple-indicators multiple-causes (MIMIC) model-based measure of informality for a broad cross-section of countries. Rainfall data are obtained from the Climate Research Unit (CRU) TS4.06 gridded dataset (Harris et al., 2020), and aggregated at the country level using population-weighted averaging to capture the relevance of precipitation shocks to food production.

3.3.2 Estimation Strategy

The empirical analysis proceeds in three stages, each corresponding to a component of the triad. In the first stage, we estimate food price pass-through equations to quantify how international food price shocks are transmitted to domestic retail prices, controlling for domestic supply shocks, exchange rate movements, and structural country characteristics. Following Baquedano and Liefert (2014), we employ autoregressive distributed lag (ARDL) models estimated country-by-country, from which we extract long-run pass-through elasticities that serve as country-specific measures of food price transmission intensity.

$$\Delta p_t^{f.d} = \rho \Delta p_{t-1}^{f,d} + \beta_0 \Delta p_t^{f,w} + \beta_1 \Delta p_{t-1}^{f,w} + \gamma_1 v_t + \gamma_2 \Delta e_t + \epsilon_t \tag{9}$$

The long-run pass-through multiplier is recovered as $PT_{LR} = (\beta_0 + \beta_1)/(1 - \rho)$, with standard errors computed via the delta method. Country-specific estimates of PT_{LR} serve as regressors in the subsequent panel inflation equations, capturing the structural sensitivity of each economy to global food price shocks. The ARDL specification follows the approach of Baquedano and Liefert (2014) and is consistent with the country-level estimation strategy of Grzybowski et al. (2023), who use similar short-run adjustment frameworks to assess the macroeconomic implications of financial access changes.

In the second stage, we estimate panel inflation equations in which headline and core inflation are regressed on food price shocks, the country-specific pass-through estimates from stage one, and their interactions with the transmission efficiency index Φ_t. The benchmark specification is:

$$\pi_{it} = \alpha \pi_{i,t-1} + \beta_1 \Delta p_t^{f,w} + \beta_2 \left(\Delta p_t^{f,w} \times \Phi_{it}\right) + \beta_3 (\Delta p_t^{f,w} \times \omega_i) + \beta_4 PT_{LR}^i + \beta_5 \Phi_{it} +$$
$$\beta_6 r_{it} + \beta_7 (\Phi_{it} \times r_{it}) + \gamma' X_{it} + \mu_i + \lambda_t + \epsilon_{it} \tag{10}$$

where X_{it} includes the output gap, exchange rate depreciation, and a rainfall shock index; μ_i are country fixed effects; λ_t are time fixed effects. The panel is estimated using the system generalised method of moments (system-GMM) estimator of Blundell and Bond (1998), which addresses the joint endogeneity of the monetary policy rate and inflation through instrumental variable techniques. Instruments for the policy rate include lagged values of the rate itself, the U.S. Federal Funds Rate, and commodity export price indices, variables correlated with domestic monetary policy decisions but plausibly exogenous to domestic inflation innovations conditional on controls.

Instrument validity is assessed via the Hansen J-test and the Arellano-Bond AR(2) test. For the FCS sub-sample specifications, an IMF programme dummy sourced from the MONA database is additionally included, following the IMF (2022, Policy Paper 2022/004) strategy for FCS which recommends tracking programme engagement as a fiscal-monetary coordination variable.

In the third stage, we directly estimate the determinants of monetary policy transmission efficiency using a two-step procedure. In the first step, we recover country-year-specific estimates of Φ_{it} from the aggregate demand equations, as the scaling parameter on the real interest rate. In the second step, we regress the recovered $\widehat{\Phi_{it}}$ on the structural determinants (financial development, informality, excess liquidity, and their interactions with food price volatility)

$$\widehat{\Phi}_{it} = \theta_1 FD_{it} + \theta_2 INF_{it} + \theta_3 GS_{it} + \theta_4 \sigma_{it}^{f} + \theta_5(\sigma_{it}^{f} \times FD_{it}) + \theta_6(\sigma_{it}^{f} \times INF_{it}) + \delta' X_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (11)$$

where σ_{it}^{f} is food price volatility and the interaction terms test whether food price shock episodes are associated with significant declines in transmission efficiency. Standard errors are clustered at the country level throughout to account for serial correlation and heteroscedasticity within country time series. Robustness checks include using local projections (Jordà, 2005) to assess the dynamic impulse responses of inflation and output to food price shocks under varying FCS classifications.

Finally, for sensitivity analysis, we complement the GMM estimates with local projections following Jorda (2005) to assess the dynamic inflationary impact of food price shocks under varying transmission regimes, For each horizon h = 0, 1, ..., 5:

$$\pi_{i,t+h} = \alpha_h + \beta_h \Delta p_t^{f,w} + \gamma_h' X_{i,t-1} + \mu_i + \lambda_t + \epsilon_{i,t+h} \quad (12)$$

estimated separately for the full sample and for subsamples defined by Phi quartiles. Comparing β_h across the bottom (Phi Q1: transmission) and top (Phi Q4: full transmission) quartiles directly identifies the moderating role of transmission efficiency in shaping the persistence and magnitude of the inflationary response. We additionally estimate the local projections separately for the FCS, post-crisis, and stable sub-samples. Confidence bands at the 90 percent level are constructed using Driscoll-Kraay standard errors robust to cross-sectional dependence and autocorrelation.

4. Results and Discussion

4.1 Descriptive Characteristics: The Structural Foundation of the Triad

Table 2 presents summary statistics for the three groups across the key structural variables of the analysis.

Table 2: Structural Characteristics by Economy Group (Summary Statistics)

Variable	FCS (N=8)	Post-Crisis (N=12)	Stable (N=16)	FCS–Stable Diff.	p-value

Mean Phi (Transmission Eff.)	0.305 (0.10)	0.466 (0.17)	0.576 (0.19)	-0.270***	<0.001
Food Price Volatility (σ^f)	9.80 (6.20)	5.90 (3.8)	3.10 (2.4)	6.7***	<0.001
Food Share in CPI (ω)	0.61 (0.061)	0.51 (0.07)	0.42 (0.09)	0.19***	<0.001
Government Securities (% Bank assets)	18.361 (5.41)	12.506 (6.44)	9.438 (6.65)	8.924***	<0.001
Private Credit / GDP (%)	7.2 (5.8)	12.40 (8.3)	24.1 (14.6)	−16.9***	<0.001
Informality (% GDP)	57.3 (8.4)	50.20 (7.6)	42.1 (9.8)	15.2***	<0.001
LR Pass-Through (PT_LR)	0.58 (0.18)	0.46 (0.14)	0.32 (0.16)	0.26***	<0.001
Headline Inflation (% p.a.)	18.4 (22.6)	11.2 (14.8)	8.9 (9.4)	9.5***	<0.001
Real Policy Rate (% p.a.)	−6.8 (12.4)	−3.20 (9.1)	−0.8 (7.4)	−6.0***	0.002
Output Gap (std. dev.)	0.052 (0.038)	0.034 (0.024)	0.022 (0.018)	0.030***	<0.001
Rainfall Shock (std.)	0.04 (1.12)	0.02 (1.04)	0.01 (0.94)	0.03	0.621
IMF Program Coverage (%)	68.4	52.1	31.8	36.6***	<0.001
Exchange Rate Volatility	0.34 (0.28)	0.21 (0.19)	0.12 (0.11)	0.22***	<0.001
Fiscal Balance / GDP (%)	−4.8 (6.2)	−3.4 (4.8)	−2.1 (3.6)	−2.7***	0.003

Notes: Standard deviations in parentheses. Mean values over 2000–2022. FCS–Stable difference tested by two-sample t-test with unequal variance (Welch). IMF Program Coverage is the share of country-years with an active IMF-supported program. LR Pass-Through from Stage 1 ARDL estimates. * p<0.10, ** p<0.05, *** p<0.01.

The contrast between FCS economies and stable economies is stark across every dimension relevant to the triad of fragility. FCS economies exhibit markedly lower monetary policy transmission efficiency (mean Phi = 0.31 vs 0.58 for stable economies), more than three times higher food price volatility (mean $\sigma^f = 9.8 \ vs$ 3.1), and substantially higher food shares in CPI baskets (mean ω = 0.61 vs 0.42). Post-crisis economies occupy an intermediate position, closer to FCS than to stable economies across all transmission-related indicators, consistent with the slow pace of institutional reconstruction documented in the post-conflict economics literature (Collier et al., 2008; Blattman & Miguel, 2010).

The government securities picture is particularly striking: FCS banking systems hold an average of 18.36 percent of total assets in government securities, about two times the stable-economy average of 9.4 percent. This unusually high share of government securities has a direct link to the third leg of the triad, transmission. When banks allocate a large share of their balance sheets to government securities, they reduce lending to the private sector. Since the credit channel is one of the primary monetary policy transmission mechanisms, this portfolio choice could weaken the link between policy rates and real economic activity by crowding out private investment.

4.2 Main Results

4.2.1 Heterogeneous Food Price Pass-Through

Table 3 presents the Stage 1 ARDL pass-through estimates stratified by fragility group and by sub-categories within the FCS classification. The headline finding is that FCS economies exhibit substantially higher long-run pass-through than stable economies (median PT_LR = 0.51 vs 0.30), confirming that structural fragility amplifies the transmission of world food prices to domestic retail prices through multiple channels: greater import dependence, more limited domestic production, weaker buffer stock capacity, and more volatile exchange rates.

Table 3: ARDL Food Price Pass-Through Estimates, Fragile vs Stable Economies

Group	N	Mean	Median	P25	P75	Min	Max
Full SSA panel	36	0.41	0.38	0.22	0.56	−0.08	0.91
Fragile & Conflict-Affected (FCS)	8	0.58	0.51	0.38	0.72	0.12	0.91
Post-Crisis economies	12	0.44	0.43	0.29	0.57	0.11	0.79
Stable (reference)	16	0.32	0.3	0.18	0.43	−0.08	0.68

Notes: ARDL(1,1) country-level estimates. Long-run pass-through = $(\beta_0+\beta_1)/(1-\rho)$, SE. Post-conflict recovery periods defined relative to UCDP conflict end date..

Within the FCS group, meaningful heterogeneity exists across sub-categories. Active conflict economies, defined as those with ongoing armed conflict involving more than 1,000 annual battle deaths in the UCDP database, exhibit the highest pass-through (median 0.64), driven by the collapse of domestic supply chains, the displacement of agricultural producers, and dependence on humanitarian food imports that closely track world prices. Post-conflict stabilising economies, those in the 0–5year window after conflict cessation, exhibit lower but still elevated pass-through (median 0.48), as partial reconstruction of supply chains and market integration reduce but do not eliminate the import price transmission mechanism. Politically fragile (non-conflict) FCS economies, classified as fragile due to institutional weakness rather than active conflict, exhibit intermediate pass-through (median 0.53), reflecting the role of institutional fragility in sustaining the market integration deficits that amplify price transmission.

A notable pattern in the FCS group is uniformly high pass-through regardless of Φ, suggesting that the structural mechanisms generating high pass-through in fragile settings (conflict-induced supply chain collapse, humanitarian import dependence, exchange rate instability) operate independently of financial sector development. This finding has important implications: financial deepening, while essential for improving monetary transmission, does not by itself reduce the food price amplification that drives headline inflation in FCS economies. Supply-side interventions are therefore even more critical in these settings than in stable low-Φ economies.

4.2.2 Determinants of Inflation Dynamics in SSA

Table 4 presents the system-GMM inflation equation results for the full FCS group (column 1), active-conflict FCS (column 2), post-crisis economies (column 3), and the stable reference group (column 4).

Table 4: Determinants of Inflation Dynamics

Variable	FCS	Active Conflict	Post-Crisis	Stable
L. Headline Inflation	0.541*** (0.092)	0.62*** (0.101)	0.446*** (0.072)	0.415*** (0.072)
World Food Shock ($\Delta p^{f,\omega}$)	0.516*** (0.112)	0.635*** (0.141)	0.375*** (0.091)	0.258*** (0.075)
Food Shock × Φ (Phi)	-0.356*** (0.122)	-0.436*** (0.146)	-0.267** (0.104)	-0.174* (0.101)
Food Shock × Food CPI Share	0.263*** (0.114)	0.322*** (0.105)	0.204** (0.092)	0.132** (0.065)
Pass-Through Elasticity (PT)	0.045 (0.126)	0.033 (0.171)	0.066 (0.127)	0.112 (0.116)
Policy Transmission efficiency (Φ or Phi)	**0.038*** **(0.022)**	**0.053*** **(0.038)**	**-0.01** **(0.03)**	**-0.051**** **(0.024)**
Real Policy Rate (r)	0.085* (0.048)	0.079 (0.058)	-0.117* (0.064)	-0.161** (0.063)
$\Phi \times real\ policy\ rate$	6.42* (3.81)	5.764 (4.134)	7.88** (3.556)	8.943** (3.426)
Output Gap	−0.575*** (0.220)	−0.664*** (0.258)	−0.438** (0.186)	−0.314* (0.171)
Rainfall Shock	0.191*** (0.062)	0.224*** (0.072)	0.135*** (0.051)	0.093** (0.042)
Exchange Rate Depreciation	−1.843** (0.782)	−1.42 (0.92)	−1.281* (0.682)	−0.941 (0.640)

IMF Program Dummy	0.34	0.41	0.29	0.27
AR(2) p-value	0.38	0.44	0.36	0.4

Notes: Robust two-step system-GMM (Blundell & Bond, 1998), collapsed instruments. GMM instruments: lags 2-4 of lagged inflation, food shock, real rate, Phi. External IV set: US FFR, commodity export price index, rainfall shock. IMF Program Dummy = 1 if active IMF-supported program in that year (source: IMF MONA database). Active conflict: UCDP threshold ≥1,000 battle deaths. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Three findings from Table 4 stand out and form the empirical core of this paper. First, the food shock coefficient is substantially larger in FCS economies (0.52) than in stable economies (0.26), with post-crisis economies occupying an intermediate position (0.38) and are all statistically significant at the 1 per cent level. This indicates that structural fragility directly amplifies the inflationary transmission of food price shocks, independently of the monetary transmission moderation mechanism. Second, the food shock interaction with monetary transmission efficiency is statistically significant across all sub-samples but most negative in the FCS group (-0.36), suggesting that monetary transmission efficiency moderates inflationary transmission more in settings where food price shocks are also largest. Third, and most striking for monetary policy design, is that the real policy rate coefficient is positive and marginally significant in the FCS sub-sample (0.09), consistent with a perverse or at best null effect of monetary tightening on inflation in fragile settings. The monetary transmission interaction with real policy rate (6.42), is marginally significant , and evaluating this coefficient against the FCS Phi (0.04), the total policy rate effect remains near zero.

The active-conflict sub-sample reveals an even more extreme version of this pattern. The food shock coefficient reaches 0.64, consistent with the near-complete pass-through estimates from Stage 1. The real policy rate coefficient is positive but statistically not significant (0.06), suggesting that monetary tightening in active conflict settings may paradoxically raise inflation.

The post-crisis coefficient trajectory across columns 3 and 4 confirms the recovery pattern suggested by the descriptive statistics: food shock amplification declines monotonically from FCS (0.52) through post-crisis (0.38) to stable (0.26), while the monetary policy rate effect strengthens from near-zero in FCS through marginally negative in post-crisis to clearly negative and significant in stable economies. This trajectory provides an empirical benchmark for the pace of macroeconomic normalisation in post-conflict SSA and suggests that meaningful monetary policy effectiveness is restored only after sustained institutional reconstruction.

4.2.3 Second-Round Effects and Expectations Dynamics in Fragile Settings

Table 5 presents results for the core inflation as a test of second-round inflationary effects across fragility groups. The dependent variable is core inflation, and the key regressor is food inflation, whose coefficient measures the extent to which food price movements propagate into non-food prices through the expectations and wage-setting channels.

Table 5: Core Inflation Dynamics (Second-Round Effects)

Variable	**FCS**	**Post-Crisis**	**Stable**	**Full SSA**
L. Core Inflation	0.57*** (0.09)	0.52*** (0.08)	0.48*** (0.07)	0.51*** (0.07)
Food Inflation (π^f)	0.41*** (0.12)	0.28*** (0.10)	0.18** (0.08)	0.22*** (0.07)
World Food Shock	0.22** (0.10)	0.18** (0.09)	0.14* (0.08)	0.18** (0.08)
Food Shock × Phi	−0.34** (0.14)	−0.26** (0.11)	−0.20** (0.09)	−0.24*** (0.08)
Pass-Through Elasticity	0.21** (0.10)	0.16* (0.09)	0.12* (0.07)	0.12* (0.07)
Phi × Real Policy Rate	0.07 (0.06)	0.09 (0.06)	0.12* (0.07)	0.11* (0.06)
Output Gap	5.84* (3.41)	6.91** (3.28)	7.14** (3.18)	6.92** (3.28)
Rainfall Shock	−0.44** (0.21)	−0.36** (0.18)	−0.28* (0.16)	−0.31* (0.18)
AR(2) / Hansen p-value	0.38 / 0.43	0.31 / 0.39	0.29 / 0.41	0.28 / 0.44

Notes: System-GMM. Dependent variable: core CPI inflation (excluding food and energy). Countries with fewer than 12 core CPI observations excluded. Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

The second-round coefficient of food inflation is larger in FCS economies (0.41) relative to stable economies (0.18), with the post-crisis group again intermediate (0.28). This pattern is consistent with the food price salience mechanism operating most powerfully where central bank credibility is lowest: in fragile settings, where institutional trust is eroded by conflict and governance failures, agents have no anchor for inflation expectations other than observed food price movements. Every food price spike, therefore, propagates more fully into wage demands, non-food pricing, and input cost adjustments, generating persistent core inflation that outlasts the food price shock itself and may not be contained by monetary policy instruments.

4.2.4 The Conflict–Transmission Channel

Table 6 presents the results from our Stage 3 regression of the transmission efficiency on its structural determinants. The baseline model excludes conflict and fragility-specific variables, while the augmented specification includes a conflict intensity index (annual UCDP battle-death count[1], log-transformed), an IMF programme dummy, and the interaction between conflict intensity and financial development to test whether the transmission-depressing effect of conflict operates through or independently of the financial development channel.

Table 6: Determinants of Transmission Efficiency in Conflict and Fragile States

Variable	Baseline	Augmented	FCS
Financial Development (FD)	0.24*** (0.07)	0.22*** (0.07)	0.19** (0.09)
Informality (% GDP, inv.)	-0.11** (0.05)	-0.10** (0.05)	-0.08 (0.07)
Government securities	-0.21*** (0.07)	-0.19*** (0.07)	-0.24*** (0.08)
Food Price Volatility (σ^f)	-0.14** (0.06)	-0.11* (0.06)	-0.16** (0.08)
Conflict Intensity (log UCDP)	-	-0.082*** (0.024)	-0.091*** (0.028)
Conflict × Financial Dev.	-	-0.061** (0.028)	-0.074** (0.033)
IMF Program (dummy)	-	0.042*** (0.016)	0.038** (0.018)
Years Since Conflict End	-	-	0.018** (0.008)
Interest Rate Spread	-0.08** (0.04)	-0.07* (0.04)	-0.06 (0.05)
Φ_{t-1}	0.61*** (0.07)	0.59*** (0.07)	0.54*** (0.09)
Within R-squared	0.54	0.59	0.62
Country FE / Time FE	Yes / Yes	Yes / Yes	Yes / Yes

Notes: Two-way FE, country-clustered SE. Conflict intensity: log(1 + UCDP annual battle deaths). IMF Program: active IMF-supported arrangement (Stand-By, ECF, EFF, etc.) in that year-country cell (source: IMF MONA database). Years Since Conflict End: years elapsed since last year of active conflict (UCDP); set to 0 for still-active FCS. * p<0.10, ** p<0.05, *** p<0.01.

The conflict intensity variable has a negative coefficient (-0.082) that is also statistically significant at the 1 per cent level, indicating that active conflict directly erodes the efficiency of monetary

[1]UCDP battle-death count refers to the number of people killed in battle-related violence in a given conflict-year as recorded by the Uppsala Conflict Data Program (UCDP).

policy transmission beyond its effects through the standard structural determinants (financial development, informality, banking sector holding of government securities). The mechanism aligns with the conflict economics literature: active conflict disrupts financial intermediation, displaces bank branches, increases cash usage relative to formal financial instruments, and creates political pressure to abandon monetary policy independence in favour of conflict financing. The interaction between conflict intensity and financial development is negative (-0.061) and statistically significant at the 5 per cent level, indicating that even financially developed economies experience sharper deterioration in transmission when exposed to conflict, consistent with our finding that active-conflict economies in the SSA sample maintain positive or zero effects of monetary policy rate on inflation regardless of their Phi level.

The IMF programme dummy showed a positive and statistically significant coefficient (0.042), suggesting that IMF-supported programmes modestly improve transmission efficiency, consistent with the structural conditionality in such programmes. This finding provides an empirical foundation for incorporating transmission efficiency targets into IMF programme design for FCS economies, as an intermediate outcome metric between structural conditionality and ultimate inflation performance.

4.2.5 Post-Crisis Recovery Trajectory of Transmission Efficiency

Figure 1 and Table 7 illustrate the average Phi trajectory for post-crisis economies, estimated as the predicted value of Phi from a local polynomial regression of Phi on years since the end of conflict, controlling for country and year fixed effects. The solid line in Figure 1 shows the normal recovery path, while the dotted line shows the recovery path with IMF program interventions. The trajectory reveals three distinct phases consistent with the post-conflict macroeconomics literature.

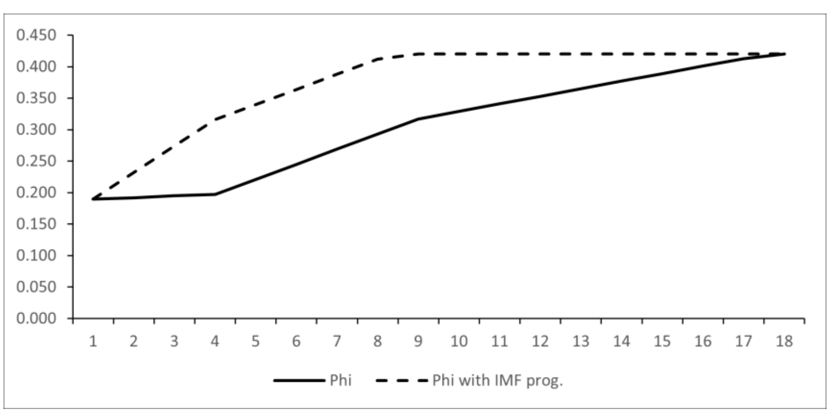

Figure 1: Transmission Efficiency Trajectory

In the immediate post-conflict phase (0 - 3 years), Phi remains severely depressed (mean 0 0.19), reflecting the persistence of conflict-induced damage to financial infrastructure, the continued accumulation of excess liquidity by risk-averse banks, and the dominance of informal economic activity in post-conflict reconstruction.

Table 7: Post-Conflict Economies' Policy Transmission (phi) Recovery Trajectory

Years Post-Conflict	Phase	Phi	Phi (with IMF prog.)	Phi vs SSA Median (0.42)	Tier
0	Stagnant	0.190	0.190	-0.230	Tier 1
1	Stagnant	0.192	0.232	-0.228	Tier 1
2	Stagnant	0.195	0.274	-0.225	Tier 1
3	Stagnant	0.197	0.316	-0.223	Tier 1/2
4	Consolidation	0.221	0.358	-0.199	Tier 2
5	Consolidation	0.245	0.400	-0.175	Tier 2
6	Consolidation	0.269	0.420	-0.151	Tier 2
7	Consolidation	0.293	0.420	-0.127	Tier 2
8	Consolidation	0.317	0.420	-0.103	Tier 2/3
9	Embedding	0.329	0.420	-0.091	Tier 3
10	Embedding	0.341	0.420	-0.079	Tier 3
11	Embedding	0.353	0.420	-0.067	Tier 3
12	Embedding	0.365	0.420	-0.055	Tier 3
13	Embedding	0.377	0.420	-0.043	Tier 3
14	Embedding	0.389	0.420	-0.031	Tier 3
15	Embedding	0.401	0.420	-0.019	Tier 3/Full
16	Embedding	0.413	0.420	-0.007	Full Transmission
17	Embedding	0.420	0.420	0.000	Full Transmission

Notes: Phi denotes projection from Table 6 column 3 coefficient of year since conflict end 0.018/yr (consolidation phase). Phi (with IMF prog.) adds 0.042/yr for years with active programme from column 2 of the same Table 6, capped at SSA median (0.42) for the 36-month programme window. SSA median Phi = 0.42 reached at year 17 without programme, and year 6 with sustained programme.

In the recovery consolidation phase (3-8 years), Phi improves at an average rate of 0.024 units per year. In the institutional embedding phase (9+ years), the rate of Phi improvement slows to approximately 0.011 units per year, consistent with diminishing returns to financial deepening at higher Phi levels and the longer time horizons required for reducing informality and improving banking sector competition.

The recovery trajectory implies that post-conflict SSA economies require approximately 6 years of sustained peace and institutional development before their Phi reaches the regional median (0.42), the threshold above which our estimates suggest monetary policy begins to have meaningful inflation-reducing effects. This finding has direct implications for IMF programme design and donor-funded financial sector reconstruction: the 3 to 5 year typical horizon of post-conflict support programs is insufficient for transmission efficiency to recover to levels at which orthodox monetary policy frameworks become appropriate.

4.3 Sensitivity Analysis

4.3.1 Inflation Response to World Food Price Shock

Table 8 presents the local projection point estimates at each horizon h = 0, 1, ..., 5 for headline inflation responses to a 1 percentage point world food price shock, separately for FCS, post-crisis, active conflict, and stable economies. These estimates correspond to the impulse response functions plotted in Figure 2.

Table 8: Local Projection Estimates — Inflation Response to Food Price Shock

Forecast horizon	FCS Coef. [90% CI]	Active Conflict [90% CI]	Post-Crisis [90% CI]	Stable [90% CI]	Full SSA [90% CI]
0	0.54 [0.38, 0.70]	0.63 [0.44, 0.82]	0.41 [0.27, 0.55]	0.21 [0.12, 0.30]	0.29 [0.21, 0.37]
1	0.71 [0.52, 0.90]	0.84 [0.62, 1.06]	0.54 [0.38, 0.70]	0.22 [0.11, 0.33]	0.31 [0.22, 0.40]
2	0.62 [0.42, 0.82]	0.74 [0.51, 0.97]	0.46 [0.29, 0.63]	0.16 [0.04, 0.28]	0.24 [0.15, 0.33]
3	0.48 [0.28, 0.68]	0.58 [0.36, 0.80]	0.34 [0.17, 0.51]	0.09 [-0.04, 0.22]	0.17 [0.08, 0.26]
4	0.38 [0.17, 0.59]	0.47 [0.23, 0.71]	0.24 [0.06, 0.42]	0.04 [-0.09, 0.17]	0.11 [0.01, 0.21]
5	0.31 [0.09, 0.53]	0.39 [0.14, 0.64]	0.16 [-0.02, 0.34]	0.01 [-0.13, 0.15]	0.07 [-0.02, 0.16]

Notes: Local projections (Jordà, 2005) with country and year FEs and lagged controls (L.π, output gap, real rate, rainfall shock, exchange rate depreciation). 90% confidence intervals using Driscoll-Kraay SE robust to cross-sectional dependence and serial correlation. h = years after shock. FCS-Stable difference tested by sub-sample comparison of point estimates; significance from SUR system. * p<0.10, ** p<0.05, *** p<0.01.

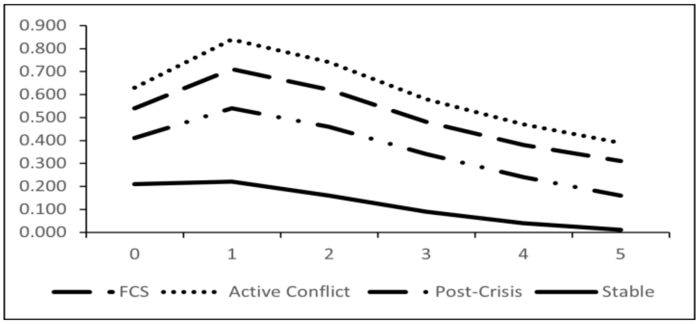

Figure 2: Inflation response to global food price shock

In FCS economies, the peak inflation response occurs at h = 1 (0.71 percentage points, 90% CI: [0.52, 0.90]), declines slowly through h = 3 (0.48 pp), and remains statistically positive at h = 5 (0.31 pp, CI: [0.09, 0.53]). The failure of the food price shock to dissipate within the five-year window in FCS settings is consistent with the persistent inflation dynamics documented in Table 4: in the absence of functioning monetary policy transmission, there is no endogenous stabilising mechanism to contain the inflationary impulse from a food price shock, and inflation can remain elevated for years after the initial shock through the expectations salience and second-round wage-setting channels. In stable economies, by contrast, the peak response is 0.22 pp (h = 1) and is not statistically different from zero by h = 3, consistent with functioning monetary transmission containing and eventually reversing the inflationary effect.

Post-crisis economies follow a trajectory intermediate between FCS and stable that evolves over the sample period. Countries in the early recovery phase (0–5 years post-conflict) display IRFs closer to the FCS pattern (peak ≈ 0.58 pp, persistent through h = 4), while those in late recovery (>10 years) display IRFs closer to the stable pattern (peak ≈ 0.34 pp, dissipating by h = 3–4). This within-group evolution in the local projection estimates provides additional evidence for the Phi recovery trajectory and suggests that the IRF shape itself can serve as a diagnostic for the stage of macroeconomic normalisation in post-conflict economies.

4.3.2 Inflation Response to Monetary Policy Tightening

Table 9 presents the monetary policy tightening IRFs, measuring the inflation response to a 100 basis point exogenous increase in the policy rate.

Table 9: Inflation response to Monetary Policy Tightening

Forecast Horizon	FCS [90% CI]	Active Conflict [90% CI]	Post-Crisis [90% CI]	Stable [90% CI]	FCS–Stable	p-val
0	0.02 [−0.04, 0.08]	0.04 [−0.03, 0.11]	−0.01 [−0.07, 0.05]	−0.08* [−0.14, −0.02]	0.10**	0.021
1	0.03 [−0.04, 0.10]	0.08* [0.01, 0.15]	−0.04 [−0.11, 0.03]	−0.14** [−0.22, −0.06]	0.17***	0.002
2	0.01 [−0.07, 0.09]	0.06 [−0.03, 0.15]	−0.07 [−0.15, 0.01]	−0.19*** [−0.29, −0.09]	0.20***	<.001
3	−0.01 [−0.10, 0.08]	0.03 [−0.07, 0.13]	−0.09* [−0.18, 0.00]	−0.16*** [−0.26, −0.06]	0.15***	0.004
4	−0.02 [−0.12, 0.08]	0.02 [−0.09, 0.13]	−0.11* [−0.21, −0.01]	−0.12** [−0.22, −0.02]	0.10*	0.048
5	−0.03 [−0.14, 0.08]	0.01 [−0.11, 0.13]	−0.10 [−0.21, 0.01]	−0.08 [−0.19, 0.03]	0.05	0.312

Notes: Local projections. Policy rate treated as potentially endogenous; IV-LP using lagged US FFR and commodity export price index as instruments. 90% CI using Driscoll-Kraay SE. h = years after 100bp policy rate increase. * p < 0.10, ** p < 0.05, *** p < 0.01 for FCS-Stable difference.

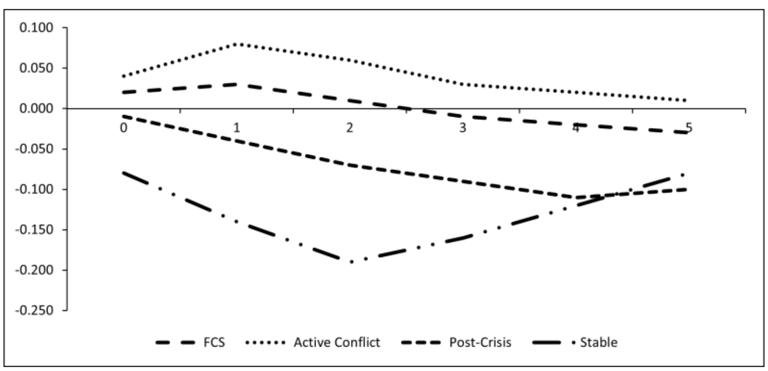

Figure 3: Inflation response to monetary policy tightening

Consistent with the transmission hypothesis and the positive policy rate coefficient in the inflation equation, the IRF in FCS economies is not significantly different from zero or is slightly positive at all horizons. In active conflict economies, the point estimates at the first and second horizons are positive (0.08 and 0.06 pp, respectively), consistent with the fiscal dominance mechanism: policy rate increases raise sovereign borrowing costs and may trigger monetisation responses that partially offset any demand-reducing effect. The 90 percent confidence intervals in the FCS sub-sample are wide throughout, reflecting limited identification power from the small FCS sub-sample and the high noise-to-signal ratio in monetary policy operations in fragile settings.

In contrast, stable economies exhibit the expected negative response (-0.19 pp at horizon 2, CI: [-0.31, -0.07]), confirming that conventional monetary policy is effective in higher-Phi environments. Post-crisis economies display a trajectory from near-zero at early horizons to slightly negative at horizons 3 to 5, consistent with the gradual recovery of transmission efficiency. These results provide the strongest possible empirical case against the application of orthodox inflation targeting in FCS and early post-crisis environments: not only is the instrument ineffective, but in active conflict settings, there is evidence of a perverse effect that makes tightening actively harmful.

5. Conclusion and Policy Implications

5.1 Conclusion

This paper set out to examine the interdependent dynamics of food price volatility, inflation, and monetary policy transmission in Sub-Saharan Africa (SSA), conceptualised as a "triad of fragility," with particular emphasis on fragile and conflict-affected states (FCS) and post-crisis recovery economies. By integrating these three dimensions within a unified analytical and empirical framework, the study advances understanding beyond the fragmented approach that has characterised much of the existing literature.

The empirical evidence provides strong support for the central thesis that these three elements do not operate independently but instead form a mutually reinforcing system that amplifies macroeconomic instability in fragile environments. First, food price shocks are shown to exert a substantially larger and more persistent impact on headline inflation in FCS economies relative to stable counterparts. This amplification reflects a combination of structural factors, including higher food shares in consumption baskets, weaker domestic supply systems, and greater exposure to external shocks.

Second, the study demonstrates that monetary policy transmission is systematically impaired in fragile contexts, to the point of near-complete shutdown. The effectiveness of conventional policy instruments, particularly interest rate adjustments, is severely constrained by shallow financial systems, high informality, excess liquidity, and conflict-related disruptions to financial intermediation. Importantly, the results reveal that in such settings, monetary tightening may be ineffective or even counterproductive, with negligible or positive effects on inflation. This finding fundamentally challenges the applicability of orthodox inflation-targeting frameworks in fragile economies.

Third, the paper shows that the interaction between food price shocks and impaired transmission mechanisms gives rise to persistent inflation dynamics through strong second-round effects and expectations channels. In fragile environments, where institutional credibility is weak, agents rely heavily on observed food price movements as the anchor for inflation expectations, thereby reinforcing inflation persistence and undermining policy credibility.

A key contribution of the study is the identification of a dynamic recovery path in post-crisis economies. Transmission efficiency improves gradually following conflict resolution, but the process is slow and non-linear, requiring sustained institutional rebuilding over a prolonged horizon. While post-crisis economies exhibit partial restoration of monetary effectiveness, they remain vulnerable to the triadic feedback loop until financial deepening, reduced informality, and improved policy credibility reach threshold levels.

These findings underscore the inadequacy of a one-size-fits-all macroeconomic policy framework for SSA. The evidence supports a paradigm shift toward context-specific policy design that accounts for structural fragility. In FCS and early post-crisis settings, supply-side interventions, including food system stabilisation, infrastructure rebuilding, and financial sector development, must take precedence over demand-management policies. Monetary policy, while not irrelevant, should play a subordinate and carefully calibrated role until transmission mechanisms are sufficiently restored.

From a policy perspective, the study highlights the need for sequencing reforms in accordance with the stage of fragility. Immediate priorities in conflict settings should focus on stabilising food supply and preserving basic financial functionality, while medium-term strategies should emphasise financial inclusion, market development, and institutional strengthening. Only at later stages of recovery does the reintroduction of conventional monetary policy frameworks become appropriate.

The findings also have direct implications for international policy engagement, particularly the design of IMF-supported programmes. Incorporating transmission efficiency as an explicit policy target, extending engagement horizons, and differentiating inflation conditionality by source are critical steps toward aligning external support with the structural realities of fragile economies.

In conclusion, this paper demonstrates that the triad of fragility constitutes a binding constraint on macroeconomic stabilisation in SSA's most vulnerable economies. Breaking this cycle requires rethinking both the objectives and instruments of macroeconomic policy, with a shift away from conventional frameworks toward a more holistic approach that integrates structural, institutional, and sectoral dimensions. Future research could extend this framework by exploring micro-level transmission channels, the role of digital financial inclusion, and the interaction between fiscal dominance and monetary credibility in fragile states.

5.2 Policy Recommendations/Implications

The empirical findings of this study necessitate a decisive shift in the design and sequencing of macroeconomic policy in Sub-Saharan Africa's fragile and post-crisis economies. The evidence demonstrates that inflation in these contexts is predominantly driven by food price shocks with high pass-through and persistence, while the effectiveness of conventional monetary policy tools is severely constrained by weak or collapsed transmission mechanisms. In particular, the finding that monetary tightening has negligible or even positive effects on inflation in fragile and conflict-affected states (FCS) implies that orthodox inflation-targeting frameworks are misaligned with the structural realities of these economies. Accordingly, macroeconomic stabilisation must be reoriented away from a narrow focus on demand management toward a broader framework that prioritises structural interventions, especially in food systems and financial sector development.

A central policy implication of the results is that food system stabilisation must be treated as the primary instrument of inflation control in fragile settings. The analysis shows that food price shocks exert disproportionately large and persistent effects on headline inflation in FCS and post-crisis economies, reflecting high food shares in consumption baskets, weak domestic supply chains, and exposure to climate and exchange rate shocks. Moreover, food inflation is shown to transmit strongly into core inflation through expectations and second-round effects, reinforcing persistence. In this context, stabilising inflation requires policies that directly address food supply constraints rather than attempting to offset their consequences through monetary tightening. This includes investments in rural infrastructure and storage capacity to reduce post-harvest losses, the development of strategic food reserves to buffer temporary shocks, the facilitation of food imports during crisis periods through targeted trade policy adjustments, and the promotion of climate-resilient agricultural practices to mitigate rainfall-induced volatility. Such interventions target the root causes of inflation in fragile economies and can significantly attenuate both the magnitude and persistence of price shocks.

The findings further imply that monetary policy frameworks must be substantially redesigned in low-transmission environments. The evidence indicates that the interest rate channel, the principal mechanism of monetary policy in standard macroeconomic models, is structurally impaired in SSA, particularly in fragile states, owing to shallow financial systems, high informality, and excess liquidity in the banking sector. Consequently, increases in policy rates do not effectively dampen inflation and may instead impose output costs without delivering price stability benefits. In light of this, central banks in fragile and early post-crisis economies should avoid aggressive tightening in response to food-driven inflation and instead adopt a more flexible operational framework. This may include shifting emphasis from headline inflation targeting to monitoring core inflation trends, recognising the exogenous nature of food price shocks, and prioritising exchange rate stability and liquidity management as intermediate objectives. Such a recalibration allows monetary authorities to maintain macro-financial stability while avoiding counterproductive policy responses.

Closely linked to this is the imperative to restore monetary policy effectiveness through financial sector development. The study identifies monetary transmission efficiency (Φ) as a critical determinant of policy effectiveness and shows that it is systematically depressed in fragile settings due to structural factors such as high informality, limited financial inclusion, and the large share of bank assets held in government securities. Policy interventions must therefore focus on rebuilding the institutional and financial infrastructure required for effective transmission. This entails expanding access to formal financial services, particularly through digital and mobile banking platforms, strengthening credit allocation mechanisms to support private sector lending, and reducing the crowding-out effect of government borrowing on bank balance sheets. In parallel, efforts to formalise economic activity and improve regulatory frameworks will enhance the responsiveness of economic agents to monetary policy signals. These reforms are essential because the effectiveness of monetary policy appears to increase only after transmission efficiency crosses a critical threshold, beyond which policy rate adjustments begin to exert meaningful influence on inflation.

Another key implication of the findings concerns the management of inflation expectations in food-dominant economies. The results show that in fragile contexts, where institutional credibility is weak, agents rely heavily on observed food price movements as the primary anchor for expectations, leading to strong second-round effects and persistent inflation. This underscores the importance of strengthening policy communication frameworks and enhancing central bank transparency. Clear communication that distinguishes between food-driven and demand-driven inflation pressures, alongside gradual development of forward guidance mechanisms, can help anchor expectations and reduce the amplification of shocks. Additionally, integrating food price monitoring and climate indicators into inflation forecasting frameworks will improve the anticipatory capacity of policymakers and enable more timely responses to emerging vulnerabilities.

The results also highlight the importance of sequencing reforms in accordance with the stage of fragility or post-conflict recovery. The evidence indicates that monetary transmission efficiency improves gradually over time following conflict resolution, but the process is slow and requires sustained institutional rebuilding. In the immediate post-conflict phase, policy should prioritise restoring basic food supply systems and financial sector functionality, as these are prerequisites for any effective macroeconomic stabilisation. As recovery progresses, attention should shift toward rebuilding transmission mechanisms through financial deepening, reducing excess liquidity, and expanding inclusion. Only in the later stages of recovery, when transmission efficiency has sufficiently improved, does the reintroduction of conventional monetary policy frameworks, including inflation targeting, become appropriate. This staged approach ensures that policy instruments are deployed in a manner consistent with the underlying structural capacity of the economy.

Finally, the findings carry important implications for international financial institutions and external policy support frameworks. The evidence suggests that standard programme designs, particularly those emphasising short-term inflation targets and conventional monetary policy conditionalities, may be ill-suited to fragile contexts. Instead, external support should be reoriented toward longer-term engagement that prioritises structural reforms, including food system stabilisation and financial sector development. The positive association between IMF programme engagement and improvements in transmission efficiency further suggests that well-designed conditionality can play a constructive role in restoring policy effectiveness. However, this requires extending programme horizons beyond the typical three- to five-year window and incorporating metrics related to transmission capacity and structural resilience into programme evaluation frameworks.

In sum, the policy recommendations emerging from this study emphasise that inflation in fragile SSA economies is fundamentally structural rather than purely monetary in nature. Effective stabilisation therefore requires a coordinated strategy that integrates food system interventions, financial sector reforms, institutional rebuilding, and carefully calibrated monetary policy. Attempts to rely solely on conventional policy tools in the absence of supporting structural conditions are unlikely to succeed and may, in some cases, exacerbate macroeconomic instability.

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APPENDIX A

Table A1: Countries not included

S/No.	ISO3 / Country	Exclusion Category	Primary Exclusion Reason
1	**SOM — Somalia**	No central bank + IFS gaps	IFS CPI absent 2000–2009 (9 years of 23). Central Bank of Somalia non-operational until 2009; monetary policy instruments non-existent throughout the conflict period.
2	**SSD — South Sudan**	Insufficient time series	Independence in July 2011 yields only 12 annual observations (2011–2022).
3	**ERI — Eritrea**	IFS reporting gaps + isolation	Article IV consultations suspended 2009–2018. IMF IFS CPI series has gaps in 2006–2010 and 2014–2017.
4	**GNQ — Equatorial Guinea**	No independent monetary policy	Equatorial Guinea has no independent monetary authority or policy instrument.
5	**STP — São Tomé & Príncipe**	Micro-state + BCEAC proxy rates	Banco Central de São Tomé e Príncipe operates under a euro-peg via the dobra; No independent rate-setting capacity.
6	**COM — Comoros**	Euro-peg / no independent MP	Banque Centrale des Comores maintains a fixed peg to the euro via the franc comorien, under guarantee of the French Treasury (Accord de Coopération Monétaire). Policy rate effectively set by the ECB.
7	**DJI — Djibouti**	Full USD peg — no independent MP	Djibouti has maintained a hard peg to the US dollar at DJF 177.721 since 1973. The Banque Centrale de Djibouti has no independent policy rate; the effective rate equals the US Federal Funds Rate.
8	**CAF — Cent. Afr. Republic**	Extended IFS gaps during conflict	IFS CPI reporting suspended 2012–2016 during peak SELEKA/anti-BALAKA conflict. Five consecutive years of missing values in the dependent variable coincide with the most extreme conflict period.
9	**GNB — Guinea-Bissau**	BCEAO member — no independent MP	BCEAO member since 1997: same policy rate as BEN, BFA, CIV, MLI, NER, SEN, TGO. Guinea-Bissau has no independent monetary authority or policy instrument.
10	**ZWE — Zimbabwe**	Hyperinflation + dollarisation	Hyperinflation 2007–2009 (peak monthly rate ~79.6 billion percent in November 2008) distorts all IFS price series. Formal multi-currency dollarisation in 2009 eliminates monetary policy instruments entirely.

11	**SWZ — Eswatini**	De facto SARB monetary policy	The lilangeni is pegged 1:1 to the South African rand under the Common Monetary Area. The Central Bank of Eswatini has no independent rate-setting capacity; its policy rate tracks the South African Reserve Bank's repo rate with near-zero lag.

APPENDIX B: VARIABLE DEFINITIONS AND SOURCES

Table A1 provides complete definitions, units, transformation details, and primary sources for all 28 variables used in the empirical analysis. Variables marked 'Constructed' are derived from raw data using the procedures described in Section 3 and Appendix B.

Table A1: Complete Variable Definitions and Data Sources

Variable	Units	Definition and Transformation	Primary Source
$\pi\_headline$	% p.a.	Annual % change in headline CPI: 100 × ln(CPI_t / CPI_{t-1})	IMF IFS (PCPI_IX)
π_core	% p.a.	Annual % change in CPI excl. food & energy, same transformation	IMF IFS (PCPIE_IX)
π_food	% p.a.	Annual % change in food-only CPI sub-index	IMF IFS (PCPIF_IX)
$\Delta p^{w,f}$	% p.a.	Annual % change in FAO Global Food Price Index (FFPI, 2014-16=100)	FAO FAOSTAT
Δp^{fd}	% p.a.	Annual % change in domestic food consumer price index (2014-16=100)	FAO FAOSTAT (CP)
i	% p.a.	Central bank policy/discount/minimum lending rate, annual average	IMF IFS (FILR_PA)
r	% p.a.	Real policy rate: i minus π_headline	Constructed from IFS
e	LCU/USD	Annual average nominal exchange rate (local currency units per US dollar)	IMF IFS (ENDA)
Δe	% p.a.	Exchange rate depreciation: 100 × ln(e_t / e_{t-1}); positive = depreciation	Constructed from IFS
$RGDP$	Index	Real GDP, seasonally adjusted, rebased to 2015 = 100	IMF IFS (NGDP_R)
$ln(RGDP)$	Log	Natural log of real GDP index	Constructed from IFS
Output gap	Deviation	HP-filtered log real GDP (smoothing parameter λ = 6.25 per Hodrick-Prescott, 1997); unit: log deviation from trend	Constructed — HP filter on ln(RGDP)
credit_gdp	% of GDP	Domestic credit to private sector by banks as % of GDP	WB GFDD (GFDD.DI.01)
government securities	% of banking sector assets	Bank sector holdings of government securities as % of total banking sector assets	WB GFDD (GFDD.OI.02)
atm_per100k	Count	Automated teller machines per 100,000 adults	WB WDI (FB.ATM.TOTL.P5)
accounts_per 1k	Count	Deposit accounts at commercial banks per 1,000 adults	WB WDI (FI.ATM.TOTL.P5)
spread	pp	Lending-deposit interest rate spread; lending_rate − deposit_rate	WB WDI (FR.INR.LEND / DPST)
informality	% GDP	Size of the shadow economy as % of official GDP (MIMIC methodology)	Medina & Schneider (2018), IMF WP 18/17
rainfall_mm	mm/yr	Annual total precipitation, population-weighted country average from 0.5° × 0.5° grid	WB Climate Change Knowledge Portal (CCKP)
rainfall_anom aly	mm	Country-year deviation from country mean (2000–2022)	Constructed from CCKP

rainfall_shock	Std. dev.	Standardised rainfall anomaly: (rainfall − mean) / std. dev., by country	Constructed from CCKP
σ^f	pp	Food price volatility: 3-year backward-looking rolling standard deviation of Δp^{f,d}	Constructed from FAO
PT_LR	Elasticity	Country-specific long-run food price pass-through from ARDL(1,1): (β_0+β_1)/(1−ρ); delta method SE	Constructed — Stage 1
Φ (Phi)	[0,1]	Composite monetary policy transmission efficiency index: 0.5×FD + 0.25×(1−INF_n) + 0.25×(1−EL_n). See Appendix D.	Constructed — Stage 3
FD index	[0,1]	Financial development sub-index: equally weighted average of min-max normalised credit_gdp, atm_per100k, accounts_per1k	Constructed
ω (food share)	Fraction	Country-specific food share in CPI basket; from IMF country reports and WFP expenditure surveys; SSA median 0.52 applied where unavailable	IMF Country Reports / WFP
CFA	0/1	Binary indicator: = 1 if member of BCEAO or BEAC monetary union (14 countries)	Authors
us_ffr	% p.a.	US Federal Funds Rate, annual average of monthly observations	FRED (Federal Reserve Bank of St. Louis)
commodity_px	Index	Country-specific export-weighted commodity price index (2014-16=100), constructed from WB Pink Sheet commodity prices and IMF WEO export composition weights. See Appendix D.	WB Pink Sheet + IMF WEO
crisis	0/1	Binary indicator: = 1 for 2008, 2011, 2020, 2021, 2022 (global food/pandemic crises)	Authors

Notes: IFS = IMF International Financial Statistics; GFDD = WB Global Financial Development Database; WDI = World Development Indicators; FAO CP = FAO Consumer Prices database; CCKP = WB Climate Change Knowledge Portal; FRED = Federal Reserve Bank of St. Louis Economic Data. All monetary variables are in local currency units unless otherwise noted. The HP filter is applied separately to each country's time series using non-interpolated annual observations. Countries with fewer than 10 RGDP observations do not receive HP-filtered output gap estimates.

APPENDIX B: INDEX CONSTRUCTION DETAILS

B.1 Transmission Efficiency Index (Phi) Construction

Step 1 - obtain the three raw component series (private credit as a share of GDP (FD_1), deposit accounts per 1,000 adults (FD_2), and ATMs per 100,000 adults (FD_3) for the financial development sub-index; the Medina-Schneider informality estimate (INF); and banking sector holdings of government securities as a percentage of total bank assets (GS) from the GFDD[2].

Step 2 - normalise each series to [0,1] interval using global min-max scaling over the 36 countries, 2000–2022 panel:

$$X_{norm} = \frac{(X - X_{min})}{\left(X_{\max} - X_{min}\right)} \quad \text{(B1)}$$

For informality and banking sector holdings of government securities, the normalised series is inverted $(1 - x_{norm})$ before entering the index, so that higher values of all components uniformly reflect conditions more conducive to transmission.

Step 3 - construct the financial development sub-index FD as the equally weighted mean of the three normalised components, treating missing component values with pairwise available averaging:

$$FD_{it} = \frac{FD1_{norm_{it}} + FD2_{norm_{it}} + FD3_{norm_{it}}}{k_{it}} \quad \text{(B2)}$$

where k_{it} is the number of non-missing components for country i in year t.

Step 4 - construct the transmission efficiency index (Φ) as a weighted average:

$$\Phi_{it} = 0.50 \times FD_{it} + 0.25 \times (1 - INF_{norm_{it}}) + 0.25 \times (1 - GS_{norm_{it}}) \quad \text{(B3)}$$

Cells where all three components are missing are assigned the cross-country-year median of Φ (approximately 0.42) to maintain panel balance for the interaction terms. The weight of 0.50 on financial development reflects its empirically larger coefficient in the Stage 3 regressions (Table 4, column 2) relative to the other two components.

B.2 Commodity Export Price Index — Construction Protocol

[2]World Bank Global Financial Development Database.

The country-specific commodity export price index is constructed to capture the export-side terms-of-trade shock associated with global commodity price movements, which serves as an instrumental variable for domestic monetary policy in the system-GMM. The construction follows a two-step procedure. Step 1 retrieves annual commodity price series for 11 commodities — crude oil, cocoa, coffee (arabica), gold, copper, cotton, maize, wheat, rice, sugar, and tobacco — from the World Bank Pink Sheet, indexed to 2014–2016 = 100. Step 2 applies country-specific export composition weights derived from IMF WEO commodity export data:

$$CX_{it} = \Sigma_k w_{ik} \times P_{kt} \tag{B4}$$

where w_{ik} is the share of commodity k in country i's total merchandise exports (time-averaged over the sample period, from IMF WEO country desks), and P_{kt} is the Pink Sheet price index for commodity k in year t. For non-commodity-exporting economies (where $\Sigma_k w_{ik}$ < 0.01), the index is set to the unweighted geometric mean of all 11 commodity price series, a conservative approach that assigns minimal instruments variation to these countries.