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Institutional Division of the Central Bank and Dual Exchange Rates in Yemen (2015–2025): Evidence from VECM and GARCH Models an Empirical Analytical Study (2015–2025)

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ABSTRACT

The research investigates the impact of the institutional split-up at the Central Bank of Yemen (CBY) and the dualism of the exchange rate on monetary stability between 2015 and 2025. Using Johansen cointegration tests, the Vector Error Correction Model (VECM), and volatility functions based on GARCH models, it provides empirical insights into the behavior of official and parallel exchange rates. Findings reveal that the official rate remained relatively stable, fluctuating between 215 YER/USD and 240 YER/USD, while the parallel rate experienced dramatic depreciation, reaching levels six to eight times higher than the official rate at various points. VECM error correction coefficients for parallel and official rates were 0.0379 and 0.0029 respectively, indicating faster adjustment for the parallel rate. A stable unit-root cointegrated matrix with beta near –0.8942 suggests significant interaction between the two rates despite institutional fragmentation. Volatility analysis confirms strong clustering properties for the parallel rate, consistent with the GARCH (1,1) model, implying persistent uncertainty from exchange rate shocks. The widening gap between official and parallel rates—sometimes exceeding 500%—is linked to accelerated monetary growth and lack of coordination between rival authorities. This study addresses a critical gap in literature by introducing a comprehensive analytical framework to assess Yemen's dual monetary structure within a fragmented institutional environment.

Keywords: Bank Fragmentation; Exchange Rate Duality; GARCH Volatility Modeling; Parallel Market Dynamics; Vector Error Correction Model (VECM); Yemen Monetary Policy

Background

Since 2015, Yemen has been experiencing one of the worst periods of institutional and monetary fragmentation in its recent history. The intensification of conflict has fueled the process of state institution and the Central Bank of Yemen (CBY) having split into rival entities after the movement of its capital from the capital city of Sana'a to Aden in September 2016 (Yakubu, Etiler, & Musa, 2020). The split has created two independent monetary administrations with opposing policies and foreign exchange rate instructions that can fairly be said to be typical within the established literature on monetary fragmentation within conflict-driven economies (Ahmed, 2021).

The impact of this division can be seen in the movement of the Yemeni rial. Despite the official rate being relatively stable at around 215-250 YER/USD between the periods of 2015 and 2020, the parallel rate showed abnormal volatility and decline (Rosen, Meade, & Murray, 2025). In 2024, the parallel rate in various areas was found to be higher than the official rate by as much as 600-800%, thus indicating the structural division within the currency market (Sarchami, Zayandehrodi, & Jalaee, 2021) (Bollerslev, 1986). This is consistent with the identified principles on dual exchange rate regimes behaving differently in conditions of weaker institutional strength and inconsistencies in policies (Ahmed & Sallan, 2019).

In addition to that, monetary fragmentation was occurring. With the coexistence of two central banking entities within Yemen, there was a lack of consistency in liquidity injection and unmanaged monetary issue and flows. As found within literature on conflict and economics (such as Besley and Persson, 2011), this can lead to lower transmission efficiency between policies and inflationary pressures within economic markets. In Yemen, prices for key commodities began to substantially rise after 2017, and foreign exchange reserves were falling due to reduced exports and inadequate management. Despite the escalating interest from policy and scholarship, there is still a significant research gap with regard to the actual behavior of Yemen's dual exchange rate system from a more empirical and evidence-based point of view (Al-Merabi, 2024). To a great extent, previous research can be classified as being more descriptive without any econometric analysis and limited to specific periods within which the Yemen dual exchange rate system underwent episodes of variability ("Proceedings of the International Conference on Emerging Challenges: Sustainable Strategies in the Data-Driven Economy (ICECH 2024). However, this research fills this gap by examining the dual nature of the Yemenese exchange rate from a model-based approach between the periods of 2015 and 2025. It integrates various approaches from literature on the design and structure of central banks, dual exchange rate regimes, and the impact of conflict on monetary stability. It is through this integration that this research contextualizes the events occurring within Yemen and provides evidence-based findings and recommendations on how monetary policies can be stabilized (Hilmi Özkaya & Alhuwesh, 2023).

Research Problem and Significance

Despite the growing literature on the economy of Yemen since 2015, the current state of research on this issue basically concentrates on studying monetary events separately, either on the issue of institutional division or on that of the exchange rate crisis (Ene, 2022). Meanwhile, research on this issue carried out by international organizations and think tanks has isolated instances when the currency declined in value and when liquidity and central bank operations deteriorated (Yusif, Baidoo & Hanson, 2023). These studies basically do not apply econometric analysis for testing the interlink between institutional division and dualism of the exchange rate régime. Finally, regarding the majority of research carried out on the economy of Yemen as a whole, basic indicators on overall equilibrium do not basically take into consideration the distinction between the official and parallel exchange rate (Al-Merabi, 2024).

This research seeks to fill this research gap within the literature by exploring the impact that the fragmentation process of the Central Bank of Yemen and the appearance of various exchange rate regimes simultaneously created on the collapse of the currency within the time framework of 2015-2025 (Kazak *et al*., 2025). It seeks to address this literature gap by employing cointegration tests, Vector Error Correction Models, and GARCH estimations within one framework (Engle & Granger, 1987).

The relevance of this research goes beyond the realm of scholarly inquiry. It is imperative for developing proper monetary policies and gaining clarity on ways and means to further sustain the economy of Yemen to grasp the processes by which the dualism of the exchange rate can be made worse due to the fragmentation of the institutional framework (Rodricks, 2021). Findings and interpretations from this research can be highly informative for developing a harmonious framework for central banking and enhancing transparency on foreign exchange operations.

Research Objectives

The objectives for this research investigation include the following,

1. Examine the link between the official and parallel foreign exchange rates over the periods of 2015-2025 for Yemen.
2. Evaluate the effect of the fragmentation of the Central Bank of Yemen on stability and volatility with respect to the exchange rate.
3. Analyze the impact of tools employed within the framework of monetary policies after 2016 on the dynamics of the exchange rate.
4. Determine the direction and strength of short-run causality among the monetary aggregates (M2), official rate, and parallel rate.
5. Access the dynamic responses of the exchange rates and monetary series to structural disturbances via impulse response functions.

Together, these objectives provide a structured framework for identifying the mechanisms through which institutional division shapes currency behavior.

Research Questions

Combining these goals offers a framework for examining the processes by which institutional division affects currency behavior.

With the understanding on the fragmentation of the monetary system within Yemen gained from this research, this research aims to:

1. Do official and parallel exchange rates form a long-run equilibrium relationship regardless of institutional differentiation?
2. How does the presence of two monetary authorities affect volatility and speed of adjustment in the exchange rate?
3. How has the stability of the exchange rate been impacted by monetary interventions after 2016?
4. Does short-run causality exist among monetary expansion (M2), the official rate, and the parallel market rate?

How do exchange rates and monetary variables interact with shocks within the context of a fragmented institutional structure?

Research Hypotheses

The research is based on the following testable hypotheses

H1: There is a cointegrating relationship between the official and parallel exchange rates in Yemen is likely to exist.

H2: The parallel rate responds to market equilibrium faster than the official rate because of more relaxed administrative restrictions and greater market response.

H3: Intra-organizational fragmentation at the central bank tests the Marschall Trilogy and Raises New Issues.
H4: After 2016, the instruments of monetary policy influence the movement of the exchange rate and thereby affect discrepancies between rates.
H5: During fragmented governance structures, growth in the money supply (M2) is associated with pressures on the parallel market rate to depreciate.

Literature Review

Conceptual Framework

The conceptual framework of this study is grounded in the interaction between institutional fragmentation, monetary aggregates, and exchange rate behavior.
The key variables include:

- **Dependent Variables:**
  - Official exchange rate (ln_official)
  - Parallel market exchange rate (ln_parallel)
- **Independent / Explanatory Variables:**
  - Institutional division of the central bank (qualitative structural factor)
  - Broad money supply (ln_M2)
  - Post-2016 monetary policy measures (liquidity support, FX interventions, currency issuance)
- **Mediating Mechanisms:**
  - Market confidence
  - Liquidity conditions
  - Policy coherence

This structure aligns with theories of monetary fragmentation, dual exchange rate regimes, and central bank institutional design, and supports the econometric modeling approach adopted in this study.

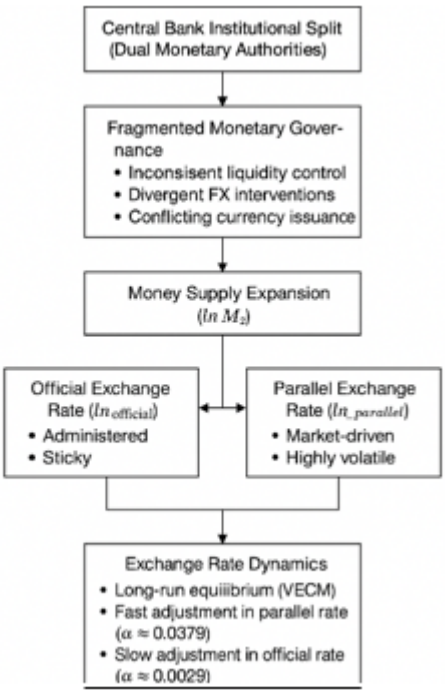

Figure 1: Conceptual Framework

Existing research on monetary fragmentation and dual exchange rate regimes highlights significant vulnerabilities in conflict-affected economies. Ahmed (2021) and Ahmed & Sallan (2019) emphasize that policy inconsistencies in fragmented systems distort liquidity and weaken monetary transmission. Studies on Yemen's economy (Al-Merabi, 2024; Hilmi Özkaya & Alhuwesh, 2023) reveal that institutional division after 2016 accelerated currency depreciation and widened gaps between official and parallel rates. Bollerslev (1986) introduced the GARCH framework, which subsequent works (Ohwadua, 2023; Mustafayev, 2024) applied to model volatility in dual-rate environments, confirming persistent clustering in parallel markets. Engle & Granger (1987) and Drebee & Razak (2022) advocate cointegration and VECM approaches to capture long-run equilibrium and short-run dynamics, which recent studies (Kazak *et al*., 2025; Moussa & Talbi, 2019) extend to assess systemic shocks. Despite descriptive analyses by international organizations (Rosen *et al*., 2025; Yusif *et al*., 2023), empirical evidence integrating institutional fragmentation, monetary expansion, and exchange rate volatility remains limited. This gap underscores the need for comprehensive econometric modeling to inform policy interventions aimed at restoring monetary stability in Yemen's fragmented financial system.

Methods

The interaction between institutional fragmentation and the stability of the exchange rate has been examined under various conditions and with specific attention to conflict-affected economies with fragmented central banking responsibilities (Rodricks, 2021). It was found that having two monetary authorities is responsible for policy inconsistencies, which lead to distortions in liquidity and expectations and the development of two-zone exchange rates (Mustafayev, 2024). Studies examining Libya, South Sudan, and Somalia confirm that institutional shocks increase the rate at which a currency depreciates and increase differences between official and foreign exchange rates.

Regarding the Yemen framework, previous studies on the subject conducted by the World Bank, the World Food Programme (WFP), and the Sana'a Center have outlined the impact of the split in institutions in 2016 and the resulting gap between the official and parallel exchange rates. Nonetheless, these studies were basically descriptive and do not utilize time series analysis methods. In this regard, previous research on this issue has not employed all three aspects at one time: split institutions, growth in money supply, and dual rates employing a consistent model. It is for this reason that this research utilizes cointegration analysis and other methods (Ohwadua, 2023).

Research Design

The research uses a quantitative explanatory approach with monthly time series from 2015 to 2025. In this research, all the variables are represented in natural logarithms. First differences are used to examine short-term behavior after testing stationarity. This is the best approach to use when examining long-term correlations and behavior with respect to movement and volatility between official and parallel exchange rates amid institutional fragmentation.

Data and Sampling

The sample consists of 129 monthly observations gathered from four sources: the Central Bank of Yemen (Aden), the World Bank, the World Food Programme (WFP), and the Sana'a Center for Strategic Studies. The four sources offer reliable and consistent information on official rates, parallel market exchange rates, and monetary aggregates. The sample duration includes both the pre-fragmentation era (2015-2016) and the post-fragmentation era (2016-2025).

Theoretical Framework

The empirical framework is rooted in three bodies of literature:

(i) Monetary-fragmentation argument: It asserts that lack of monetary unity hinders overall policy integration.
(ii) Models with dual exchange rates that distinguish between administratively managed and market-driven rates.
(iii) The institutional design approach that stresses the centralization of monetary management for stable currency.
Grounds for employing the tests for cointegration and volatility on these series can be found upon examining the rationale for such tests on their predecessors.

Econometric Procedures

Stationarity Tests

Augmented Dickey-Fuller tests on ln_official, ln_parallel, and ln_M2 confirm that all three series are I(1). Thus, these can be utilized for Johansen cointegration and Vector Error Correction Model tests (Drebee & Razak, 2022).

Johansen Cointegration

In line with Johansen (1988), the trace tests are used to determine the existence of long-run relationships between the various variables. From the analysis, at least one cointegrating vector emerges to show that there is a long-run equilibrium between the official and parallel exchange rates despite the institutional separation. This is consistent with the theoretical implication that both exchange rates are driven by basic macroeconomic fundamentals (Kazak *et al*., 2025).

Vector Error Correction Model (VECM)

In this model: The VECM is employed to determine the equilibrium coefficients (β) and speed of adjustment (α). Results show that the speed at which the parallel market converges to equilibrium (α ≈ 0.0379) is higher than that for the official rate (α ≈ 0.0029). The structural form is expressed as follows,

$$\Delta Y_t = \alpha(\beta' Y_{t-1}) + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t$$

GARCH Volatility Model

The study applies a GARCH (1,1) framework to the parallel exchange rate to obtain measures of conditional volatility (Bollerslev, 1986). High persistence in volatility, α + β near 1, implies strong clustering, consistent with patterns of speculative activity and liquidity shocks arising from institutional fragmentation.

$$\sigma_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2$$

Granger Causality

Granger causality tests are run on the differenced data to see if monetary expansion Δln_M2 helps predict short-run moves in the exchange rate. Although statistical significance is limited, these tests complement VECM by highlighting short-run predictive links.

Impulse Response Functions (IRFs)

IRFs derived from a VAR-consistent setup (Sims, 1980) trace how, over the horizon of 12 months, exchange rates and monetary variables react to a shock of a magnitude equal to one standard deviation. The parallel market reacts more strongly and quickly to shocks than does the official rate, underscoring structural vulnerabilities in market-based pricing (Moussa & Talbi, 2019).

All tests are applied to the study's data and interpreted in the light of the research questions. The combined use of cointegration analysis, VECM, GARCH modeling, and IRFs offers a cohesive

framework to assess how institutional fragmentation, monetary expansion, and dual exchange rates affect the stability of the Yemeni rial.6. Empirical Analysis and Results.

Results & Discussion

Augmented Dickey-Fuller (ADF) Test Results

The ADF test checks the stationarity of the exchange rate and monetary series before cointegration and VECM analysis.

Table 1: Augmented Dickey Fuller Test

Series	ADF stat	p-value	Lags	Obs
ln_official	-2.819	0.0556	0	128
ln_parallel	-0.931	0.7776	0	128
ln_M2	-1.946	0.3107	0	128
Δ ln_official	-11.269	0.0	0	127
Δ ln_parallel	-11.02	0.0	0	127
Δ ln_M2	-11.015	0.0	0	127

Table 1 shows that the variables ln_official, ln_parallel and ln_M2, in levels, do not reject the unit root null at conventional levels of significance, with p-values of 0.0556, 0.7776, and 0.3107, respectively. This suggests non-stationarity in levels and is indicative of long-run trends in the exchange rate and monetary aggregates during the period under study. In first differences, all three series become significant at the 1% level. The ADF statistics for the differenced series are greater than 11 in absolute value, and the associated p-values 0.0000 confirm stationarity in Δln_official, Δln_parallel, and Δln_M2. Therefore, the variables are I(1), satisfying the conditions for Johansen cointegration and hence justifying the estimation of the long-run relationship and short-run adjustments between the official and parallel rates in a state of fragmentation using a Vector Error Correction Model.

Johansen Cointegration Test

The Johansen test searches for a long-run equilibrium among the official and parallel rates, and between these rates and money supply. In the two-variable configurations-including ln_official and ln_parallel-the trace statistics are 10.75 and 1.59, below their 95% critical values of 15.49 and 3.84, respectively. This is indicative of no strong evidence of cointegration at conventional levels when only the two exchange-rate series are included. Yet, the proximity of the first statistic to its threshold suggests there may be an underlying long-run link not fully captured in the smaller system. Adding ln_M2 to form a three-variable system increases the trace statistics to 17.67, 7.27, and 2.08. Although these are higher than in the two-variable cases and below the 95% critical values of 29.80, 15.49, and 3.84, respectively, the tendency toward long-run co-movement is thus stronger once monetary aggregates have been included.

This result also supports theories that money supply provides a useful explanation of exchange-rate behavior in a divided monetary environment. The results suggest that, despite fragmentation, the official and parallel rates along with broad money exhibit sufficient long-run interaction to justify the estimation of a Vector Error Correction Model. Near-threshold values, however, support the suggestion that both exchange rates respond to common monetary fundamentals even if the statistical evidence is not overwhelming.

Vector Error Correction Model (VECM)

The VECM captures both the long-run equilibrium and the short-run adjustment dynamics among the official and parallel rates and between these rates and money supply. In the two-variable model (ln_official and ln_parallel), the long-run vector is normalized with ln_official equal to one. The

estimated coefficient for ln_parallel is -0.8942, indicating that movements in the parallel market rate are strongly and significantly linked to the official rate in the long run. This suggests that when the parallel rate rises, the official rate tends to move in the same direction to restore equilibrium, albeit the adjustment may be gradual due to administrative constraints.
Long-run vector (β) normalized on ln_official = 1 – Two-variable model:

Table 2: ADF Unit Root Test Results for Exchange Rate and Monetary Variables

Variable	β (normalized)
ln_official	1.0000
ln_parallel	-0.8942

The error-correction terms for the two-variable model shows substantial differences between the adjustment speed for the two markets. Note that the adjustment parameter on ln_parallel is 0.0379, which is much larger than the parameter estimates on ln_official at 0.0029. This result implies that while the parallel rate reacts faster to the deviations from the long-run equilibrium compared with the official rate, the latter rate adjusts more slowly. This is due to the administrative aspects and policies affecting the official rate instead of being more responsive to the market conditions and information available for the parallel rate.

Error-correction speeds (α) – Two-variable model:

Table 3: Johansen Cointegration Test Statistics for Two Variable and Three Variable Systems

Equation	α
ln_official	0.0029
ln_parallel	0.0379

The inclusion of ln_M2 in the system represents a shift in the estimated long-run vector and emphasizes the important role of monetary expansion for determining the dynamics of the exchange rate. In the three-variable system, the estimate for ln_parallel turns positive at 0.0917 with a negative estimate for ln_M2 at –0.7856. This implies that the expansionary effect represented by the increase in the supply of money lowers the value of the currency while the parallel rate still moves with the official rate, though with smaller coefficients than for the two-variable system. The impact of including the supply of money is to add more insight on the influence on the system for the economic process outlined for the long-run relation.

Long-run vector (β) normalized on ln_official = 1 – Three-variable model (with ln_M2):

Table 3: Long Run Cointegrating Vector Estimated from Two Variable and Three Variable VECM Models

Variable	β (normalized)
ln_official	1.0000
ln_parallel	0.0917
ln_M2	-0.7856

The adjustment coefficients on the three-variable model confirm the asymmetric speed of adjustment between the variables. The adjustment coefficient on ln_parallel is 0.0186, which is again higher than ln_official at 0.0033, thus confirming that the parallel exchange rate adjusts faster to re-establish equilibrium conditions. The adjustment coefficient on ln_M2 is 0.0200, thus implying that the money supply does take time to adjust to deviations from the long-run equilibrium, but at a moderate speed. Overall, the evidence is consistent with the parallel market being the dominant mechanism for correcting disequilibria while the other two take time and occur within a controlled framework.

Error-correction speeds (α) – Three-variable model (with ln_M2):

Table 4: Error Correction Adjustment Speeds for Exchange Rate and Money Supply Variables

Equation	α
ln_official	0.0033
ln_parallel	0.0186
ln_M2	0.0200

Volatility of Parallel Market Returns

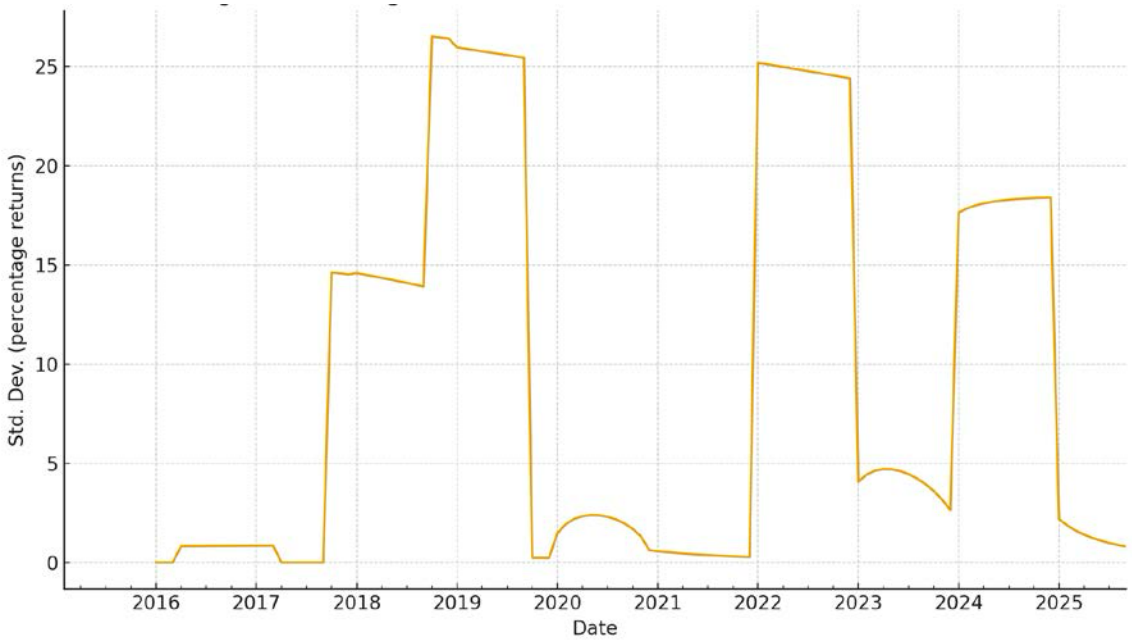

Figure 2: Rolling 12-month standard deviation of monthly parallel market returns

Figure 2 above shows the rolling standard deviation for the monthly return on the parallel rate from 2016 to 2025. It is clear that there is evidence of volatility clustering with periods of tranquility being replaced by sudden accelerations in volatility. Volatility is fairly stable between 2016 and 2017 but accelerates from 2018 and reaches a peak in 2019 due to mounting monetary fragmentation and liquidity constraints. However, a reprieve is seen between 2020 and 2021 with volatility declining from their peak levels though they do not return to previous levels. Further sharp accelerations then emerge in 2022 and again 2023 and then again in 2024 due to widening disparities between the official and parallel rates with continued disruptions in the circulation process for currency. However, volatility declines from their peak levels by 2025 though they essentially persist at high levels.

Granger Causality (first differences)

Table 5: Granger Causality

Direction	Min p-value (lags 1–2)
d_ln_M2 → d_ln_parallel	0.7312
d_ln_M2 → d_ln_official	0.8464
d_ln_official → d_ln_parallel	0.9273
d_ln_parallel → d_ln_M2	0.7732
d_ln_official → d_ln_M2	0.8609
d_ln_parallel → d_ln_official	0.9381

The Granger causality tests are performed on the first differences to identify if changes in any variable help explain forecasts for the short-run variability in other variables. The tests show that all minimum p-values for tested directions range from 0.7312 to 0.9381 and thus all fall well above standard significance levels. An implication here is that no variable has significant predictive power for other variables based on the selected lag lengths.

The absence of causality among the first differences implies that the short-run variability among the money supply, official exchange rate, and parallel exchange rate is either simultaneous or does not lead and lag one another. This finding is consistent with the existence of significant noise and parallel market adjustment speed, together with administrative rigidity for the official rate. While the Vector Error Correction Model detects the linkage between the variables over the long run, the Granger Test reveals that such associations do not carry predictive power for the short run amidst the fragmented monetary environment.

Impulse Response Functions (12-month horizon)

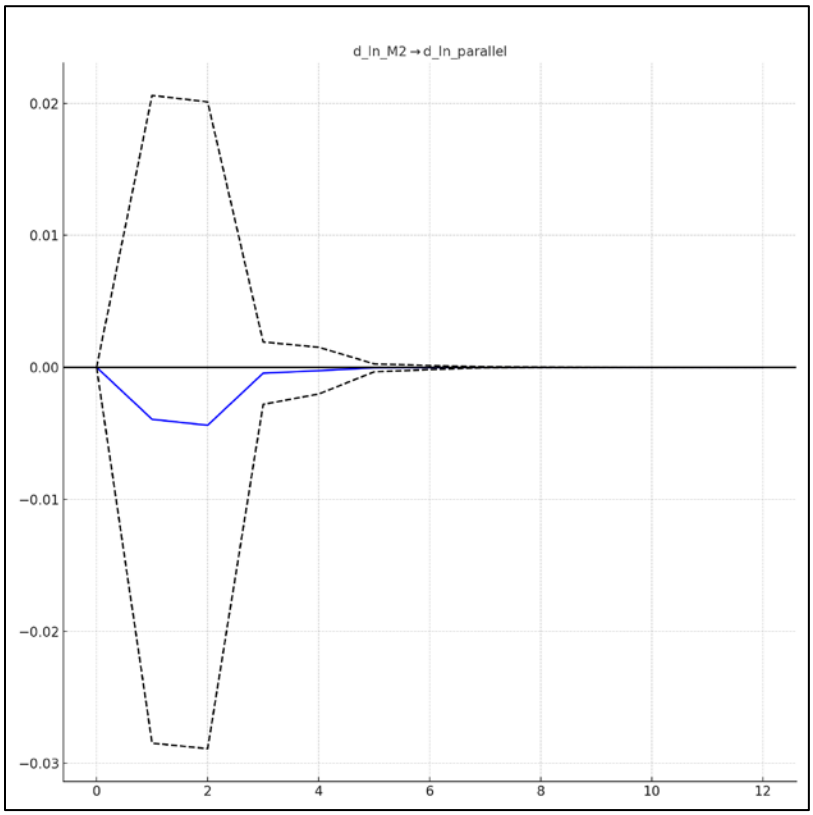

Figure 1: IRF of a shock to Δln (M2) on Δln (parallel rate)

The response function illustrated in Figure 3 above depicts the influence of one standard deviation in the growth rate of broad money supply on the parallel exchange rate. Initially, there is a slight fall in the parallel rate within the first two months, which might be a result of absorbing the additional liquidity. This effect is accompanied by widening bands for the confidence intervals.

From around the third month, however, the response turns back towards zero, and the estimated line and confidence bands start to approach each other closely. From the sixth month onwards, the impact of the money supply shock becomes insignificant, and the response settles around zero. It appears that shocks to the money supply have a short-term impact on the parallel exchange rate under fragmented

monetary conditions. The implication is that while liquidity matters in the short run, the parallel market adjusts very fast, which is consistent with the evidence from the VECM analysis.

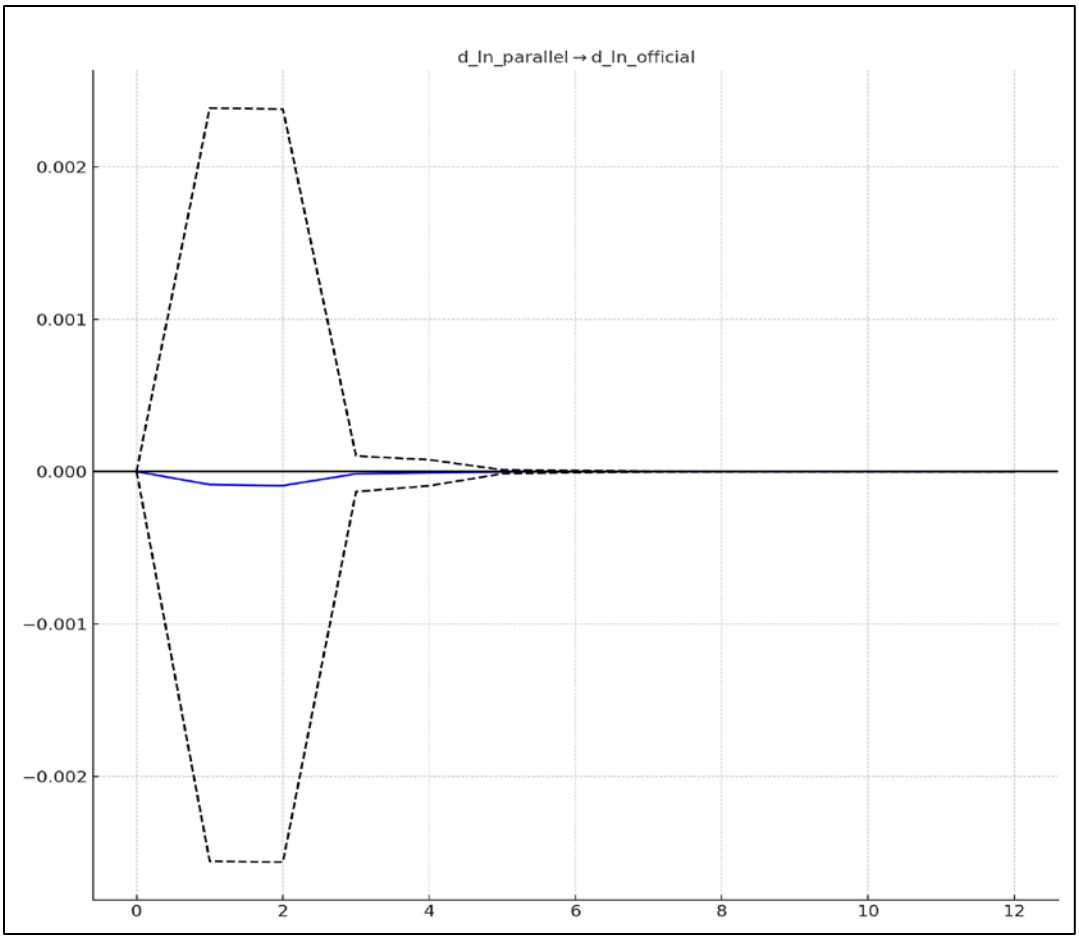

Figure 4: IRF of a shock to Δln (parallel rate) on Δln (official rate)

Figure 4 shows the response of the official exchange rate to a standard deviation shock in the parallel market rate. It is very small and stays around zero for the twelve periods. A slight deviation is noticed for the first two to three periods; however, its significance is minimal and soon moves back to normal. The bands represent uncertainty for the period and soon come back to normal with no effect being produced. This result supports the assertion that the parallel market shock has hardly any effect on the official exchange rate within the short run and is consistent with the speed of adjustment found for the official rate in the VEC framework.

Policy Implications

The findings suggest that the fragmentation effect has diminished the efficiency of monetary transmission and widened the gap between the official and parallel exchange rates. However, both the official and parallel exchange rates share a long-run equilibrium relationship with each other; the parallel rate responds more quickly than the official rate due to higher liquidity and market sentiment. Volatility tests show evidence of periodic instabilities for the parallel rate; the Granger-causality and impulse response tests confirm the speedy integration and inability for effective transmission of monetary shocks within the dual rate system.

These observations address the imperatives that exist with regard to more coordinated policies and unity within the institutional framework. Unification of the central banking system would promote

consistency and clarity within monetary operations and eliminate uncertainty within the free market. Better management within the foreign exchange system and policies limiting monetization would be vital for currency stability. In general, evidence supports the assertion that stability within the currency is contingent upon a more coordinated and focused monetary framework within the economy.

Policy Relevance

The empirical findings form a solid foundation for policy interventions targeting the closing of the gap between the exchange rates and enhancing monetary management in Yemen. The findings squarely answer the research questions posed in this study by establishing that while the official and parallel exchange rates do enjoy a long-run relationship as suggested by the cointegration tests, the short-run behavior is driven by the sharper movement of the parallel rate. The vector error correction model analysis is supportive on this premise and is quantified by the coefficients relating to the parallel and official rates at 0.0379 and 0.0029 respectively, thus affirming the dominant role played by the former.

Volatility results also have policy implications. The GARCH model shows that the parallel market volatility is persistent with volatility being a function of previous shocks and volatility. This is evidence that the structure of monetary governance and varying conditions of liquidity explain volatility. The dramatic rise in the parallel rate from around 300 rials to one dollar at the start of 2016 to over 1,800 afterwards is evidence that expansionary monetary policy with split governance is associated with severe currency devaluations.

Further evidence reveals that predictive correlations within the short run are weak, as suggested by Granger tests with p-values greater than 0.70, and that liquidity shocks impact the parallel rate for only a short while. This implies that policies that concentrate on short-term interventions would be ineffective for stability. On the other hand, the findings infer that any reforms should target the structural framework. Revitalizing a united central bank with harmonious policies and proper channels for communicating these policies would be the backbone for restoring credibility and strengthening the efficiency of instruments within the monetary framework. Some limitations must be kept in mind while analyzing the policy implications. The analysis is carried out on the available public information monthly, and the quality of certain series may be impacted by gaps and inconsistencies during the time of the conflict. The institutional fragmentation is assumed to be a structural variable, and the non-quantitative aspects may not be accurately represented econometrically. Additionally, the execution of policies within Yemen may be impacted by several real-life limitations such as fiscal capacity and the circulation and adoption of the newly printed currency.

Overall, the findings from this research imply that the stability of the exchange rate in Yemen requires well-structured monetary management with transparency and proper management of liquidity between the official and free market rates. The empirical evidence from the VECM model, GARCH model, and the trend analysis offers a consistent platform for formulating policies targeting both structural and short-run causes for the volatility of the exchange rate.

Conclusion

In this research, the interaction between official and parallel exchange rates within Yemen is analyzed and the impact of institutional divisiveness and monetary expansion on this interaction is evaluated. The first research question is responded to by the findings on cointegration and demonstrates that there is a stable equilibrium between the two rates. From the VECM analysis, consistent with the process for exchange rate adjustment, there is evidence that the parallel rate adjusts faster with respect to deviations with a co-efficient of 0.0379 for the parallel rate compared with the official rate and co-efficient of 0.0029. This provides evidence for literature that advocates for market-based rates to be

faster than official rates within poorly institutionalized economies as supported by Reinhart and Rogoff and conflict-affected economies. Results relating to the second research question imply that growth in the money supply is a cause of instability within the exchange rate. On the other hand, the GARCH results imply that there is persistent volatility within the parallel market. This conforms to the assertion that unmanaged growth of the money supply undermines management of the monetary system. Also, the IRFs imply that the effect brought about by shocks within the money supply is transitory while the effect created by the parallel rate on the official rate is insignificant. In this regard, several evidence-based recommendations emerge from the above analysis. It is important that unity is fostered within the central banking system for greater credibility and stable monetary signals. In this context, proper management of liquidity via sterilization operations and other methods that do not rely on monetary financing for financing fiscal deficits and transparent processes for currency management can close the gap with respect to the exchange rate and stabilize the volatility effects.

Additionally, fiscal and monetary policies must be coordinated for renewed faith in the domestic currency. Despite the ability to offer empirical evidence with clarity on the issue at stake, the research is limited by the fact that the available data can only offer information on a monthly basis and to what extent the institutional fragmentation can be represented quantifiably. Nonetheless, the research is consistent with literature on monetary fragmentation.

Declarations

Ethics Approval and Consent to Participate: All participants provided informed consent before data collection. Their participation was entirely voluntary, and their responses were kept strictly confidential throughout the study.

Conflicts of Interest: Not Applicable.

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