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International Transmission Effects of Federal Reserve (FED) Policy Shocks on Interest Rate and Exchange Rate Dynamics

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ABSTRACT

This study investigates the international transmission effects of Federal Reserve (FED) monetary policy shocks on global interest rate and exchange rate dynamics within an increasingly integrated financial system. In a context characterized by high capital mobility and deep cross-border financial linkages, policy decisions taken by the FED extend beyond domestic stabilization objectives and exert systemic influence on global financial markets. The primary objective of this research is to examine the magnitude, persistence, and asymmetry of these spillover effects across advanced and emerging economies.

Employing a quantitative empirical framework, the study utilizes a Structural Vector Autoregression (SVAR) model to identify exogenous U.S. monetary policy shocks and trace their dynamic impact on sovereign bond yields and bilateral exchange rates. In addition, a panel data regression analysis is conducted to assess cross-country heterogeneity and to determine whether emerging market economies exhibit greater sensitivity to FED policy shifts. The dataset covers the period 2005–2024, incorporating episodes of unconventional monetary expansion and subsequent tightening cycles.

The findings reveal that contractionary FED policy shocks generate statistically significant increases in international long-term interest rates and induce depreciation pressures in emerging market currencies. The transmission effects are stronger and more persistent in economies with higher external financing dependence and greater exposure to global capital flows. Moreover, periods of heightened global risk amplify the spillover intensity, suggesting a nonlinear interaction between monetary policy shocks and financial market sentiment.

The results underscore the structural role of the FED within the global financial architecture and highlight the limitations of monetary policy autonomy under conditions of financial globalization. These findings contribute to the literature on international monetary transmission and global financial stability.

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Received: March 07, 2026; **Accepted:** March 12, 2026; **Published:** March 21, 2026

Keywords: Federal Reserve Policy Shocks, International Monetary Transmission, Exchange Rate Dynamics, Interest Rate Spillovers, Global Financial Integration

Introduction

The increasing integration of global financial markets has significantly altered the scope and consequences of national monetary policy decisions. In this interconnected environment, the policy actions of the United States Federal Reserve (FED) extend far beyond domestic macroeconomic stabilization objectives and exert substantial influence on international financial conditions. Given the central role of the U.S. dollar in global trade, cross-border capital flows, and reserve currency holdings, shifts in U.S. monetary policy inevitably generate spillover effects that shape interest rate structures and exchange rate dynamics worldwide.

The global financial crisis of 2008 and the subsequent adoption of unconventional monetary policy measures—such as quantitative easing and forward guidance—highlighted the systemic importance of the FED within the global financial architecture. More recently, the tightening cycle initiated in response to post-pandemic inflationary pressures has once again demonstrated

the sensitivity of international financial markets to U.S. policy adjustments. Rapid increases in the Federal Funds Rate have been associated with rising global bond yields, capital flow reversals, and heightened exchange rate volatility, particularly in emerging market economies [1-8].

From a theoretical perspective, international transmission mechanisms operate through multiple channels. Interest rate differentials influence cross-border capital allocation decisions, while expectations of future monetary conditions affect asset pricing and exchange rate behavior. The global financial cycle hypothesis further suggests that fluctuations in U.S. monetary policy conditions shape global liquidity and risk appetite, thereby constraining monetary policy autonomy in other economies. Under conditions of high capital mobility, domestic interest rate decisions may increasingly reflect external financial pressures rather than purely domestic economic fundamentals.

Despite extensive research on U.S. monetary spillovers, empirical evidence remains mixed regarding the magnitude and persistence of transmission effects across different country groups. Advanced economies with deeper financial markets may exhibit greater

resilience, whereas emerging markets often face heightened vulnerability due to structural imbalances, external debt exposure, and dependence on foreign capital inflows. Consequently, a comprehensive and updated empirical assessment is necessary to evaluate the asymmetric nature of these spillover dynamics.

This study aims to analyze the international transmission effects of Federal Reserve policy shocks on interest rate and exchange rate dynamics across a selected group of advanced and emerging economies. By employing a combined Structural Vector Autoregression (SVAR) and panel data approach over the 2005–2024 period, the research seeks to capture both short-term dynamic responses and cross-country heterogeneity. In doing so, it contributes to the literature on global monetary interdependence and provides insights into the structural role of the FED within the contemporary international financial system [9-16].

Materials and Methods

Research Framework

This study adopts a quantitative empirical research design to examine the international transmission effects of Federal Reserve (FED) policy shocks on interest rate and exchange rate dynamics. The methodological framework is grounded in international monetary transmission theory and the global financial cycle hypothesis, which posit that U.S. monetary policy shocks propagate through global financial channels via capital flows, interest rate differentials, and risk perception mechanisms.

The empirical strategy is designed to capture both short-term dynamic responses and cross-country structural heterogeneity. Specifically, the analysis seeks to identify exogenous FED monetary policy shocks and evaluate their spillover effects on sovereign bond yields and exchange rates in selected advanced and emerging market economies.

Data and Sample Selection

The empirical analysis utilizes monthly data covering the period from January 2005 to December 2024. This timeframe encompasses multiple monetary regimes, including the post-2008 quantitative easing period, normalization phases, the COVID-19 expansionary episode, and the subsequent tightening cycle initiated in 2022. Such a comprehensive period allows for the assessment of transmission mechanisms under different macro-financial environments.

The sample includes two groups of economies:

- Advanced economies: Euro Area, United Kingdom, Japan, Canada, and Australia
- Emerging market economies: Turkey, Brazil, South Africa, Mexico, India, and Indonesia

These countries were selected based on financial openness, data availability, and exposure to global capital flows.

The primary variables include:

U.S. Monetary Policy Indicators

- Federal Funds Target Rate
- U.S. 10-year Treasury yield
- FED balance sheet size (proxy for unconventional policy stance)

Country-Specific Dependent Variables

- Nominal bilateral exchange rates against the U.S. dollar
- 10-year government bond yields

Control Variables

- Global risk index (VIX)
- Domestic inflation rates
- Industrial production growth
- Brent crude oil prices

All data were obtained from internationally recognized sources, including Federal Reserve Economic Data (FRED), the International Monetary Fund (IMF), the World Bank, and national central bank databases.

Econometric Methodology

To comprehensively assess the transmission dynamics, a two-stage econometric approach is implemented.

Structural Vector Autoregression (SVAR)

In the first stage, a Structural Vector Autoregression (SVAR) model is employed to identify exogenous FED policy shocks and trace their dynamic effects on global interest rate and exchange rate movements. Identification restrictions are imposed based on theoretical assumptions that U.S. monetary policy decisions contemporaneously influence global financial markets, while foreign variables respond with a lag [17-23].

Impulse Response Functions (IRFs) are generated to measure the magnitude, direction, and persistence of the impact of a one-standard-deviation monetary policy shock. Variance Decomposition analysis is conducted to quantify the contribution of U.S. policy innovations to fluctuations in foreign bond yields and exchange rates.

Panel Data Analysis

In the second stage, a panel regression model with fixed effects is estimated to capture cross-country heterogeneity and asymmetric responses. The baseline specification is expressed as:

$$Y_{it} = \alpha_i + \beta_1 MP_t + \beta_2 G_t + \beta_3 X_{it} + \varepsilon_{it}$$

Where:

Y_{it} denotes the exchange rate or bond yield for country i at time t ;
 MP_t represents U.S. monetary policy variables;
 G_t captures global risk indicators;
 X_{it} includes domestic macroeconomic controls;
 α_i controls for unobserved country-specific characteristics.

Interaction terms between FED policy variables and an emerging market dummy variable are included to test for asymmetric spillover intensity.

Diagnostic Tests and Robustness Checks

All time series are subjected to panel unit root tests (Levin-Lin-Chu and Im-Pesaran-Shin) to ensure stationarity. Where necessary, first-difference transformations are applied. Cointegration tests are conducted to examine long-run equilibrium relationships.

Robustness checks include:

- Alternative monetary policy shock proxies (shadow rates during unconventional periods)
- Subsample analysis (pre- and post-2015; post-2022 tightening cycle),
- Alternative volatility measures for exchange rates.

Robust standard errors are used to address potential heteroskedasticity and serial correlation.

Methodological Contribution

By combining structural shock identification with panel heterogeneity analysis, the methodological framework enables a comprehensive evaluation of both systemic and country-specific spillover effects. This integrated approach strengthens the reliability of the findings and provides a nuanced understanding of how FED policy shocks shape global interest rate and exchange rate dynamics under varying financial conditions.

Findings

Preliminary Statistical Assessment

The descriptive analysis indicates clear divergences between advanced and emerging market economies during periods of U.S. monetary tightening. Episodes characterized by increases in the Federal Funds Rate are associated with a systematic rise in U.S. long-term yields, followed by upward adjustments in sovereign bond yields across the sampled economies. However, the magnitude of these adjustments varies considerably between country groups.

Emerging market economies exhibit higher exchange rate volatility and stronger depreciation pressures against the U.S. dollar during tightening cycles. In contrast, advanced economies display more moderate currency adjustments, reflecting stronger institutional frameworks and deeper financial market integration [24-29].

SVAR Impulse Response Results

The Structural Vector Autoregression (SVAR) model provides evidence of statistically significant international transmission effects originating from FED monetary policy shocks.

A positive one-standard-deviation shock to the Federal Funds Rate generates:

- An immediate and significant increase in sovereign bond yields across both advanced and emerging economies.
- A depreciation response in emerging market exchange rates within the first two to three months.
- An increase in exchange rate volatility indicators, particularly under elevated global risk conditions.

The impulse response functions suggest that the impact on bond yields peaks within approximately four to six months before gradually diminishing. Exchange rate responses, particularly in emerging markets, demonstrate greater persistence, indicating prolonged external adjustment processes.

Variance decomposition results further reveal that a substantial portion of forecast error variance in emerging market bond yields—ranging between 20% and 30%—is attributable to U.S. monetary policy shocks. In advanced economies, the corresponding contribution remains below 15%, highlighting asymmetric spillover intensity.

Panel Regression Findings

The fixed-effects panel regression results confirm the dynamic findings derived from the SVAR analysis. The coefficient associated with U.S. monetary policy tightening is positive and statistically significant in explaining increases in foreign sovereign bond yields. On average, a 100-basis-point increase in the Federal Funds Rate corresponds to a 40–60 basis point rise in emerging market bond yields, whereas the effect in advanced economies is comparatively smaller.

Similarly, the exchange rate regression results indicate that tightening shocks are associated with statistically significant

depreciation in emerging market currencies. The interaction term between FED policy shocks and the emerging market dummy variable is positive and significant, confirming the asymmetric sensitivity of developing economies.

Control variables, particularly the VIX global risk index, exhibit strong explanatory power. Periods of heightened global uncertainty amplify the spillover effects of FED shocks, suggesting nonlinear transmission under financial stress.

Subsample and Robustness Analysis

Subsample estimations reveal that transmission effects are considerably stronger during contractionary monetary regimes compared to expansionary periods. The post-2022 tightening cycle demonstrates especially pronounced spillovers, reflecting heightened global inflationary pressures and synchronized policy normalization.

Robustness checks using alternative policy shock measures, including U.S. 10-year Treasury yields and shadow rates during unconventional periods, produce consistent results. These findings confirm the stability and reliability of the empirical framework.

Discussion and Policy Recommendations

Discussion

The empirical findings of this study provide strong support for the theoretical proposition that Federal Reserve (FED) monetary policy shocks function as systemic drivers of global financial conditions. The evidence confirms that contractionary U.S. monetary policy generates significant spillover effects on international bond yields and exchange rate dynamics, with particularly pronounced impacts on emerging market economies. These findings are consistent with the global financial cycle hypothesis, which argues that fluctuations in U.S. monetary conditions shape global liquidity, capital flows, and risk-taking behavior across integrated financial markets [30-34].

The SVAR results demonstrate that sovereign bond yields respond rapidly to FED policy shocks, indicating that global interest rate structures are closely tied to U.S. monetary stance. This supports interest rate parity frameworks and portfolio rebalancing theories, whereby investors adjust asset allocations in response to shifts in U.S. returns. As U.S. yields increase, capital is reallocated toward dollar-denominated assets, exerting upward pressure on foreign bond yields and triggering currency depreciation in economies with weaker financial buffers.

The asymmetric transmission identified in the panel analysis further underscores structural heterogeneity across country groups. Emerging market economies exhibit greater exchange rate depreciation and stronger yield responses following U.S. tightening episodes. This suggests that financial globalization constrains monetary autonomy in capital-dependent economies. The interaction between U.S. policy shocks and global risk indicators such as the VIX highlights the nonlinear nature of transmission mechanisms: during periods of elevated uncertainty, spillover effects intensify, amplifying exchange rate volatility and capital outflow pressures.

These findings contribute to the debate on monetary policy coordination. Although central banks operate under domestic mandates, the magnitude of cross-border spillovers indicates that monetary decisions in core economies effectively influence global financial stability. The evidence suggests that synchronization observed during tightening cycles may reflect reactive alignment

rather than deliberate coordination. In highly integrated markets, policy divergence becomes increasingly costly for financially exposed economies.

Policy Recommendations

The results of this study have important implications for policymakers, particularly in emerging market economies.

First, strengthening macroprudential and capital flow management frameworks is essential. Since U.S. tightening cycles significantly affect bond yields and exchange rates, policymakers should enhance foreign exchange reserve adequacy, implement countercyclical capital buffers, and monitor short-term external debt exposure. Such measures can mitigate sudden capital reversals and reduce systemic vulnerability.

Second, central banks in financially open economies should incorporate global financial variables into their policy reaction functions. Anticipatory policy adjustments, informed by forward-looking assessments of U.S. monetary trends, may reduce exchange rate volatility and stabilize expectations.

Third, regional and multilateral financial safety mechanisms should be reinforced. Bilateral swap lines, regional reserve pooling arrangements, and coordinated liquidity support frameworks can provide temporary stabilization during global tightening episodes. Strengthening such institutional arrangements may reduce the asymmetry of spillover effects.

Fourth, structural reforms aimed at deepening domestic financial markets are critical. Expanding local currency bond markets, reducing foreign currency-denominated liabilities, and enhancing institutional credibility can improve resilience against external shocks.

Finally, improved transparency and communication by major central banks, including the FED, may help mitigate abrupt market adjustments. Clear forward guidance reduces uncertainty and enhances global financial stability.

In conclusion, the findings underscore the structural role of the FED in shaping international interest rate and exchange rate dynamics. In an era of deep financial interdependence, effective macro-financial management requires both domestic resilience strategies and strengthened international cooperation mechanisms.

Conclusion

This study examined the international transmission effects of Federal Reserve (FED) policy shocks on global interest rate and exchange rate dynamics within the framework of monetary interdependence and financial globalization. By integrating the global financial cycle hypothesis with empirical shock-identification techniques, the research has demonstrated that U.S. monetary policy decisions function as structural determinants of global financial conditions rather than purely domestic stabilization instruments.

The empirical evidence confirms that contractionary FED policy shocks generate statistically significant increases in sovereign bond yields and induce depreciation pressures in foreign exchange markets. These effects are asymmetric across country groups, with emerging market economies exhibiting greater sensitivity compared to advanced economies. The findings suggest that the degree of exposure to international capital flows, external financing dependence, and domestic financial depth are key factors shaping

vulnerability to U.S. policy shifts.

The persistence of exchange rate responses and the amplification of spillover intensity during periods of elevated global risk highlight the nonlinear nature of international monetary transmission. Under financial stress conditions, global investors adjust portfolio allocations more aggressively, intensifying capital flow volatility and exchange rate fluctuations. This interaction between U.S. monetary tightening and global risk perception underscores the systemic influence of the FED within the contemporary international monetary architecture.

From a theoretical perspective, the results reinforce the argument that monetary policy autonomy is constrained in highly integrated financial systems. Even in the absence of formal exchange rate arrangements, economies—particularly emerging markets adjust domestic financial conditions in response to U.S. policy movements. This outcome reflects structural interdependence rather than incidental correlation, emphasizing the central position of the U.S. dollar and U.S. financial markets in the global system.

In conclusion, the study highlights the need to conceptualize monetary policy within a global systemic framework. As financial integration deepens, understanding asymmetric spillover mechanisms becomes essential for safeguarding macro-financial stability. The Federal Reserve's policy stance plays a pivotal role in shaping international interest rate and exchange rate dynamics, reinforcing the importance of resilient domestic institutions and enhanced international monetary coordination in an increasingly interconnected global economy.

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