The Exchange-Rate Transmission of Multi-Dimensional US Monetary Policy

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Abstract

I estimate the effects of US conventional policy, Odyssean forward guidance, large-scale asset purchases, and information effects on advanced-economy and emerging-market exchange rates. To do so, I combine high-frequency event-study estimates with monthly BVARs to distinguish announcement-window effects from medium-run dynamics. In the short run, contractionary forward guidance shocks generate the largest dollar appreciation among Fed policy tools, while information shocks lead to a distinct risk-on pattern across currencies. At longer horizons, conventional policy leads to the strongest dollar appreciations, while information shocks mainly persist against emerging-market currencies. Expected interest-rate differentials alone do not explain these differences. Deviations from uncovered interest parity (UIP), increases in proxies of currency risk, and cross-sectional sorting of currencies by intermediary risk point towards a risk-based explanation. The results suggest that understanding the exchange-rate transmission of US monetary policy requires accounting for how different policy tools reprice risk and why a common US shock generates heterogeneous risk-premium responses across countries.

Keywords: Exchange rates; US monetary policy; Information effects; Uncovered interest parity; Intermediary asset pricing; Convenience yields

JEL Codes: E52, F31, F41, G15

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1 Introduction

US monetary policy is multi-dimensional. Federal Open Market Committee (FOMC) announcements contain news about the current stance of policy, the expected future path of the federal funds rate, asset purchases, and the Fed's assessment of economic fundamentals. These dimensions affect different parts of the yield curve and may therefore have distinct effects on financial markets abroad.

The foreign-exchange market provides an important lens through which to distinguish the international effects of these dimensions. Exchange rates reveal how US monetary policy is transmitted to economies with different risk exposures and can amplify spillovers by weakening the balance sheets of borrowers with dollar liabilities (e.g., Akinci and Queralto, 2023). Existing work has shown that currencies respond heterogeneously to US monetary policy shocks, reflecting compensation for their varying degrees of exposure to US monetary policy risk (Mueller et al., 2017; Antolin-Diaz et al., 2023). It remains less understood how these risk exposures account for currency responses across the Fed's policy tools, and how these relationships affect the medium-run macroeconomic transmission of US monetary policy abroad. In this paper, I address these questions by comparing the exchange-rate transmission of US conventional policy, forward guidance, large-scale asset purchases, and information effects across advanced- and emerging-market currencies.

A priori, it is unclear whether different dimensions of US monetary policy which are aimed at different parts of the yield curve should affect exchange rates through the same channels. The prediction of Dornbusch (1976) provides a natural benchmark. With sticky prices and risk-neutral uncovered interest parity (UIP), a US monetary policy shock that raises the expected path of US short-term interest rates relative to foreign rates should appreciate the dollar. Under this benchmark, the different dimensions of US monetary policy should generate different exchange-rate responses according to how they move expected interest-rate differentials. At the same time, US monetary policy affects the willingness of global market participants to take on risk (Rey, 2015; Miranda-Agrippino and Rey, 2020), with currencies

in particular being driven by a small number of common risk factors (Lustig et al., 2011). These alternative approaches to exchange-rate modelling motivate the need to go beyond interest-rate differentials when examining the potential transmission channels.

My empirical strategy proceeds three steps. First, I use recent advances in the high-frequency methodology of Georgiadis and Jarociński (2025) to separate US monetary policy surprises into three policy tools while also accounting for endogenous components, such as information effects. The policy tools are conventional monetary policy (CMP), Odyssean forward guidance (OFG), and large-scale asset purchases (LSAP); I refer to the residual component as the information or Delphic forward guidance (DFG) shock. This decomposition allows me to estimate the announcement-window response of each bilateral exchange rate to each shock and to compare responses across the four dimensions of US monetary policy. Second, to investigate the channels behind these responses over longer horizons, I take the present-value decomposition of Jiang et al. (2021) to the data using Bayesian vector autoregressions (BVARs). Following the internal-instrument approach of Plagborg-Møller and Wolf (2021), I order the monetary policy shock first and study expected interest-rate differentials, conditional UIP deviations, empirical proxies of currency risk premia, and convenience yields based on the Treasury-premium series by Du et al. (2018). Third, I study the cross-section using each currency's exposure to intermediary risk, measured by the covariance of its returns with the He et al. (2017) intermediary capital ratio. Following Stavrakeva and Tang (2026), I use this market-based proxy for the intermediary stochastic discount factor (SDF) to ask whether currencies that are poor hedges for intermediary wealth respond more strongly to Fed shocks both over the announcement window and over longer horizons.

I highlight three main results. First, the impact and persistence of exchange-rate responses differ sharply across the four dimensions of US monetary policy. In the announcement window, a contractionary shock to each of the three Fed policy tools appreciates the dollar around the announcement, with forward guidance generating the largest average response. By contrast, the Delphic shock appreciates the dollar against safe-haven currencies

and depreciates it against riskier currencies. This risk-on pattern of the Delphic shock is representative of its prior characterization as a shock in which markets infer positive news about economic fundamentals, increasing their risk appetite and overturning the standard interest-rate channel. Over longer horizons, conventional policy generates the largest and most persistent dollar appreciation, followed by LSAP and forward guidance, while the information shock generates persistent effects only for emerging market economies.

Second, evidence from the BVARs shows that expected interest-rate differentials alone do not explain these differences. The responses of expected interest-rate differentials are too small relative to the exchange-rate responses and, for several shocks and country groups, move in the direction opposite to that implied by a standard interest-rate channel. All four shocks generate conditional UIP deviations. Conventional policy produces the clearest increase in currency-risk proxies, while the Delphic shock reverses these risk responses. Together with shorter-lived convenience-yield responses, these results suggest a risk-based explanation of the exchange-rate responses.

Third, exposure to intermediary risk helps organize the cross-section of exchange-rate responses. The strongest responses are also those most closely associated with this exposure. In the announcement window, forward guidance generates the largest average dollar appreciation among the three Fed policy tools and also exhibits their strongest association with intermediary-risk exposure: currencies that are poorer hedges for intermediaries depreciate more. At longer horizons, the relationship is most robust for the large and persistent responses to conventional policy and information shocks. The fact that intermediary-risk exposure most clearly characterizes the largest or most distinctive responses across shocks and horizons supports a risk-based explanation of exchange-rate transmission.

Related literature. This paper contributes first to the literature on the effects of US monetary policy on exchange rates. A long literature begins with the overshooting prediction of Dornbusch (1976) and its empirical failure documented with vector autoregression (VAR) methods by Eichenbaum and Evans (1995) and subsequent work (Faust et al., 2003; Scholl

and Uhlig, 2008). The literature has since refined identification of US monetary policy shocks using high-frequency surprises in narrow windows around FOMC announcements (Faust et al., 2003) and has documented heterogeneity in the responses of country groups and individual currencies (Mueller et al., 2017; Kalemli-Özcan, 2019; Kalemli-Özcan and Varela, 2021). Relative to this work, I compare exchange-rate responses across conventional policy, forward guidance, LSAP, and information shocks in a common empirical framework.

Second, this paper relates to extensive work on unconventional monetary policy and exchange rates, with recent attention devoted to the consequences of information effects (Rogers et al., 2018; Inoue and Rossi, 2019; Franz, 2020; Dedola et al., 2021; Gürkaynak et al., 2021; Miranda-Agrippino and Nenova, 2022; Swanson, 2021, 2024; Antolin-Diaz et al., 2023; Stavrakeva and Tang, 2026). This literature shows that unconventional monetary policy has significant exchange-rate effects and that the response depends on the type of monetary policy news, the separation of policy and information components, and the behavior of risk premia. The study most closely related to this paper is that of Rogers et al. (2018), who examine the effects of conventional US monetary policy, forward guidance, and asset purchases on exchange rates and currency risk premia. Using recent advances in high-frequency identification, I extend their results by separating the Delphic information component from the three policy shocks. This permits me to estimate policy responses net of the identified information component while also studying it as a distinct shock. I further contribute to their analysis by incorporating convenience yields and studying a broader cross-section of currencies.

Third, this paper speaks to the literatures on intermediary asset pricing and the global financial cycle. These literatures are closely related in that the global financial cycle emphasizes the importance of global financial intermediaries in transmitting US monetary policy abroad. Intermediary asset-pricing models argue that currency risk premia compensate financial intermediaries for bearing risk on their balance sheets (Gabaix and Maggiori, 2015; He et al., 2017; Itskhoki and Mukhin, 2021; Kekre and Lenel, 2026). I provide conditional

evidence that intermediary-risk exposure helps characterize the transmission of US monetary policy to currencies. The exposure that sorts announcement-window responses also robustly sorts the dynamic responses to conventional policy and information shocks, with the ordering reversed for the latter. The dynamic evidence for LSAP shocks is more sensitive to the response summary and the inclusion of safe-haven currencies, while no persistent ordering emerges for forward guidance. Relative to work on the global financial cycle and international spillovers of US monetary policy (Rey, 2015; Kalemli-Özcan, 2019; Miranda-Agrippino and Rey, 2020; Boehm and Kroner, 2024; Georgiadis and Jarociński, 2025), I contribute by providing evidence on the channels through which US monetary policy affects global currency markets. I build most directly on Georgiadis and Jarociński (2025), adopting their identification strategy and comparison of Fed instruments. Whereas their analysis spans a broad set of international outcomes, I focus on exchange rates and explore both the channels of the response to each shock as well as the cross-section.

The rest of the paper is structured as follows. Section 2 describes the identification of the four US monetary policy shocks. Section 3 presents the announcement-window exchange-rate responses and their cross-sectional relationship with intermediary-risk exposure. Section 4 traces the medium-run exchange-rate responses and examines the roles of interest-rate differentials, conditional UIP deviations, convenience yields, and currency risk proxies. Section 5 concludes.

2 Identification of US monetary policy shocks

To study the transmission of different dimensions of US monetary policy to exchange rates, I use the US monetary policy shocks identified in Georgiadis and Jarociński (2025), building on work by Jarociński (2024). The authors extend previous research by identifying four orthogonal shocks from high-frequency asset price movements around Federal Reserve events: a conventional policy shock, an Odyssean forward guidance shock, an LSAP shock, and an

information effect shock.

The identification procedure exploits high-frequency asset price surprises in a 30-minute window around Fed events. The observed surprises are measured in four variables: the price of the first eurodollar future, the 2-year Treasury yield, the 10-year Treasury yield, and the S&P 500 stock market index. Following Swanson and Jayawickrema (2023), the authors expand the set of Fed events beyond FOMC announcements to include Fed Chair speeches, testimonies, press conferences, and minutes releases. This broader set of events provides additional variation for identification.

The identification assumes that the observed high-frequency asset-price surprises are linear combinations of latent structural shocks and, following Jarociński (2024), allows these shocks to be fat-tailed. This non-Gaussianity provides information beyond the covariance structure of the surprises, helping the authors distinguish among the structural shocks without imposing economic sign or zero restrictions. The authors label the shocks ex post based on their estimated effects on financial market variables.

The four shocks differ systematically in how they affect the yield curve and equity prices. A contractionary conventional policy shock raises the short end of the yield curve, particularly yields on 3-month and 1-year Treasury bills. Equity prices decline, consistent with standard monetary transmission. A contractionary forward guidance shock raises the medium-term segment of the yield curve, specifically the 2-year and 5-year Treasury yields. Compared to other shocks, forward guidance operates almost entirely through the expectations component. This is consistent with the interpretation of Odyssean forward guidance as a commitment to a future policy path. Equity prices decline following forward guidance tightening.

A contractionary LSAP shock raises the long end of the yield curve, particularly the yield on the 10-year Treasury note. Compared to conventional policy and forward guidance, LSAP shocks mainly affect the term premium component rather than the expectations component of yields. This empirical pattern is consistent with models of segmented bond markets and

limits to arbitrage, in which Fed asset purchases of longer-term bonds compress term premia (Vayanos and Vila, 2021). Equity prices decline following contractionary LSAP shocks. A contractionary Delphic forward guidance shock raises yields across the term structure but, unlike the other three shocks, generates an increase in equity prices. The positive co-movement of yields and equity prices goes against the prediction of standard macroeconomic models. The exact interpretation of this shock is still a source of ongoing debate in the literature and beyond the scope of this paper. Nakamura and Steinsson (2018) posit that the Fed has private information on economic fundamentals that is revealed through the monetary policy action. Bauer and Swanson (2023) push back and show that financial markets and the Fed are jointly responding to incoming economic news. Regardless of the exact source of this shock, financial markets revise their expectations of future economic variables upward, generating a risk-on effect that lifts equity prices despite higher interest rates.

One challenge in comparing effects across shock types is that different shocks move different segments of the yield curve. There is no unique normalization that makes a conventional policy shock directly comparable to a forward guidance shock. To illustrate, consider the impact effects on Treasury yields. A one-standard-deviation conventional policy shock raises the 1-year Treasury yield by roughly the same amount as a one-standard-deviation forward guidance shock. Therefore, based on their impact on the 1-year yield, the impulse responses can be compared directly. However, a one-standard-deviation conventional policy shock raises the 2-year Treasury yield by less than half the amount a forward guidance shock does. Comparing the shocks based on their impact on the 2-year yield requires the conventional policy impulse responses to be scaled up by a factor of two. For this reason, I report throughout this paper the impulse responses to a one-standard-deviation shock based on the historical standard deviation of the constructed shock series. In this way, impulse responses can be interpreted as typical shocks given the historical time series of the shock.

3 Announcement-window exchange-rate responses

3.1 Announcement-window exchange-rate responses

I begin the empirical analysis by contrasting the announcement-window effects of the four monetary policy shocks on advanced-economy and emerging-market exchange rates. These estimates are useful because the high-frequency setting makes the exchange-rate responses plausibly attributable to the monetary-policy news itself, rather than other macroeconomic news or policy feedback. This comparison also establishes a baseline relative to prior literature, which has not yet compared individual currency responses to conventional policy, forward guidance, LSAP, and information shocks in a common empirical framework. I estimate the announcement-window responses for each currency i and monetary policy shock (MPS) type k in the following regression:

$$\widetilde{\Delta} s_{i,t} = \alpha_i^k + \beta_i^k \, MPS_t^k + \gamma_i^k \, \Delta s_{i,t-1} + u_{i,t}^k. \tag{1}$$

I define $S_{i,t}$ as units of foreign currency per US dollar and $\Delta s_{i,t} = \ln S_{i,t} - \ln S_{i,t-1}$ as its log change, so a positive response denotes a US dollar appreciation. To estimate Eq. (1) I sample daily spot exchange rates from Bloomberg at the 5:00 p.m. New York close, with t indexing the first closing price after the Fed event.[1] The baseline dependent variable is country group-specific: $\widetilde{\Delta} s_{i,t} = \Delta s_{i,t}$ for advanced-economy currencies and $\widetilde{\Delta} s_{i,t} = \ln S_{i,t+1} - \ln S_{i,t-1}$ for emerging-market currencies. The two-day window for emerging markets addresses a timing concern raised by Curcuru et al. (2023): at the time of most Fed events in my sample (2:00 p.m. US Eastern Time), many emerging-market currencies have stopped trading, so the first New York closing observation may not yet contain the full response to the FOMC announcement. Appendix Fig. B.1 reports the estimates for both the one-day and two-day windows, confirming that this primarily affects a number of emerging-market currencies.

[1] An event occurring before 5:00 p.m. on a trading day is assigned to that day. An event occurring at or after 5:00 p.m., or on a nontrading day, is assigned to the next available trading day.

The coefficient of interest is β_i^k, which measures the announcement-window appreciation following a contractionary monetary policy shock k. The figures report $100\beta_i^k$ in percent. The term α_i^k is the shock-specific intercept, γ_i^k is the coefficient on the lagged change in the exchange rate, and $u_{i,t}^k$ is the regression residual. The shock MPS_t^k is one of the four monetary policy shocks: CMP, OFG, LSAP, or DFG. I estimate Eq. (1) separately for each shock type, using one shock series at a time.

Fig. 1 reports the baseline announcement-window response of each currency to each of the four monetary policy shocks. The three Fed policy shocks appreciate the US dollar against most advanced-economy and emerging-market currencies, though with notable differences between shocks and currency groups. The results are consistent with the vast high-frequency monetary-policy literature, which finds that contractionary US monetary policy surprises tend to appreciate the dollar (e.g., Faust et al., 2003; Swanson, 2021). The relatively large response to forward guidance is also consistent with the idea that exchange rates react to news that affects the expected future path of interest rate differentials, not only to news about the current Fed funds rate (Hausman and Wongswan, 2011; Galí, 2020). The magnitude is more uniform across advanced economies than emerging market economies, which show greater cross-sectional dispersion and wider confidence bands. This is consistent with advanced economies' tighter financial integration with the US and more heterogeneity in capital account openness and currency intervention policies in emerging markets. Even though I exclude periods in which currencies were pegged, this does not rule out the possibility of central bank intervention in the foreign exchange market, which can dampen the response of exchange rates to US monetary policy shocks.

The Delphic forward-guidance shock produces a different response from the three Fed policy shocks. Rather than generating a broad dollar appreciation, the dollar most clearly appreciates against safe-haven currencies such as the Swiss franc, but depreciates against cyclical currencies such as the Brazilian real. Importantly, this distinction holds for both advanced economies and emerging market economies. This pattern is consistent with previous

work interpreting the Delphic shock as a positive risk-appetite shock induced by information disclosure rather than as a standard monetary tightening (Georgiadis and Jarociński, 2025). The cross-sectional heterogeneity also closely mirrors Franz (2020), who finds that information shocks depreciate the home currency against investment currencies of the carry trade. These carry-trade investment currencies are often emerging market currencies, which are known to be particularly sensitive to movements in global risk appetite (Kalemli-Özcan, 2019; Kalemli-Özcan and Varela, 2021), consistent with the observed divergence in the exchange-rate responses.

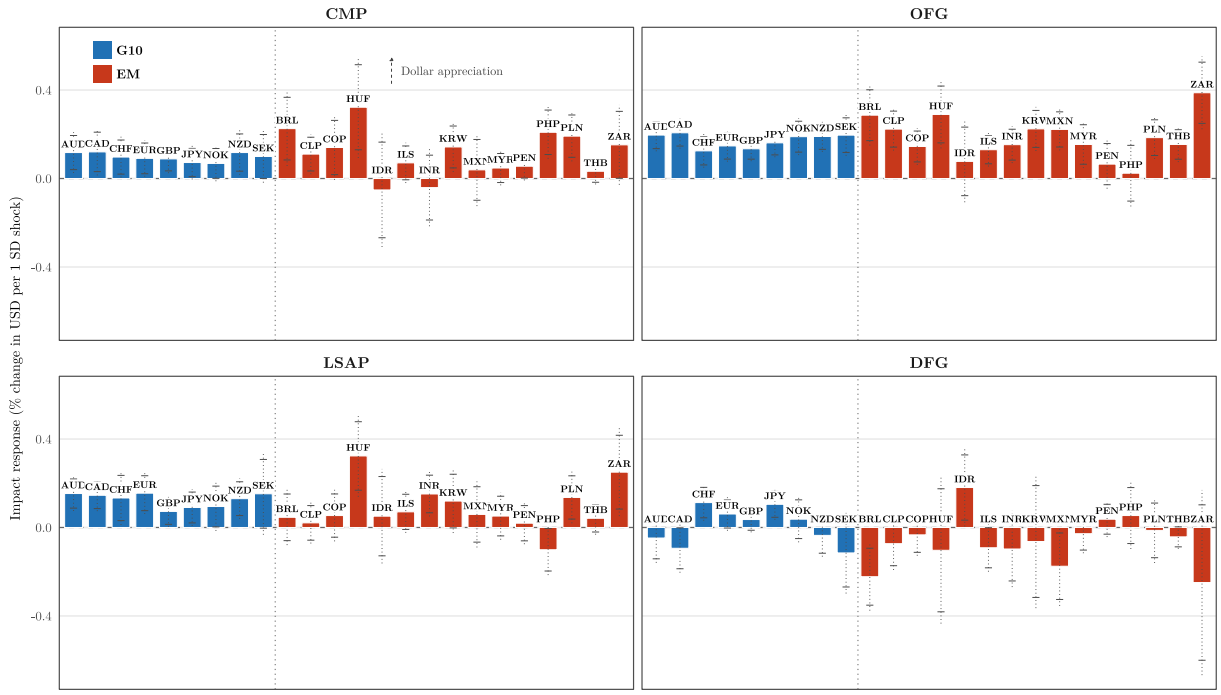


Figure 1: Announcement-window effects of US monetary policy shocks on exchange rates.

Note: This plot shows the baseline announcement-window effect of US monetary policy shocks on exchange rates. Periods during which the currency was pegged (strict or narrowly defined crawling band) or classified as freely falling are excluded according to the classification by Ilzetzki et al. (2022). Sample 1991:01–2024:06. Each panel shows the response to one shock: conventional monetary policy (CMP), Odyssean forward guidance (OFG), large-scale asset purchases (LSAP), and Delphic forward guidance (DFG). Point estimates are based on the posterior-median shock series of Georgiadis and Jarociński (2025) instead of the entire distribution. Vertical intervals report 90% confidence intervals based on Newey-West standard errors with five lags.

3.2 Announcement-window cross-sectional sorting

Taken together, the evidence in Fig. 1 suggests that the transmission of US monetary policy to exchange rates is not uniform across shocks or currencies. To explore the potential differences in transmission mechanisms between the shocks, I examine the cross-sectional variation in the response of each currency to each shock in greater detail. A number of recent studies argue that this cross-sectional heterogeneity is informative about how US monetary policy transmits to exchange rates through its effects on risk premia.[2] As noted above, certain currencies are considered riskier than others. If riskier currencies respond more strongly to Fed shocks, this suggests that US monetary policy transmits to exchange rates through a risk channel. Comparing the cross-section of exchange-rate responses to the four shocks can therefore help assess which shocks are more likely to operate through a risk channel, while also being less sensitive to the chosen shock normalization.

To extend these insights from the previous literature to a multi-dimensional monetary policy setting, I follow Stavrakeva and Tang (2026) and measure currency risk by the covariance of exchange-rate changes with the He et al. (2017) intermediary capital ratio. Focusing on intermediary risk follows naturally from theoretical and empirical work emphasizing the role of global financial intermediaries in transmitting US monetary policy abroad. In intermediary asset-pricing models, the relevant marginal investor is a financial intermediary whose risk-bearing capacity varies with balance-sheet conditions. Currencies that lose value precisely when intermediary capital falls are poorer hedges and therefore should carry a higher expected rate of return.

A contractionary Fed shock that tightens financial conditions will make intermediary constraints more binding, raising their price of risk. Currencies that are poorer hedges for

[2] Mueller et al. (2017) show that G10 currency returns around FOMC announcements are systematically related to currency risk premia, while Antolin-Diaz et al. (2023) show that monetary and information shocks generate different cross-sectional patterns that are related to economic fundamentals. Kekre and Lenel (2026) provide a structural interpretation of this evidence, arguing that US monetary policy affects currencies and government bond yields by changing the global price of risk. Loualiche et al. (2024) further show that the cross-section of exchange-rate responses explains real economic outcomes, affecting currency flows and firm-level investment in proportion to a currency's riskiness.

them should therefore suffer larger losses. Conversely, an information shock that improves risk appetite should tend to reverse this ordering. I compute the covariance between overlapping medium-horizon changes in log exchange rates and log changes in the capital ratio over the entire sample, using changes from one daily observation before date t through 90 observations after it, and then standardize the measure while preserving its sign. Because the intermediary capital ratio moves inversely with the intermediary SDF, a negative covariance between Δs and the capital ratio means that the foreign-currency return, $-\Delta s$, covaries negatively with the SDF and is therefore a poor hedge.

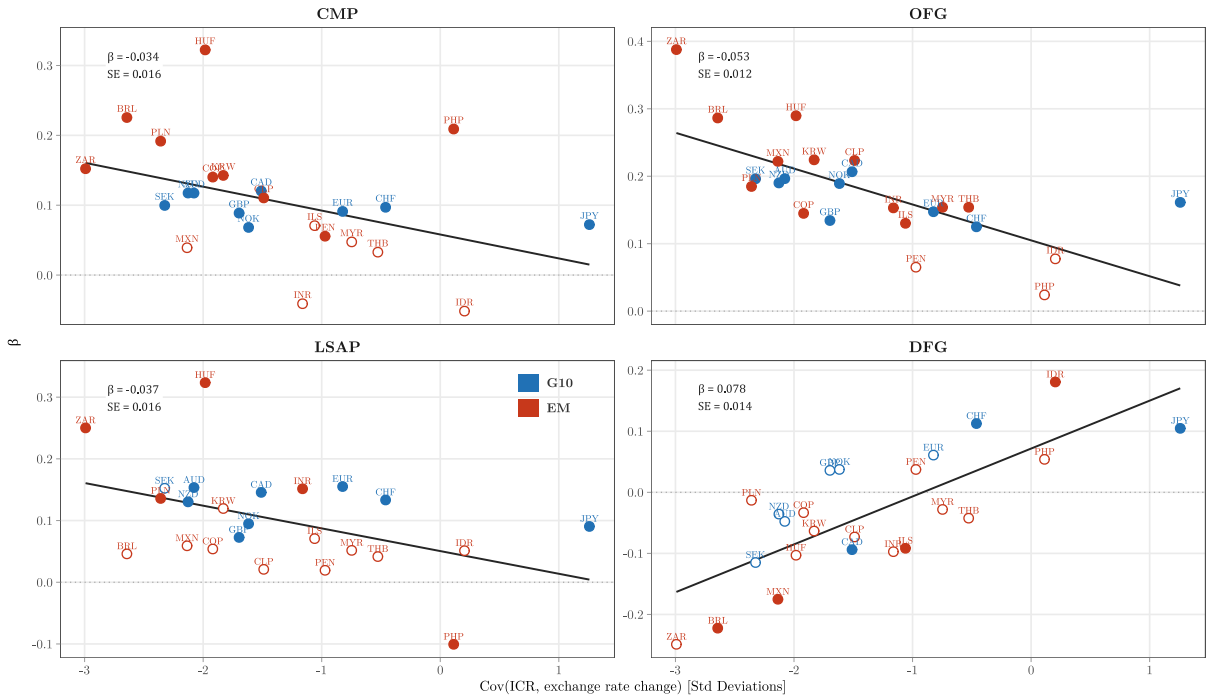


Figure 2: Currency-specific response to US monetary policy shocks versus covariance with intermediary capital ratio.
Note: This plot shows the currency-specific announcement-window response versus its covariance with the He et al. (2017) intermediary capital ratio. In each panel the solid line is an ordinary least squares fit that treats the estimated currency responses as observations; the annotated slope standard error uses conventional cross-sectional OLS inference. Filled markers indicate currency-specific responses whose 90% confidence interval in Fig. 1 excludes zero, while hollow markers indicate responses that are not statistically significant at the 10% level. See also notes from Fig. 1.

Fig. 2 shows that intermediary-risk exposure organizes the cross-section of announcement-window exchange-rate responses. For the three Fed policy shocks in the top two and lower left panels, the slope is negative: currencies with a more negative covariance with inter-

mediary capital tend to depreciate more against the dollar. In other words, currencies that are poor hedges and thus riskier for intermediaries tend to suffer larger losses around FOMC announcements. The slope is most negative for forward guidance, echoing its relatively large responses in Fig. 1, while the slopes for conventional policy and LSAP are flatter. Thus, despite moving different parts of the yield curve, the common ordering across all three policy shocks supports the interpretation that the exchange-rate responses contain an important risk-based component, although its strength differs across shocks. This announcement-window ordering is not driven by the two safe-haven currencies at the upper end of the covariance distribution: for all four shocks, the slope retains its sign and remains statistically significant at the 5% level after excluding the yen and after excluding both the yen and franc.

The Delphic shock in the lower right panel reverses the relationship between intermediary risk and the announcement-window response. The dollar appreciates against traditional safe-haven currencies such as the Japanese yen and Swiss franc, but depreciates against riskier currencies such as the South African rand and Brazilian real. The relationship is highly statistically significant and robust to excluding the yen and franc, reinforcing the interpretation of the information shock as a shock that raises risk appetite. Compared to the three Fed policy shocks, intermediary risk exposure not only helps explain the magnitude of the announcement-window response but also its sign. Appendix Table B.6 shows that the DFG slope remains positive and statistically significant after adding an emerging-market dummy, restricting the sample to G10 currencies, or controlling for the average foreign-minus-US 3-month yield differential.

Relative to prior work on the effects of the information shock, the cross-sectional ordering in Fig. 2 provides an additional moment that information-based explanations as discussed by Gürkaynak et al. (2021) need to account for. Not all exchange-rate responses exhibit the wrong sign relative to the predictions of standard macroeconomic models. Stavrakeva and Tang (2026) document a similar empirical pattern during a narrow sample around the Great

Recession and rationalize the findings through a model where the information component of FOMC announcements was especially strong due to heightened uncertainty in this period. The shocks I estimate are not confined to the Great Recession, making this argument unlikely to be the entire explanation.

Comparing the DFG responses to the other panels shows that the two forward-guidance shocks, OFG and DFG, exhibit the tightest association with intermediary exposure. These shocks are also more closely associated with broader Fed communications than with formal FOMC announcements: most of their historical variation occurs around speeches, testimony, press conferences, and minutes. This pattern is consistent with evidence that such communications are an important source of high-frequency monetary-policy news (Swanson and Jayawickrema, 2023). It suggests that communication about the future policy path and the Fed's assessment of economic fundamentals carries an especially important risk-pricing component relative to unexpected changes in conventional policy or asset purchases in the short run.

Overall, the announcement-window evidence suggests that US monetary policy shocks have a significant effect on exchange rates, with economically meaningful differences between them and an important risk-based component. The high-frequency evidence alone, however, leaves several important issues open. First, the cross-sectional ordering suggests an important role of currency risk premia but does not entirely rule out alternative explanations such as differential responses of expected interest rates. Second, the announcement-window responses do not reveal whether the shocks with the strongest effects also persist over time, which is important for the broader transmission of US monetary policy to real macroeconomic outcomes.

4 Dynamic exchange-rate responses and transmission channels

4.1 Modeling exchange rates and VAR specification

To discipline the empirical analysis of the exchange-rate responses to US monetary policy shocks over the medium term and further characterize the sources of the heterogeneity between shocks and currencies documented in the previous section, I use the asset-pricing decomposition developed by Jiang et al. (2021). This present-value approach to exchange rates has been used in related settings by Kalemli-Özcan and Varela (2021), Dedola et al. (2021), Obstfeld and Zhou (2022), and Boehm and Kroner (2024) to study one dimension of monetary policy in isolation. Based on a microfounded model of exchange rates, the framework of Jiang et al. (2021) expresses the level of the nominal spot exchange rate as follows:

$$s_t = \mathbb{E}_t \sum_{\tau=0}^{\infty} \left(y^{\$}_{t+\tau} - y^{*}_{t+\tau}\right) + \mathbb{E}_t \sum_{\tau=0}^{\infty} \left(\lambda^{\$|*}_{t+\tau} - \lambda^{*|*}_{t+\tau}\right) - \mathbb{E}_t \sum_{\tau=0}^{\infty} rp^{*}_{t+\tau} + \bar{s}. \tag{2}$$

Equation (2) describes a generic currency pair and suppresses the country index i, which I restore in the empirical estimations below. The variable s_t is the logarithm of the nominal exchange rate, expressed in units of foreign currency per US dollar, so an increase in s_t corresponds to an appreciation of the dollar. The yield differential $y^{\$}_{t+\tau} - y^{*}_{t+\tau}$ compares one-period US and foreign government-bond yields. For convenience yields, $\lambda^{a|j}_t$ denotes the convenience yield that an investor from country j assigns to government bonds issued by country a. Thus, $\lambda^{\$|*}_{t+\tau} - \lambda^{*|*}_{t+\tau}$ is the foreign investor's convenience yield on US Treasury securities relative to the convenience yield on the investor's own government bonds. The term $rp^{*}_{t+\tau}$ is the currency risk premium required by a foreign investor on dollar assets. Finally, $\bar{s} \equiv \mathbb{E}_t[\lim_{T\to\infty} s_{t+T}]$ is the terminal expected exchange-rate level, which I assume

to be constant. If UIP held in its risk-neutral, frictionless, rational-expectations form, and covered interest parity (CIP) also held, both the risk premium and relative convenience-yield terms would be zero.

According to this decomposition, the US dollar appreciates relative to foreign currencies when (1) US risk-free rates are expected to rise relative to foreign ones, (2) expected convenience yields for holding US bonds rise relative to convenience yields on foreign bonds, and (3) the risk premium required by foreign investors to invest in US assets declines. If the four monetary policy shocks generate different dollar responses, or if currencies respond differently to the same shock, those differences should be reflected in heterogeneous responses of expected interest-rate differentials, relative convenience yields, or currency risk premia.

To take Eq. (2) to the data, I estimate a monthly structural Bayesian VAR separately by country and shock. Following the internal-instrument approach of Plagborg-Møller and Wolf (2021), I include the monetary policy shock as the first endogenous variable in the VAR and identify impulse responses using a recursive Cholesky decomposition in which the shock is ordered first. For each country i and shock $k \in \{\text{CMP}, \text{OFG}, \text{LSAP}, \text{DFG}\}$, the vector of endogenous variables is given by:

$$\mathbf{Y}_{i,t}^{k} = \begin{pmatrix} MPS_t^k \\ \mathbf{x}_{i,t} \end{pmatrix}, \tag{3}$$

where MPS_t^k is the monetary policy shock and $\mathbf{x}_{i,t}$ collects the US macro-financial variables and country-i financial variables. In the baseline specification, the US block in $\mathbf{x}_{i,t}$ includes the US 3-month yield, US 10-year yield, the excess bond premium by Gilchrist and Zakrajšek (2012), the log of US industrial production, and the log of US headline CPI. To study the dynamics of the exchange-rate channels proposed by Jiang et al. (2021), $\mathbf{x}_{i,t}$ additionally contains the log of the spot exchange rate, the foreign 3-month yield, and the 3-month convenience yield as estimated by Du et al. (2018). The joint dynamics in the VAR

are then given by:

$$\mathbf{Y}_{i,t}^{k} = \mathbf{c}_{i}^{k} + \sum_{\ell=1}^{p} \mathbf{A}_{i,\ell}^{k} \mathbf{Y}_{i,t-\ell}^{k} + \mathbf{e}_{i,t}^{k}, \tag{4}$$

where $\mathbf{c}_i^k$ is a vector of intercepts, $\mathbf{A}_{i,\ell}^k$ is the coefficient matrix at lag ℓ, and $\mathbf{e}_{i,t}^k$ is a vector of reduced-form innovations with conditional covariance matrix $\mathbf{\Sigma}_i^k$. I estimate all models with a standard Minnesota prior with tightness parameter $\lambda = 0.2$, a decay parameter $\alpha = 1$, and lags $p = 24$. The longer lag specification relative to the prior literature connects to recent work in the empirical macro literature raising the issue of truncation bias in short-lag VARs (De Graeve and Westermark, 2025; Montiel Olea et al., 2025; Baumeister, 2025). Including $p = 24$ lags in the baseline specification mitigates concerns about dynamic misspecification and lets the VAR better capture medium-run dynamics.

The results I report are based on 2,000 posterior draws of the shock series and reduced-form parameters. Let

$$\mathbf{MPS}_{k}^{(d)} \equiv \left(MPS_{1}^{k,(d)}, \ldots, MPS_{T}^{k,(d)} \right)'$$

denote the posterior realization of the complete monthly series for monetary-policy shock k used in iteration d. For each shock k and posterior iteration d, I use $\mathbf{MPS}_k^{(d)}$ to construct $\mathbf{Y}_{i,t}^k$ and its lags. I then draw once from the conditional posterior of the reduced-form innovation covariance matrix and once from the conditional posterior of the VAR coefficients,

$$\mathbf{\Sigma}_{i}^{k,(d)} \sim p\left(\mathbf{\Sigma}_{i}^{k} \mid \mathbf{MPS}_{k}^{(d)}, \mathbf{X}_{i} \right), \qquad \{\mathbf{A}_{i,\ell}^{k,(d)}\}_{\ell=1}^{p} \sim p\left(\{\mathbf{A}_{i,\ell}^{k}\}_{\ell=1}^{p} \mid \mathbf{\Sigma}_{i}^{k,(d)}, \mathbf{MPS}_{k}^{(d)}, \mathbf{X}_{i} \right),$$

where $\mathbf{X}_i$ denotes the remaining observed variables in the currency-i system. Thus, the reduced-form parameter draws are conditional on the generated shock-series realization. For a given shock and posterior iteration, I use the same shock-series realization across all currency-specific BVARs, while drawing currency-specific reduced-form parameters condi-

tional on that common realization. I then apply the recursive Cholesky decomposition and shock normalization separately to every joint draw. Finally, I average the resulting currency-level impulse responses within each posterior draw and horizon to obtain the advanced-economy and emerging-market mean-group responses. This follows previous research showing that the responses and transmission channels of exchange rates differ significantly across advanced economies and emerging market economies (Kalemli-Özcan, 2019; Kalemli-Özcan and Varela, 2021). Appendix Table A.2 contains details of the country composition and sample period of the baseline BVAR. The reported point estimates are posterior means, and the shaded areas contain 68% and 90% of the resulting posterior draws.

To ensure that impulse responses correspond to a shock of one historical standard deviation, I use the upper-triangular Cholesky factor $R^{(d)}$, defined by $\mathbf{\Sigma}^{(d)} = (R^{(d)})' R^{(d)}$, and rescale its first row for each posterior draw. Suppressing the country and shock indices for compactness,

$$\widetilde{R}^{(d)}_{1\cdot} = \frac{\widehat{\sigma}^{(d)}_{\mathrm{MPS},k}}{r^{(d)}_{11}} R^{(d)}_{1\cdot}, \qquad \widetilde{R}^{(d)}_{j\cdot} = R^{(d)}_{j\cdot}, \qquad j = 2, \ldots, n, \tag{5}$$

I compute impulse responses using $\widetilde{R}^{(d)}$ in place of $R^{(d)}$. Here, $\widehat{\sigma}^{(d)}_{\mathrm{MPS},k}$ is the historical standard deviation of shock series k in posterior draw d, $r^{(d)}_{11}$ is the corresponding diagonal element of the Cholesky factor, and n is the dimension of the VAR. The scale factor adjusts the size of the first structural shock while preserving the relative transmission coefficients encoded in $R^{(d)}_{1\cdot}$; all other rows are unchanged. In practice, $\widehat{\sigma}^{(d)}_{\mathrm{MPS},k} \approx r^{(d)}_{11}$ and the scale factors cluster near unity.

4.2 Exchange-rate responses

Fig. 3 shows impulse responses of the group-mean exchange rate to contractionary US monetary policy shocks, measured as a percentage change from the pre-shock level. Consistent

with the impact-day responses, the dollar appreciates in response to a conventional monetary policy shock. The appreciation persists for several months beyond the initial shock, before gradually depreciating back to its pre-shock level. Relative to conventional policy, LSAP shocks generate a more modest appreciation of the dollar. The response of the dollar to LSAP shocks is consistent with recent work showing that an increase in domestic term premia goes hand in hand with a domestic currency appreciation (Gourinchas et al., 2025). The responses to conventional and LSAP shocks are also in line with the overshooting hypothesis put forward by Dornbusch (1976), whereby the dollar appreciates immediately upon impact before gradually depreciating back to its steady-state value. In contrast, I find no strong evidence of delayed overshooting as reported by some of the prior literature using older sample periods.

Forward guidance reveals a divergence between advanced-economy and emerging-market currencies. It appreciates the dollar on impact for both groups. Against advanced-economy currencies, the response initially recedes but subsequently re-emerges. Against emerging-market currencies, by contrast, the response is imprecisely estimated after impact. Forward guidance therefore has a medium-run exchange-rate effect for advanced economies, whereas its effect on emerging-market currencies is largely concentrated on impact. Relative to conventional policy, its magnitude and persistence remain smaller, despite Georgiadis and Jarociński (2025) finding that forward guidance produces comparable domestic output contractions. I return to this distinction below, where the decomposition shows that conventional policy generates larger UIP deviations.

For Delphic forward guidance shocks, the dollar depreciates against emerging market economies and advanced economies on impact. The advanced-economy response is smaller and quickly reverts to zero after the initial depreciation. Against emerging market economies, the depreciation is larger and remains negative for longer than it does against advanced-economy currencies. The dynamic responses thus suggest that the heterogeneity of the information shock previously documented in Fig. 1 exists beyond the announcement day,

with the more persistent dollar depreciation concentrated against riskier emerging market currencies.

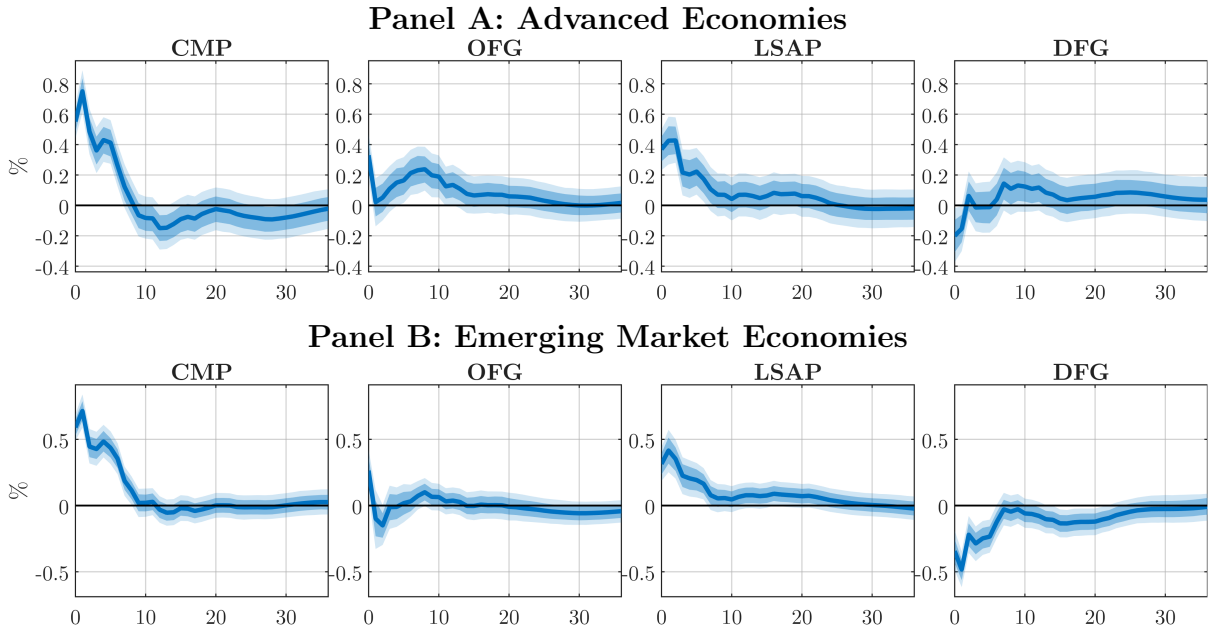


Figure 3: Exchange rate responses to US monetary policy shocks.
Note: This plot shows the impulse responses of the exchange rate to a one-standard-deviation contractionary shock from a Bayesian vector autoregression with 24 lags [BVAR(24)]. The outer sample is 2000:01–2024:06. Each panel averages currency-level posterior impulse responses within the indicated country group. Columns show conventional monetary policy (CMP), Odyssean forward guidance (OFG), large-scale asset purchases (LSAP), and Delphic forward guidance (DFG). Shaded bands denote 68% and 90% posterior credible sets. An increase denotes an appreciation of the US dollar.

Overall, the direction of the responses reported in Fig. 3 agrees with previous evidence that US monetary tightenings appreciate the dollar, both for conventional and unconventional policy shocks (Rogers et al., 2018; Inoue and Rossi, 2019; Miranda-Agrippino and Nenova, 2022). The main difference relative to prior work is quantitative. In my estimates, conventional policy generates a substantially larger exchange-rate response than forward guidance or LSAP shocks. The difference from prior work most likely emerges because of the different sample periods and shock identification strategies. Inoue and Rossi (2019) identify monetary shocks as announcement-day movements in the entire US yield curve and distinguish conventional from unconventional policy primarily by sample period, rather than separately identifying forward-guidance, asset-purchase, and information components. Their unconventional shock therefore combines several types of policy news that are separated in

the Georgiadis and Jarociński (2025) decomposition. Similarly, Rogers et al. (2018) identify target, forward-guidance, and asset-purchase surprises, but do not separately remove the information component. Part of what I classify as an information shock may therefore be embedded in their estimates of Fed policy shocks. The larger exchange-rate response to conventional policy is consistent with recent work showing that conventional monetary policy has especially strong effects relative to unconventional policy tools. Swanson (2024) finds that federal funds rate surprises have larger macroeconomic effects than forward guidance or LSAP surprises, while Curcuru et al. (2023) show that dollar exchange rates respond more strongly to expected short-rate changes than to term-premium changes around FOMC announcements. My results in Fig. 3 are complementary to this evidence using a different identification strategy and sample period.

4.3 Interest-rate differentials

Having shown that the dynamics of exchange-rate responses differ sharply across monetary policy shocks, I start the decomposition exercise with the first term in Eq. (2) by asking whether these differences result from the standard interest-rate channel. Fig. 4 reports the response of the 3-month US-minus-foreign interest-rate differential, $d_{i,t}^{(3m)} \equiv y_{\mathrm{US},t}^{3m} - y_{i,t}^{3m}$. For advanced economies, conventional policy and information shocks widen the interest-rate differential. By contrast, the response to LSAP and forward guidance shocks is small and not credibly different from zero. These patterns are difficult to reconcile with the exchange-rate responses: conventional policy produces a substantially larger dollar appreciation than forward guidance despite having modest effects on short-rate differentials, while LSAP shocks appreciate the dollar without a strong response of the interest-rate differential. Short-rate differentials therefore cannot, on their own, account for the variation in exchange-rate responses across shocks.

For emerging markets, the responses of the interest-rate differential are of the same order of magnitude as in advanced economies, generally a few basis points, but with different

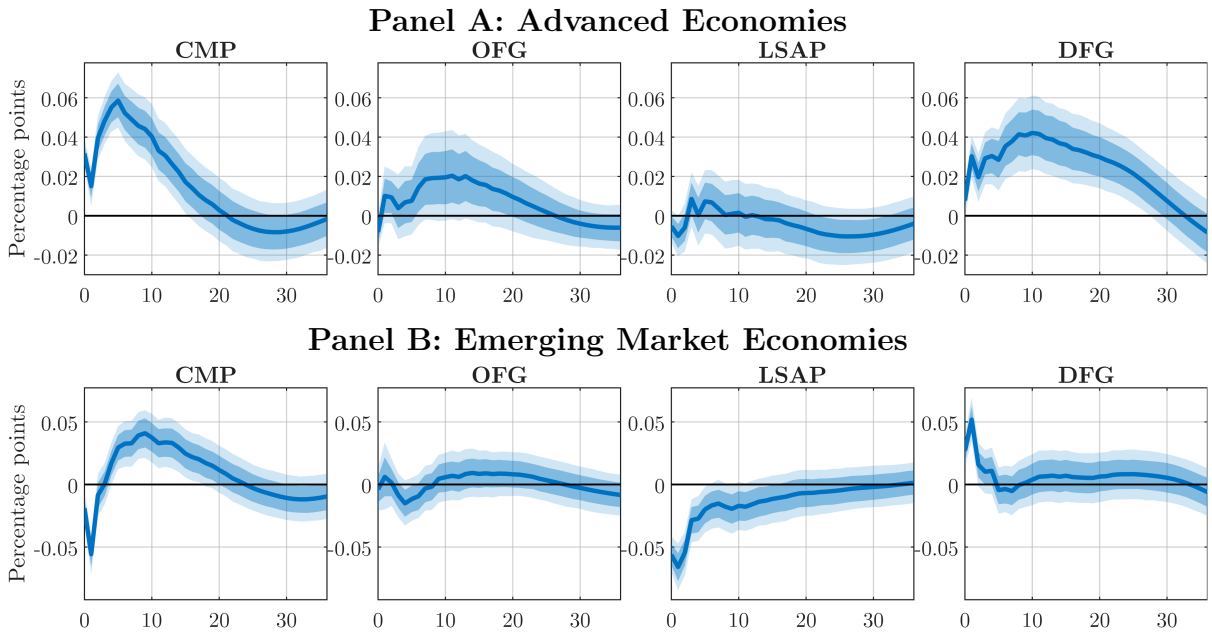


Figure 4: Response of expected interest-rate differential to US monetary policy shocks.

Note: This plot shows the impulse responses of the 3-month US-minus-foreign interest-rate differential in response to a one-standard-deviation contractionary shock from a Bayesian vector autoregression with 24 lags [BVAR(24)]. The interest-rate differential is defined as $d_{i,t}^{(3m)} \equiv y_{\text{US},t}^{3m} - y_{i,t}^{3m}$. Each panel averages currency-level posterior impulse responses within the indicated country group. Sample 2000:01–2024:06. Columns show conventional monetary policy (CMP), Odyssean forward guidance (OFG), large-scale asset purchases (LSAP), and Delphic forward guidance (DFG). Shaded bands denote 68% and 90% posterior credible sets.

signs and dynamics across shocks. Following conventional policy and LSAP shocks, the US-minus-foreign interest-ratedifferential falls on impact, meaning that emerging-market short rates rise by more than US short rates after contractionary Fed shocks. The pure interest-rate channel would therefore predict a dollar depreciation, the opposite of what is observed. Conversely, information shocks widen the differential sharply on impact, which would predict dollar appreciation, while the dollar instead depreciates against emerging-market currencies. Forward guidance shocks produce an imprecise response of the interest-rate differential, despite an impact appreciation of the dollar.

The opposing movements in the response of the interest-rate differential and the exchange rate in emerging markets are broadly consistent with Kalemli-Özcan (2019) and Kalemli-Özcan and Varela (2021), who argue that US monetary spillovers to emerging-market economies operate through risk perceptions and that their interest rates embed

global and local risk premia. Thus, the fall in the US-minus-foreign interest-rate differential in Fig. 4 for conventional and LSAP shocks may reflect an increase in emerging-market risk premia that overturns the pure interest-rate channel induced by a contractionary Fed shock. Conversely, the rise in the differential for information shocks may reflect the same mechanism in reverse, as improved risk appetite lowers emerging-market risk premia. My results thus complement prior work by showing that risk helps explain emerging-market exchange-rate responses across multiple dimensions of US monetary policy. Appendix Figs. B.2.A and B.2.B shows that the broad conclusion that interest-rate differentials do not explain the observed exchange-rate responses is not unique to the 3-month interest-rate differential. Longer-maturity 2-year and 10-year differentials also do not fully align with the observed exchange-rate responses.

4.4 Convenience yields

Because interest-rate movements do not match either the sign or persistence of several exchange-rate responses, I next turn to the second term in Eq. (2): the relative convenience yield on US Treasury securities. To approximate the relative convenience yield of US Treasury securities, I rely on the US Treasury Premium series by Du et al. (2018), who construct the series as a measure of deviations from CIP:

$$\begin{aligned} \lambda_{t,3m}^{\mathrm{US}|i} - \lambda_{t,3m}^{i|i} \approx x_{i,t}^{\mathrm{Govt},3m} \equiv y_{i,t}^{\mathrm{Govt},3m} - \rho_{i,t}^{3m} - y_{\mathrm{US},t}^{\mathrm{Govt},3m}, \\ \rho_{i,t}^{3m} \approx 4\left(f_{i,t}^{3m} - s_{i,t}\right). \end{aligned} \tag{6}$$

Here, $x_{i,t}^{\mathrm{Govt},3m}$ is the government-bond CIP deviation, $y_{i,t}^{\mathrm{Govt},3m}$ is the 3-month yield on country-i government securities, and $y_{\mathrm{US},t}^{\mathrm{Govt},3m}$ is the 3-month US Treasury yield. The variable $\rho_{i,t}^{3m}$ is the annualized market-implied forward premium. With both $f_{i,t}^{3m}$ and $s_{i,t}$ expressed as logs of units of currency i per US dollar, it is approximately four times the 3-month log forward premium. Thus, $x_{i,t}^{\mathrm{Govt},3m}$ measures the synthetic dollar borrowing cost on country-i

government bonds relative to the direct US Treasury borrowing cost. CIP deviations can be driven by default-risk differentials, convenience-yield differentials, market segmentation, and other financial frictions. As Du et al. (2018) argue, default risk on G10 government bonds plays a negligible role, so the government-bond CIP deviation approximates the US convenience yield relative to the foreign convenience yield, as shown on the left-hand side of Eq. (6). For emerging market economies, additional friction make the interpretation of the CIP deviation measure less direct. Sovereign yields likely have a default-risk component, and the CIP deviation may also reflect frictions such as capital controls. Therefore, I interpret the responses of the advanced-economy group as the more direct measure of safe asset demand.

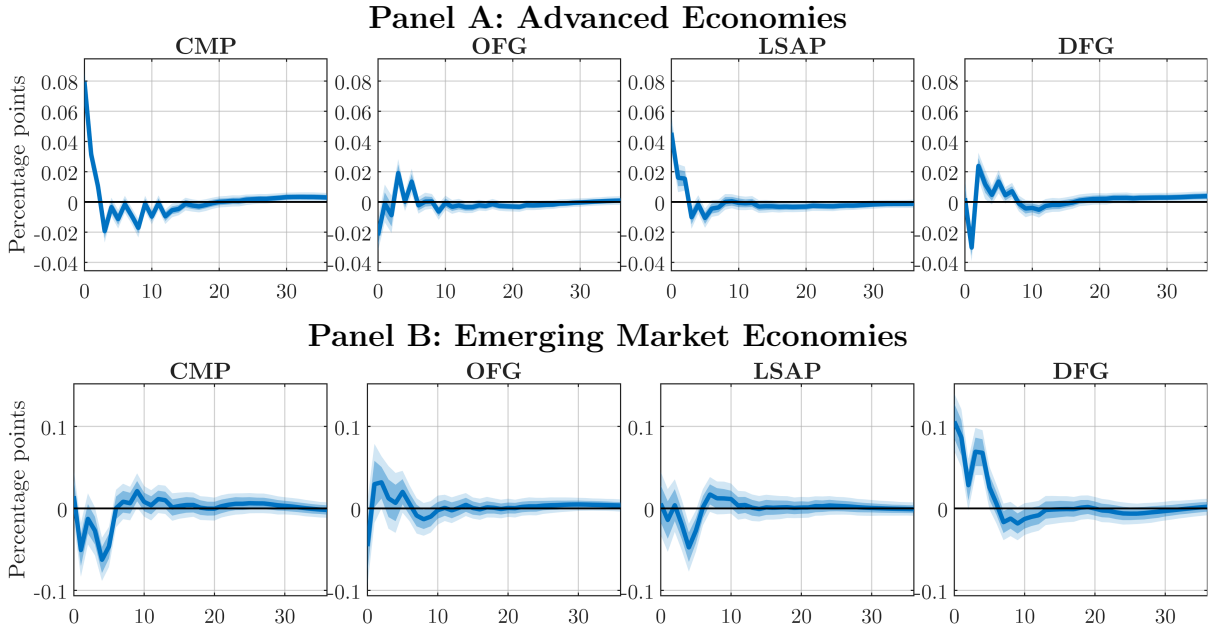


Figure 5: Treasury-premium proxy responses to US monetary policy shocks.
Note: This plot shows the impulse responses of the average US Treasury premium over foreign government bonds in response to a one-standard-deviation contractionary shock from a Bayesian vector autoregression with 24 lags [BVAR(24)]. Each panel averages currency-level posterior impulse responses within the indicated country group. Sample 2000:01–2024:06. Columns show conventional monetary policy (CMP), Odyssean forward guidance (OFG), large-scale asset purchases (LSAP), and Delphic forward guidance (DFG). Shaded bands denote 68% and 90% posterior credible sets.

Fig. 5 shows impulse responses of this Treasury-premium proxy, measured in percentage-point deviations from the pre-shock level. For advanced economies, conventional policy and LSAP shocks significantly raise the convenience-yield proxy on impact before returning to the pre-shock level shortly after. This suggests that the non-pecuniary benefits of holding

US Treasuries increase following unexpected Fed tightening. This is consistent with the mechanism in the model proposed by Jiang et al. (2024), where tighter monetary policy reduces the supply of dollar bonds and thus increases the convenience yield, leading to further appreciation of the dollar. Forward guidance produces a small decline on impact that quickly reverses. For emerging markets, conventional policy, forward guidance, and information shocks produce positive impact responses, while the LSAP response is imprecisely estimated. These responses generally fade within the first few months. Taken together, Fig. 5 suggests that convenience-yield effects may explain some of the responses on impact to some of the Fed instruments, but they are unlikely to explain the more persistent exchange-rate responses observed in Fig. 3.

4.5 Risk premia and the UIP wedge

The previous two subsections show that neither the interest-rate differential nor the relative convenience yield fully explain the exchange-rate responses to US monetary policy shocks. What remains in the decomposition is the third term in Eq. (2), the currency risk premium. Currency risk premia are not directly observable but are often associated with deviations from UIP and can be characterized by different empirical proxies.

Excess returns and UIP deviations

I start by formalizing the previous observation that the exchange-rate response is unlikely to be explained by the interest-rate differential alone. I follow Müller et al. (2024) and Cormun and De Leo (2026), among others, by analyzing conditional deviations from UIP in terms of excess returns. Having estimated the response of the 3-month interest-rate differential and the spot exchange rate above, I can recover the implied expected excess return on a 3-month dollar position from their impulse responses. More precisely, at each horizon h, I compute the annualized excess return from entering a 3-month dollar position relative to a 3-month foreign currency position as follows:

$$\widehat{\Psi}_{i,k}^{(3m)}(h) = \widehat{\mathrm{IRF}}_{d_i,k}(h) + 4\left[\widehat{\mathrm{IRF}}_{s_i,k}(h+3) - \widehat{\mathrm{IRF}}_{s_i,k}(h)\right] \tag{7}$$

Here, $\widehat{\mathrm{IRF}}_{z_i,k}(h)$ denotes the posterior-mean response of variable z_i at horizon h to shock k. The first term is the response of the 3-month US-minus-foreign interest-rate differential $d_{i,t}^{(3m)}$, and the bracketed term is the model-implied change in the log spot exchange rate between horizons h and $h+3$. The factor of four annualizes that 3-month exchange-rate change. Since an increase in $s_{i,t}$ is a dollar appreciation, positive values of Eq. (7) correspond to positive expected excess returns on the dollar position.

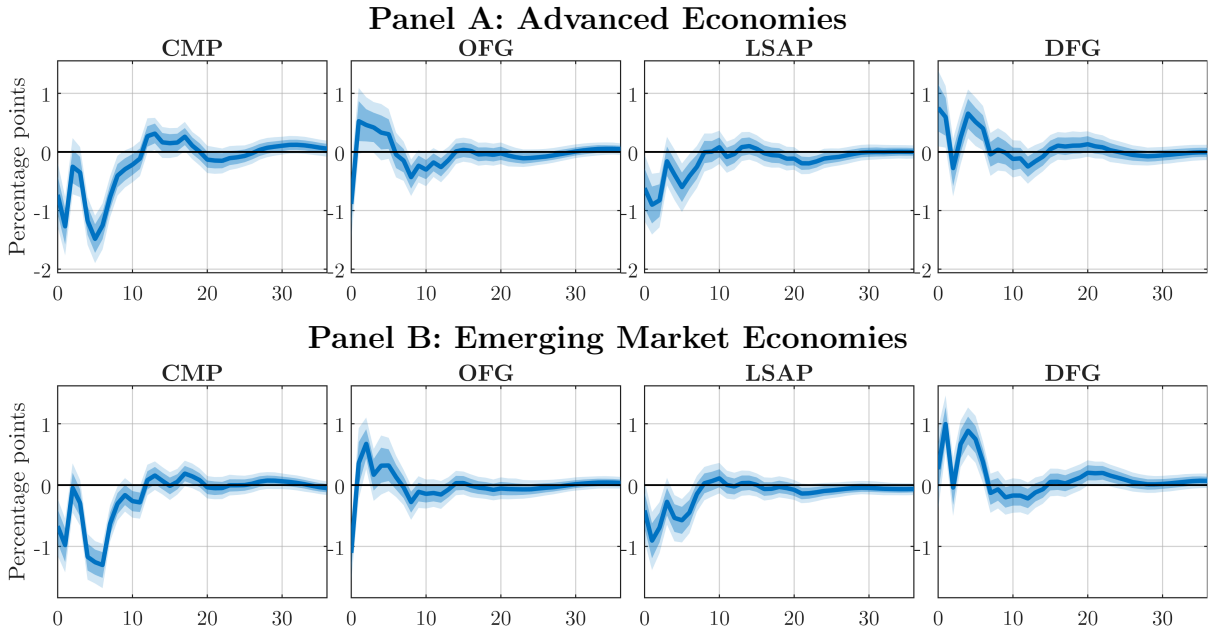


Figure 6: Response of annualized 3-month dollar excess return to US monetary policy shocks.

Note: This plot shows the impulse responses of the conditional annualized 3-month excess dollar return $\widehat{\Psi}_{i,k}^{(3m)}(h)$ defined in Eq. (7) in response to a one-standard-deviation contractionary shock from a Bayesian vector autoregression with 24 lags [BVAR(24)]. Each panel averages currency-level posterior impulse responses within the indicated country group. Sample 2000:01–2024:06. Columns show conventional monetary policy (CMP), Odyssean forward guidance (OFG), large-scale asset purchases (LSAP), and Delphic forward guidance (DFG). Shaded bands denote 68% and 90% posterior credible sets.

Fig. 6 plots this implied dollar excess return, measured in annualized percentage points. Each point represents the excess return from entering the 3-month dollar trade at that hori-

zon after the shock; the impact response corresponds to entering the position immediately after the monetary-policy shock. On impact, a conventional monetary policy shock implies an annualized 3-month dollar excess return of about -0.60 percentage points relative to advanced-economy currencies. The trade is entered immediately *after* the shock, once the dollar has already appreciated: from that point, the VAR-implied expected dollar depreciation over the next three months more than offsets the 3-month US-minus-foreign interest-rate differential, leaving a small but persistent negative wedge. In this sense, the dollar appreciates by more than can be rationalized by the short-rate differential alone. The negative excess returns persist for several months after impact, indicating that the conventional policy shock generates a persistent UIP wedge.

Viewed across shocks, conditional UIP deviations are present for all four shocks but differ in sign and dynamics. The wedge is negative after conventional policy and LSAP shocks. Forward guidance produces an even larger negative impact wedge that briefly reverses before turning negative again, while the information shock produces a positive wedge over the first few months. These patterns show that the relationship between interest rates and exchange rates depends on the shock and does not mechanically mirror the magnitude of the dollar response. This makes the wedge a natural candidate for explaining cross-currency heterogeneity as well. If currencies differ in their exposure to the component that drives UIP deviations, then the same shock should generate systematically different exchange-rate responses across currencies. The importance of UIP deviations in explaining exchange-rate dynamics is not novel in itself, as the literature has documented that UIP deviations are a key determinant of exchange-rate dynamics overall (Itskhoki and Mukhin, 2021) and for individual policy instruments such as large-scale asset purchases (Dedola et al., 2021). The results in Fig. 6 suggest that these insights extend to a multi-dimensional monetary-policy setting, showing that the UIP wedge is also key to understanding why exchange rates respond differently to different US monetary policy shocks.

Although UIP deviations are commonly associated with risk premia, a cautious reading

of Fig. 6 would be that the dollar excess return captures all deviations from UIP, rather than a pure risk premium measured in isolation. For example, the deviations could also reflect expectational errors, as in Müller et al. (2024). To further assess the economic interpretation of the wedge and whether it reflects a currency risk premium, I turn to various empirical proxies of currency risk premia.

Empirical proxies for currency risk premia

I first turn to option-implied foreign exchange (FX) volatility as a complementary empirical proxy for currency risk premia. Implied volatility does not directly measure a risk premium as it reflects both expected future exchange-rate volatility and compensation for bearing volatility or crash risk. The link between FX implied volatility and expected returns is less direct as FX volatility measures uncertainty in a bilateral exchange rate, whereas currency risk premia depend on the direction of the position and its covariance with the stochastic discount factor.[3] Nevertheless, option-implied volatility is forward-looking, responds to changes in perceived currency risk, and is closely related to currency risk premia in empirical asset-pricing work (Jurek, 2014). It is therefore useful as a market-based proxy for whether a Fed shock reprices the risk embedded in dollar exchange rates.

To study the responses of FX implied volatility to US monetary policy shocks, I re-estimate the monthly BVAR after adding implied volatility as an additional state variable. For the advanced economy group, I add the implied volatility series of each currency to the respective currency-level VAR and then average the resulting posterior IRFs across G10 currencies. For emerging markets, I use the group-level J.P. Morgan emerging market FX implied-volatility index. This implied-volatility specification is therefore the only exercise for which I pair the outcome with EME state variables constructed from monthly cross-currency averages.

[3]Quanto index contracts reveal the risk-neutral covariance between currency and equity returns, which can be mapped into currency risk premia under assumptions about the investor's stochastic discount factor (Kremens and Martin, 2019). However, these contracts have substantially narrower currency and time-series coverage than FX implied volatility.

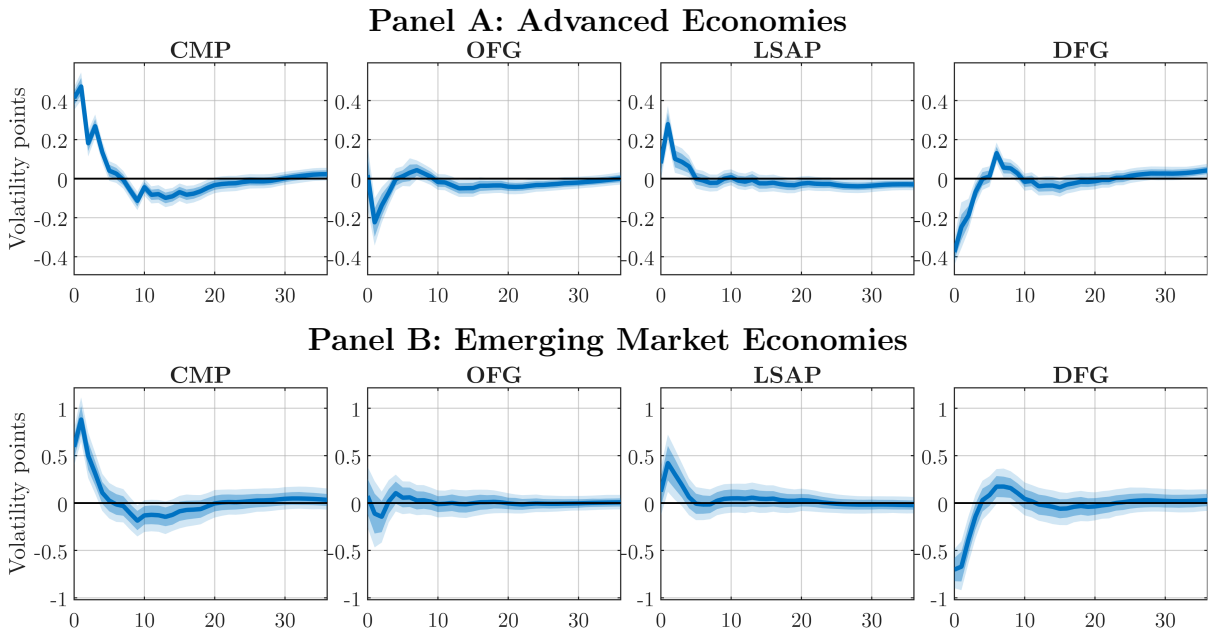


Figure 7: FX implied-volatility responses to US monetary policy shocks.
Note: This plot shows the impulse responses of one-month foreign exchange (FX) implied volatility to a one-standard-deviation contractionary shock from a Bayesian vector autoregression with 24 lags [BVAR(24)]. Panel A averages posterior impulse responses from currency-specific Group of Ten (G10) implied-volatility specifications. Panel B reports the response of the J.P. Morgan emerging-market FX implied-volatility index, paired with EME state variables constructed from monthly cross-currency averages. Sample 2000:01–2024:06. Columns show conventional monetary policy (CMP), Odyssean forward guidance (OFG), large-scale asset purchases (LSAP), and Delphic forward guidance (DFG). Shaded bands denote 68% and 90% posterior credible sets.

Fig. 7 shows that conventional policy generates the clearest increase in FX implied volatility. The response is positive on impact for both advanced economies and emerging market economies, peaks within the first few months, and then gradually returns toward zero. LSAP shocks also raise implied volatility, but by less than conventional policy. Forward-guidance shocks produce a more muted and less persistent response. The G10 response falls shortly after impact before partially reversing, while the emerging-market response is not statistically distinguishable from zero. In contrast, Delphic forward-guidance shocks sharply reduce implied volatility on impact, especially for emerging markets, consistent with the interpretation of the Delphic shock as a risk-on shock. The empirical patterns in Fig. 7 supports the view that differences in the exchange-rate responses across shocks are driven in large part by differences in the risk-pricing response. Conventional policy and, to a lesser extent, LSAP shocks lead to a dollar appreciation and a rise in FX implied volatility, while the Delphic

shock does the opposite for risk-sensitive emerging-market currencies. By contrast, forward guidance does not produce a strong or persistent increase in implied volatility, which helps explain why its exchange-rate response is less persistent.

Taken together with the convenience-yield evidence, the results suggest that the residual exchange-rate response is driven by risk-premium forces, but also includes volatility-risk and safe-asset demand forces. Appendix Fig. B.3 provides complementary evidence from the Bekaert et al. (2022) risk-aversion index, which rises after conventional policy and LSAP shocks and falls after the Delphic shock, reinforcing the interpretation that risk-premium forces help drive the residual exchange-rate response.

Dynamic heterogeneity and intermediary-risk exposure

The cross-currency dimension of the data provides a valuable additional test of the risk-based interpretation of the previous results. To exploit the cross-currency variation, I return to the exercise from Fig. 2 and ask whether the same intermediary-risk exposure also organizes the dynamic BVAR responses. Let $\widehat{\mathrm{IRF}}^{(d)}_{s_i,k}(h)$ denote the exchange-rate response in posterior draw d, and define the posterior-mean response as $\bar{r}_{i,k}(h) \equiv D^{-1}\sum_{d=1}^{D}\widehat{\mathrm{IRF}}^{(d)}_{s_i,k}(h)$. For each currency i and shock k, I summarize the response by the signed peak

$$h^{\max}_{i,k} = \min \underset{h\in\{0,\ldots,36\}}{\arg\max} \left|\bar{r}_{i,k}(h)\right|, \qquad \bar{r}^{\max}_{i,k} = \bar{r}_{i,k}\left(h^{\max}_{i,k}\right). \tag{8}$$

This statistic is a summary of the largest dynamic exchange-rate movement over the discrete impulse-response horizons. I keep the sign of the response because the mechanism predicts not only larger responses for currencies that are poor intermediary hedges, but also a reversal for the information shock. The minimum operator selects the earliest horizon if the absolute posterior-mean response has multiple maxima. Because peak-horizon summaries can be sensitive when responses are close to zero, Appendix Fig. B.5 reports some alternative

horizons.

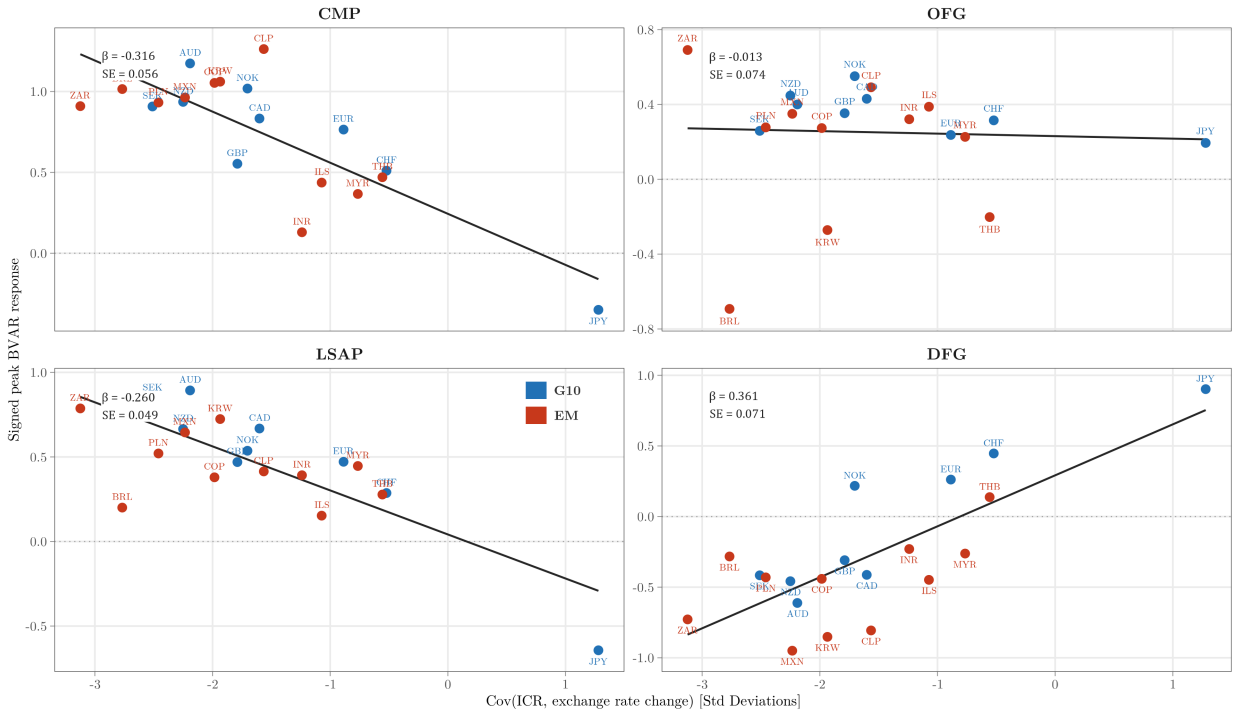


Figure 8: Signed peak responses versus intermediary-risk exposure.
Note: This plot shows the signed peak currency-level exchange-rate response against the standardized covariance with the He et al. (2017) intermediary capital ratio. The signed peak is the posterior-mean response at the horizon where the absolute posterior-mean response is largest over horizons 0–36 months. Positive values denote a dollar appreciation. The covariance measure is the same as in Fig. 2. In each panel the solid line is an ordinary least squares fit, annotated with the slope estimate β and its standard error.

Fig. 8 shows that the dynamic exchange-rate response partly inherits the risk ordering documented in the announcement window, but the strength of the evidence differs across shocks. Following conventional policy shocks, currencies that are poor hedges for intermediary wealth depreciate more against the dollar, whereas DFG reverses this ordering, consistent with a risk-on information shock. Both relationships survive various robustness checks reported in Appendix Table B.6, although the DFG relationship weakens at longer horizons. The corresponding LSAP relationship is less robust, while no systematic ordering emerges for forward guidance. Thus, risk exposure continues to organize the conventional-policy and Delphic responses beyond the announcement day, suggesting that risk repricing may contribute to their broader transmission.

This final cross-sectional result ties together the main empirical thread of the paper.

The shocks that generate stronger risk-pricing responses in the decomposition also generate stronger exchange-rate responses, and those responses are concentrated in currencies that are more exposed to intermediary risk. Conversely, the information shock reverses both the risk-pricing response and the currency ordering. The evidence is therefore consistent with risk exposure linking the differences across Fed instruments to the differences across currencies.

5 Conclusion

In this paper I study how different dimensions of US monetary policy transmit to exchange rates. Using the multi-dimensional shock decomposition of Georgiadis and Jarociński (2025), I compare the responses of advanced-economy and emerging-market currencies to conventional policy, Odyssean forward guidance, LSAP, and information shocks. I document that the type of monetary policy shock matters for the size of the initial exchange-rate response and its subsequent evolution. Forward guidance has the largest impact response of the three policy tools, while conventional policy generates the largest medium-run appreciation. The effects of LSAP shocks are more modest, while the information shock produces a risk-on pattern in which the dollar strengthens against safe-haven currencies and depreciates against riskier currencies.

These observed differences in exchange-rate responses cannot be accounted for by expected interest-rate differentials alone. In several cases, interest-rate differentials respond too little or in the wrong direction to account for the currency responses. Conditional UIP deviations account for an important part of the remaining response, while the evidence from convenience yields and currency-risk proxies indicates that the underlying wedge contains both risk-pricing and other financial forces. I interpret these results as pointing towards a transmission mechanism that goes beyond the standard interest-rate channel.

Turning to the cross-section of currencies, I show that the shocks with the largest

exchange-rate responses are also those that are most systematically related to the measure of intermediary-risk exposure. In the announcement-window, forward guidance produces the largest overall dollar appreciation and the clearest sorting by intermediary-risk exposure. At medium-run horizons, intermediary exposure most robustly characterizes the responses to conventional policy and the information shock, with the latter reversing the usual ordering across the full sample of advanced-economy and emerging-market currencies. This alignment between response strength and cross-sectional risk sorting is consistent with a risk-based explanation of the exchange-rate responses. Understanding the international transmission of US monetary policy therefore requires explaining how different policy tools change risk premiaand why the same shock generates divergent risk-premium responses across countries.

References

Akinci, Ö. and Queralto, A. (2023). Exchange rate dynamics and monetary spillovers with imperfect financial markets. *The Review of Financial Studies*, 37(2):309–355.

Antolin-Diaz, J., Cenedese, G., Han, S., and Sarno, L. (2023). Us interest rate surprises and currency returns. *Available at SSRN 4565111*.

Bauer, M. D. and Swanson, E. T. (2023). An alternative explanation for the "Fed information effect". *American Economic Review*, 113(3):664–700.

Baumeister, C. (2025). *Comment on "Local Projections or VARs? A Primer for Macroeconomists"*, pages 153–171. In Leahy and Ramey (2026).

Bekaert, G., Engstrom, E. C., and Xu, N. R. (2022). The time variation in risk appetite and uncertainty. *Management Science*, 68(6):3975–4004.

Boehm, C. and Kroner, T. N. (2024). Monetary policy without moving interest rates: The Fed non-yield shock. Technical report, National Bureau of Economic Research.

Cormun, V. and De Leo, P. (2026). Shocks and exchange rates in small open economies. *American Economic Journal: Macroeconomics*, 18(2):457–85.

Curcuru, S., Kamin, S., Li, C., and Rodriguez, M. (2023). International spillovers of monetary policy: Conventional policy vs. quantitative easing. *International Journal of Central Banking*, 19(1):111–158.

De Graeve, F. and Westermark, A. (2025). Long-lag VARs. *Journal of Monetary Economics*, 156:103831.

Dedola, L., Georgiadis, G., Gräb, J., and Mehl, A. (2021). Does a big bazooka matter? quantitative easing policies and exchange rates. *Journal of Monetary Economics*, 117:489–506.

Dornbusch, R. (1976). Expectations and exchange rate dynamics. *Journal of Political Economy*, 84(6):1161–1176.

Du, W., Im, J., and Schreger, J. (2018). The U.S. treasury premium. *Journal of International Economics*, 112:167–181.

Eichenbaum, M. and Evans, C. L. (1995). Some empirical evidence on the effects of shocks to monetary policy on exchange rates. *The Quarterly Journal of Economics*, 110(4):975–1009.

Faust, J., Rogers, J. H., Swanson, E., and Wright, J. H. (2003). Identifying the effects of monetary policy shocks on exchange rates using high frequency data. *Journal of the European Economic Association*, 1(5):1031–1057.

Franz, T. (2020). Central bank information shocks and exchange rates. Technical report, Deutsche Bundesbank.

Gabaix, X. and Maggiori, M. (2015). International liquidity and exchange rate dynamics. *The Quarterly Journal of Economics*, 130(3):1369–1420.

Galí, J. (2020). Uncovered interest parity, forward guidance and the exchange rate. *Journal of Money, Credit and Banking*, 52(S2):465–496.

Georgiadis, G. and Jarociński, M. (2025). Global spillovers from multi-dimensional US monetary policy. *Journal of International Economics*, 158:104169.

Gilchrist, S. and Zakrajšek, E. (2012). Credit spreads and business cycle fluctuations. *American Economic Review*, 102(4):1692–1720.

Gourinchas, P.-O., Ray, W., and Vayanos, D. (2025). A preferred-habitat model of term premia, exchange rates, and monetary policy spillovers. *American Economic Review*, 115(11):3788–3824.

Gürkaynak, R. S., Kara, A. H., Kısacıkoğlu, B., and Lee, S. S. (2021). Monetary policy surprises and exchange rate behavior. *Journal of International Economics*, 130:103443.

Hausman, J. and Wongswan, J. (2011). Global asset prices and fomc announcements. *Journal of International Money and Finance*, 30(3):547–571.

He, Z., Kelly, B., and Manela, A. (2017). Intermediary asset pricing: New evidence from many asset classes. *Journal of Financial Economics*, 126(1):1–35.

Ilzetzki, E., Reinhart, C. M., and Rogoff, K. S. (2022). Rethinking exchange rate regimes. In Gopinath, G., Helpman, E., and Rogoff, K., editors, *Handbook of International Economics: International Macroeconomics*, number 6 in Handbook of International Economics, pages 91–145. Elsevier.

Inoue, A. and Rossi, B. (2019). The effects of conventional and unconventional monetary policy on exchange rates. *Journal of International Economics*, 118:419–447.

Itskhoki, O. and Mukhin, D. (2021). Exchange rate disconnect in general equilibrium. *Journal of Political Economy*, 129(8):2183–2232.

Jarociński, M. (2024). Estimating the Fed's unconventional policy shocks. *Journal of Monetary Economics*, 144:103548.

Jiang, Z., Krishnamurthy, A., and Lustig, H. (2021). Foreign safe asset demand and the dollar exchange rate. *The Journal of Finance*, 76(3):1049–1089.

Jiang, Z., Krishnamurthy, A., and Lustig, H. (2024). Dollar safety and the global financial cycle. *The Review of Economic Studies*, 91(5):2878–2915.

Jurek, J. W. (2014). Crash-neutral currency carry trades. *Journal of Financial Economics*, 113(3):325–347.

Kalemli-Özcan, S. (2019). U.S. monetary policy and international risk spillovers. In of Kansas City, F. R. B., editor, *Proceedings of the Economic Policy Symposium: Jackson Hole*, pages 95–191, Jackson Hole, WY. Federal Reserve Bank of Kansas City.

Kalemli-Özcan, Ş. and Varela, L. (2021). Five facts about the UIP premium. Technical report, National Bureau of Economic Research.

Kekre, R. and Lenel, M. (2026). A model of U.S. monetary policy and the global financial cycle. Working paper.

Kremens, L. and Martin, I. (2019). The quanto theory of exchange rates. *American Economic Review*, 109(3):810–843.

Leahy, J. V. and Ramey, V. A. (2026). *NBER Macroeconomics Annual 2025, Volume 40*. University of Chicago Press.

Litterman, R. B. (1986). Forecasting with Bayesian vector autoregressions—five years of experience. *Journal of Business & Economic Statistics*, 4(1):25–38.

Loualiche, E., Pecora, A. R., Somogyi, F., and Ward, C. (2024). Monetary policy transmission through the exchange rate factor structure. *SSRN Electronic Journal*.

Lustig, H., Roussanov, N., and Verdelhan, A. (2011). Common risk factors in currency markets. *The Review of Financial Studies*, 24(11):3731–3777.

Miranda-Agrippino, S. and Nenova, T. (2022). A tale of two global monetary policies. *Journal of International Economics*, 136:103606. NBER International Seminar on Macroeconomics 2021.

Miranda-Agrippino, S. and Rey, H. (2020). U.S. monetary policy and the global financial cycle. *The Review of Economic Studies*, 87(6):2754–2776.

Montiel Olea, J. L., Plagborg-Møller, M., Qian, E., and Wolf, C. K. (2025). *Local projections or VARs? A primer for macroeconomists*. In Leahy and Ramey (2026).

Mueller, P., Tahbaz-Salehi, A., and Vedolin, A. (2017). Exchange rates and monetary policy uncertainty. *The Journal of Finance*, 72(3):1213–1252.

Müller, G. J., Wolf, M., and Hettig, T. (2024). Delayed overshooting: The case for information rigidities. *American Economic Journal: Macroeconomics*, 16(3):310–342.

Nakamura, E. and Steinsson, J. (2018). High-frequency identification of monetary non-neutrality: the information effect. *The Quarterly Journal of Economics*, 133(3):1283–1330.

Obstfeld, M. and Zhou, H. (2022). The global dollar cycle. *Brookings Papers on Economic Activity*, 2022(2):361–447.

Plagborg-Møller, M. and Wolf, C. K. (2021). Local projections and VARs estimate the same impulse responses. *Econometrica*, 89(2):955–980.

Rey, H. (2015). Dilemma not trilemma: the global financial cycle and monetary policy independence. Technical report, National Bureau of Economic Research.

Rogers, J. H., Scotti, C., and Wright, J. H. (2018). Unconventional monetary policy and international risk premia. *Journal of Money, Credit and Banking*, 50(8):1827–1850.

Scholl, A. and Uhlig, H. (2008). New evidence on the puzzles: Results from agnostic identification on monetary policy and exchange rates. *Journal of International Economics*, 76(1):1–13.

Stavrakeva, V. and Tang, J. (2026). The dollar during the Great Recession: The information channel of US monetary policy and the "flight to safety". *The Journal of Finance*.

Swanson, E. T. (2021). Measuring the effects of Federal Reserve forward guidance and asset purchases on financial markets. *Journal of Monetary Economics*, 118:32–53.

Swanson, E. T. (2024). The macroeconomic effects of the Federal Reserve's conventional and unconventional monetary policies. *IMF Economic Review*, 72(3):1152–1184.

Swanson, E. T. and Jayawickrema, V. (2023). Speeches by the Fed chair are more important than FOMC announcements: An improved high-frequency measure of US monetary policy shocks. *Unpublished Manuscript*.

Vayanos, D. and Vila, J.-L. (2021). A preferred-habitat model of the term structure of interest rates. *Econometrica*, 89(1):77–112.

Appendix

A Data

Table A.1: Data and empirical specifications.

Variable	**Source**	**(1)** *Impact LP*	**(2)** *BVAR*	**(3)** *Risk sort*
Monetary policy shocks (CMP, OFG, LSAP, DFG)	Georgiadis and Jarociński (2025)	•	•	•
Bilateral spot exchange rates (foreign currency per USD)	Bloomberg (New York close for LP; month-end for BVAR)	•	•	•
Exchange-rate regime classification	Ilzetzki et al. (2022)	•		•
Intermediary capital ratio	He et al. (2017)			•
US 3-month government yield	Bloomberg BFV/BVAL		•	
Foreign 3-month government yields	Bloomberg BFV/BVAL; Du et al. (2018) gap fill		•	
US 10-year Treasury yield	Georgiadis-Jarocinski BVAR data		•	
Excess bond premium	Gilchrist and Zakrajšek (2012)		•	
US industrial production (log)	FRED (INDPRO)		•	
US headline CPI (log)	FRED (CPIAUCSL)		•	
Treasury-premium / convenience-yield proxy (3m)	Du et al. (2018)		•	
2-year and 10-year government-yield-differential robustness	Bloomberg BFV/BVAL; Du et al. (2018) CIP construction		•	
One-month FX implied volatility (AE currencies; EME aggregate)	Bloomberg (AE); J.P. Morgan (EME)		•	
Bekaert–Engstrom–Xu risk-aversion index	Bekaert et al. (2022)		•	
Frequency		daily	monthly	daily monthly
Sample		1991:01–2024:06	2000:01–2024:06	see note
Figures		1; B.1	3–7; B.2.A, B.2.B; B.3	2, 8

Note: Bullets indicate inclusion in each baseline empirical block. Column (1) is the daily announcement-window local projection in Eq. (1). Column (2) is the monthly BVAR(24) decomposition, with the monetary policy shock ordered first, followed by the US macro-financial block and currency-level exchange-rate channel variables. Column (3) reports cross-sectional sorting exercises that relate either announcement-window responses or signed peak BVAR responses to intermediary-risk exposure. The risk-sorting sample is therefore daily for Fig. 2 and monthly for Fig. 8. *Abbreviations:* LP = local projection; BVAR = Bayesian vector autoregression; CMP = conventional monetary policy; OFG = Odyssean forward guidance; LSAP = large-scale asset purchases; DFG = Delphic forward guidance; USD = US dollar; CPI = consumer price index; FRED = Federal Reserve Economic Data; FX = foreign exchange; G10 = Group of Ten; EM = emerging market.

Table A.2: Country composition and baseline BVAR data coverage.

Country/economy	Currency	First month	Last month	Usable months
Panel A: Advanced economies (AE)				
Australia	AUD	2000:01	2024:06	294
Canada	CAD	2000:01	2024:06	294
Switzerland	CHF	2000:01	2024:06	294
Euro area	EUR	2000:01	2024:06	294
United Kingdom	GBP	2000:01	2024:06	294
Japan	JPY	2000:01	2024:06	294
Norway	NOK	2000:01	2024:06	294
New Zealand	NZD	2000:01	2024:06	294
Sweden	SEK	2000:01	2024:06	294
Panel B: Emerging-market economies (EME)				
Brazil	BRL	2007:03	2024:06	208
Chile	CLP	2005:10	2024:06	225
Colombia	COP	2004:10	2024:06	237
Hungary	HUF	2001:01	2024:06	282
Indonesia	IDR	2005:06	2024:06	229
Israel	ILS	2005:03	2024:06	232
India	INR	2009:04	2024:06	183
South Korea	KRW	2000:10	2024:06	285
Mexico	MXN	2003:02	2024:06	257
Malaysia	MYR	2005:08	2024:06	227
Peru	PEN	2006:02	2024:06	221
Philippines	PHP	2000:12	2024:06	283
Poland	PLN	2000:01	2024:06	294
Thailand	THB	2000:01	2024:06	294
South Africa	ZAR	2000:01	2024:06	294

Note: Coverage is the effective complete-case monthly sample entering each currency-specific baseline 3-month yield-state BVAR. A usable month requires nonmissing observations for the monetary policy shock, US 3-month yield, US 10-year Treasury yield, excess bond premium, log US industrial production, log US headline CPI, log bilateral spot exchange rate, foreign 3-month yield, and 3-month convenience yield. The common outer window is 2000:01–2024:06. The first month is chosen so that every currency has continuous monthly coverage through 2024:06; the code verifies the monthly sequence and does not compress the calendar by dropping internal gaps. *Abbreviations:* AE = advanced economy; EME = emerging-market economy; BVAR = Bayesian vector autoregression.

B Additional results

B.1 Announcement-window timing robustness

Fig. B.1 compares the one-day and two-day windows for every currency and shock using the same event mapping and regime filter. The baseline selects the one-day window for advanced-economy currencies and the two-day window for emerging-market currencies.



Figure B.1: Announcement-window responses with one- and two-day windows.
Note: The one-day responses are 100 times the log change from the last available 5:00 p.m. New York close before the Fed event to the first such close after it. The two-day responses extend the endpoint through the next available close. Both windows are reported for every currency. The baseline uses a one-day window for advanced-economy currencies and a two-day window for emerging-market currencies. Points are responses in percent to a one-standard-deviation contractionary shock. Positive values denote a US dollar appreciation. Vertical lines are 90% confidence intervals based on the posterior-median shock series and Newey–West standard errors with five lags. The dotted vertical line separates advanced-economy currencies (left) from emerging-market currencies (right). See also notes from Fig. 1.

B.2 Longer-maturity interest differentials

The baseline interest-rate specification in Fig. 4 includes the US and foreign 3-month yields separately and constructs the US-minus-foreign differential draw by draw. As a robustness check for the interest-rate channel, I estimate the BVAR with longer-maturity yields as an additional variable.

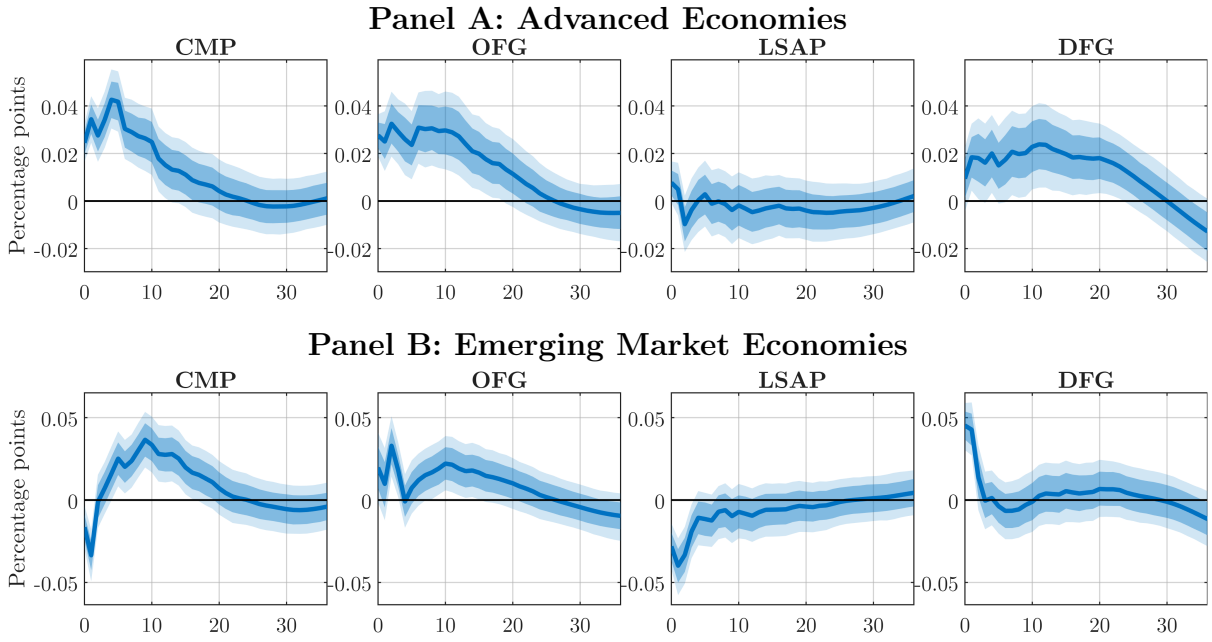


Figure B.2.A: Two-year interest-rate differential responses to US monetary policy shocks.

Note: This plot reports responses of the 2-year US-minus-foreign yield differential from a currency-level BVAR(24), with the monetary-policy shock ordered first. The specification is the same as in Fig. 4. Estimation uses 2,000 posterior draws, the baseline Minnesota prior, and a 2000:01–2024:06 sample. Shaded bands denote 68% and 90% posterior credible sets.

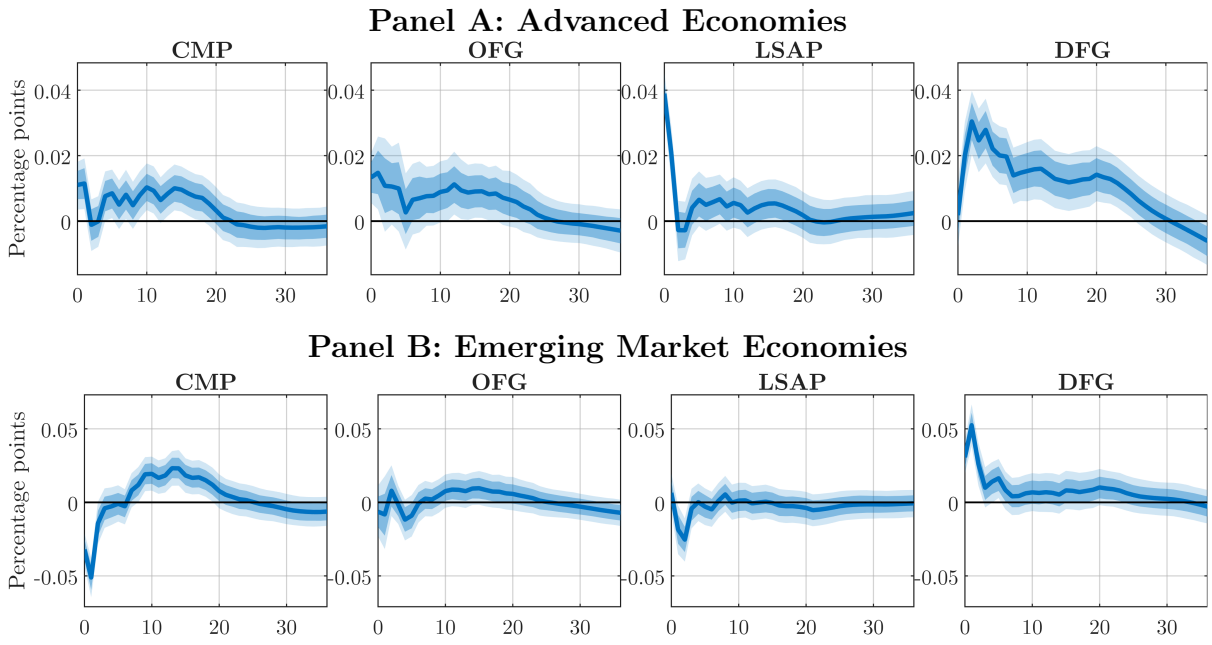


Figure B.2.B: Ten-year interest-rate differential responses to US monetary policy shocks.

Note: This plot show the response of the 10-year US-minus-foreign yield differential to US monetary policy shocks. See also notes from Fig. B.2.A.

B.3 Risk aversion

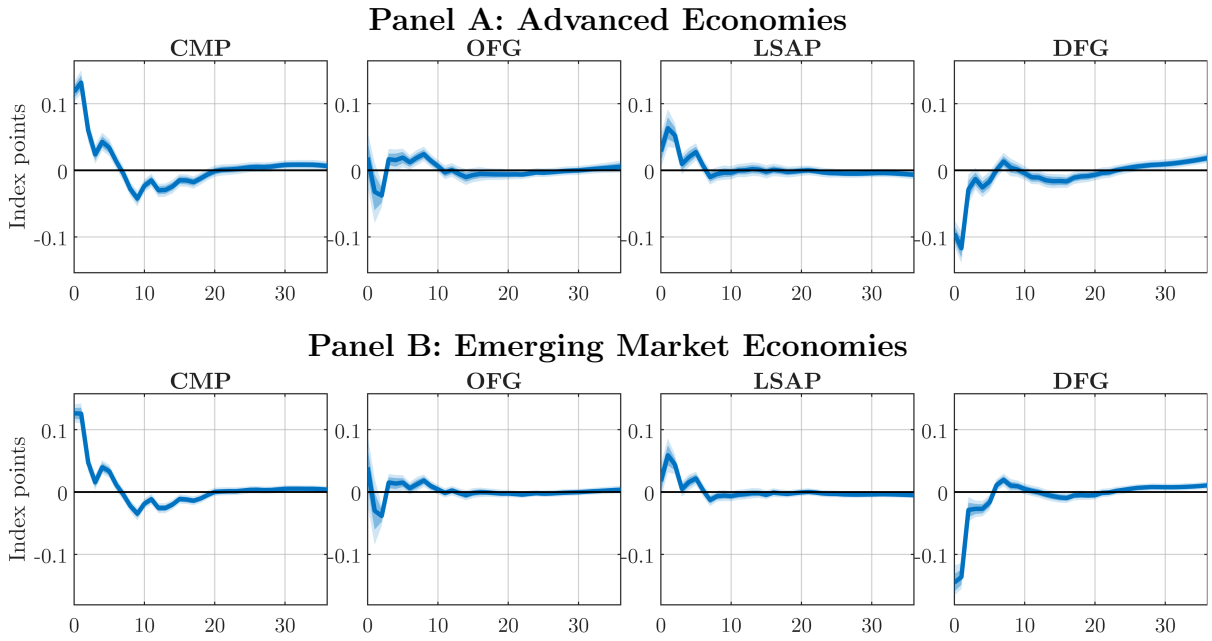


Figure B.3: Bekaert risk-aversion responses to US monetary policy shocks.
Note: This plot shows the impulse responses of the Bekaert–Engstrom–Xu risk-aversion index (Bekaert et al., 2022) to a one-standard-deviation contractionary shock from a Bayesian vector autoregression with 24 lags [BVAR(24)]. The index is included as an additional variable in the monthly BVAR. Sample 2000:01–2024:06. Columns show conventional monetary policy (CMP), Odyssean forward guidance (OFG), large-scale asset purchases (LSAP), and Delphic forward guidance (DFG). Panel A reports responses from the advanced-economy models; Panel B reports responses from the emerging-market models. Shaded bands denote 68% and 90% posterior credible sets.

B.4 Cross-sectional robustness

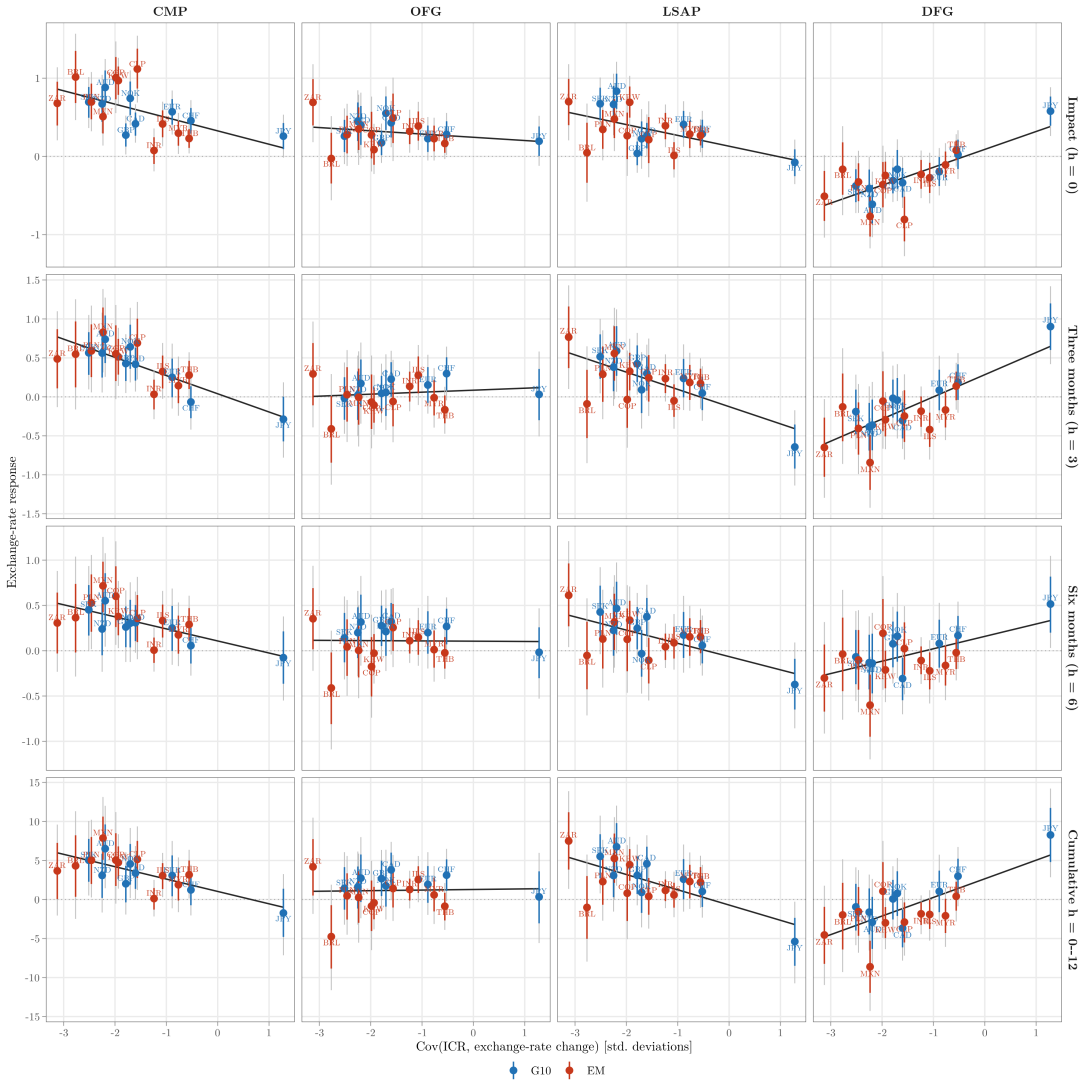


Figure B.5: Fixed-horizon Bayesian vector autoregression responses versus intermediary-risk exposure.

Note: This plot repeats the dynamic cross-sectional sorting exercise using fixed-horizon and cumulative exchange-rate responses instead of the signed peak statistic in Fig. 8. Rows report the posterior-mean response at impact, three months, six months, and the cumulative response from impact through 12 months. Columns report conventional monetary policy (CMP), Odyssean forward guidance (OFG), large-scale asset purchases (LSAP), and Delphic forward guidance (DFG). Positive values denote a dollar appreciation. Dark and light vertical intervals are the currency-level 68% and 90% posterior credible sets, respectively; they do not represent uncertainty around the cross-sectional slope. Each panel shows the full-sample ordinary least squares fit.

B.5 Intermediary-risk robustness

Table B.6: Intermediary-risk sorting: advanced-economy/emerging-market-economy and carry robustness.

Outcome	Shock	Cov-ICR + EM dummy	G10 only	Cov-ICR + carry	Corr(Cov-ICR, carry)
Announcement window	CMP	-0.034 (0.047)	-0.009 (0.128)	-0.006 (0.748)	-0.596 (0.007)
Announcement window	DFG	0.076 (< 0.001)	0.056 (0.018)	0.048 (0.012)	-0.596 (0.007)
Dynamic signed peak	CMP	-0.323 (< 0.001)	-0.345 (< 0.001)	-0.370 (< 0.001)	-0.654 (0.003)
Dynamic signed peak	DFG	0.327 (< 0.001)	0.401 (< 0.001)	0.364 (0.003)	-0.654 (0.003)

Note: Entries in columns 3-5 are slopes on the standardized covariance with the He et al. (2017) intermediary capital ratio, with p-values in parentheses. The first specification controls for an emerging-market dummy, the second restricts the sample to G10 currencies, and the third controls for carry, measured as the currency's average foreign-minus-US 3-month yield differential. The final column reports the Pearson correlation between the Cov-ICR measure and the interest-rate differential. Announcement-window regressions use the group-specific baseline window, with 24 currencies for the EM-dummy specification, 9 G10 currencies for the G10-only specification, and 19 currencies with carry data for the carry specification. The corresponding dynamic samples contain 20, 9, and 18 currencies. *Abbreviations:* Cov-ICR = covariance with the intermediary capital ratio; EM = emerging market; G10 = Group of Ten; CMP = conventional monetary policy; DFG = Delphic forward guidance.

C VAR models

Estimation details. Let B collect the lag coefficients and intercepts and let Σ be the reduced-form innovation covariance matrix. As is common in the structural vector autoregression (SVAR) literature, I use Bayesian techniques to impose more structure in the estimation, particularly given the relatively short sample and large number of lags. I use a standard Minnesota prior in the sense of Litterman (1986), implemented with a normal-inverse-Wishart distribution that is conjugate to the likelihood of a VAR with Gaussian errors. The prior is specified as

$$B \mid \Sigma \sim \mathcal{N}(B_0, \Sigma \otimes Q_0), \qquad \Sigma \sim \mathcal{IW}(S_0, \nu_0), \tag{9}$$

where B_0, Q_0, S_0, ν_0 are hyperparameters. More precisely, S_0 is the scale matrix and ν_0 is the degrees-of-freedom parameter for the inverse-Wishart prior on Σ.

$$\mathbb{E}[(A_\ell)_{i,j}] = \begin{cases} \delta_i, & \text{if } i = j \text{ and } \ell = 1, \\ 0, & \text{otherwise.} \end{cases} \tag{10}$$

$$\mathrm{Var}[(A_\ell)_{i,j}] = \begin{cases} \frac{\lambda^2}{\ell^2}, & \text{if } i = j, \\ \frac{\lambda^2 \sigma_i^2}{\ell^2 \sigma_j^2}, & \text{if } i \neq j. \end{cases} \tag{11}$$

In the baseline, I set $\delta_i = 1$ for log US industrial production, log US headline CPI, and the log exchange-rate level. For the monetary-policy shocks, US and foreign yields, the excess bond premium, convenience yield, FX implied volatility, and the risk-aversion index, I set $\delta_i = 0$.

Covid treatment and missing values. I set the four raw high-frequency surprises and the resulting monetary-policy shock to zero in 2020:03, while retaining that month's observations for all other endogenous variables. I remove rows with missing values in any variable or raw surprise before constructing lags.

Group-level impulse response functions. To compute the group-level impulse response functions reported in the main text, I take the mean response for either advanced economies or emerging market economies at each horizon h and draw k,

$$\widehat{\mathrm{IRF}}^{(d)}_{G,k}(h) = \frac{1}{N_G} \sum_{i \in G} \widehat{\mathrm{IRF}}^{(d)}_{i,k}(h), \qquad G \in \{\mathrm{AE}, \mathrm{EME}\}. \tag{12}$$