



International Monetary Policy Spillovers based on Government Bond Yield Dynamics: Evidence from G7 Countries and China

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Abstract. This paper investigates the international transmission of monetary policy shocks using daily changes in 10-year government bond yields for the G7 economies and China from 2015 to 2025. A Vector Autoregression (VAR) model combined with Granger causality tests is employed to examine dynamic interdependencies among global bond markets. The empirical results show clear cross-country spillover effects, although domestic factors remain the dominant driver of bond yield movements. The United States plays a central role as the primary source of global monetary policy spillovers, exerting strong influence on economies such as the United Kingdom, Japan, and China. In contrast, China primarily acts as a recipient of external shocks, with limited outward transmission effects. European countries exhibit regional interdependence, while Italy serves as an important transmission hub. Overall, the findings highlight an asymmetric and hierarchical structure of global bond market linkages, with important implications for financial stability and international policy coordination.

Keywords: Monetary policy spillovers; Government bond yields; VAR model; Granger causality

1 Introduction

In recent years, the cross-border spillover effects triggered by monetary policy adjustments in major global economies have become a key topic in international finance research. In particular, shifts in expectations regarding Federal Reserve policy often lead to rapid repricing in global long-term government bond markets. For instance, expectations of an interest rate cut by the Federal Reserve in early 2025 have put upward pressure on US Treasury yields. On 8 January 2025, the yield on the 10-year US Treasury surged to over 4.7%, UK government bond yields reached their highest level since 2008, whilst the yield on the German 10-year government bond—the benchmark for the eurozone—rose to 2.327% on Monday, its highest level since 22 November 2024, an increase of approximately 4 basis points. The yield on the Italian 10-year government bond rose by 5 basis points to 3.50% [1, 2]. This indicates that the impact of interest rate adjustments in one country is no longer confined to that country alone;

long-term government bond yields in developed economies, such as G7 nations, are showing a high degree of sensitivity to shocks in US interest rates. As a major global economy, China's policy adjustments may also influence international investors' asset allocation decisions. Against the backdrop of increasingly close global financial linkages, the impact of interest rate adjustments in one country on the yields of long-term government bonds in other countries has become a key factor in understanding international financial interdependence.

These cross-border effects are primarily transmitted through three mechanisms. First, interest rate adjustments alter yield differentials across national assets, thereby inducing international capital reallocation and influencing bond prices and yields in foreign markets. Second, changes in interest rates affect exchange rate expectations, which in turn modify the attractiveness of domestic-currency-denominated bonds to international investors. Third, shifts in global risk appetite and safe-haven sentiment are often transmitted through core government bond markets, such as those of the United States and Germany, thereby further strengthening the international co-movement of long-term government bond yields. Consequently, fluctuations in long-term government bond yields reflect not only domestic policy conditions and macroeconomic expectations, but also changes in cross-border capital flows and global financial conditions.

The significance of this issue lies not merely in the co-movement of bond yields itself, but also in its potential implications for financial stability. Long-term government bond yields serve as a key pricing benchmark in financial markets, and their rapid fluctuations can affect sovereign and corporate financing costs while exerting pressure on the balance sheets of financial institutions such as banks and investment funds. In economies characterized by high levels of foreign participation or insufficient market depth, bond market volatility triggered by external interest rate shocks is more likely to evolve into reversals in capital flows, tighter financing conditions, and heightened financial vulnerability.

Against this background, this study examines the effects of interest rate adjustments on long-term government bond yields among the G7 economies and China.

2 Literature Review

The international transmission of monetary policy shocks and the resulting synchronization of bond markets have become central themes in international finance. This section provides a detailed review of pivotal studies that explore these spillovers, focusing on the roles of the U.S. and China, the global financial cycle, and the specific mechanisms of transmission.

The U.S. Federal Reserve remains the primary driver of international interest rate movements. Albagli et al. [3] investigate U.S. monetary policy spillovers to international bond markets using panel regressions and shocks identified from Treasury yield changes around FOMC meetings. They find that spillovers to long-term yields increased significantly post-2008 crisis. Crucially, they show that transmission in advanced economies occurs through risk-neutral rates, while in emerging markets, it is

driven by term premia, suggesting a global risk-taking channel. Similarly, Ha [4] examines the cross-border propagation of U.S. shocks to five open economies (Australia, Canada, New Zealand, South Korea, and the UK) using structural VAR models with high-frequency external instruments. The study reveals that U.S. shocks significantly impact domestic bond yields and equity prices, concluding that exchange rate flexibility offers limited insulation in highly integrated financial markets.

Recent literature has also refined the nature of these shocks. Camara [5] quantifies spillovers by accounting for the "Fed Response to News" channel using local projection and SVAR models. By decomposing surprises into pure shocks and news-driven components, the author finds that pure tightening causes global recessions and currency depreciation, whereas news-related hikes lead to economic expansion and appreciation. This underscores the importance of information effects in interpreting international linkages. On a broader scale, Gupta and Dubey [6] explore the differentiated impacts of U.S. policy on the global financial cycle versus specific cross-country cycles using dynamic factor models. They find that while U.S. policy significantly drives the global financial cycle, localized cycles are determined more by specific macro-financial linkages between countries.

As China's financial integration deepens, its role as a spillover source has become prominent. Beirne et al. [7] compare spillovers from the U.S. and China to Asian economies using a structural VAR approach. They find that China's monetary policy now generates stronger economic spillovers in Asia than US policy, significantly affecting GDP, inflation, and current accounts. It also shows that China's financial influence has increased, with Asian interest rates and financial markets responding more persistently to PRC monetary shocks than to US shocks. Guo et al. [8] investigates monetary policy spillovers among the US, Euro area, Japan, the UK, and China using spillover index and frequency-domain methods. The authors find significant cross-country monetary policy interdependence, especially during global crises such as the Global Financial Crisis and COVID-19 pandemic. Unconventional monetary policies, particularly quantitative easing, generate stronger international spillovers than conventional policies.

The literature also delves into the specific channels through which these spillovers manifest. An et al. [9] investigate the impact of the global financial cycle on China's cross-border capital flows using a dynamic factor model and MSVAR analysis. They find that the global financial cycle, triggered by core countries' monetary policies, affects China nonlinearly, with expansionary phases having stronger effects and outflows being more sensitive than inflows. The risk implications of such flows are examined by Xu et al. [10], who evaluate cross-border inflows across 33 countries. Using a fixed-effects model, they find that equity and debt inflows significantly increase systemic risks and reduce stability, particularly in market-oriented economies with low financial development.

Finally, the underlying co-movement of sovereign bond yields is addressed by Venetis and Ladas [11]. Applying a multilevel factor model to sovereign bond data, they decompose yield fluctuations into global and local components. They identify three primary global factors—closely linked to global inflation and real economic activity—that account for the majority of yield variation, emphasizing that the U.S.-Germany bond pair serves as the core driver for sovereign bond market integration.

In summary, the reviewed literature establishes that monetary policy of certain country is no longer solely determined by domestic factors. Instead, it is shaped by a complex interplay of international monetary policy shocks, global risk appetite, and capital flow dynamics. While the U.S. continues to lead the global cycle, China's regional and global influence is expanding. These studies highlight that mechanisms such as risk-taking channels and information effects are critical to understanding why long-term national bond yields. Consequently, building on existing research, this paper will take the G7 countries and China as the subjects of a systematic analysis, using long-term government bond yields as an indicator, to examine the mechanisms of mutual influence between the monetary policies of these major economies. It will then identify the interlinkages between global monetary policies at the present stage, as well as the key influencing countries.

3 Methodology and Data

3.1 Econometric Model Specification

The study applies a Vector Autoregression (VAR) model as the primary analytical framework. The greatest advantage of the VAR model lies in its ability to capture the dynamic interrelationships between multiple time-series variables without the need to predefine a strict economic theoretical framework. Not only can it perform Granger causality tests, but it can also analyze the dynamic transmission of shocks through impulse response analysis. Consequently, the VAR model is particularly well-suited to studying monetary policy transmission, financial market linkages and international capital flows.

Vector Autoregression (VAR) model:

$$r_t = \Phi_0 + \Phi_1 r_{t-1} + \dots + \Phi_p r_{t-p} + a_t, p > 0 \quad (1)$$

where r_t is an eight-variable vector, including the daily change rates of 10-Year Bond Yield of the United States (US), the United Kingdom (UK), Canada (CA), France (FR), Germany (GE), Italy (IT), Japan (JP) and China (CN). Φ_0 is a constant vector, $\Phi_1, \Phi_2, \dots, \Phi_p$ are the coefficient matrices, p is the lag order, a_t is the error term.

Based on the results from Vector Autoregression model, the paper adopts Granger Causality Test to investigate whether historical data on changes in government bond yields in one country can improve the ability to forecast future changes in government bond yields in another country.

3.2 Data

The data used in this paper are the daily change rates of 10-Year Bond Yield of G7 and China, collected from Investing.com, sample period is from January 5, 2015 to December 31, 2025. Each value has been multiplied by 100. Data on 10-year government bond yields reflect changes in each country's money market and are indicative of their monetary policy.

Table 1 presents descriptive statistics on the rate of change in 10-year government bond yields for China and the G7 countries. In terms of the mean, Japan recorded the highest value at 3.055, which is significantly higher than that of other countries; the means for the remaining countries fluctuated around zero, with China's mean at -0.021 and the United States' at 0.049. In terms of volatility (Std. Dev.), there are marked differences between countries. France has a standard deviation of 154.199 and Japan of 114.571, both significantly higher than other countries. By contrast, China has a standard deviation of just 0.770, the lowest of all countries, indicating that changes in China's 10-year government bond yields are relatively stable and market volatility is low.

Table 1. Descriptive statistics

	CA	CN	FR	GE	IT	JP	UK	US
Mean	0.065	-0.021	0.156	0.139	0.081	3.055	0.195	0.049
Median	-0.060	0.000	-0.070	0.000	-0.040	0.000	-0.050	0.000
Maximum	42.830	4.570	4780.000	1300.000	59.780	3000.000	74.670	44.370
Minimum	-26.240	-6.700	-2412.500	-923.080	-27.090	-2100.000	-31.470	-27.670
Std. Dev.	3.218	0.770	154.199	47.925	3.731	114.571	5.918	2.995
Skewness	1.097	-0.347	9.999	1.953	2.161	8.443	2.334	1.929
Kurtosis	21.081	10.737	442.533	351.127	35.919	377.614	28.679	46.896
Observations	2502	2502	2502	2502	2502	2502	2502	2502

Table 2 presents the correlation matrix between the rates of change in 10-year government bond yields in China and the G7 countries. In terms of the magnitude of the correlation coefficients, the strongest correlation is between the United States and Canada, with a correlation coefficient of 0.842, indicating a very strong positive correlation. Furthermore, the United Kingdom exhibits strong positive correlations with both Canada and the United States. The correlation coefficients between China and the other countries are generally lower.

Table 2. Correlation matrix

	CA	CN	FR	GE	IT	JP	UK	US
CA	1.000	0.083	0.013	-0.021	0.205	0.015	0.634	0.842
CN	0.083	1.000	-0.006	-0.003	-0.001	-0.005	0.099	0.098
FR	0.013	-0.006	1.000	-0.004	0.015	-0.041	0.001	-0.007
GE	-0.021	-0.003	-0.004	1.000	-0.018	0.006	-0.039	-0.017
IT	0.205	-0.001	0.015	-0.018	1.000	-0.017	0.244	0.167
JP	0.015	-0.005	-0.041	0.006	-0.017	1.000	0.041	0.012
UK	0.634	0.099	0.001	-0.039	0.244	0.041	1.000	0.602
US	0.842	0.098	-0.007	-0.017	0.167	0.012	0.602	1.000

4 Empirical Result Analysis

Based on Hannan-Quinn information criterion, lag order selected by the model is lag 1. The result of Vector Autoregression estimates is shown in Table 3.

Table 3. VAR model estimate result

	CA	CN	FR	GE	IT	JP	UK	US
CA(-1)	-0.021	-0.002	-0.741	-0.050	0.134	-1.846	-0.060	-0.019
	(-0.039)	(-0.009)	(-1.865)	(-0.580)	(-0.045)	(-1.383)	(-0.071)	(-0.036)
	[-0.532]	[-0.223]	[-0.398]	[-0.086]	[2.988]	[-1.335]	[-0.853]	[-0.518]
CN(-1)	0.041	0.113	0.492	-1.500	-0.107	-2.729	0.140	-0.038
	(0.083)	(-0.020)	(-4.031)	(-1.254)	(-0.097)	(-2.989)	(-0.152)	(-0.077)
	[0.497]	[5.670]	[0.122]	[-1.196]	[-1.101]	[-0.913]	[0.920]	[-0.490]
FR(-1)	0.001	0.000	0.048	-0.003	0.001	-0.009	0.001	0.001
	(-0.000)	0.000	(-0.020)	(-0.006)	(-0.000)	(-0.015)	(-0.001)	(-0.000)
	[2.579]	[-1.910]	[2.375]	[-0.449]	[2.140]	[-0.616]	[0.769]	[1.518]
GE(-1)	0.000	0.000	-0.005	-0.027	0.000	0.016	-0.001	-0.001
	(-0.001)	(-0.000)	(-0.064)	(-0.020)	(-0.002)	(-0.048)	(-0.002)	(-0.001)
	[0.233]	[-1.462]	[-0.076]	[-1.340]	[0.172]	[0.337]	[-0.434]	[-0.451]
IT(-1)	0.097	0.008	-0.679	0.115	-0.045	0.005	0.166	0.110
	(-0.018)	(-0.004)	(-0.855)	(-0.266)	(-0.021)	(-0.634)	(-0.032)	(-0.016)
	[5.486]	[1.978]	[-0.794]	[0.431]	[-2.158]	[0.008]	[5.118]	[6.728]
JP(-1)	-0.001	0.000	-0.002	-0.004	-0.001	-0.026	-0.002	0.000
	((-0.001)	(-0.000)	(-0.027)	(-0.008)	(-0.001)	(-0.020)	(-0.001)	(-0.001)
	[-1.642]	[-0.108]	[-0.080]	[-0.492]	[-0.853]	[-1.319]	[-1.926]	[-0.399]
UK(-1)	0.003	0.002	0.987	-0.194	-0.037	0.041	-0.174	0.010
	(-0.014)	(-0.003)	(-0.694)	(-0.216)	(-0.017)	(-0.514)	(-0.026)	(-0.013)
	[0.224]	[0.588]	[1.423]	[-0.900]	[-2.240]	[0.079]	[-6.629]	[0.774]
US(-1)	-0.063	0.014	0.609	0.130	-0.024	4.602	0.354	-0.113
	(-0.040)	(-0.010)	(-1.939)	(-0.603)	(-0.047)	(-1.437)	(-0.073)	(-0.037)
	[-1.574]	[1.417]	[0.314]	[0.216]	[-0.506]	[3.201]	[4.836]	[-3.032]
C	0.065	-0.020	0.047	0.149	0.083	2.965	0.212	0.046
	(-0.064)	(-0.015)	(-3.088)	(-0.960)	(-0.074)	(-2.289)	(-0.117)	(-0.059)
	[1.023]	[-1.313]	[0.015]	[0.155]	[1.112]	[1.295]	[1.814]	[0.785]
R-squared	0.019	0.022	0.004	0.002	0.010	0.008	0.033	0.030
Adj. R-squared	0.016	0.019	0.000	-0.001	0.007	0.005	0.030	0.026
F-statistic	6.157	7.093	1.111	0.624	3.263	2.423	10.529	9.488

The result suggests that monetary policy changes among the G7 economies and China exhibit a certain degree of international interconnection during 2015–2025. Alt-

though the overall explanatory power of the model is relatively limited, several statistically significant spillover effects can still be identified. Domestic persistence remains the dominant characteristic of long-term interest rate movements, indicating that national monetary conditions are primarily driven by domestic factors.

Granger causality network (Figure 1) shows the results of Granger Causality Tests, the judgment criterion adopts a significance level of 5% ($p < 0.05$).

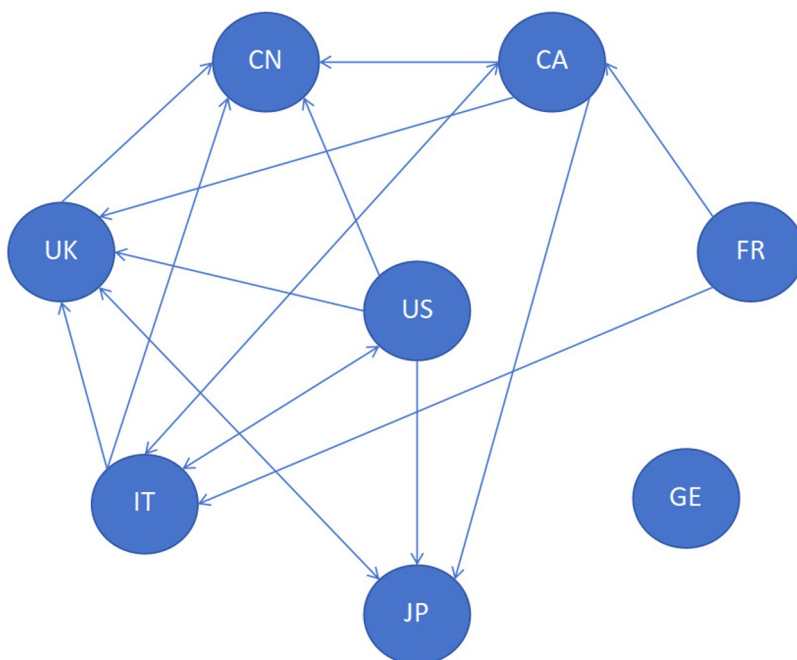


Fig. 1. Granger causality network

Based on the results of the Granger causality test (Figure 1) on the changes in 10-year government bond yields in G7 countries and China from 2015 to 2025, the international monetary policy transmission network exhibits a distinct asymmetric structure. The United States is the most significant source of global monetary policy spillovers; changes in its monetary policy can significantly affect major economies such as China, Japan, and the United Kingdom. Italy, meanwhile, serves as a key transmission hub in Europe, forming a two-way feedback relationship with the United States and Canada, and transmitting impacts to China and the United Kingdom. China primarily acts as a recipient of external monetary policy shocks, being influenced by the United States, the United Kingdom, Italy, and Canada, but no significant outward transmission of effects to other major economies was found. Germany, on the other hand, did not exhibit any significant cross-country causal relationships, reflecting a high degree of independence. Overall, the results demonstrate a hierarchical transmission structure characterized by U.S. dominance, European regional transmission, and China's role as a primary recipient of external shocks.

5 Conclusion

This study examines the international spillover effects of monetary policy across G7 countries and China by analyzing daily changes in 10-year government bond yields from 2015 to 2025 using a VAR framework and Granger causality analysis. The results provide clear evidence that global bond markets are interconnected, although the degree and direction of spillovers vary significantly across countries.

First, the United States emerges as the dominant source of global monetary transmission, with its monetary policy shocks significantly affecting other major economies, particularly the United Kingdom, Japan, and Canada. This confirms the central role of U.S. financial markets in shaping global yield dynamics. Second, China is found to primarily function as a receiver of external shocks, with relatively weak evidence of outward spillover effects, reflecting its still-developing financial integration with global bond markets. Third, European economies exhibit moderate intra-regional linkages, with Italy acting as a key intermediary node in the transmission network.

Despite the presence of statistically significant spillovers, domestic persistence remains the most important determinant of bond yield movements, indicating that national macro-financial conditions continue to play a leading role. Overall, the findings reveal a hierarchical and asymmetric structure of global monetary transmission, characterized by U.S. dominance, regional clustering within Europe, and China's role as a net recipient of external shocks. These results have important implications for policy-makers, particularly in terms of financial stability management and coordination in an increasingly interconnected global bond market.

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