Dynamic Relationship between Inflation and Economic Growth in the Gambia: A VECM Analysis

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ABSTRACT

This study examines the dynamic relationship between inflation and economic growth in The Gambia for the period 2000-2024 using a Vector Error Correction Model (VECM). Annual data on GDP growth, inflation, and the Real Effective Exchange Rate (REER) are analyzed through unit-root tests, cointegration analysis, and VECM estimation to capture both short-run dynamics and long-run equilibrium relationships. The results reveal a statistically significant and economically meaningful negative long-run effect of inflation on GDP growth, while the REER does not significantly influence long-term growth. Short-run effects of inflation on growth are weak and statistically significant, and adjustment toward long-run equilibrium is slow. Graphical evidence further suggests nonlinear dynamics, where episodes of elevated inflation coincide with growth downturns. These findings underscore the importance of maintaining price stability to support sustainable economic growth in The Gambia. The paper concludes with policy recommendations, including the adoption of a formal inflation-targeting framework, strengthened monetary-fiscal coordination, and structural reforms to enhance revenue mobilization and reduce import dependence.

Keywords: Dynamic, Relationship, Equilibrium, Cointegration, Inflation-Targeting, Nonlinear.

INTRODUCTION

Since independence in 1965, economic policies in The Gambia have been a concerned basically with anti-inflationary measures aimed at achieving price stability. There is almost a universal consensus that macroeconomic stability, specifically defined as low inflation, is positively related to economic growth. Inflation is an interesting microeconomic phenomenon, in that it affects everything from wages to the price of basic commodities the fluctuation of which could have a significant impact on the economy. While the Gambian currency (Dalasi GMD) has experience significant depreciations in May 2024 due to underlying economic vulnerabilities, report do not explicitly describe the situation as a coordinated speculative attack, instead the pressure appears to be driven by structural issues and market forces such as, trade imbalance, low domestic production, and global economic shocks (CBG, November 2024). These depreciations in the dalasi results to a hike in domestic market prices in the country. Furthermore, it makes foreign goods relatively expensive and Gambian goods relatively cheaper. The Gambian economy being an import-based, experienced a fall in its terms of trade and its effect worsens the overall welfare of the country. Additionally, Uncertainty about future price levels is another factor contributing to higher inflation rates. This uncertainty lowers investment efficiency, deters potential investors, creates unpredictable real interest rates, and discourages domestic financial saving (Sowe et al., 2023).

The problem of inflation surely is not a new phenomenon to the Gambian economy. However, it has recently emerged to become a serious economic problem of our time, partly impacted by COVID-19. The COVID-19 crisis has caused a sharp economic downturn in 2020, with a drop in tourists and trade disruptions leading to a 0.2 % contraction in economic growth and a 3.1 % contraction in real GDP per capita, reversing gains in poverty reduction, with the international poverty rate (US$1.9 in 2011 PPP) rising from 8.4 % in 2019 to 9.2 % in 2020 (The world bank, 2022). Recently, the Central Bank of The Gambia (CBG) reported that the inflation rate stands at 7% in the month of December 2025.

The primary objective of this study is to empirically explore the dynamic relationship between inflation and economic growth in the Gambia from 2000 to 2024 by using a vector Error Correction Model (VECM) framework. Therefore, this paper will contribute to the literature by using a comprehensive time series analysis of annual data ranging from 2000 to 2024 by employing Augmented Dickey-Fuller unit root tests, Johansen cointegration analysis, and vector Error Correction Model (VECM) to examine both the short-run and long-run dynamics from the equilibrium relationships among GDP growth, inflation, and the real effective exchange rate (REER).

The remainder of the paper is organized in the following way. Chapter 2 brings out the literature review balancing the theoretical and empirical frameworks of inflation and economic growth. This is followed by chapter 3, which takes readers through the methodology, describing the type of dataset and estimation technic used for the analyzing the model. Chapter 4 presents the analysis of the results while chapter 5 concludes the paper and provides policy recommendations and further research.

LITRATURE REVIEW

The concept of inflation has long been the subject of debate among economists, with differing interpretations of its nature and meaning; two key definitions are presented below. According to Afolabi (1991) "Inflation is a term, which describes a situation when the general prices of goods and services in the economy rises rapidly, continuously and unreasonably while, the purchasing power of the currency of that economy decreases". On the other hand, according to Parking (2018), Price inflation is an average upward movement of the prices of goods and services in the economy.

Inflation, among other things, could have devastating effects on the economy as per the monetarist theory. Inflation confuses the whole mechanism of the economy by causing relative price uncertainty that also disrupts the efficient resource allocation (Friedman 1963), by eating real money balances thus reducing transactions efficiency (Fisher 1911), and, by increasing uncertainty thus, discouraging investment in the long run by (Fischer 1993). A good example of it is the Quantity Theory of Money (MV=PT), as it shows that the change in money supply leads to a change in price with no change in output and velocity.

Endogenous growth models Mundell (1963) and Tobin (1965) argue that slightly inflation can stimulate portfolio substitution from low-yield money to productive capital, thus, the growth rates of steady-state can increase. While, Stockman (1981) argues that cash-in-advance limitations make money a complement to production, therefore, inflation unambiguously reduces capital accumulation when money is used for transactions.

Some of the predictions of such theories are largely confirmed by cross-country panel studies that account for the variations across the countries included in the panel. Barro (1995) provides an estimation of significant negative effects made for over 100+ countries and is resistant to conditioning variables. Fischer (1993) points out that the distortions in the macroeconomics worsen the growth of the economy. Easterly-Fischer (1998) set limits for the inflation effects changing the range of 15% - 40% across 26 countries in the period (1961 to 1992). However, Single-country analyses unveil local scenarios in which different factors operate. Mansur et al. (2009) reveal inflation-growth positive effects below 3.89% in Malaysia and negative impacts over this threshold. Bhurumshah et al. (2016) acknowledge that low inflation is a growth driver while high inflation causes contraction in 94 emerging economies. J B., (2014) investigated the impact of inflation on economic growth using time series data from 1980-2012. The findings reveal that there is high positive correlation between inflation and growth for all the countries.

Unfortunately, there is little macroeconomic literature that focuses on The Gambia. Cessay et al. (2019) reveals a remittances-growth linkages but leave out inflation dynamics. Alagidede et al. (2012) report inflation persistence but do not consider growth interactions. The recent IMF analysis is looking at inflation sources (exchange rates, global commodity prices) without determining growth linkages (Nachega 2024). Jallow (2025) uses VECM and finds that money supply is the main driver of long-term growth but leaves out the inflation-growth interaction. There is no comprehensive study that uses modern cointegration techniques to analyse the inflation-growth nexus with the longest data series available. This paper is a major step to close

these gaps in the literature by providing a thorough VECM analysis over periods of hyperinflation, political changes, and recent stabilization efforts.

Despite the fact that some studies found inflation to be an important determinant of economic growth, some empirical studies revealed different results. Fisher and (Gregorio, 1992,1994) explored the connection between inflation and economic growth using both time series, cross section and panel data sets for several countries. All the results found an adverse impact of inflation on economic growth. (Fisher, 1993) also argued that inflation hinders the efficient allocation of resources due to harmful changes of relative prices. At the same time, relative prices appear to be one of the most important channels in the process of efficient decision making. Easterly (1998), studied inflation and economic growth relationships for 26 countries over the period (1961-1992). The study found a negative relationship between inflation and economic growth when level of inflation exceeds some threshold. At the same time, they showed that the impact of low and moderate inflation on growth is quite ambiguous. They argued that in this case inflation and growth are influenced jointly by different demand and supply shock thus no stable pattern exists (Easterly, 1998).

Bharumshah, (2016) studied inflation uncertainty, and economic growth in a panel of 94 emerging and developing countries employing the system generalized method of moments (SGMM). Firstly, the study found that inflation harms growth only in non-inflation crisis countries, and inflation uncertainty indeed promotes growth. High inflation promotes negative growth, and a low inflation rate promotes positive growth. Secondly, the negative cost of not keeping inflation in check outweighs the positive benefit from uncertainty in non-inflation crisis countries in all three regimes. Thirdly, the study also found that inflation uncertainty has a positive effect on growth through a precautionary motive when inflation reaches moderate range (5.6% - 15.9%) (Bharumshah, 2016).

 ultimately, Barro (1995) investigated the inflation-economic growth relationship using large samples covering more than 100 countries from 1960 to 1990. His results indicated there exists a significant negative relationship between inflation and economic growth if country characteristics such as, fertility rate, education, etc. are held constant. More specifically, an increase in average inflation by 10 percentage points per year is estimated to reduce the growth rate of real GDP per capita by 0.2% to 0.3% percentage points per year. In other words, his empirical analysis implies that the estimated relationship between inflation and economic growth is negative when some reasonable instruments are taken into consideration in the statistical process. He concluded that higher long-term inflation reduces economic growth (Barro, 1995).

METHODOLOGY

The data for this study was extracted from the World Bank database and FRED, the variables include GDP growth, Inflation (annual changes in GDP deflator) and Real Effective Exchange rates (index normalized to 2010). The impact of inflation on economic growth was analyzed using annual time series data collected between 2000 and 2024.

Model specifications (Vector Error Correction Model)

A Vector Error Correction Model (VECM) is a multivariate time-series econometric model used when several non-stationary variables share one or more long-run equilibrium relationships (i.e., they are cointegrated); it captures both short-term dynamics and long-term equilibrium behavior by including an error-correction term that measures deviations from the equilibrium and how the variables adjust toward it over time.

The mixed integration of the VECM of I(0)/I(1) is accommodated through the following specification:

$$\Delta \mathbf{y}_t = \Pi \mathbf{y}_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta \mathbf{y}_{t-i} + \mu + \epsilon_t \tag{1}$$

Where $Y_t = [\text{GDPgrowth}_t, \text{Inflation}_t, \text{REER}_t]$, $\Pi = \alpha\beta$ implies the long-run impact matrix of a(3*r) adjustment speeds, b(3*r) cointegrating vectors, and Γ_i *short-run coefficients.*

The error correction will now become:

$$\Delta \mathbf{y}_t = \alpha ECT_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta \mathbf{y}_{t-i} + \epsilon_t \qquad (2)$$

with $ECT_{t-1} = \beta' \mathbf{y}_{t-1}$ capturing disequilibrium. Optimal lag p = 2 (AIC) yields

$p - 1$ = 1 short-run term.

4.2.2 Lon-Run cointegrating Vector

The normalization of GDP growth will produce the interpretable form below:

$GDPgrowth_t = \gamma_0 + \gamma_1 Inflation_t + \gamma_2 REER_t + u_t$ (3)

where $\gamma_1 < 0$ tests the core inflation-growth hypothesis.

4.2.3 Short-run GDP Growth Equation

$$\Delta GDPgrowth_t = \alpha_1 ECT_{t-1} + \gamma_{11} \Delta Inflation_{t-1} + \gamma_{12} \Delta REER_{t-1} + \epsilon_{1t} \qquad (4)$$

$\alpha_1 < 0$ indicates convergence speed toward equilibrium.

Descriptive Statistics

Table 1 presents the descriptive statistics explaining the characteristics volatility pattern from this study. We can see that GDP growth averages 3.43% but reveals a big dispersion with a standard deviation of 3.89%, ranging from a serious -8.13% contraction in 2011 to 7.24% improvement in 2018. Inflation on the other hand reveals an extreme variability by averaging 10.96% but peaking dramatically at 94.19% during 2004. Finally, to the REER index, it fluctuates around its 2010 base period which reflected a periodic shift in external competitiveness.

These summarized the highlighted macroeconomics challenges ranging from environment confronting Gambian policymakers characterized by growth volatility superimposed upon episodic inflation crisis.

Table 1: Descriptive Statistics: The Gambia (2000–2024)

Variable	Observations	Mean	Std.Dev.	Minimum	Maximum
GDP growth (%)	36	3.664	4.512	-8.130	7.050
Inflation (%)	36	12.200	27.980	-5.970	134.040
REER (2010=100)	25	102.358	24.188	72.737	183.588
Sources: World Bank WDI, FRED Economic Data. Note: REER 2000–2024.					

Unit Root and stationarity Test

Accurate time series inference needs establishing appropriate integration orders. To fulfil this requirement, we implemented an Augmented Dickey-Fuller Test (ADF) which incorporates a linear trend at level together with Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests with constant terms. It's reported comprehensively in Table 2.

We found out that GDP growth and REER fail to reject the unit root null at conventional level of significant with ADF P-values of 0.969 and 0.955 respectively. They were later stationary after the first difference with P-values of 0.030 and 0.051 respectively. Inflation on the other hand was stationary at level with ADF P-values of 0.004 which is in line with the volatility nature of price series. The subsequent mixed I(0)/I(1) configuration disqualifies standard VAR analysis but validates cointegrated system estimation.

Table 2: Unit Root Test Results (2000–2024)

Variable	ADF Level (p)	ADF 1st Diff (p)	KPSS Level (p)	Order
GDP growth	0.969	0.030**	0.100	I(1)
Inflation	0.004***	0.000***	0.100	I(0)
REER	0.955	0.051*	0.081	I(1)

***p¡0.01, **p¡0.05, *p¡0.10. ADF includes trend (levels).

Lag Length Determination

From the information criteria guide for VAR lag selection, The Akaike information requirement obtain the minimum value of 143.23 at lag 2 whereas the Schwarz Bayesian criterion supports lag 1 for future analysis.

Cointegration Test

The Johansen minimum likelihood tests provide formal evidence of cointegration amid the I91) variables qualified after the stationary inflation series. Evidence from table 3 reports trace statistics strongly rejected the null of zero cointegrating vectors of 51.249 with a critical value of 29.796 at 5% and rank at the highest one (29.252 vs. 15.494). The minimum eigenvalue tests corroborate these findings.

Table 3: Johansen Cointegration Test Results

Null: rank ¡= r	Trace Statistic	5% Critical Value	Decision
r = 0	51.249***	29.796	Reject
r ¡= 1	29.252***	15.494	Reject

***p¡0.01. Lag length = 1 (BIC criterion).

ANALYSIS AND DISCUSSION OF RESULTS

The results reported in table 4 present the Vector Error Correction Model (VECM) estimates for long run cointegration relationship, normalized on GDP growth. The coefficient on inflation is both statistically significant and economically meaningful, with an estimated beta of -0.483, Z statistics of -5.965 and a p-value of 0.002. This finding implies that a one percentage point increase in inflation is associated with a 0.48 percentage point decline in steady-state GDP growth.

Turning to the short-run dynamics, lagged inflation exerts a negative effect on contemporaneous GDP growth; however, this effect is not statistically significant as reflected by the coefficient of –0.040 and the p-value sits at 0.507. The error correction term in the GDP growth equation indicates a slow adjustment toward the long run equilibrium, with an implied speed of adjustment of approximately 8% per year. Nevertheless, the coefficient (0.042) is statistically insignificant (P-value = 0.787), suggesting weak short-run corrective dynamics.

Robustness checks using the autoregressive Distributed Lag (ARDL) bounds testing framework broadly support the core findings. In the level's specification, the estimated inflation coefficient is 0.052 and statistically significant (P-value = 0.245). The short-run ARDL estimates indicate the presence of temporary positive effects, with a coefficient of 0.080. The error correction term once again suggest convergence toward equilibrium at an annual rate of roughly 8%, although this adjustment remains statistically weak. Diagnostic

test confirms the structural adequacy of the model, indicating no evidence of serial correlation and normally distributed residuals.
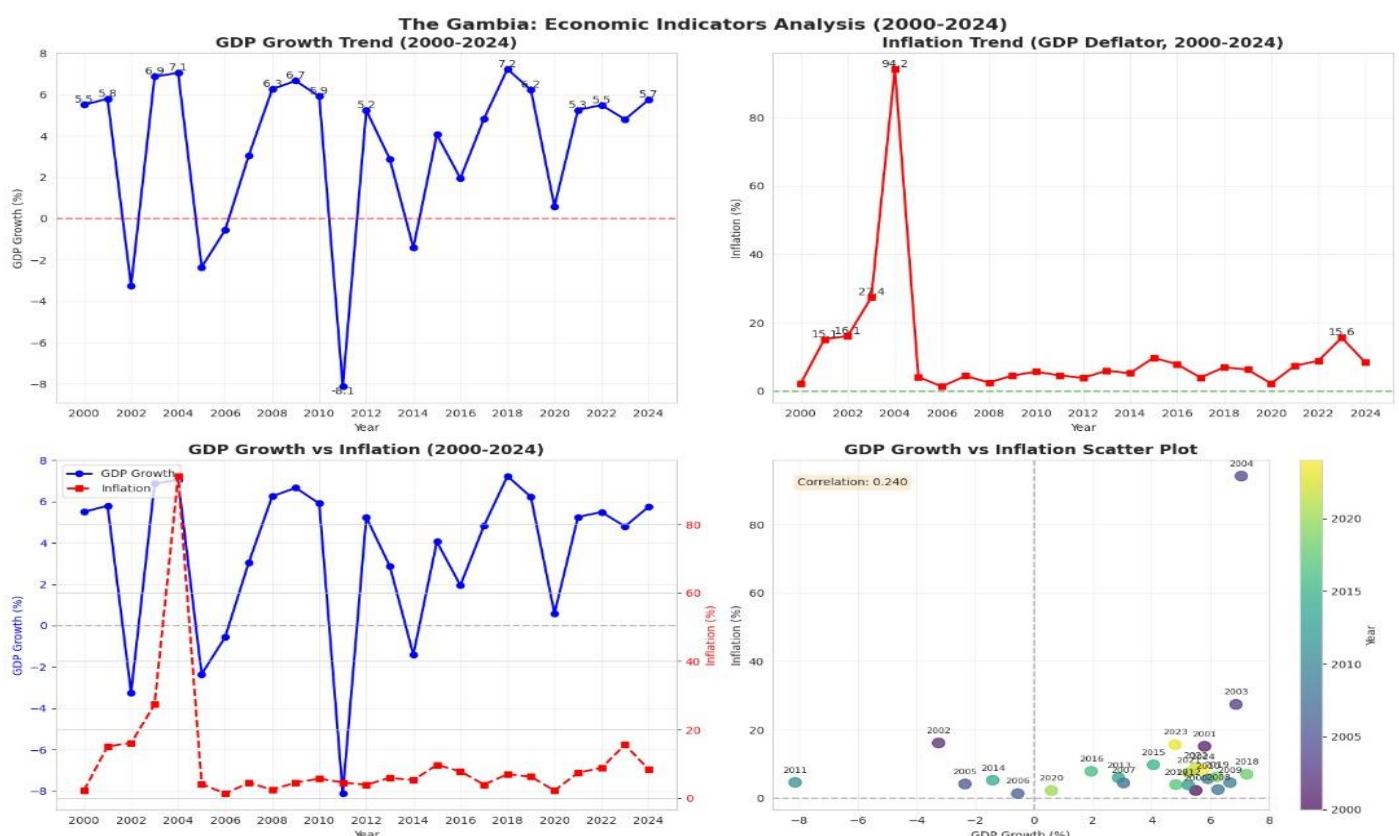
Table 4: VECM Estimation Results (1989–2024)

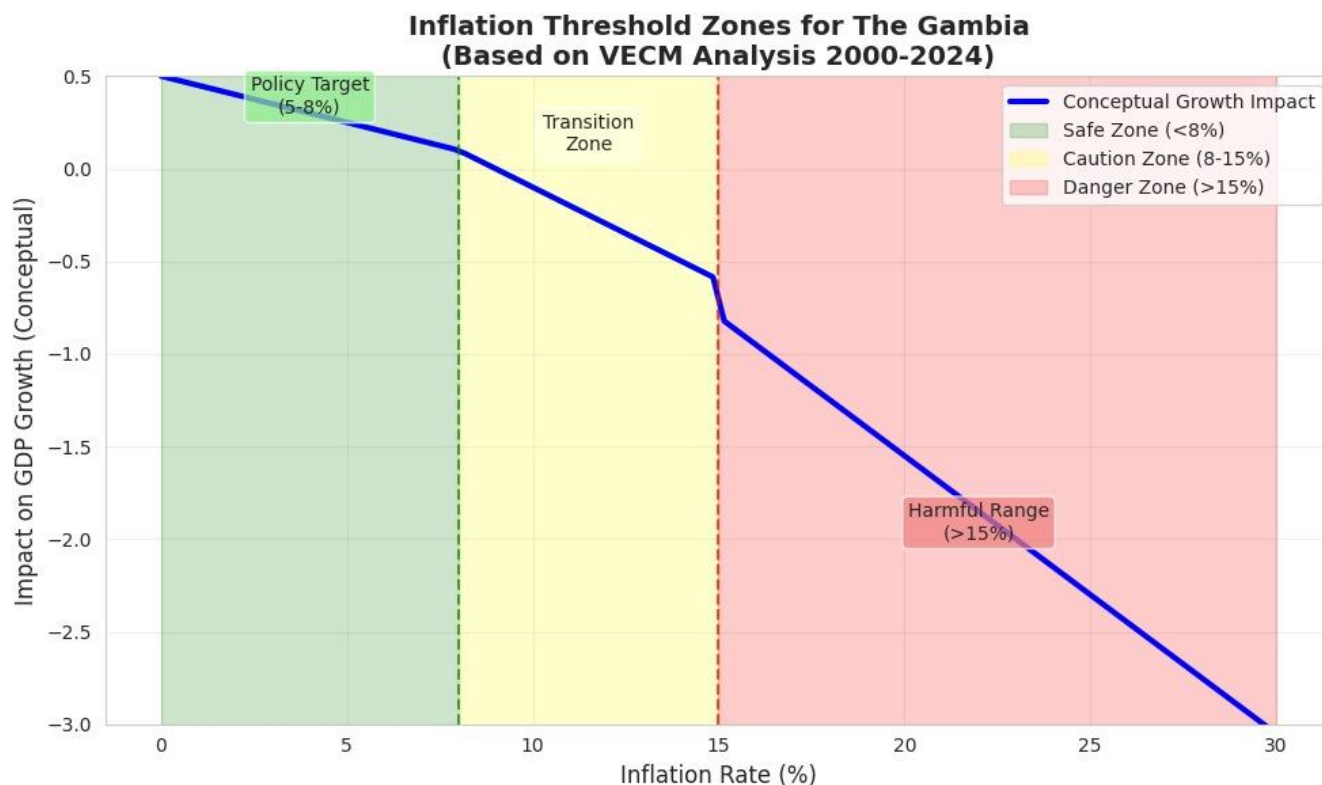| Long-run Cointegrating Vector (Normalized on GDP growth)			
Variable	**Coefficient**	**z-statistic**	**p-value**
Constant	1.000	—	—
Inflation	-0.483***	-5.965	0.000
REER	0.002	0.102	0.919
Short-run GDP Equation			
$\Delta Inflation_{t-1}$	-0.040	-0.667	0.507
ECT_{t-1}	0.042	0.272	0.787

***p¡0.01. n=36 observations.

Overall, the VECM estimates for the period 2000-2024 reveal a statistically robust and economically significant negative long-run relationship between inflation and GDP growth, indicating that sustained increases in inflation are associated with lower long-term equilibrium growth. In contrast, the Real Effective Exchange Rate (REER) does not exert a significant long-run influence on GDP growth. The short-run dynamics of the model are relatively weak, as neither the lagged changes in inflation nor the error correction term are statistically significant. The positive and significant error correction coefficient suggests the absence of a statistically confirm self-correcting mechanism capable of restoring short-run deviation to the long-run equilibrium.

Figure 1: GDP growth v.s Inflation (2000-2024)

The graphical evidence for The Gambia over the 2000-2024 period suggests that the relationship between inflation growth is characterized by nonlinear dynamics rather than a uniform liner association. In most years with moderate inflation, economic growth remains positive and the correlation between inflation and growth is weak, indicating that low to moderate inflation does not consistently hinder economic performance. However, episodes of extreme inflation coincide with subsequent downturns in GDP growth, implying that inflation may exert adverse effects on growth once it exceeds critical thresholds.

Inflation Threshold Zones in the Gambia

From our analysis, we found out that inflation begins to be significantly detriment with negative effects on Economic growth in the Gambia when it exceeds a threshold of 12-15%. In practical implications, the inflation of below 8% percent is a non-concern for growth, for a range of 8 to 12% it required monitoring but once it is 15% it required an immediate policy intervention.

CONCLUSION AND POLICY IMPLICATIONS

This study provides robust empirical evidence that inflation exerts a statistically significant and economically meaningful negative effect on long-run GDP growth in The Gambia over 2000 – 2024. While short-run dynamics suggest transient positive responses, like driven by nominal demand effects, these dissipate over time as inflationary distortions accumulate, reinforcing persistent adverse long-run consequences. The REER does not display a statistically significant long-run impact, indicating that domestic price stability matters more for growth outcomes than exchange rate movements in The Gambian context.

The findings are consistent with theoretical models of open, import-dependent economies and empirical evidence on inflation threshold effects. Episodes of extreme inflation appear to have amplified these long-run costs. Given resurgence of inflation (e.g. 15.6% in 2023), maintaining credible macroeconomic policies is essential.

Policy measures should prioritize price stability to support sustainable growth. In practice, this involve adopting a formal-targeting framework with a medium-term target of 5-8% to anchor expectations and guide monetary policy. When inflation significantly exceeds thresholds, decisive use of contractionary monetary instruments is warranted. Effective coordination with fiscal policy is critical, especially under high public debt conditions. Structural reforms to strengthen domestic revenue through digital tax administration and to reduce

import dependence via export diversification can further mitigate inflationary pressures and enhance resilience. These policy actions, grounded in the empirical evidence, aim to stabilize prices and foster a more conducive environment for long-term economic growth.

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