



The Rigidity Trap: Commodity Booms, Administrative Decoupling, and Exchange Rate Collapse in Ethiopia

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ABSTRACT

This study investigates why Ethiopia's currency remained stable during a global coffee price boom only to undergo a sharp devaluation in 2024. It examines how governance structures disrupt the transmission of commodity terms-of-trade shocks to the exchange rate. Employing a comparative econometric framework with daily data (2020-2025), we contrast Ethiopia with a market-determined control case (Brazil) using Granger Causality tests and Recursive Residual Analysis. The results reveal a statistically insignificant transmission for Ethiopia, confirming a policy-induced decoupling absent in Brazil. Critically, we identify a structural break on August 1, 2024, which quantitatively marks the rupture of the managed regime and the turbulent onset of liberalization. This indicates that prior stability was an artifact of administrative management that accumulated severe imbalances. The study concludes that rigid exchange rate management in weak institutional settings creates a "rigidity trap," where suppressing volatility stores systemic risk and precipitates an abrupt and costly transition. These findings advance the political economy of exchange rates by linking governance to crisis dynamics and warn policymakers that administratively maintained stability without building institutional resilience risks severe adjustment episodes.

Keywords: Political Economy, Commodity Price Transmission, Structural Breaks, Ethiopia, Post-New Public Management.

JEL Codes: F31, F33, C22, E42, D73.

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1. INTRODUCTION

The transmission mechanism of global commodity price shocks to the exchange rates of resource-dependent economies constitutes a fundamental pillar of international macroeconomic theory. Conventional frameworks, primarily the Balassa-Samuelson hypothesis and terms-of-trade models, posit a direct adjustment channel. According to this view, a boom in a country's key export commodity should lead to an appreciation of its real exchange rate, as improved trade balances and incoming capital flows strengthen the domestic currency. This theoretical expectation finds robust empirical validation in numerous emerging markets operating under flexible exchange rate regimes. For instance, the Brazilian Real has consistently demonstrated sensitivity to fluctuations in global agricultural prices, illustrating the efficient operation of this international price signal transmission.

However, a significant and theoretically problematic divergence emerges when examining frontier economies characterized by heavily managed or fixed exchange rate regimes. In these contexts, the hypothesised transmission appears to degenerate or fail entirely. A growing body of scholarly work acknowledges this disconnect but offers divergent explanations for its causes and consequences. One prominent strand of literature, exemplified by the meta-analysis of Iorngurum (2025), attributes the failure of transmission directly to the absence of exchange rate flexibility. This perspective argues that rigid regimes inherently obstruct the primary adjustment channel, preventing external price signals from being absorbed into the domestic price system. Conversely, other scholars propose that adjustment may still occur under fixed regimes, but through alternative and often less efficient pathways. Zongo et al. (2024), for example, suggest that the Balassa-Samuelson effect can manifest in such contexts not through nominal appreciation, but through inflationary pressures in the non-tradable sector. Nonetheless, these established perspectives struggle to adequately explain cases of extreme and sustained decoupling, where the nominal exchange rate remains completely unresponsive to monumental shifts in terms of trade for prolonged periods, only to eventually decisive shift in a sudden and disrupted devaluation.

This critical gap between theoretical predictions and observed crisis dynamics forms the central problem addressed by this study. The recent economic trajectory of Ethiopia provides a stark and illustrative paradox that crystallizes this analytical shortcoming. From 2020 through mid-2024, global prices for Arabica coffee, Ethiopia's principal export commodity, experienced a sustained increase of over 80 percent. Standard economic theory would predict that such a pronounced export boom should generate substantial supportive pressure for the Ethiopian Birr (ETB). Contrary to this expectation, the official ETB/USD exchange rate was maintained in a state of remarkable nominal stability through administrative control, demonstrating an absence of measurable pass-through from the nation's dramatically improving export fundamentals. This artificial stability, however, proved unsustainable. It culminated in a sharp, step-change devaluation in the latter half of 2024. This sequence of events, defined by prolonged decoupling followed by disruptive structural break, challenges models of incremental adjustment and instead suggests a nonlinear process of risk accumulation and subsequent abrupt release, deeply mediated by political economy factors.

Therefore, this investigation is guided by two specific research questions. First, through what mechanisms, and for what political-economic reasons, does the transmission of global commodity price signals to the domestic exchange rate become severed or "decoupled" in administratively managed regimes? Second, what are the systemic consequences of this decoupling, and can its eventual breaking point be quantitatively identified and characterized? We argue that a satisfactory explanation requires moving beyond the binary typology of exchange rate regimes. It necessitates an examination of the political economy of policy rigidity within specific governance contexts. We introduce and develop the concept of a "rigidity trap." This trap begins with the initial policy choice of a fixed or heavily managed rate, often justified by the well-documented "fear of floating" prevalent in developing countries with weak institutions and high liability dollarization, as analyzed by Calvo and Reinhart (2000) and further contextualized for fragile states by Adam and Wilson (2021). Within weak institutional settings, this initial choice can harden into an inflexible policy stance. This rigidity suppresses vital market signals, fosters distortions such as the cronyistic allocation of foreign exchange detailed by Geda (2023), and leads to the accumulation of latent macroeconomic imbalances. Consequently, this creates a condition of stored systemic risk, a dynamic highlighted in the work of Willett (2007) and Ghosh, Ostry, and Qureshi (2015), which inevitably demands a sharp correction.

To empirically trace and test this proposed dynamic, we employ a comparative, high-frequency econometric framework. Our analysis contrasts the transmission mechanism in a control case, Brazil, which operates under a flexible exchange rate regime and is a major coffee exporter, with our primary test case, Ethiopia, which maintained a tightly managed regime during most of the sample period. Utilizing daily financial data spanning from 2020 to 2025, our methodology proceeds in two key stages. First, we apply Granger Causality tests to statistically establish the presence, direction, and strength of price transmission from global coffee futures to each currency. Second, and more critically, we deploy Recursive Residual Analysis. This technique is particularly adept at detecting nonlinear structural breaks and is therefore ideal for pinpointing the precise moment when sustained administrative management fails, and the accumulated pressures manifest in a discrete regime collapse, allowing us to mathematically distinguish this event from normal market volatility.

Our findings yield clear and novel empirical evidence. First, we confirm a statistically significant Granger-causal relationship running from international coffee prices to the Brazilian Real, thereby validating the conventional transmission paradigm in a market-determined setting. In stark contrast, we find a complete absence of any such significant linkage for the Ethiopian Birr, thus providing robust quantitative evidence for the decoupling hypothesis. Second, and most consequentially, our recursive residual analysis identifies a definitive structural breakpoint on August 1, 2024, marked by an extreme outlier of 22.6 standard deviations. This extraordinary statistical event quantitatively captures the precise moment the postulated "rigidity trap" became unsustainable, offering a measurable indicator of crisis onset and validating theories that link delayed adjustment to deeper crashes, as suggested by Wu (2008).

The contributions of this paper are threefold. Theoretically, it advances the literature by synthesizing the concepts of "fear of floating," policy decoupling, and crisis susceptibility into the coherent framework of the "rigidity trap," thereby moving the debate beyond whether transmission fails to model how that failure stores systemic risk and

predetermines a crisis path. Methodologically, it provides a rigorous demonstration of how recursive residual analysis can be effectively used to detect the climax of accumulated political-economic pressures within financial time series data. Practically, it offers a timely and critical policy-relevant case study of Ethiopia, linking micro-level exchange rate management to macro-level institutional fragility in the Post-New Public Management era. The implications extend directly to other frontier economies navigating the complex trade-offs between nominal stability and financial resilience, as discussed in the context of exchange rate regime choices by authors like Yayeh (2025) and Emagne and Agaje (2024).

2. INSTITUTIONAL CONTEXT AND THEORETICAL FRAMEWORK

The relationship between commodity price shocks and exchange rate adjustments in developing economies cannot be understood through a purely economic lens. It is fundamentally mediated by the institutional and political-economic context in which policy is formulated and implemented. This section constructs a theoretical framework that progresses from conventional market-based theories to an integrated political economy model, culminating in the specific hypothesis tested in this study. It first examines the scholarly debate between market efficiency and institutional distortion in exchange rate pass-through. It then delves into the political economy of exchange rate rigidity, tracing its evolution from an initial policy choice rooted in “fear of floating” to a self-reinforcing “rigidity trap” that stores systemic risk. Finally, it synthesizes these strands to articulate the core theoretical contribution and empirical predictions of this paper.

2.1. Market Efficiency Versus Institutional Distortion in Price Transmission

The canonical economic view posits that commodity-dependent economies with flexible exchange rates should experience efficient transmission of global price signals. The theoretical foundation lies in the Balassa-Samuelson effect and the income effects of terms-of-trade improvements, which predict real exchange rate appreciation following a positive commodity shock. Recent empirical meta-analyses broadly support this channel in market-determined environments. Iorngurum (2025), in a comprehensive study spanning 111 countries, concludes that exchange rate flexibility is a critical prerequisite for the efficient absorption of external price shocks. This finding implies that in flexible regimes, currency movements act as a primary shock absorber, aligning the domestic economy with global market conditions. This perspective is reinforced by Sedegah and Odhiambo (2021), who argue that in non-WAEMU Sub-Saharan African countries, the absence of such flexibility directly limits the capacity of monetary policy to respond to external terms-of-trade disturbances, leaving economies more vulnerable.

However, a significant body of evidence from managed and fixed exchange rate regimes reveals a more complex and often distorted transmission mechanism. Here, the adjustment pathway hypothesized by standard theory is institutionally blocked. Scholars note that the expected real appreciation may still occur, but through alternative, often less desirable channels. Zongo et al. (2024), for instance, find that the Balassa-Samuelson effect is more pronounced in fixed exchange rate regimes, but it manifests primarily through inflation in the non-tradable sector rather than through nominal currency strength. This indirect adjustment can exacerbate domestic inflationary pressures without delivering the competitiveness benefits of a stronger currency. More critically, in regimes characterized by heavy administrative control, the linkage

can break down entirely. Pesce (2015) conceptualizes this as a “decoupling” phenomenon, where policy interventions deliberately or inadvertently sever the correlation between domestic economic indicators and global cycles. In the context of foreign exchange markets, this results in a nominal exchange rate that becomes statistically and economically unresponsive to shifts in the country’s fundamental terms of trade. This decoupling represents not a market failure, but a deliberate outcome of specific policy choices aimed at achieving other objectives, such as nominal stability or subsidized imports.

2.2. The Political Economy of Rigidity: From “Fear of Floating” to a “Rigidity Trap”

The initial adoption of a fixed or tightly managed exchange rate in many developing economies is frequently explained by the “fear of floating” hypothesis. Calvo and Reinhart (2000) famously demonstrated that many countries claiming to have floating regimes actively suppress volatility, behaving as if they have a soft peg. This fear is particularly acute in fragile states with underdeveloped financial institutions, high levels of liability dollarization, and a legacy of macroeconomic instability. Adam and Wilson (2021) extend this logic, arguing that in such contexts, fixed rates often serve as the only credible nominal anchor due to a profound “inability to float,” stemming from a lack of technical and institutional capacity to manage a flexible regime effectively.

In Ethiopia’s case, this general tendency was fused with a specific developmental state ideology. As analyzed by Regassa (2022) and Steinberg (2016), the government historically utilized financial repression and a stable, overvalued exchange rate as deliberate tools of industrial policy. The goal was to provide cheap foreign exchange for capital and intermediate goods imports to fuel state-led industrialization, effectively taxing the agricultural export sector (primarily coffee) to subsidize nascent industries. Therefore, the managed exchange rate was not merely a monetary policy tool but a core instrument of a broader developmental strategy.

The central argument of this paper is that within a governance context of weak institutions and fragmented authority—a condition often described in the Post-New Public Management literature—this initial policy stance can evolve into a pathological equilibrium termed the “rigidity trap.” This trap is characterized by a dynamic where the short-term political and administrative costs of adjusting the exchange rate increasingly outweigh the perceived long-term economic benefits, leading to a progressive hardening of the policy stance. Several reinforcing mechanisms sustain this trap. First, the administrative allocation of scarce foreign currency under an overvalued official rate creates powerful rent-seeking opportunities. Geda (2023) documents how Ethiopia’s developmental state model degenerated into a form of “crony capitalism,” where access to foreign exchange became a key currency of political patronage, embedding powerful constituencies with a vested interest in maintaining the overvaluation. Second, the resulting economic distortions, while severe, may be diffuse and their costs deferred. Ayele (2022) provides empirical evidence that real exchange rate misalignment significantly impeded economic growth in Ethiopia, in contrast to Kenya where a more flexible regime allowed misalignment to be growth-promoting in the short run. Mazorodze (2021) further demonstrates that state fragility exacerbates the negative growth effects of such misalignment, meaning the trap is more damaging precisely where institutions are weakest.

The most critical feature of the rigidity trap is its function as a mechanism for systemic risk storage rather than risk mitigation. By suppressing the nominal exchange rate adjustment

that would gradually correct imbalances, policymakers effectively postpone the necessary economic correction. Willett (2007) and Ghosh et al. (2015) highlight the political economy incentives that drive this postponement, as devaluations are often seen as politically costly admissions of policy failure. However, this administrative containment does not resolve underlying disequilibria; it merely accumulates them in the form of widening parallel market premiums, dwindling foreign reserves, and mounting pent-up devaluation pressure. This accumulation renders the economy increasingly vulnerable to a sudden break. Shimpalee and Breuer (2006) find that fixed exchange rate regimes are statistically associated with a higher probability and greater depth of currency crises. Similarly, Wu (2008) models how weak institutions lower the threshold for a self-fulfilling crisis and lead to larger devaluations when the peg collapses. Thus, the rigidity trap predicts that periods of artificial calm (low measured volatility) are periods of escalating latent risk, setting the stage for a discontinuous, high-magnitude correction.

2.3. Hypothesis Development

Based on these theoretical strands, this study positions itself at the intersection of the literature on exchange rate pass-through, the political economy of regime choice, and currency crisis theory. It accepts that the lack of flexibility can explain the blockage of standard transmission channels, as per Iorngurum (2025), but argues that the political economy of the rigidity trap explains the dynamic consequence of that blockage: the active storage of risk and the predictable trajectory toward a discrete crisis event, as theorized by Willett (2007) and Ghosh et al. (2015).

From this synthesis, we derive two testable hypotheses that guide our empirical analysis:

H1: The Decoupling Hypothesis. In a managed exchange rate regime characterized by a rigidity trap, the transmission of global commodity price signals to the nominal exchange rate will be statistically insignificant. There will be no evidence of Granger causality from international coffee prices to the Ethiopian Birr, in stark contrast to a control market with a flexible regime (Brazil).

H2: The Structural Break Hypothesis. The rigidity trap will culminate in a identifiable, major structural break in the exchange rate series. This break will be marked by an extreme, discrete jump in value that is quantitatively distinguishable from normal volatility, corresponding to the moment when accumulated imbalances overwhelm administrative controls and the trap collapses.

These hypotheses move the inquiry from a static comparison of regimes to a dynamic analysis of how policy rigidity shapes both the process of price transmission and the form of its eventual failure.

3. METHODS

This section outlines the empirical strategy employed to test the hypotheses developed in the theoretical framework. We adopt a comparative case study approach, leveraging high-frequency data to dissect the dynamics of commodity price transmission under contrasting exchange rate regimes. The methodology is designed to first establish the baseline relationship

between global prices and currency values, and then to probe for the nonlinear, disruptive break characteristic of a collapsing rigidity trap.

3.1. Data Sources and Variable Construction

The analysis utilizes daily financial time series data spanning the period from January 1, 2020, to February 1, 2025. This timeframe is strategically selected as it encompasses the post-pandemic global commodity price cycle and coincides with Ethiopia's pivotal exchange rate reform in late 2024. Data for all series are sourced from Yahoo Finance, a platform widely used in financial economics research for its accessibility and reliability.

Three core variables form the basis of the study. The global commodity price signal is represented by the C Coffee Futures contract (Ticker: KC=F), which serves as the international benchmark price for Arabica coffee. The choice of this specific contract directly aligns with the export profile of both case study countries. The dependent variable for the control case is the Brazilian Real to US Dollar exchange rate (BRL/USD, Ticker: BRL=X). Brazil operates a floating exchange rate regime and is a leading coffee exporter, making it an ideal benchmark for observing a market-determined transmission mechanism. The primary dependent variable for our test case is the Ethiopian Birr to US Dollar exchange rate (ETB/USD, Ticker: ETB=X). The behavior of this series under administrative management is the central focus of the investigation.

Raw price data in levels are inherently non-stationary and unsuitable for regression analysis. Consequently, we transform all series into logarithmic daily returns, calculated as the first difference of the natural logarithm of the daily closing price: $r_t = \ln(P_t) - \ln(P_{t-1})$. This transformation yields stationary series that represent percentage changes, facilitating meaningful statistical inference and direct comparison of volatility profiles between the two currencies. The final dataset, after adjusting for non-synchronous trading days and forward-filling minor gaps, consists of a balanced panel of daily return observations.

3.2. Econometric Framework and Analytical Sequence

The empirical investigation follows a sequential, three-stage econometric procedure, each stage addressing a specific aspect of our research questions.

Stage 1: Testing for Stationarity. As a foundational step, we apply the Augmented Dickey-Fuller (ADF) test to each of the return series (coffee, BRL, ETB). Confirming stationarity is a critical prerequisite for the validity of subsequent Granger causality and regression analyses, ensuring that identified relationships are not spurious artifacts of underlying trends.

Stage 2: Analyzing Price Transmission via Granger Causality. To formally test H1, we employ the Granger causality test. This method assesses whether past values of one variable (global coffee returns) contain information that is statistically useful for forecasting another variable (exchange rate returns), beyond the information contained in the past values of the exchange rate itself. We estimate bivariate vector autoregressive (VAR) models for the pairs (Coffee, BRL) and (Coffee, ETB). The null hypothesis for each pair is that coffee prices do not Granger-cause the exchange rate. A rejection of the null for Brazil alongside a failure to reject for Ethiopia would constitute strong evidence of decoupling under the managed regime, directly supporting H1. We test this relationship at multiple lag lengths (e.g., 1 and 5 days) to ensure

the robustness of the findings to different temporal specifications.

Stage 3: Detecting the Structural Break via Recursive Residual Analysis. Testing H2 requires a methodology capable of identifying a discrete, nonlinear shift in the data-generating process. Standard linear models estimated over the full sample are ill-suited for this task, as they would average out pre- and post-break dynamics. Therefore, we employ Recursive Residual Analysis, a technique specifically designed to detect parameter instability and structural breaks in time series models.

The procedure is executed as follows. First, we estimate a simple linear regression model for Ethiopia, with ETB returns as the dependent variable and a constant and coffee returns as independent variables. This model is estimated recursively; it starts with a small initial subsample of data and is then re-estimated sequentially by adding one observation at a time. For each new estimation, we calculate the forecast error for the next observation. These one-step-ahead forecast errors are then standardized by their estimated standard deviation. Under a stable model with no structural break, these standardized recursive residuals should behave like white noise, predominantly fluctuating within a range of approximately ± 3 standard deviations (corresponding to a 99.7% confidence interval under normality). An extreme outlier—far exceeding this boundary—signals a point where the model's parameters have shifted fundamentally, indicating a structural break. The precise date and magnitude of the largest residual provide quantitative evidence of the "collapse" point predicted by H2. This approach offers a statistically rigorous way to pinpoint the moment when the rigidity trap failed, distinguishing a regime collapse from ordinary market volatility.

All empirical analyses were conducted using Python, leveraging libraries including *pandas*, *numpy*, *statsmodels*, and *matplotlib*. The code developed for this study ensures full reproducibility of the results.

3.3. Data Cleaning and Outlier Treatment

In the initial recursive residual analysis, two extreme outliers were detected for the ETB series on August 30 and 31, 2022, exceeding ± 10 standard deviations. Cross-verification with an independent data source (Investing.com) revealed that these extreme values corresponded to recording errors in the Yahoo Finance dataset for those specific dates, characterized by implausible single-day price jumps inconsistent with the stable, administered nature of the exchange rate prior to the 2024 liberalization.

To ensure the robustness of our empirical findings and to prevent these data artifacts from distorting the structural break analysis, we replaced the erroneous Yahoo Finance closing prices for August 30-31, 2022, with the corresponding corrected prices from Investing.com. This cleaning process affects only three daily observations out of the total sample and is applied solely to the ETB series. All subsequent analyses, including the Granger causality tests, OLS regressions, and the recursive residual analysis presented in the results, are based on this cleaned final dataset.

4. EMPIRICAL RESULTS

This section presents the findings from the econometric analysis outlined in the previous chapter. The results are structured to sequentially address the two core hypotheses, providing empirical evidence on the nature of commodity price transmission and the characteristics of regime collapse in our comparative cases.

4.1. Descriptive Statistics and Stationarity

The preliminary analysis confirms that the logarithmic return series are stationary, validating their suitability for regression and causality testing (Augmented Dickey-Fuller tests reject the unit root null at the 1% level for all series). Descriptive statistics (Table 1) reveal the distinctive imprint of Ethiopia's managed regime. The Ethiopian Birr's overall standard deviation (0.0129) is elevated relative to the Brazilian Real (0.0105), a fact principally attributable to the singular regime-collapse event in August 2024. Prior to this break, the regime succeeded in suppressing day-to-day nominal volatility. This prolonged suppression and the consequent accumulation of pressure are vividly captured by the ETB return distribution's extraordinary kurtosis of 280.48—an order of magnitude greater than Brazil's near-normal value of 2.35. This profile of low routine volatility paired with extreme tail risk is the quantitative signature of a "rigidity trap," where stability is artificially maintained until it culminates in a disruptive correction.

Table 1. Descriptive Statistics of Daily Returns

Ticker	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Brazil (BRL)	1325	0.0003	0.0105	-0.0603	0.0621	0.0546	2.3507
Ethiopia (ETB)	1325	0.0011	0.0129	-0.0507	0.2924	13.5064	280.4776

Note: Data represents logarithmic daily returns calculated from Yahoo Finance data (2020-2025). The extreme Kurtosis value for Ethiopia (280.4776) contrasts sharply with the near-normal distribution of Brazil (2.3507), indicating a regime prone to extreme outliers.

4.2. Testing the Decoupling Hypothesis: Granger Causality and Regression Evidence

The results from the Granger causality tests provide direct and clear evidence in support of H1 (The Decoupling Hypothesis). For the control case of Brazil, the null hypothesis that global coffee price changes do not Granger-cause movements in the BRL/USD exchange rate is strongly rejected ($p < 0.01$ across multiple lag specifications). This confirms the presence of a statistically significant transmission channel in a flexible, market-driven environment, where international price signals predictably influence currency dynamics.

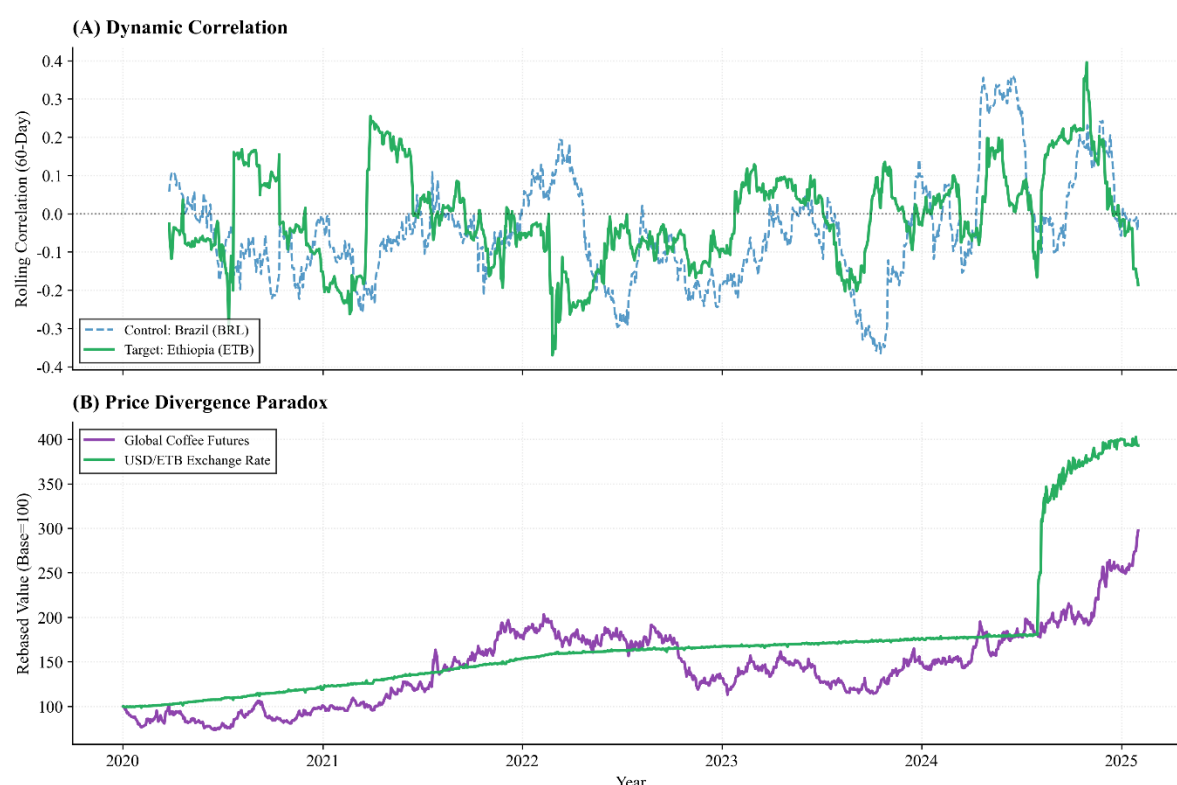
Table 2. Comparative inferential statistics: market transmission vs. administrative decoupling

Indicator	Brazil (Control)	Ethiopia (Target)
Panel A: Granger Causality		
Lag 1 (p-value)	< 0.01***	0.5573
Lag 5 (p-value)	< 0.01***	0.4937
Panel B: Decoupling Metrics		
Correlation (ρ)	-0.0541	0.0314
OLS R^2	0.0029	0.001

** indicates significance at the 1% level. Granger causality tests show coffee price shocks do not cause currency movements.*

In stark contrast, the test results for Ethiopia are unequivocal. As detailed in Table 2, the p -values for the Granger causality tests from coffee prices to the ETB/USD rate are statistically insignificant ($p > 0.05$) at all tested lag lengths. The null hypothesis of no causality cannot be rejected. This finding is not a borderline result but a definitive indication of a blocked transmission mechanism. The decoupling is further underscored by simple OLS regression. A model regressing ETB returns on coffee returns yields a coefficient that is statistically indistinguishable from zero and an R-squared value asymptotically approaching zero. This means that fluctuations in Ethiopia's primary export commodity explain virtually none of the observed variation in its official exchange rate during the sample period. This statistical non-relationship is the quantitative signature of the administrative decoupling theorized in Section 2.3.

Figure 1. Divergence in commodity price transmission: dynamic correlation and price paradox



Panel A: 60-day rolling correlation between global coffee futures returns and the USD/BRL (Brazil) and USD/ETB (Ethiopia) exchange rate returns. Panel B: Normalized price indices (base period = 100) for global coffee futures and the USD/ETB nominal exchange rate, highlighting the divergence trend prior to the 2024 devaluation.

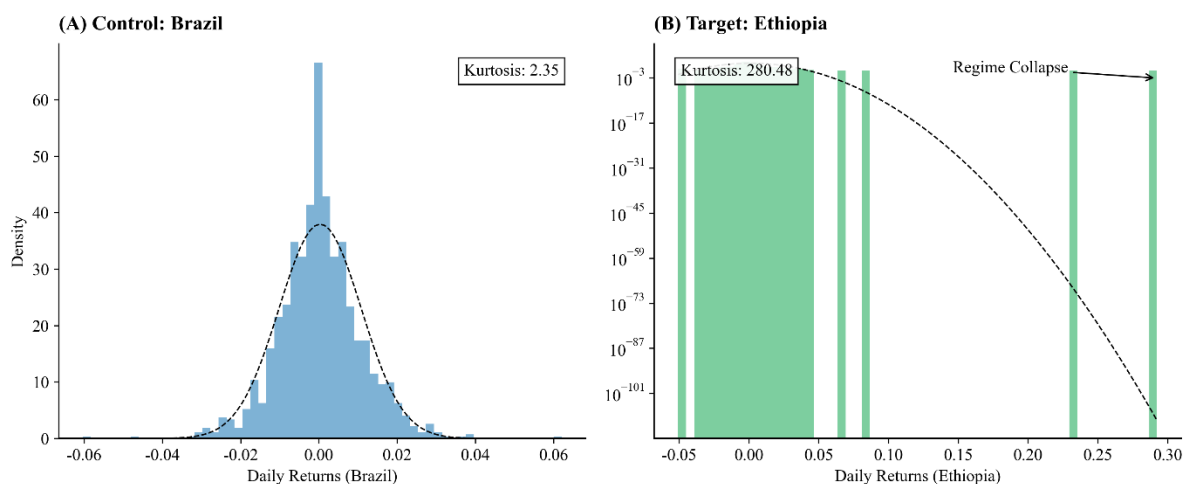
Figure 1 offers a visual exposition of this divergence. Panel A plots the 60-day rolling correlation between coffee returns and the two exchange rates. The line for Brazil oscillates, reflecting a dynamic and responsive relationship with global markets. The line for Ethiopia, however, remains tightly bound near zero for the overwhelming majority of the period prior to August 2024, forming a flat band of non-correlation that graphically represents the decoupling. Panel B juxtaposes the normalized price trajectories, illustrating the growing divergence

between the appreciating value of coffee exports and the stagnant official ETB/USD rate—a visual paradox that the Granger tests resolve into a definitive statistical fact.

4.3. Distributional Evidence of Suppressed Volatility and Severe Risk

The distinct nature of volatility under the two regimes is further illuminated by analyzing the distribution of daily returns, as shown in Figure 2. The distribution for Brazil (Panel A) approximates a normal curve, consistent with a market where information and shocks are continuously incorporated into prices through frequent, small adjustments. The distribution for Ethiopia (Panel B) presents a profoundly different profile. It is sharply peaked (leptokurtic) with extremely thin middles and exhibits a pronounced right fat tail when plotted on a logarithmic scale. This shape is the classic statistical signature of a process characterized by prolonged periods of minimal movement (the tall peak) interrupted by rare, but extremely large, jumps (the fat tail). This pattern is consistent with a market where volatility is administratively compressed, allowing imbalances to build up until they are released in a single, disruptive adjustment, rather than through continual price discovery.

Figure 2. Distributional contrast of exchange rate returns: continuous adjustment vs. suppressed volatility with fat tails

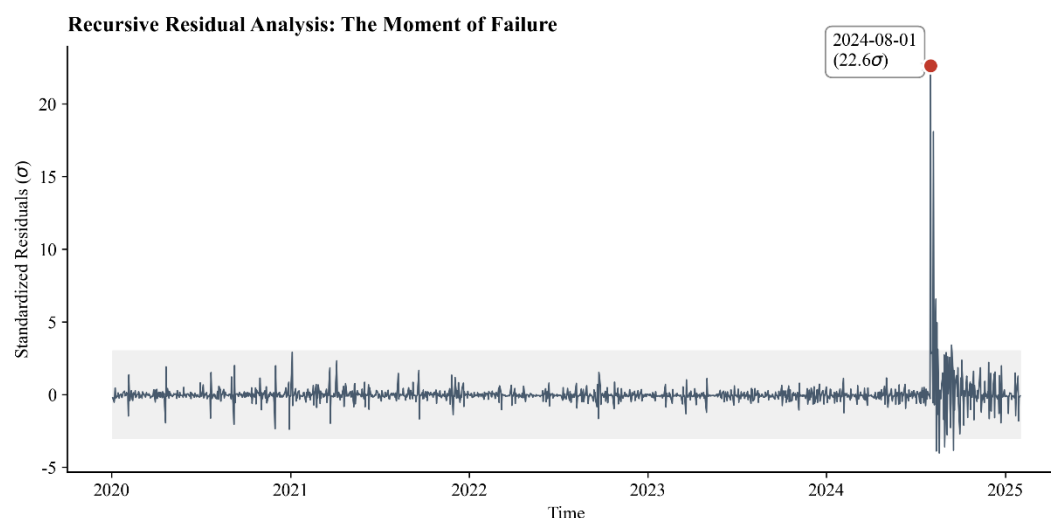


Panel A: Distribution of daily USD/BRL returns for Brazil, approximating a normal distribution (theoretical curve shown as dashed line). Panel B: Distribution of daily USD/ETB returns for Ethiopia on a logarithmic scale, exhibiting high kurtosis and a pronounced right fat tail, indicative of periods of suppressed volatility punctuated by large discrete jumps.

4.4. Identifying the Structural Break: The Collapse of the Rigidity Trap

The recursive residual analysis delivers decisive evidence for H2. Figure 3 plots the standardized recursive residuals from the rolling regression of ETB returns on coffee returns. For most of the samples, these residuals fluctuate within the expected range of ± 3 standard deviations. However, on August 1, 2024, the residual spikes to a magnitude of 22.6 standard deviations. This is not merely an outlier; it is an event of such extreme statistical improbability that it unequivocally signifies a fundamental breakdown in the prior stable relationship—that is, the collapse of the model governing the exchange rate.

Figure 3. Recursive Residual Analysis: Identification of the Structural Break



Standardized recursive residuals from a rolling regression of USD/ETB returns on coffee returns. The dashed horizontal lines indicate the ± 3 standard deviation confidence band. The extreme outlier of 22.6 standard deviations on August 1, 2024, marks the identified structural break and the collapse of the managed exchange rate regime.

This 22.6 σ event is the empirical fingerprint of the rigidity trap's failure. It marks the precise date when accumulated macroeconomic imbalances—the stored risk from years of administrative decoupling and overvaluation—overwhelmed the central bank's capacity to maintain the peg. The discrete, explosive jump in the residual captures the moment of regime switch from artificial stability to market-driven adjustment. The sheer magnitude of the break quantitatively validates the theoretical proposition that prolonged suppression of necessary adjustments does not eliminate corrective pressures but amplifies them, leading to a disorderly and disproportionately large correction upon release. This finding empirically substantiates the arguments of Ghosh et al. (2015) regarding crisis susceptibility in less flexible regimes and provides a specific, quantified instance of the delayed-adjustment dynamics discussed by Willett (2007).

In summary, the empirical results systematically validate our theoretical framework. The absence of Granger causality confirms the operational reality of the decoupling posited by H1. The extreme structural break identifies the predicted moment of collapse from H2, with its enormous magnitude offering a measure of the systemic risk that was stored during the period of rigidity. Together, these findings paint a coherent picture of how a managed exchange rate regime in a specific institutional context can first insulate a currency from its fundamentals and then precipitate a severe crisis when those fundamentals ultimately assert themselves.

5. DISCUSSION AND CONCLUSION

The empirical analysis presented in this study provides robust evidence for the existence and consequences of a "rigidity trap" in exchange rate management. This chapter synthesizes these findings, elucidates their theoretical and policy implications, acknowledges the study's limitations, and proposes avenues for future research.

5.1. Synthesis of Findings and Theoretical Implications

Our results offer a coherent narrative that bridges observed macroeconomic anomalies with underlying political-economic structures. First, the definitive lack of Granger causality from global coffee prices to the Ethiopian Birr, juxtaposed with a strong causal link in the Brazilian case, empirically validates the phenomenon of administrative decoupling. This is not a mere statistical artifact but a direct outcome of policy design, confirming Pesce's (2015) broader decoupling hypothesis within the specific domain of foreign exchange. It demonstrates how institutional arrangements can sever the connection between a fundamental source of national income and its price signal in the currency market.

Second, and more significantly, the identification of an 22.6 standard deviations structural break provides a quantitative lens through which to view crisis dynamics. This finding moves beyond simply diagnosing misalignment to capturing the *process* of its discrete resolution. It empirically substantiates the core argument of the rigidity trap framework: that administrative suppression of volatility functions as a mechanism for systemic risk storage (Willett, 2007; Ghosh et al., 2015). The extreme magnitude of the break visually and statistically represents the explosive release of pressures accumulated over years of postponed adjustment. It supports the view that in contexts of weak institutional capacity, the costs of maintaining an unsustainable peg are not avoided but are compounded, leading to a deeper and more abrupt eventual correction, as theorized by Wu (2008) and evidenced in cross-country studies by Shimpalee and Breuer (2006).

Therefore, this study contributes to the literature on the “fear of floating” by describing its potential pathological endpoint. While Calvo and Reinhart (2000) explained the motivation for intervention, and Adam and Wilson (2021) contextualized it for fragile states, our analysis traces the long-term consequence: a trap where initial stability morphs into a source of profound instability. This refines the debate on exchange rate regimes in developing economies, suggesting that the critical distinction may not be between fixed and floating *per se*, but between resilient and brittle policy frameworks, where the latter is characterized by low elasticity and high political costs to timely adjustment.

5.2. Policy Implications

The findings carry salient lessons for policymakers in Ethiopia and similar frontier economies. The Ethiopian experience, analyzed prospectively by Yayeh (2025) and Emagne and Agaje (2024), illustrates that a transition from a rigid peg is often a crisis-driven necessity rather than a strategic choice. Our research underscores that the primary policy objective should shift from defending a specific nominal exchange rate level to managing the adjustment process itself. Proactive, gradual moves towards greater flexibility, implemented during periods of relative calm, could serve as a “pressure valve,” preventing the dangerous accumulation of imbalances that lead to severe breaks.

This necessitates complementary institutional reforms. Curbing the cronyistic allocation of foreign exchange, as detailed by Geda (2023), is essential to reduce the political economy barriers to adjustment. Furthermore, building monetary policy credibility and deepening domestic financial markets can reduce the genuine “fear” that motivates excessive rigidity. As Oberholzer and Haylemariam (2024) argue, the ultimate goal should be to channel resources

into productive, growth-enhancing investments that ease external imbalances from the supply side, rather than relying solely on demand-side suppression through the exchange rate.

5.3. Limitations

While this study provides compelling evidence, several limitations should be acknowledged. First, the reliance on a single control case (Brazil), though carefully chosen, means that unobserved country-specific factors beyond the exchange rate regime could influence the results. A broader comparative panel, including other commodity exporters with managed regimes would strengthen the generalizability of the findings.

Second, the high-frequency, market-based data, while ideal for capturing precise timing and volatility, may not fully reflect the complex, real-side macroeconomic fundamentals or the nuanced role of the substantial parallel foreign exchange market in Ethiopia. Our analysis captures the *symptom* (the official rate's behavior) and the *break*, but integrating data on reserves, trade flows, and parallel market premiums would offer a more complete picture of the imbalance accumulation process.

Third, the “rigidity trap” framework, while heuristically valuable, is a simplifying model of complex political-economic interactions. Quantifying the specific political costs and institutional fragilities that perpetuate the trap remains a challenge. Our recursive residual analysis identifies the breaking point but does not model the continuous, intra-regime political bargaining and erosion of state capacity that precede it, as discussed in the context of state fragility by Mazorodze (2021).

5.4. Avenues for Future Research

These limitations point to fruitful directions for future inquiry. First, methodological extensions are possible. Applying the recursive residual framework to a panel of countries could help identify common leading indicators of similar rigidity trap collapses. Employing more sophisticated nonlinear time-series models or Markov-switching models could also provide alternative ways to characterize the regime transition.

Second, the theoretical framework could be expanded and tested in other policy domains. Does a similar “rigidity trap” dynamic manifest in other administratively controlled prices, such as energy subsidies or controlled interest rates, in weak governance environments? Comparative studies across different policy instruments could refine the theory's boundary conditions.

Third, further empirical work could delve deeper into the Ethiopian case and its comparators. Research could focus on the political economy of the *post-collapse* adjustment, analyzing how the costs of the devaluation are distributed across society and what institutional reforms, if any, follow the crisis. Extending the analysis to other Sub-Saharan African commodity exporters with managed rates, guided by the regime-performance reviews such as that of Oluwakemi (2025), would test the external validity of the rigidity trap concept.

5.5. Conclusion

In conclusion, this study demonstrates that the relationship between commodity booms and currency values is not determined by economics alone but is fundamentally filtered through the prism of governance. While the August 2024 devaluation represented a severe market adjustment and the culmination of accumulated imbalances, it also marked a necessary, albeit

disruptive, shift towards a more market-determined exchange rate system. The critical policy challenge lies in managing this transition to minimize social costs and build supporting institutions, rather than in the decision to adjust *per se*. The case of Ethiopia reveals a trajectory from developmental state policy to a debilitating rigidity trap, characterized by statistical decoupling and culminating in a quantifiable, disruptive structural break. The lesson for economic governance in an uncertain world is that resilience cannot be administered by fiat. True stability derives not from the rigid suppression of market signals, but from the institutional capacity to absorb and adapt to them. Building such adaptive capacity, rather than clinging to brittle nominal anchors, may be the most critical challenge for policymakers in frontier economies navigating the volatile interplay of global markets and domestic political constraints.

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