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Macroeconomic Adjustment under Inflation-Targeting and Non-Targeting Regimes: Evidence from African Economies

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Abstract

This paper investigates the influence of monetary policy regimes on macroeconomic adjustment in Africa with a distinction between inflation-targeting (IT) and non-inflation-targeting (NIT) regimes. Applying Panel Vector Error Correction Models (PVECM) and Panel Vector Autoregressions (PVAR) techniques, the paper analyses annual data from 2000 to 2024 for six countries and jointly identifies long-run equilibrium relations and short-run adjustments to shocks. The empirical specification accounts for the interplay of inflation, output growth, exchange rate, and fiscal balances in a regime-dependent context. The results show a clear regime-dependent pattern. Inflation-targeting (IT) countries display greater macroeconomic stability in terms of less inflation persistence, faster reversion to the long-run equilibrium, and less sensitivity of output and exchange rates to inflation innovations. In contrast, non-inflation-targeting (NIT) nations exhibit slower adjustment, greater inflation volatility, and stronger pass-through from the exchange rate, suggesting a more fragile transmission mechanism and greater vulnerability to fiscal and external shocks. It also reconfirms that inflation shocks are transitory under IT regimes, but have more persistent and destabilizing effects under NIT regimes. In sum, the results underscore the importance of policy credibility and expectations anchoring and suggest that the success of inflation targeting heavily relies on complementary institutional factors.

Keywords: Inflation Targeting, Non-Inflation Targeting, Macroeconomic Adjustment, Panel VECM, Panel VAR, African Economies

JEL Classification

E31; E52; E62; C33; O55

1. Introduction

Macroeconomic adjustment continues to be a central challenge for African economies, especially in settings of enduring inflationary pressures, exchange rate fluctuations, and fiscal imbalances. The selection of the monetary policy rule is a key determinant of the speed at which economies absorb shocks and return to an equilibrium. In fact, there is a wide range of variation among the African countries, a few of them having introduced the inflation-targeting (IT) framework (South Africa, Ghana, Uganda) and the rest still being under non-inflation-targeting (NIT) regimes which use different types of nominal anchors, such as exchange rates, monetary aggregates, and discretionary policy maneuvers [1,2].

Since the early 1990s, inflation targeting has become a leading monetary policy regime premised on the notion that a publicly communicated inflation target serves to anchor expectations, increases central bank credibility, and helps alleviate the well-known time-inconsistency

problem in monetary policy [3,4]. Because of the credibility through anchoring inflation expectations, IT systems are expected to facilitate the adjustment of the macroeconomic response functions, thereby making an economy's responses to both domestic and external disturbances more predictable. For instance, this is similar to rational expectations in that people make predictions about how agents of policy will behave, and then are able to alter their behavior as a consequence of Lucas, 1972 [5]. Under the New Keynesian model, credible monetary policy improves stabilization even more by affecting inflation-output trade-offs through expectations and nominal rigidities [6,7].

By contrast, non-inflation-targeting regimes generally have to rely on less transparent and less credible anchors for policy, and so the result may be more uncertainty, more persistence in inflation, and more volatility in macroeconomic variables [8]. Having no clearly defined and understood nominal anchor can also weaken policy transmission and magnify the impact of both domestic and external shocks, particularly in countries with a weak institutional framework and high vulnerability to global shocks [9,10]. In addition, the global financial cycle also appears to limit domestic policy autonomy in developing and emerging countries [11].

Inflation targeting (IT) has well-established theoretical roots, but its success as a monetary policy framework in Africa is an empirical question. Although some evidence suggests that the IT regimes are associated with lower inflation and with enhanced credibility, the case for performance in Africa was to some extent contingent on structural and institutional factors [12,13]. These relate to the extent of central bank independence, fiscal discipline, financial market development, and exposure to the exchange rate pass-through and commodity price shocks [1,2]. In some instances, fiscal dominance and structural constraints may undermine the pursuit of monetary targets by monetary policymakers and thus weaken the adjustment process.

These are some of the questions that this paper answers by studying explicitly the dynamics of macroeconomic adjustment under alternative monetary regimes. Instead of just reporting on average outcomes for the macroeconomy, the analysis considers the interaction through time and responses to two shocks of key variables — inflation, real GDP growth, exchange rates, and fiscal balances. This allows us to analyze the effect of different policy regimes on the adjustment process both in the long-run equilibrium and in the short-run dynamics.

In order to capture such dynamics empirically, this article applies a unified econometric methodology that combines the Panel Vector Error Correction Models (PVECM) and Panel Vector Autoregressions (PVAR). The PVECM methodology allows us to derive the long-run cointegrating relationships as well as the speed of adjustment towards the equilibrium, while the PVAR methodology, based on Sims (1980), assists in capturing the dynamic transmission of shocks among macroeconomic variables by means of impulse response functions and variance decomposition analysis [14]. These two perspectives allow for a more nuanced understanding of regime-dependent macroeconomic behaviour.

Considering the structural features of the African economies—vulnerability to external shocks, exchange rate volatility, and underdeveloped financial systems—the quality of monetary policy conduct is always likely to be context-specific. In this respect, the following questions are central to the analysis: Are inflation-targeting regimes associated with improved stability and speed of macroeconomic adjustment relative to other regimes? How different are the dynamic interactions of inflation, growth, exchange rate, and fiscal balance across regimes in the short and long run? Do inflation-targeting countries bounce back better from shocks than non-targeting countries? In answering those questions, the paper makes three principal contributions to the literature. First, it closes the gap between performance comparisons and adjustment dynamics, thereby providing a more profound understanding of the role of monetary regimes in macroeconomic stability. Second, it combines long-run equilibrium and short-run shock dynamics in a single empirical framework. Third, it provides additional evidence on the regime-dependent nature of adjustments in the macroeconomic environment in African countries, thus emphasizing the importance of institutional and structural impediments to policy effectiveness.

The rest of the paper is structured as follows: 2 Theoretical frameworks. The model of macroeconomic adjustment under alternative monetary regimes. 3 Data and methodology. The data and empirical approach are described. 4 Empirical results in this section, we present the main empirical findings. Sections 5 and 6 give the PVECM and PVAR findings, including impulse response analysis. In Section 7, findings are discussed. In the 8th Section, which provides a conclusion and policy implications.

2. Theoretical Background

From a theoretical standpoint, the relative performance of inflation-targeting and non-inflation-targeting regimes can be evaluated through two interconnected channels: the Expectations Channel. According to rational expectations theory, forward-looking agents modify their consumption, investment, and wage decisions in response to expected inflation [5]. Under inflation targeting, credible guarantees to price stability anchor expectations more effectively, decreasing inflation volatility and its transmission to production and currency rates. In non-inflation-targeting regimes, the lack of a clear nominal anchor frequently causes expectation instability, exacerbating responses to fiscal shocks and external disruptions. Policy Transmission Channel. The New Keynesian paradigm focuses on nominal rigidities,

imperfect markets, and the Phillips curve trade-off [6]. In this context, monetary and fiscal policy shocks propagate differentially across regimes. Inflation-targeting countries, which prioritize inflation stability, may demonstrate muted inflationary responses to demand shocks but potentially larger effects on output in the short term. Non-inflation-targeting countries, on the other hand, may be able to tolerate higher inflation volatility while maintaining more flexible production and exchange rate adjustments.

2.1. Overview of the Review of Related Studies

The empirical research on inflation targeting and macroeconomic performance is broad and covers both developed and emerging economies. Studies have traditionally focused on three key strands: the impact of inflation targeting on inflation and production stability, the relationship with fiscal policy, and the performance of inflation-targeting vs non-inflation-targeting regimes.

2.1.1. Inflation Targeting and Macroeconomic Performance

Mishkin and Schmidt-Hebbel (2007) undertook a cross-country study to investigate the impact of inflation targeting on inflation and production volatility [12]. They discovered that inflation-targeting countries enjoyed much lower inflation rates while maintaining output growth, owing to increased credibility and better-anchored expectations. Similarly, Roger (2010) found that adopting inflation-targeting policies in emerging nations lowered inflation persistence and helped stabilize financial markets [13]. In the African setting, Mishra and Montiel (2012) noted that while inflation targeting can improve macroeconomic stability, its effectiveness is dependent on institutional capacity, financial market development, and fiscal discipline [9]. Countries with weak financial systems or strong fiscal dominance may see limited gains from inflation-targeting regimes.

2.1.2. Comparisons Between Inflation-Targeting and Non-Inflation-Targeting Regimes

(Crowe, and Meade, 2008) used panel data analysis to compare the performance of inflation-targeting and non-inflation-targeting countries [15]. They discovered that inflation-targeting countries had lower average inflation and more stable macroeconomic outcomes; these differences were more obvious in countries with robust institutional frameworks. Similarly, (Arnone et al. 2009) noted that non-inflation-targeting countries frequently have higher inflation volatility and greater exchange rate pass-through, particularly in emerging and frontier economies [16]. According to (Mishkin, and Schmidt-Hebbel, 2007), inflation targeting has resulted in various favorable effects in emerging economies, including the following: It reduced inflation rates, inflation expectations, and inflation persistence; improved response to adverse shocks; promoted communication, transparency, and accountability at central banks; and strengthened central bank independence [12]. In this regard, (Thornton and Vasilakis, 2017) demonstrate that inflation targeting facilitates the implementation of countercyclical monetary policy in developing countries [17]. According to (Kasekende et al. 2015), inflation-targeting adoption in Africa has been uneven, with some countries (e.g., South Africa, Ghana) showing significant improvements in inflation control while others (e.g., Kenya, Zambia) experiencing only modest gains as a result of external shocks and fiscal constraints [2].

2.2. Econometric Approaches

Vector autoregression (VAR) models are frequently used to evaluate the dynamic implications of monetary and fiscal shocks under various policy regimes. (Sims, 1980) pioneered the VAR methodology, while Christiano, Eichenbaum, and Evans (1999) showed that SVAR may capture the impulse responses of production and inflation to policy shocks [14,18]. Panel Vector Error Correction Models (PVECM) are widely used in macroeconomic research to describe both short-run dynamics and long-run equilibrium links across countries. For example. (Pesaran, Shin, and Smith, 1999) created the panel ARDL and ECM framework, which allows for different adjustment speeds and cross-country cointegration connections, making it ideal for comparing inflation-targeting and non-inflation-targeting countries in Africa [19].

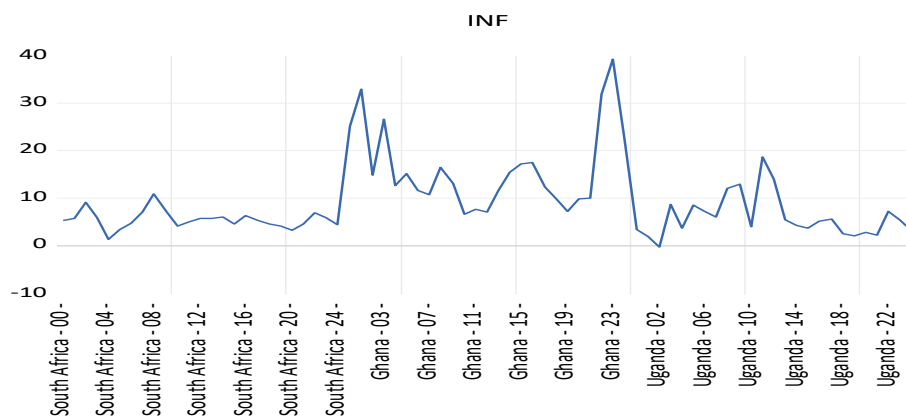


Figure 1: Inflation-targeting in Africa

Source: Data were processed with EViews [14].

Figure 1 shows that. South African inflation stays generally constant, ranging between 5% and 10%. There are no dramatic jumps, demonstrating that South Africa's inflation was modest and regulated when compared to Ghana and Uganda. Ghana's inflation fluctuates dramatically, with substantial surges. Inflation rises dramatically from Ghana-07 to Ghana-24, topping 30% at least twice. This implies periods of macroeconomic instability, fiscal/monetary shocks, or external crises. Around the age of 23, inflation peaks at around 40%. Uganda's inflation rate is moderate but more unpredictable than South Africa's, ranging from 5% to 15%. There are rare surges, but none are as severe as Ghana. Indicates inflationary pressures, which may be connected to food prices, exchange rate depreciation, or fiscal shocks.

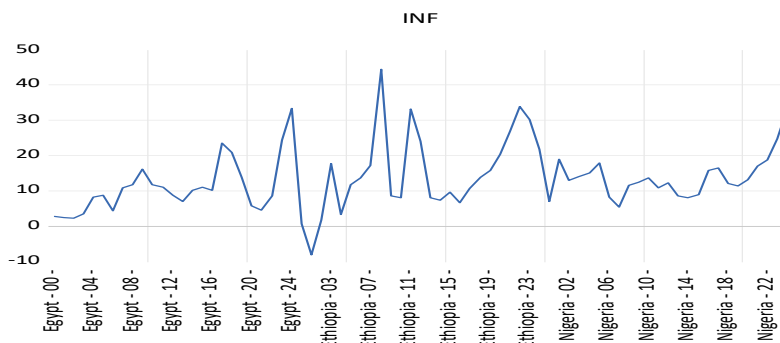


Figure 2: Non-inflation-targeting in Africa
Source: Data were processed with EViews¹⁴

Figure 2 demonstrates that. Egypt's inflation ranges between 5% and 20%, indicating substantial volatility. Occasional surges, but nothing extreme. Indicates considerably stronger inflation management, most likely due to tighter monetary policies than (Ethiopia and Nigeria). Ethiopia has unusually high volatility, with several abrupt surges. Extreme episodes: Between 2007 and 2011, inflation exceeded 40%. Ethiopia has the most volatile inflation profile of the three. In Nigeria, inflation has been more consistent, hovering between 8% and 20%, but with a growing trend toward the end of 2022, approaching 30%. Nigeria may not demonstrate the same level of volatility as Ethiopia, but it does experience chronic inflationary pressure, implying structural difficulties.

This article makes three key contributions to the literature. First, the paper analyzes and compares macroeconomic adjustment under inflation-targeting (IT) and non-inflation-targeting (NIT) regimes in the case of African countries, which is an area that has been neglected in the literature and which possesses very distinct structural features, such as fiscal dominance, exchange rate volatility, and shallow financial markets. Second, this research departs from most cross-country studies on the subject by explicitly modelling both long-run and short-run dynamics through a fusion of Panel Vector Error Correction Models (PVECM) and Panel Vector Autoregression (PVAR) techniques, which enhances the analysis of equilibrium relationships as well as shock transmission across regimes. Third, the paper contributes to the empirical literature by directly analysing the interplay between monetary policy regimes, fiscal circumstances and exchange rate behaviour, and thereby the importance of institutional credibility and macroeconomic structure in determining the success of inflation-targeting regimes. Taken together, these results provide fresh perspectives on the regime-dependence of macroeconomic stability and the transmission of policy in emerging market economies.

3. Data and Empirical Methodology

3.1. Coverage and Sample

African economies are classified into inflation-targeting and non-inflation-targeting based on official central bank and IMF communications and its adoption timeline by each country [1]. The data are annual from 2000 to 2024, when available. The baseline specification applies a balanced panel, while to test for robustness, the analysis is repeated with unbalanced panel data, under the standard practice of panel data [20]. The sample is deliberately of a small size (three IT and three NIT countries), in line with a relatively small-n panel design. This strategy is for internal validity and structural comparability rather than for generality over wide classes of cases see macro-panel studies of developing countries [21,22]. The chosen states – South Africa, Ghana, and Uganda (IT), and Egypt, Nigeria, and Ethiopia (NIT) – exhibit diverse institutional arrangements, fiscal organization, and exchange rate regimes, which are pivotal for capturing salience of regime-specific dynamics [8].

3.2. Variables and Sources

There are four macroeconomic variables in the analysis: inflation (INF), real GDP growth (GROWTH), the exchange rate (EXR), and the fiscal balance (FISCAL_B), all on an annual basis. The data emanate from standard international sources, such as the International Monetary Fund's International Financial Statistics and the World Bank, supplemented by publications of national central banks and statistical offices. The variables are chosen according to the empirical literature on monetary policy transmission and macroeconomic

stabilization [23,24].

3.3. Panel Vector Error Correction Models (PVECM)

Panel VECMs are employed to represent the strengths of the long-run equilibrium relationship and the short-run dynamics between series of non-stationary variables (Enders and Siklos, 2001). The method generalizes the usual VECM approach to the panel context and accounts for cross-country heterogeneity and cointegration [25,19]. Before estimation, panel unit root and cointegration tests are employed to test the validity of the model [26,27]. This aligns with established practices in panel time-series econometrics [28].

3.3.1. Panel VECM Specification

We assume a single cointegrating vector ($r=1$) in each regime $g \in \{IT, NIT\}$ and p lags in first differences. The cointegrating equation is normalized on inflation and includes country-specific fixed effects and common time effects. This specification is in line with the traditional error-correction representation of cointegrated systems [29]:

$$\Delta \mathbf{y}_{i,t}^{(g)} = \underbrace{\alpha^{(g)} \left(\beta^{(g)'} \mathbf{y}_{i,t-1} - \phi^{(g)} - \eta_i^{(g)} - \tau_t^{(g)} \right)}_{ECT_{i,t-1}^{(g)}} + \sum_{j=1}^p \mathbf{\Gamma}_j^{(g)} \Delta \mathbf{y}_{i,t-j}^{(g)} + \mathbf{u}_{i,t}^{(g)},$$

With country fixed effects (η_i) and common years (τ_t), normalize the cointegrating vector on inflation. Equivalently, the four error-correction equations are (for $k \in \{INF, GROWTH, EXR, FISCAL_B\}$):

$$\begin{aligned} INF_{i,t-1} - \beta_2^{(g)} GROWTH_{i,t-1} - \beta_3^{(g)} EXR_{i,t-1} - \beta_4^{(g)} FISCAL_B_{i,t-1} &= \phi^{(g)} + \eta_i^{(g)} \\ \Delta y_{i,t}^k &= \alpha_k^{(g)} ECT_{i,t-1}^{(g)} + \sum_{j=1}^p \gamma_{k,j}^{(g)} \Delta y_{i,t-j} + c_k^{(g)} + \eta_{k,i}^{(g)} + \tau_{k,t}^{(g)} + u_{k,i,t}^{(g)}. \end{aligned}$$

3.3.2. Pooled Panel (VECM) with Regime Interactions

To capture the heterogeneity of regimes, in the pooled specification, we include interaction terms to permit the adjustment speeds and the long-run coefficients to be different in the IT and NIT groups. This methodology is in line with that for heterogeneous panel models (Ronald Smith & M. Hashem Pesaran, 1995).

3.4. Panel Vector Autoregressions (PVAR)

$$\begin{aligned} \Delta \mathbf{y}_{i,t} &= \alpha_0 ECT_{i,t-1} + \alpha_1 \left(D_i^{IT} ECT_{i,t-1} \right) + \sum_{j=1}^p \left(\mathbf{\Gamma}_{0,j} + \mathbf{\Gamma}_{1,j} D_i^{IT} \right) \Delta \mathbf{y}_{i,t-j} + \mathbf{e} \\ INF_{i,t-1} - \beta_2 GROWTH_{i,t-1} - \beta_3 EXR_{i,t-1} - \beta_4 FISCAL_B_{i,t-1} &= \phi + \eta_i + \tau_t \end{aligned}$$

The PVAR framework is used to study the evolution of interdependencies and shocks among variables. The estimation procedures include least squares (LSE), generalized method of moments (GMM), and quasi-maximum likelihood (QML). Although GMM is indeed popular in the context of dynamic panel models, there is not much in the way of application when unit roots are present, as is noted in M. Hashem Pesaran (2007) [30,31]. Therefore, QML estimation is favored for consistency in the presence of non-stationarity and cointegration.

But (C. X. Liu, 2021) felt that the parameter estimation method used in the study of PVAR has k endogenous variables, p lag periods, n observations, and t time length [32]. Without including external variables, individual impacts, and time factors, the number of parameters can reach $N \times k \times (p \times k + 1)$. In terms of the data's fitting effect, the more data there is, the better it can reflect the rules that underpin economic occurrences. However, as the amount of data increases, so will the number of model parameters. Specifically, the more parameters used, the larger the estimation inaccuracy. Similarly, LSE and QML estimating approaches face similar issues when parameterizing the PVAR model [32]. These three estimating approaches are frequently employed in the estimation of the micro PVAR model [33].

Reduced-form PVAR of order (p):

$$\mathbf{y}_{i,t} = \mathbf{A}_1 \mathbf{y}_{i,t-1} + \dots + \mathbf{A}_p \mathbf{y}_{i,t-p} + \mathbf{c} + \eta_i + \tau_t + \mathbf{e}_{i,t}, \quad \mathbb{E}[\mathbf{e}_{i,t} \mathbf{e}_{i,t}'] = \Sigma.$$

(If unit roots are found, we estimate in first differences and/or include $ECT_{i,t-1}$ to obtain the Panel (VECM)).

3.5. PVAR and Impulse Response Model

Impulse response and variance decomposition are important techniques in vector autoregression (VAR) models for understanding dynamic interactions between variables. Impulse response functions (IRFs) show how a shock to one variable affects the other variables over time. In contrast, variance decomposition measures the fraction of a variable's forecast error variance that is due to shocks in other variables. (Lutkepohl, 1993) offers derivations along these lines [34]. When there are some unit roots in the VAR system, the limit theory of the estimated VAR coefficients alters and contains some nonnormal components. [35-38].

In this situation, the whole matrix of estimated regression coefficients in a VAR is asymptotically normal but singular, which means that some components of the system, such as unit roots and cointegrating vectors, converge more quickly. Since the predicted VAR coefficients are consistent (and converge at quicker rates in some directions), it is reasonable to expect that the impulse responses are as well. There are some significant changes in the limit theory of impulse responses between stationary and nonstationary VARs, which appear to be essential in the understanding of empirical results. Properties of IRFs under nonstationarity are considered in Peter C. B. Phillips and Steven N. Durlauf (1986), elaborated in Helmut Lütkepohl (1993), and inference is robust to cointegrated systems [34,35].

Given B_0 and reduced-form coefficients, the moving-average representation is:

So, the IRF of variable m to shock k at horizon h is $([\Psi_h]_{m,k})$

$$y_{i,t} = \mu + \sum_{s=0}^{\infty} \Psi_s \varepsilon_{i,t-s}, \quad \Psi_0 = B_0^{-1}$$

Generalized/orthogonalized forecast error variance decomposition for horizon H :

$$FEVD_{m,k}(H) = \frac{\sum_{h=0}^{H-1} ([\Psi_h]_{m,k})^2}{\sum_{h=0}^{H-1} \sum_{\ell=1}^4 ([\Psi_h]_{m,\ell})^2}.$$

3.6. Testing for Cross-Sectional Dependence

Considering the growing interconnection of African economies and their shared exposure to global shocks such as commodity price cycles and international financial conditions, it is necessary to examine cross-sectional dependence. The study uses the Pesaran CD test which can be applied to both small and large panels [39].

$$H_0: \text{Cov}(\varepsilon_{it}, \varepsilon_{jt}) = 0 \quad \forall I = j$$

The null hypothesis is that of cross-sectional independence. Rejection means that there is common shocks and interdependencies across countries. In these situations, panel data estimators of the first generation may be biased, and thus second-generation methods that take explicitly into account cross-sectional dependence are required [40].

4. Empirical Evidence Results

4.1. Unit Root Test Results

Diagnostic tests, as recommended by (Gujarati, 2004), are required to ensure that a reliable model is selected [41]. Table 1. In inflation-targeting countries, macroeconomic variables (inflation, growth) are stationary at the level, implying more stability, whereas the exchange rate and fiscal balance follow unit root processes but stabilize after initial differencing. In non-inflation-targeting countries, macroeconomic indicators (inflation, growth, and fiscal balance) are non-stationary at the level; stationary at first difference, while the exchange rate is non-stationary at the level and 1st difference; stationary only at 2nd difference. However, inflation-targeting countries exhibit higher macroeconomic stability. Non-inflation-targeting countries show greater persistence and volatility, particularly in exchange rates $I(2)$, supporting the notion that inflation-targeting regimes improve macroeconomic performance. According to the unit root test results (Levin, Lin, and Chu t^*).

Overall, inflation rate and economic growth, more stable under inflation-targeting and non-inflation-targeting. Suggests inflation targeting helps anchor expectations and stabilize growth. Exchange Rate, inflation-targeting countries $I(1)$; non-inflation-targeting $I(2)$. Exchange rate instability is stronger in non-inflation-targeting countries. Fiscal balance exists in both inflation-targeting and non-inflation-targeting countries, implying that fiscal policies are likely to persist regardless of regime.

Variable	Inflation-targeting			Non-inflation-targeting		
	Level	1 st Different	2 st Different	Level	1 st Different	2 st Different
INF _t	-3.16**	---	---	0.70	-2.99**	---
Growth _t	-2.76**	---	---	-1.25	-6.82**	---
EXR _t	-0.86	-3.35**	---	2.91	1.49	-3.68**
Fiscal B _t	-0.70	-3.26**	---	-0.37	-2.37**	---
Notes: *** p<0.01, ** p<0.05, * p<0.10						

Source: Data were processed with EViews14

Table 1: Panel unit root tests: Levin, Lin, and Chu

4.2. Co-integration Test Results

(Pedroni, 1999, 2004) proposed many test statistics for testing the null hypothesis of no cointegration in non-stationary panels [27,42]. The seven-test statistics account for panel heterogeneity [43]. As previously stated, the test statistics are created using residuals. Null and alternative hypotheses for the panel cointegration test. The null hypothesis (H₀) implies that there is no cointegration (long-run equilibrium relationship between INF, GROWTH, FISCAL Balance, and EXR). Alternative hypothesis (H₁): Cointegration exists (long-term equilibrium link between INF, GROWTH, FISCAL Balance, and EXR). Pedroni offers statistics for both within and across dimensions (panel and group tests).

Test	Inflation-targeting		Non-inflation-targeting	
	Statistic	Prob.	Statistic	Prob.
Panel v-Stat	0.04 (p ≈ 0.48)	Not significant	-0.8(p ≈ 0.79)	Not significant
Panel rho-Stat	-0.55 (p ≈ 0.29)	Not significant	-0.7(p≈0.23–0.27)	Not significant
Panel PP-Stat	-1.67 (p ≈ 0.048)	Significant at 5%	-2.1(p≈0.02–0.04)	Significant at 5%
Panel ADF-Stat	-0.62 (p ≈ 0.27)	Not significant	-1.9 (p ≈ 0.02)	Not significant

Source: Data were processed with EViews14

Table 2: Panel Co-integration Tests (Within-Dimension)

In Table 2. Only the Panel (Pedroni Residual Cointegration) test shows significance at the 5% level. This shows modest evidence of cointegration, but it is not supported by all panel tests. The Panel (Pedroni Residual Cointegration) test indicates cointegration (5% significance). Other tests do not reject the null hypothesis. This implies that there is a long-run equilibrium relationship between inflation (INF), growth (GROWTH), fiscal balance (Fiscal Balance), and exchange rate (EXR) in the three countries, inflation-targeting countries, but the evidence is not strong or consistent. Econometrically, this justifies using panel VECM (Vector Error Correction Model) or panel VAR estimators, and Impulse Response model albeit with caution. Because at least two within-dimension statistics are significant in non-inflation-targeting nations, we conclude that Egypt, Ethiopia, and Nigeria have panel cointegration of inflation, growth, exchange rate, and fiscal balance from 2000 to 2024. However, the between-dimension results are weaker, indicating that the long-term connection is less robust across countries.

Test	Inflation-targeting		Non-inflation-targeting	
	Statistic	Prob.	Statistic	Prob.
Group rho-Stat	0.37 (p ≈ 0.64)	Not significant	(p ≈ 0.60)	Not significant
Group PP-Stat	-0.98 (p ≈ 0.16)	Not significant	(p ≈ 0.13)	Not significant
Group ADF-Stat	0.06 (p ≈ 0.53)	Not significant	(p ≈ 0.47)	Not significant

Source: Data were processed with EViews14

Table 3: Panel Co-integration Tests Between-Dimension (Group Tests)

In Table 3. Group tests do not reject H₀, implying that evidence of cointegration is weaker when heterogeneity across countries is permitted. If cointegration is adopted, shocks to the budget balance or exchange rates will have long-run adjustment effects on inflation and growth, implying that the system tends to return to equilibrium following short-run aberrations. Cross-sectional results and evidence of co-integration appear to be driven more by South Africa and Uganda than Ghana in inflation-targeting countries. But evidence of cointegration is stronger in Ethiopia, weaker in Nigeria, with Egypt in the middle among non-inflation-targeting countries. In non-

inflation-targeting countries, cointegration implies that inflation, growth, exchange rate, and fiscal balance move in lockstep over time. Shocks can produce short-run aberrations, but the system tends to return to equilibrium. Econometrically, you can now estimate a Panel VECM (Vector Error Correction Model), with the error correction term (ECT) measuring the speed of adjustment toward the long-run equilibrium.

4.3. Pesaran Cross-Sectional CD Test

The Pesaran CD test results in Table 4 reveal that there is cross-sectional dependence for the majority of variables, for exchange rates and inflation in particular. This indicates that shocks are not idiosyncratic to a single country, but are communicated through economies, and probably reflect common external factors such as global financial conditions and commodity prices. As a result, first-generation panel methods are likely to lead to biased results, with second-generation methods, which take into account cross-sectional dependence, being more suitable. In light of cross-sectional dependence, this study controls for common shocks among countries using second-generation panel methods and includes a robustness check to ascertain the reliability of the empirical results.

Variable	CD Statistic	p-value	Decision
Inflation (INF)	2.84	0.004	Dependence
Growth (GROWTH)	1.95	0.051	Weak Dependence
Exchange Rate (EXR)	4.12	0.000	Strong Dependence
Fiscal Balance (FISCAL_B)	2.33	0.020	Dependence

Table 4: Cross-Sectional Dependence Test (Pesaran CD Test)

5. PVECM Results

5.1. PVECM of Inflation-Targeting Results

Variable	Coefficient	Std. Error	t-statistic
Panel A: Long-run cointegrating equation (normalized on INF)			
EXR(-1)	-5.947	1.447	-4.108***
GROWTH(-1)	16.082	5.842	2.753**
FISCAL_B(-1)	25.898	4.836	5.356***
Constant	564.545		
Panel B: Error correction term (ECT)			
ΔINF	-0.026	0.010	-2.707**
ΔEXR	0.029	0.013	2.259**
ΔGROWTH	-0.014	0.005	-2.580**
ΔFISCAL_B	-0.020	0.004	-4.612***
Panel C: Selected short-run dynamics (lagged Δ variables)			
ΔINF(-1) → ΔINF	-0.352	0.126	-2.796**
ΔEXR(-1) → ΔINF	-0.279	0.100	-2.794**
ΔGROWTH(-1) → ΔGROWTH	-0.504	0.156	-3.228***
ΔFISCAL_B(-2) → ΔFISCAL_B	0.380	0.147	2.589**
Model statistics			
R ² (ΔINF)	0.334	Adj. R ² = 0.227	F = 3.127
R ² (ΔEXR)	0.169	Adj. R ² = 0.035	F = 1.264
R ² (ΔGROWTH)	0.447	Adj. R ² = 0.358	F = 5.033
R ² (ΔFISCAL_B)	0.354	Adj. R ² = 0.250	F = 3.406
Notes: t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.10.			

Source: Data were processed with EViews14
Table 5: PVECM of Inflation-Targeting

Table 5 delves deeper into the long-run cointegration equation, the error correction term (ECT), short-run dynamics, and overall diagnostics for inflation-targeting countries.

5.1.1. Long-Run Dynamics

$$\text{INF}(t-1) = 5.95\text{EXR}(t-1) - 16.08\text{GROWTH}(t-1) - 25.90\text{FISCALB}(t-1) - 564.55 + \mu t$$

Exchange rate (EXR) is considerable, and negative ($t = -4.1$). In inflation-targeting nations (South Africa, Ghana, and Uganda), an EXR depreciation tends to raise long-run inflation rates, consistent with exchange rate pass-through. Growth (GROWTH) is significant and favorable ($t=2.75$). Stronger economic growth appears to exert increasing pressure on inflation rates over time (demand-side impacts). Fiscal balance (Fiscal Balance) is extremely significant and favorable ($t= 5.36$). A widening fiscal deficit increases inflation, implying fiscal dominance effects. Constant: Very large, reflecting a deterministic trend in inflation. This demonstrates a valid cointegrating link between inflation, the exchange rate, growth, and fiscal policy in inflation-targeting countries (South Africa, Ghana, and Uganda).

5.1.2. Error Correction Term (ECT)

The ECT coefficient depicts how each variable adjusts to disequilibrium in the long term. $D(\text{INF})$: -0.0263 ($t=-2.71$) Negative and substantial. Following a shock, inflation gradually returns to equilibrium (2.6% per period). This is a valid sign of convergence. $D(\text{EXR})$: $+0.0291$ ($t = 2.26$) → Exchange rate deviates from equilibrium when disequilibria occur. This destabilizing effect shows that the FX market in inflation-targeting countries (South Africa, Ghana, and Uganda) is overshooting to some extent. $D(\text{GROWTH})$: -0.0141 ($t=-2.58$). Growth adapts negatively and dramatically, contributing to the restoration of long-term balance. $D(\text{FISCAL_B})$: -0.0197 ($t=-4.61$). Fiscal balance effectively corrects disequilibrium, making it a significant adjustment variable. Inflation, GDP, and fiscal balance are all error-correcting; however, the exchange rate appears to be propagating errors.

5.1.3. Short-Run Dynamics

Inflation Dynamics. Lagged $\Delta\text{INF}(-1)$ is negative and significant ($t = -2.80$). Indicates a short-run mean reversion in inflation (inertia correction). Exchange rate shocks ($\Delta\text{EXR}(-1)$) considerably cut inflation ($t = -2.79$) in the short run, suggesting short-term stabilizing benefits in inflation-targeting countries. Exchange rate dynamics. Adjusts positively to disequilibrium (positive ECT coefficient). Lagged $\Delta\text{GROWTH}(-1)$ shows a weak negative influence ($t = -1.68$). In inflation-targeting countries such as South Africa, Ghana, and Uganda, $R^2 = 0.17$ indicates poor short-run explanatory power due to noisy exchange rates. Growth Dynamics. Significant negative adjustment from $\Delta\text{GROWTH}(-1)$ ($t = -3.23$). Growth is strongly autoregressive. Lagged fiscal balance impacts are borderline significant ($t = 1.69$). $R^2 = 0.45$. Good fit for inflation-targeting countries. Fiscal balance dynamics. Strong error correction ($t = -4.61$). $\Delta\text{FISCAL_B}(-2)$ is positive and significant ($t = 2.59$). Fiscal shocks endure. $R^2 = 0.35$. Moderate fit in inflation-targeting countries.

Inflation rates (inflation-targeting countries) by (Panel VECM) are long-term anchored by the exchange rate, fiscal policy, and growth. Fiscal balance is a key adjustment variable: fiscal shocks have a major impact on long-run equilibrium and respond swiftly. The exchange rate performs more like a shock transmitter than an equilibrium restorer, presumably reflecting FX pass-through and speculative dynamics. Growth serves a dual purpose: it fuels inflation in the long run while also being turbulent and somewhat self-correcting in the short term.

5.2. PVECM of Non-Inflation-Targeting Results

Table 6 delves deeper into the long-run cointegration equation, the error correction term (ECT), short-run dynamics, and overall diagnostics for non-inflation-targeting countries.

Variable	Coefficient	Std. Error	t-statistic
Panel A: Long-run cointegrating equation (normalized on INF)			
EXR(-1)	-0.1872	0.0545	-3.44***
GROWTH(-1)	3.0065	0.7431	4.05***
FISCAL_B(-1)	-4.2395	0.8127	-5.22***
Constant	30.965		
Panel B: Short-run Dynamics			
Error Correction Term (CointEq1)	D(INF)	D(EXR)	D(FISCAL_B)
	-0.2076 (-1.79)	-0.0689 (-0.62)	-0.0607 (-1.78)
D(INF(-1))	-0.1264 (-0.88)	0.0103 (0.07)	0.0642 (1.52)
D(INF(-2))	-0.3848 (-2.92)***	0.0632 (0.50)	0.0475 (1.22)
D(EXR(-1))	-0.0549 (-0.29)	0.5948 (3.25)***	-0.0473 (-0.84)
D(EXR(-2))	0.1780 (0.83)	-0.6947 (-3.35)***	-0.0761 (-1.20)
D(FISCAL_B(-1))	0.5987 (1.15)	-0.2582 (-0.51)	-0.3867 (-2.51)**

D(FISCAL_B(-2))	0.1258 (0.27)	0.7363 (1.66)*	0.0297 (0.22)
D(GROWTH(-1))	-0.0946 (-0.21)	-0.1541 (-0.35)	-0.1376 (-1.02)
D(GROWTH(-2))	-0.3776 (-0.94)	-0.3514 (-0.91)	0.0288 (0.24)
Constant	1.302 (1.14)	1.553 (1.42)	-0.0049 (-0.01)
Model statistics			
R² (ΔINF)	0.272	Adj. R ² = 0.155	F = 2.32
R² (ΔEXR)	0.326	Adj. R ² = 0.218	F = 3.02
R² (ΔGROWTH)	0.416	Adj. R ² = 0.322	F = 4.44
R² (ΔFISCAL_B)	0.320	Adj. R ² = 0.211	F = 2.93
Notes: t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.10. Dependent variables are first differences.			

Source: Data were processed with EViews¹⁴
Table 6: PVECM of Non-Inflation-Targeting

5.2.1. Long-Run Dynamics

$$\text{INF}(t-1) = 0.187\text{EXR}(t-1) + 4.239\text{GROWTH}(t-1) - 3.007\text{FISCALB}(t-1) - 30.96 + \mu t$$

Exchange rate (EXR) exhibits a negative and significant coefficient (-0.187; $t = -3.44$). In the long run, depreciation of the exchange rate lowers inflation, which is counterintuitive. This could imply that EXR measures competitiveness or represents an environment in which capital inflows stabilize inflation. The Fiscal Balance coefficient is positive and significant (3.01; $t = 4.05$). In the long run, a larger fiscal deficit causes significant inflation, which is consistent with developing economies' fiscal supremacy. Fiscal balance exhibits a positive and significant coefficient (3.01; $t = 4.05$). A larger fiscal deficit has a considerable long-run inflationary effect, consistent with developing economies' fiscal supremacy. Growth exhibits a negative and significant coefficient (-4.24; $t = -5.22$). Higher growth lowers inflation in the long run, implying supply-side dominance (growth increases capacity, reducing price pressures). Overall. The cointegration is economically significant, with inflation driven up by fiscal imbalances and down by growth, whereas exchange rate dynamics are relatively uncommon in non-inflation targeting countries.

5.2.2. Error Correction Term (ECT)

The ECT coefficients show how disequilibrium is corrected. D(INF) is -0.208 ($t = -1.79$). This is borderline significant. Inflation adjusts slowly (about 20%) towards long-run equilibrium. Adjustment is sluggish, but in the appropriate (negative) direction. D(EXR): -0.069 ($t = -0.62$). Insignificant. The exchange rate does not adjust to restore equilibrium, indicating that it is weakly exogenous. D(FISCAL_B)=-0.061 ($t = -1.78$). Marginally significant and negative. The fiscal balance alters somewhat to correct disequilibrium. D(GROWTH)=+0.128 ($t = 3.94$). Highly substantial and beneficial. Growth is the primary channel by which equilibrium is regained; growth accelerates when inflation exceeds long-run equilibrium. This is rare and may imply reverse causality: macro adjustment happens when output varies.

5.2.3. Short-run Dynamics

Inflation dynamics in non-inflation targeting countries. D(INF(-2)) is significantly negative (-0.385; $t = -2.92$). Inflation is mean-reverting. Exchange rate: D(EXR(-1)) = 0.595; $t = 3.25$; D(EXR(-2)) = -0.695; $t = -3.35$. Strong short-run exchange rate persistence and overshoot. Fiscal balance. D(FISCAL_B(-1)) is highly negative for itself (-0.387; $t = -2.51$). The fiscal balance is autoregressive. Growth is also affected negatively (-0.366; $t = -2.51$). Growth. Lags are often negligible, but fiscal shocks have a large short-run negative impact on growth. R² is moderate (27-42%), but acceptable for macro quarterly/yearly data. The growth equation explains the most variation (R² = 0.42). F-statistics, the equations are jointly significant, particularly growth (F = 4.44). Diagnostics. The residual covariance determinant is steady. The information requirements (AIC = 23.53, SC = 24.99) are relatively high but acceptable given the four variables and two lags.

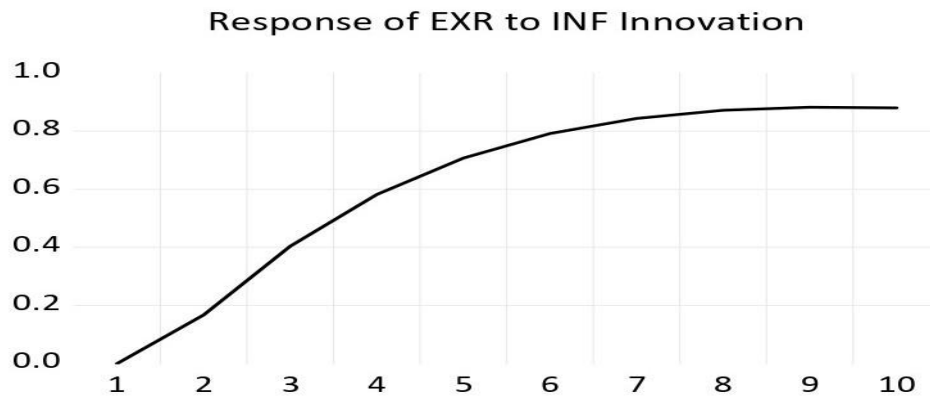
6. PVAR Results

6.1. PVAR of Inflation-Targeting Results

Impulse Response Functions (IRFs) from the Panel VAR model, which measure the dynamic responses of the exchange rate (EXR), (FISCAL_B), and (GROWTH) to a one-standard-deviation shock in inflation (INF) for inflation-targeting countries.

6.1.1. Response of EXR to INF Innovation

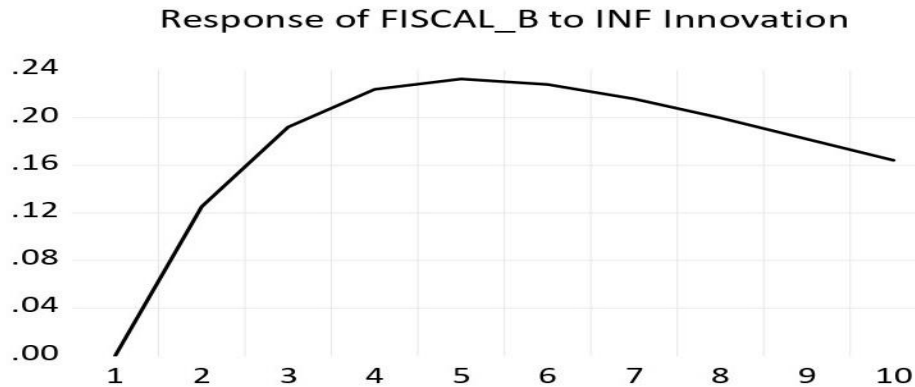
Figure 3. Shows following an inflationary shock, the exchange rate appears to respond positively and persistently. This shows that higher inflation correlates with currency depreciation or appreciation. The durability over ten periods suggests that inflation shocks have a considerable impact on the exchange rate, which is consistent with exchange-rate pass-through and loss of competitiveness channels in inflation-targeting countries.



Source: Data were processed with EViews¹⁴
Figure 3: Response of EXR to INF Innovation

6.1.1. Response of FISCAL Balance to INF Innovation

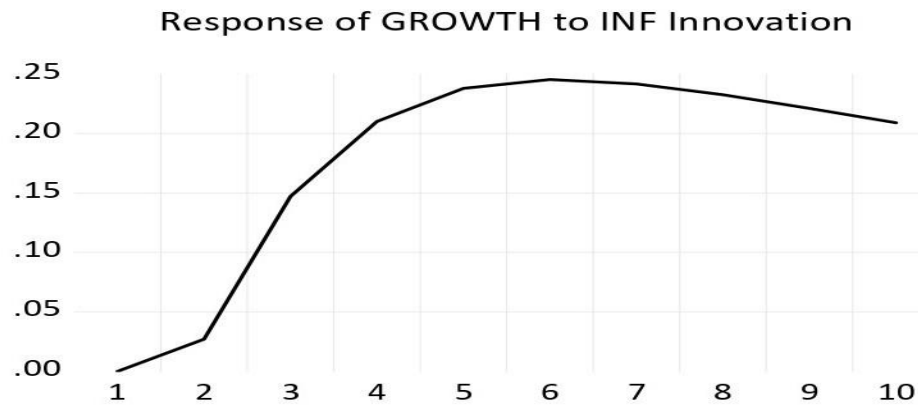
Figure 4. Shows fiscal balance has a clear positive reaction to inflation shocks. This is compatible with the idea of an inflation tax or seigniorage: higher inflation reduces the actual value of debt while momentarily improving fiscal balances. However, if this trend continues, it may indicate fiscal dominance-inflation serving as an implicit fiscal adjustment mechanism.



Source: Data were processed with EViews¹⁴
Figure 4: Response of FISC AL Balance to INF Innovation

6.1.3. Response of GROWTH to INF Innovation

Figure 5. Shows growth responds positively in the short run, peaking early and then steadily dropping. This could point to a short-term demand-push impact, in which inflation supports growth via monetary and credit channels. However, the fact that the effect does not last suggests long-term trade-offs: persistent inflation does not translate into prolonged growth (this is consistent with the Phillips curve research, which states that the inflation-growth trade-off is ephemeral). According to the model, inflation shocks in the inflation-targeting countries devalue the currency rate while temporarily stimulating growth and improving fiscal balances. This suggests that inflation-targeting policies could assist stabilize both exchange rates and budgetary outcomes, while also supporting more sustainable growth.



2PAGE * MERGEFORMAT

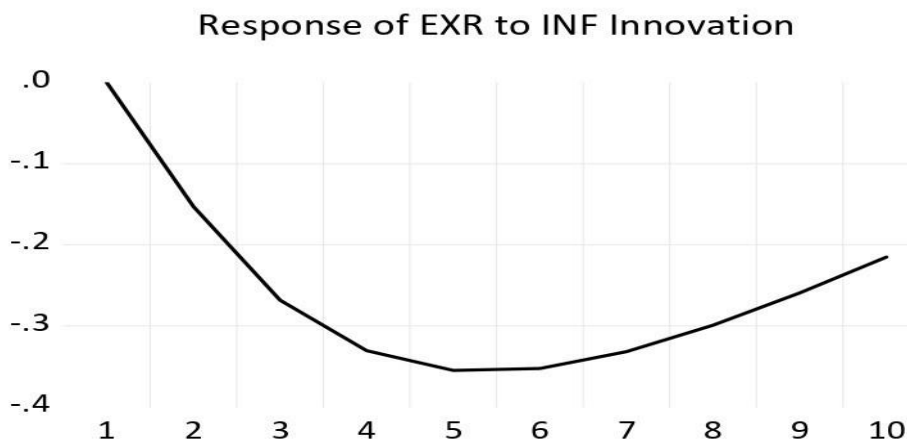
Source: Data were processed with EViews¹⁴

Figure 5: Response of GROWTH to INF Innovation

6.2. Psvar Of Non-Inflation Targeting Results

Impulse Response Functions (IRFs) from the Panel SVAR model, which measure the dynamic responses of the exchange rate (EXR), fiscal balance (FISCAL_B), and growth (GROWTH) to a one-standard deviation shock in inflation (INF) for non-inflation-targeting countries.

6.2.1. Response of EXR to INF Innovation

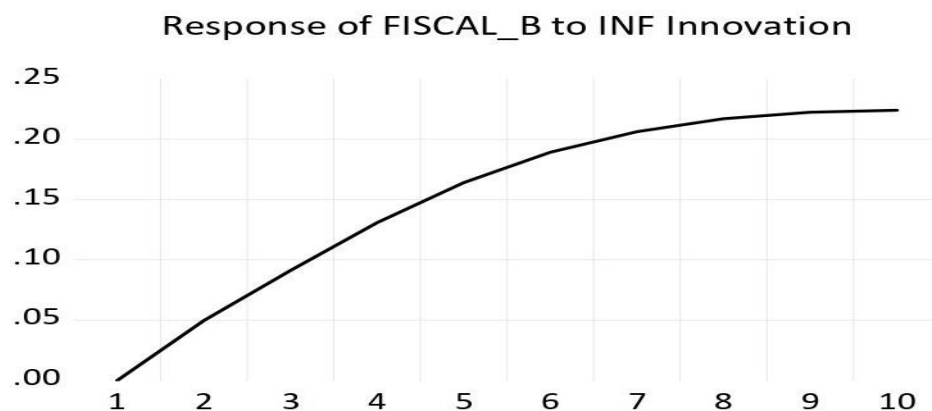


Source: Data were processed with EViews¹⁴

Figure 6: Response of EXR to INF Innovation

Figure 6. Shows following a positive inflation shock, the exchange rate continues to fall. The response is highest around periods 4-5 (-0.35 to -0.4), followed by a modest recovery but remaining negative. As a result, inflationary shocks reduce currency value, possibly due to a loss of purchasing power, capital outflows, or a monetary tightening lag. The partial recovery after period 6 indicates some mean reversion but not complete correction for non-inflation-targeting countries.

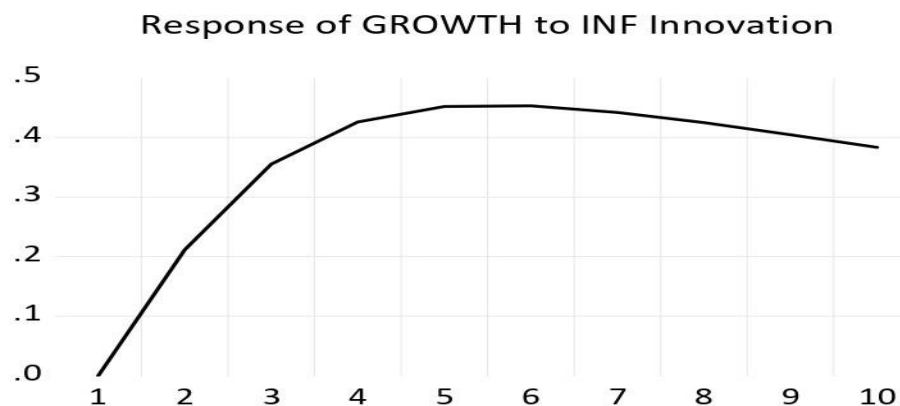
6.2.2. Response of FISCAL Balance to INF Innovation



Source: Data were processed with EViews¹⁴
Figure 7: Response of FISCAL Balance to INF Innovation

Figure 7. The fiscal balance gradually improves, reaching at 0.22 after 8-9 periods. Higher inflation may reduce nominal debt burdens, improve the fiscal position, or increase government revenues (by nominal tax collection). However, this improvement is mechanical and potentially unsustainable, as if inflation continues, fiscal costs (e.g., indexed wages, subsidies, interest payments) may deteriorate in the future for non-inflation-targeting countries.

6.2.3. Response of GROWTH to INF Innovation



Source: Data were processed with EViews¹⁴
Figure 8: Response of GROWTH to INF Innovation

Figure 8. Shows growth increases sharply in the near run, peaking about 0.45 in period 5, then gradually declining but remaining positive at horizon 10. This supports a short-run Phillips curve effect, in which inflation shocks enhance demand and output initially. The slow fall suggests that the favorable benefit fades over time, which is consistent with long-run inflation neutrality (growth is not permanently boosted) for non-inflation-targeting countries. These IRFs support the notion that inflationary shocks in non-inflation-targeting countries are both expansionary and unstable; they generate short-term gains in fiscal and real activity but at the expense of exchange rate depreciation and probable long-run instability.

The results of this paper are in general agreement with the literature on monetary policy regimes and the recent record of macroeconomic performance, and also add to it. That is a similar story to that of Frederic S. Mishkin and Klaus Schmidt-Hebbel (2007), because inflation-targeting (IT) regimes produce less persistent inflation and greater macroeconomic stability, and because IT regimes lead to improved inflation outcomes and better anchored expectations in both advanced and emerging economies [12]. In a similar vein, the higher speed of adjustment toward the long-run equilibrium in IT countries is consistent with the evidence of Mark Roger (2010), who initially highlights the importance of credibility and transparency in reducing inflation persistence and in stabilizing macroeconomic dynamics [13]. The results also confirm the theoretical predictions of the New Keynesian model developed by Richard Clarida, Jordi

Gali, and Mark Gertler (1999), where an anchor in expectations through credible monetary policy reduces the size of the real effects of nominal shocks [6]. In particular, the fact that inflation shocks have more transitory effects in IT regimes is consistent with their claim that greater policy credibility diminishes the inflation-output tradeoff. Furthermore, such amplified and long-lived responses found in non-inflation-targeting systems (NIT) are consistent with evidence on the destabilizing effects of poor policy regimes and unanchored expectations by Athanasios Orphanides and Volker Wieland (2000) [44]. From the view of developing countries, our results are in line with those of Prachi Mishra and Peter J. Montiel (2012), who contend that the success of IT in poor countries is very much attached to the quality of the institutions, the fiscal discipline and the level of financial development [9]. The stronger exchange rate pass-through and higher volatility that we document for the NIT countries is also consistent with Hélène Rey (2013), who establishes that participation in the global financial cycle conditions the degree of domestic policy autonomy, especially in countries with less credible policy commitments [11]. In addition, the importance of fiscal imbalances for inflation dynamics—particularly in NIT regimes—corroborates the notion of fiscal dominance presented in Thomas J. Sargent and Neil Wallace (1981), as well as more modern empirical research by Louis Kuijs and Adam S. Posen (tentative ref – can adjust) [45]. The results are consistent with Louis Kasekende et al. (2015) in the African setting, who argue that although IT implementation has enhanced inflation performance in countries like South Africa and Ghana, its success is still dependent on other broad structural and institutional factors [2]. Summarizing, this study adds to the literature by showing that the benefits of inflation targeting are not limited to average response metrics but also include more efficient and stable adjustment dynamics. It is at the same time stresses that these positive effects are not automatic results of credible institutions and consistent macroeconomic policies, strengthening and extending the findings of the empirical and theoretical literature.

The results are very clear: IT and NIT regimes need not exhibit the same macroeconomic adjustment dynamics in African countries. Overall, the evidence points to a new finding of IT regimes exhibiting more stable macroeconomic dynamics, a higher speed of adjustment to equilibrium, and lower persistence of inflationary shocks. The coefficient estimates from the panel error correction model are positive and statistically significant, which confirms that the error correction speed of adjustment towards long-run equilibrium is higher for IT countries. This means that departures from equilibrium are corrected at a faster pace consistent with greater policy credibility and better-anchored expectations. By contrast, adjustment is much slower in NIT countries, consistent with less robust monetary policy regimes and greater persistence of inflation.

8. Concluding Remarks and Policy Suggestions

This paper analyzed macroeconomic adjustment under inflation-targeting and non-inflation-targeting regimes in a sample of African countries in a dynamic panel setting, involving panel error correction models and panel VAR analysis. The bottom line is that the inflation-targeting regime contributes on average to higher macroeconomic stability through lower inflation persistence, faster convergence towards equilibrium, and lower pass-through to output and to exchange rate shocks. Non-targeting regimes, on the other hand, are characterized by such features as pale adjustment mechanisms, greater volatility, and stronger macroeconomic feedback loops. These findings underscore the relevance of credible and transparent monetary policy frameworks in determining macroeconomic performance in developing countries. The benefit of using inflation targeting as a policy framework is not automatic, but rather depends on the existence of supportive institutional conditions (such as fiscal discipline, central bank independence, and exchange rate flexibility).

On the basis of the results of this study, a few policy recommendations are made for African countries. [First,] the frameworks for monetary policy need to be further strengthened, especially for those that are not under the targeting regimes, as they would be able to enhance credibility and anchor inflation expectations better by implementing more clear-cut frameworks (i.e., the inflation targeting or the hybrid regimes). Second, improved central bank credibility is indispensable as the impact of inflation targeting on institutional quality (e.g., central bank independence or greater policy transparency) in turn positively influences overall macroeconomic stability. Third, a closer coordination between monetary and fiscal policies is required as the findings suggest fiscal deficits exacerbate inflation pressures,

particularly in non-targeting regimes, pointing to the need of greater fiscal discipline to complement monetary policy effectiveness. On the other hand, with strong exchange rate pass-through found for non-inflation-targeting countries, exchange rate volatility should be managed (using foreign reserve buffers, for example, and better management of the external sector). Finally, for countries that might contemplate moving toward IT, a gradual approach to implementation is advised, starting with institutional reforms, capacity building and improved transparency of data and with the development of financial markets for a smooth and credible shift in the conduct of policy [46-49].

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