Monetary Transmission and Price Puzzle: Evidence from High-Frequency Identification

Abhishek Kumar*

Abstract

This paper proposes a novel high-frequency identification (HFI) strategy to measure monetary policy surprises in eight Asian economies- three advanced and five emerging- using changes in forward discounts of their respective currencies against the USD within a narrow window around monetary policy announcements. We show that cross-currency basis (deviations from covered interest parity) and the U.S. interest rate remain stable in this window, making changes in forward discounts a clean measure of monetary surprises. We further show that a 1 percentage point increase in existing HFI estimates from the U.S., U.K., and India leads to a 1 percentage point change in forward discount-based measures for these countries, as predicted by covered interest parity, implying that the forward discount-based measure is a consistent and comparable measure of monetary surprises. Monetary tightening generates a persistent increase in short-term interest rates, but equity markets respond negatively, indicating limited evidence of central bank information effects in these monetary surprises. Unlike in the US, monetary tightening in these countries leads to broad-based currency depreciation- both nominal and real- and raises inflation through higher import costs. This indirect effect of interest rates through the exchange rate accounts for the observed price puzzle. It highlights the complex trade-offs facing central banks in these economies, and especially in emerging markets, in managing inflation through interest rate policy.

*University of Southampton & Centre for Social and Economic Progress, UK. E-mail: a.kumar@southampton.ac.uk; akumar@csep.org

JEL classification: E31; E32; E43; F31

Keywords: Monetary Policy; High-Frequency Identification; Price Puzzle; Exchange Rate Pass-Through; Central Banking

1 Introduction

High-Frequency Identification (HFI) has emerged as a key strategy for estimating the causal impact of monetary policy shocks. By using financial market data within tight time windows- typically 30 minutes around central bank announcements- HFI isolates the unanticipated component of policy decisions, overcoming the endogeneity concerns that limited traditional structural VAR approaches. This methodology, pioneered by Kuttner (2001) and extended by Gurkaynak, Sack, and Swanson (2005), Swanson (2021), and Jarocinski (2024), allows researchers to disentangle target rate shocks from other policy components such as forward guidance and large-scale asset purchases (LSP), which became particularly relevant during the zero lower bound period. However, the application of HFI in emerging markets remains scarce, largely due to the lack of instruments like federal funds futures and the limited availability of intraday data. Furthermore, short-term bond yields- commonly used in advanced economies- can be distorted in EMs by liquidity fluctuations and risk premia (De Leo, Gopinath, and Kalemli-Ozcan, 2024), making it harder to cleanly identify policy shocks.

This paper contributes to the literature by developing a novel HFI approach for identifying monetary policy shocks in eight Asian economies- three advanced and five emerging. Rather than relying on interest rate futures or bond yields, we use changes in the forward discount of each country's currency against the U.S. dollar in a narrow window around central bank announcements, which is similar to Witheridge (2024). This approach is grounded in covered interest parity (CIP), which implies that a country with higher interest rates relative to the U.S. should experience currency depreciation, reflected in a higher forward discount. Assuming that U.S. interest rates and factors driving deviations from

CIP remain constant[1] in the two day window around monetary policy announcements in these economies, we interpret the change in forward discount as a market-based measure of unexpected monetary policy tightening or easing as these reflects the change in the interest rate in these economies only.

We validate the forward discount-based measure of monetary surprises by first demonstrating that the key assumptions underlying its identification hold in our sample. Specifically, we show that deviations from cross-currency basis and changes in U.S. interest rates are negligible during the two-day window around monetary policy announcements in the economies under study[2]. To further ensure the robustness of this measure, we replicate the methodology for the U.S. and the U.K., calculating the change in forward discount on USD and GBP in a two-day window around monetary policy meetings of the Federal Reserve and the Bank of England. This allows us to benchmark our measure against countries with well-established high-frequency monetary surprises.

We compare our forward discount-based monetary surprises for the U.S., U.K., and India with a range of high-frequency monetary policy shocks from the existing literature, including those by Gurkaynak, Sack, and Swanson (2005), Nakamura and Steinsson (2018), Jarocinski and Karadi (2020), Bu et al. (2021), Jarocinski (2024), Braun, Miranda-Agrippino, and Saha (2025), and Lakdawala and Sengupta (2024). We find significant correlations between our measure and these existing high-frequency indicators. Moreover, we find that 1% points of single/target shocks from Nakamura and Steinsson (2018), Gurkaynak, Sack, and Swanson (2005), Jarocinski and Karadi (2020), Bu et al. (2021), and Braun, Miranda-Agrippino, and Saha (2025) cause a 1% point increase

[1]See Baba, Packer and Nagano (2008), Borio et al. (2016), Avdjiev, Du, Koch and Shin (2019), Jiang, Krishnamurthy and Lustig (2021), Engel and Wu (2023), Dao & Gourinchas (2025) on deviations from covered interest parity since the global financial crisis, and Du and Schreger (2022) for a recent review. The deviation from uncovered interest rate parity is known as cross-currency basis in the literature, Baba, Packer and Nagano (2008).

[2]We find some overlap in monetary policy meeting dates in these economies and US Federal Reserve which gives rise to movement in the US rates during the meeting dates in these countries. We do robustness exercises by excluding these meeting dates, which ensure that both the assumptions required for these changes in forward discount to act as a monetary surprise are true in this subsample.

in forward discount as expected from covered interest rate parity. These two sets of validation exercises- both testing assumptions and benchmarking against high-frequency shocks- provide strong evidence that our two-day forward-discount-based monetary surprises capture credible and comparable monetary policy shocks across these economies.

After establishing that these forward discount measures of monetary surprises are credible, we estimate the % point response (change) in monetary policy rate, one-month yield, one, five, and ten-year yields due to these monetary surprises upto 1 year using monthly data and local projection, Jorda (2005). We also estimate the % response (change) in nominal USD exchange rate, nominal and real effective exchange rate, and benchmark equity index, and change in y-o-y industrial production growth and inflation using monthly data. We find that Monetary policy surprises in these economies cause a persistent upward shift in all interest rates, particularly at the short end of the yield curve. However, in contrast to the predictions of the information effect (Jarocinski and Karadi, 2020), equity markets respond negatively to these surprises. The modest and statistically insignificant initial increase in stock prices is followed by a sustained decline, suggesting that these monetary surprises are free of the central bank information effect. This is expected as we use four lags of these variables, including monetary surprises as the control variable in the local projection regressions to tease out any potential role of central bank information effects.

We find that exchange rate depreciates in these economies due to monetary tightening, consistent with findings in Kohlscheen (2014), Hnatkovska, Lahiri, and Vegh (2016). This is also consistent with the findings in and Aruoba et al. (2021) and Bolhuis et al. (2024) but contradicts the findings in Checo et al. (2024) using high frequency identification. The exchange rate depreciation is broad-based, leading to persistent depreciation of both nominal and real effective exchange rates as well. We find that interest rate tightening leads to higher inflation and an insignificant but positive effect on industrial growth. One possible explanation is the central bank information effect, as proposed by Nakamura and Steinsson (2018), where monetary tightening reflects positive economic signals. However, this appears unlikely in our case, as the equity index does not exhibit the positive response typically associated with such an effect. A more plausible interpretation is that the inflation response is driven by indirect effects of interest rate shocks through exchange rate depreciation. As discussed earlier, monetary tightening leads to depreciation in both nominal and real effective exchange rates, which can increase inflation due to higher import prices- a "price puzzle" driven by incomplete exchange rate pass-through, widely documented in the literature (see Burstein and Gopinath, 2014; Amiti et al., 2014). The timing of the inflationary response of the interest rate shock closely matches the pattern of exchange rate depreciation, supporting this view. For output growth, the direct contractionary impact of higher interest rates may be offset by improved external competitiveness, resulting in no significant overall effect.

We estimate the direct and indirect effects of interest rate using the local projection framework of Cloyne et al. (2023). Once the indirect effect of interest rate through the exchange rate channel is controlled for, the price puzzle disappears, and inflation declines steadily and significantly from around the ninth month. This suggests that the price puzzle is largely due to the indirect effect of interest rate through exchange rate, a mechanism often overlooked in existing studies. This channel is particularly relevant in emerging markets, where monetary tightening tends to weaken the currency, unlike in advanced economies such as the U.S. (Bolhuis et al., 2024), where it typically leads to appreciation. These results are important for inflation management in these economies through interest rate policy.

The rest of the paper is structured as follows. Section 2 provides a brief overview of the recent related literature. Section 3 outlines the theoretical framework, identification, and validation of monetary surprises based on covered interest parity and explains the data. Section 4 presents the empirical framework, including the instrumental variable regression. Section 5 presents the empirical results, followed by concluding remarks and policy implications.

2 Related Literature

This paper contributes to several key strands of the literature, beginning with the extensive body of work on high-frequency identification (HFI) of monetary policy surprises and their transmission in advanced economies. Seminal contributions such as Kuttner (2001), Gurkaynak, Sack, and Swanson (2005), and Gertler and Karadi (2015) laid the groundwork for isolating unexpected policy shocks using high-frequency financial data. Building on these foundations, more recent studies- including Altavilla et al. (2019), Jarocinski and Karadi (2020), Andrade (2021), Swanson (2021), Bu et al. (2021), Bauer and Swanson (2023), Jarocinski (2024), Braun, Miranda-Agrippino, and Saha (2025)- have applied it to different settings or extended the framework to distinguish among various monetary policy instruments such as target rate adjustments, forward guidance, and quantitative easing. A central challenge in this literature is the so-called "Fed information effect" (Nakamura and Steinsson, 2018), whereby contractionary monetary surprises are associated with upward revisions in macroeconomic forecasts. This has prompted a reevaluation of the assumption that policy shocks are purely exogenous, recognizing instead that they may convey information about the central bank's private assessment of economic conditions. In this context, Bauer and Swanson (2023) emphasize the simultaneity between central bank decisions and market expectations, motivating recent methodological refinements that seek to purge monetary surprises of pre-announcement macroeconomic information.

This study is also related to the emerging literature on the application of HFI methods in developing economies. Bolhuis, Das, and Yao (2024) construct a harmonized cross-country database of monetary policy surprises based on daily changes in interest rate swap (IRS) rates, encompassing both advanced and emerging economies. Their standardized identification strategy responds to concerns raised by Brennan et al. (2024) about the comparability of policy shock estimates due to heterogeneous measurement approaches. The dataset spans 3,545 monetary policy announcements and disaggregates shocks into exogenous policy actions and endogenous information effects, contributing to a growing literature that emphasizes the dual signaling role of monetary policy (Jarocinski and Karadi, 2020; Miranda-Agrippino and Ricco, 2021). Complementary studies include Checo, Grigoli, and Sandri (2024), who use orthogonalized forecast errors from Bloomberg analysts to filter out endogenous responses to macro-financial conditions. Lakdawala and Sengupta (2024) apply the HFI framework to India using Overnight Index Swap (OIS) rates, separating immediate policy moves from forward guidance, following the methodology of Gurkaynak et al. (2005). In the case of Chile, Aruoba et al. (2021) integrate survey-based and market-based forecasts, concluding that Bloomberg expectations provide the most accurate identification of policy surprises. These contributions collectively demonstrate how HFI approaches can be adapted to heterogeneous institutional and data environments in emerging markets, thereby enhancing our understanding of monetary transmission mechanisms in these contexts.

Furthermore, the paper engages with the literature on the exchange rate effects of interest rate shocks, which differ markedly between advanced and emerging economies. Dornbusch's (1976) overshooting model predicts that a contractionary monetary policy shock results in immediate currency appreciation followed by gradual depreciation. However, empirical findings are mixed. Eichenbaum and Evans (1995) observe that U.S. monetary tightening leads to a gradual and persistent appreciation of the dollar, while Kim and Roubini (2000) document eventual depreciation consistent with uncovered interest parity (UIP). Schmitt-Grohe and Uribe (2022) introduce a distinction between transitory and permanent interest rate shocks, finding that transitory shocks cause short-run appreciation whereas permanent shocks lead to immediate nominal and real depreciation. Recent evidence employing HFI methods largely corroborates these distinctions. Bolhuis et al. (2024) report that a 100-basis-point policy shock in advanced economies generates a peak nominal effective exchange rate (NEER) appreciation of 6.3% within 20 trading days, stabilizing at 3.3 % after three months. Jarocinski (2024) finds similar results for the U.S., reinforcing the robustness of HFI-based exchange rate responses.

In contrast, the exchange rate response in emerging markets appears more heterogeneous and, in some cases, counterintuitive. Bolhuis et al. (2024) document that the same 100-basis-point shock induces a modest 0.8% NEER depreciation after 20 trading days, with the effect dissipating thereafter. Aruoba et al. (2021) similarly report a depreciation of the Chilean peso following monetary tightening, consistent with earlier findings by Kohlscheen (2014) and Hnatkovska, Lahiri, and Vegh (2016). These results challenge standard open-economy models, which generally predict currency appreciation in response to higher interest rates. One explanation is the presence of fiscal dominance, wherein rising real interest rates exacerbate concerns about sovereign solvency, particularly when fiscal authorities fail to counterbalance the growing interest burden (Alberola et al., 2021; Witheridge, 2024). Under such conditions, the risk premium may increase sufficiently to offset the conventional interest rate differential, leading to exchange rate depreciation. However, contrasting evidence is presented by Checo, Grigoli, and Sandri (2024), who find that exchange rates in emerging markets typically appreciate in response to monetary tightening, albeit gradually, underscoring the importance of country-specific factors and institutional credibility.

Lastly, this paper contributes to the longstanding debate surrounding the price puzzle in monetary transmission. The price puzzle refers to the empirical finding that inflation sometimes rises following a contractionary monetary policy shock. While early VAR analyses (e.g., Sims, 1992) identified this as a robust feature of U.S. data, subsequent studies have questioned its interpretation. Barakchian and Crowe (2013) and Ramey (2016) argue that conventional identification strategies often conflate true policy shocks with endogenous responses to inflation expectations. Advances in identification strategies, particularly those relying on high-frequency and narrative approaches, have significantly mitigated the price puzzle. Jarocinski and Karadi (2020) demonstrate that once monetary shocks are cleansed of information effects, the anomalous inflation response largely disappears. Structural models incorporating imperfect information and communication channels (e.g., Melosi, 2017; Nakamura and Steinsson, 2018) further clarify that observed inflation dynamics may reflect the informational content of policy actions rather than failures in monetary transmission. Together, these findings suggest that the price puzzle is not an inherent flaw in monetary policy effectiveness but a reflection of complex identification challenges and the dual role of policy as both an instrument and a signal.

3 Data, Shock Identification, and Validation

3.1 Data

We hand-collect the monetary policy meeting dates from the respective central bank's website, given in Appendix A1. We use daily data from eight Asian economies (India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand) to identify the high-frequency monetary policy shock. Specifically, we use 3-month and 1-year Forward rates with respect to USD, the spot exchange rate with USD to calculate the % change in forward discount during the two-day window of monetary policy meeting dates. This is the measure of monetary policy surprise in this paper. To establish the validity of these monetary policy surprises, we apply the same method to calculate the monetary surprise to the US and UK and compare these with existing measures of high-frequency monetary policy surprises from the US, UK, and India. We use a 1-year forward rate with respect to EUR, CHF, JPY, and GBP, and the spot exchange rate with these currencies to calculate the % change in forward discount during the two-day window of monetary policy meeting dates of the Federal Reserve to calculate the monetary policy surprise for the US. We use 1 1-year forward rate with respect to USD and the spot exchange rate with USD to calculate the % change in forward discount during the two-day window of the monetary policy meeting dates of the Bank of England to calculate the monetary policy surprise for the UK. Table A.1 in Appendix A.2 gives the variables used to calculate monetary policy surprise for the US and UK and existing measures of monetary surprises for the US and UK. These existing measures for the US and UK also contain monetary policy meeting dates for the Federal Reserve and the Bank of England.

We calculate the response of monthly monetary policy rate, one-month zero coupon yield, one-year yield, five-year yield, ten-year yield, exchange rate, nominal effective exchange rate, real effective exchange rate, Y-o-Y consumer inflation, and Y-o-Y industrial production growth due to the high-frequency monetary policy shock. We include global variables like oil prices, CBOE volatility index (VIX), and three-month treasury yield in the US in all these estimations. Appendix B gives the detailed information related to all these variables.

3.2 Shock Identification

We measure high-frequency monetary policy shocks in emerging markets by exploiting changes in forward and spot exchange rates. This approach is similar to Witheridge (2024) and is motivated by the lack of financial instruments-such as policy rate futures contracts (e.g., Fed Funds futures for the U.S.), which are commonly used to identify monetary policy shocks in advanced economies. The identification strategy is based on the covered interest parity (CIP) condition, which in its standard form is given by:

$$\left(1 + r^{c}_{t,t+1}\right) = \left(1 + r^{US}_{t,t+1}\right) \cdot \frac{F_{t,t+1}}{E_t}$$

Here, $r^{c}_{t,t+1}$ denotes the one-period risk-free interest rate in local currency c, $r^{US}_{t,t+1}$ is the corresponding U.S. dollar interest rate, $F_{t,t+1}$ is the forward exchange rate (local currency per USD) for delivery at $t+1$, and E_t is the spot exchange rate at time t (an increase in E_t corresponds to a depreciation of currency c).

CIP is a no-arbitrage condition that equates returns on domestic and foreign currency investments when hedged through the FX forward market. However, since the global financial crisis, deviations from CIP have become common due to international financial frictions[3]. Taking logs of equation (1) and allowing for a time-varying CIP deviation λ_t,

[3]See Baba, Packer and Nagano (2008), Borio et al. (2016), Avdjiev, Du, Koch and Shin (2019), Jiang, Krishnamurthy and Lustig (2021), Engel and Wu (2023), Dao & Gourinchas (2025) on deviations from covered interest parity since the global financial crisis, and Du and Schreger (2022) for a recent review

we obtain[4]:

$$r_t^c - r_t^{US} + \lambda_t = f_{t,t+1} - e_t$$

where $f_{t,t+1}$ and e_t are the log forward and spot exchange rates, respectively. The right-hand side is the *forward premium*, denoted $fp_{t,t+1}$. The left-hand side represents the interest rate differential adjusted with the CIP wedge. Positive values of $fp_{t,t+1}$, i.e., $r_t^c > r_t^{US}$, imply forward discount assuming wedge is constant. Ceteris paribus, an increase in the domestic interest rate should lead to an expected depreciation of the local currency, reflected in an increase in the forward discount. To identify monetary policy shocks, we make the following assumption:

Assumption Within a narrow window around a central bank policy announcement, both r_t^{US} and the CIP deviation (cross-currency basis) λ_t remain constant.

$$\Delta fp_{t,t+1} = \Delta r_t^c$$

This implies that changes in the forward premium around the policy announcement window directly capture unanticipated changes in the domestic interest rate. Hence, we can use high-frequency forward and spot exchange rate data to measure monetary policy shocks in countries lacking direct financial instruments for such identification. We identify monetary surprises by the difference in the forward discount a day after the monetary

[4]Suppose we borrow 1 USD for one period, and the interest rate in the US is r_t^{US}. The liability at the end of one period is $(1 + r_t^{US})$. But if we borrow E in country c and convert that into USD, then we can obtain 1 USD as well. This is an indirect way of USD borrowing. The borrowing in country c is E, the liability in country C after 1 period is $E_t(1 + r_t^C)$. The USD liability after one period is $\frac{E_t(1+r_t^C)}{F_{t,t+1}}$. If CIP holds then $(1 + r_t^{US}) = \frac{E_t(1+r_t^C)}{F_{t,t+1}}$ which is same as equation 1. But as mentioned before, CIP deviations have been normal after the financial crisis where usually $(1 + r_t^{US}) < \frac{E_t(1+r_t^C)}{F_{t,t+1}}$ i.e., the direct cost of USD borrowing has usually been lower than the indirect cost of USD borrowing. We can define a wedge Λ_t such that $(1 + r_t^{US}) = \Lambda_t \frac{E_t(1+r_t^C)}{F_{t,t+1}}$ where Λ_t is called cross currency basis. Taking logs and using lowercase for logs, we can write

$$f_{t,t+1} - e_t = r_t^C - r_t^{US} + \lambda_t$$

This can be further written as

$$(f_{t,t+1} - e_t) + r_t^{US} - r_t^C = \lambda_t$$

policy meeting and a day before the monetary policy meeting. Hence

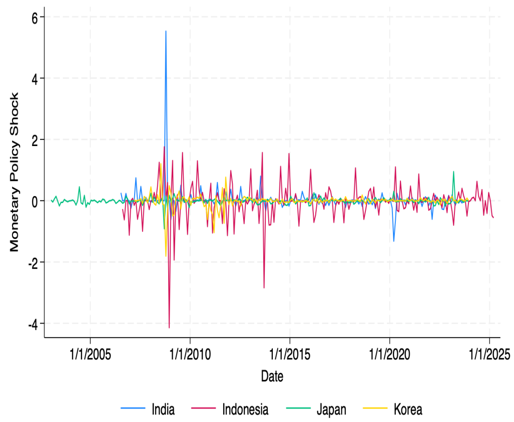
$$\Delta fp_{t-1,t+1} = \Delta r_t^c$$

. After identifying the monetary policy surprises, we create a monthly dataset of monetary shocks. Table 1 gives the sample period for the monetary policy surprises for each country. Figure 1 gives the time series plot of the identified shocks for these eight countries based on availability. The monetary policy shock has the highest volatility in Indonesia, followed by India, Thailand, and Korea. The monetary shocks almost 1/6th volatility in Japan and Malaysia compared to Indonesia.

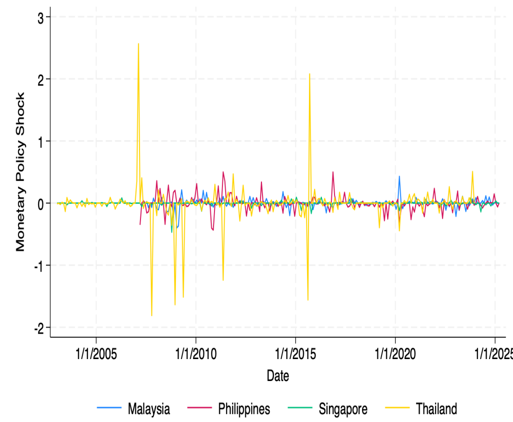
Table 1: Monetary Policy Shock: Sample Period

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: Monetary policy shocks are % points change in the one-year forward discount for each currency with respect to the USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t). The one-year forward discount for each country is calculated using spot and forward rates with respect to USD obtained from LSEG. The LSEG codes for these are TDIDRSP; TDINRSP; TDJPYSP; TDKRWSP; TDMYRSP; TDPHPSP; TDSGDSP; TDTHBSP; PDIDR1Y; PDINR1Y; TDJPY1Y; TDKRW1Y; TDMYR1Y; TDPHP1Y; TDSGD1Y; TDTHB1Y.



(a) Monetary Policy Shocks



(b) Monetary Policy Shocks

Figure 1: Monetary policy shocks are % points change in the one-year forward discount for each currency with respect to the USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in country c.

3.3 Shock Validation

3.3.1 Validity of the Assumption

The identification strategy used above yields correct monetary policy surprises for country c at time t only if the cross-currency basis and the U.S. interest rate remain stable within a narrow window surrounding the monetary policy meeting in country c at time t. We now provide evidence supporting the reasonableness of this assumption. Specifically, we examine changes in the cross-currency basis, $\Delta\lambda_{t-1,t+1}$, and in the one-year U.S. government bond yield, $\Delta r^{\text{US}}_{t-1,t+1}$, over the same window. We regress these changes on a dummy variable that equals one on monetary policy meeting dates in country c, conducting separate regressions for each country since the timing of meetings differs across countries.

Tables C.1-C.4 in the appendix present the regression results. These results provide strong evidence that the cross-currency basis does not systematically change during monetary policy meetings in these countries. However, we do find that U.S. interest rates tend to move on the monetary policy meeting dates of Japan and Thailand. This is not surprising, as there is significant overlap between these countries' meeting dates and those of the U.S. Federal Reserve. Table 2 reports the count of such overlapping dates, with Japan having the highest number, followed by Indonesia and Thailand.

To address this, we conduct two additional sets of regressions. First, we exclude Japan and Thailand from the sample. Second, we exclude observations corresponding to overlapping meeting dates from the sample of monetary policy shocks for the eight countries. We believe that the monetary policy surprises identified in these two robustness exercises are purged of any contamination from changes in the cross-currency basis and U.S. interest rates.

Country	No of Overlapping Dates
India	5
Indonesia	11
Japan	17
Korea	3
Malaysia	6
Philippines	6
Singapore	1
Thailand	9

Table 2: Overlapping Meeting Dates in Sample Countries With Federal Reserve Meeting Dates

3.3.2 Relationship with Existing High-Frequency Monetary Surprises from US, UK, and India

Having established the reasonableness of the identification assumption, we next compare the monetary policy surprises based on covered interest parity with existing high-frequency monetary shocks from the US, UK, and India. For the US, we use several high-frequency shock measures. Figure 2 presents four covered interest parity-based monetary surprises for the US and the high-frequency US monetary policy shocks constructed by Bu, Rogers, and Wu (2021). Table 3 presents regression results of four covered interest parity-based monetary surprises for the US on the high-frequency US monetary policy shocks constructed by Bu, Rogers, and Wu (2021). Bu, Rogers, and Wu (2021) construct a single US monetary policy shock that incorporates both conventional and unconventional policy actions on FOMC announcement days. Their shock series is largely unanticipated and is designed to exclude central bank information effects. Our results show that a 1 percentage point monetary policy shock is associated with a 0.7 to 1 percentage point increase in the forward discount on the US dollar.

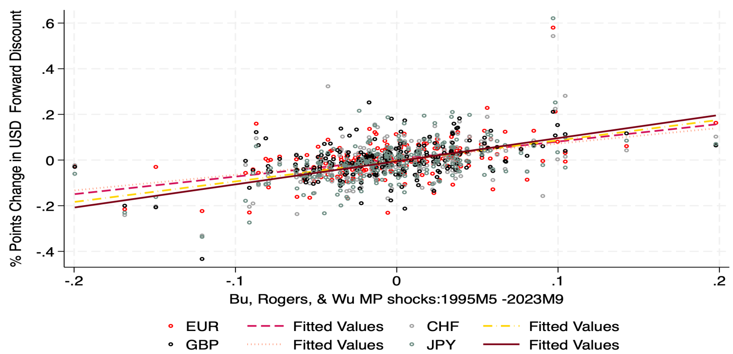


Figure 2: % points change in the one-year USD forward discount for each currency in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US and monetary policy shock for the US from Bu, Rogers, & Wu (2021).

In theory, if covered interest parity (CIP) holds perfectly, a 1 percentage point monetary policy shock should lead to a 1 percentage point increase in the forward discount across all currencies. Deviations from this benchmark may reflect actual departures from CIP or differences in measurement windows: while Bu, Rogers, and Wu (2021) use a 30-minute window, our monetary surprises are measured over a two-day window. Nonetheless, the regression results support our central claim: interest rate surprises identified through covered interest parity over a two-day window capture monetary policy surprises, as evidenced by their statistically significant correlation with 30-minute high-frequency monetary shocks and their effect on forward discounts based on covered interest rate parity. The low R^2 values are not a major concern. Brennan et al. (2024) document that different US high-frequency monetary shock series can have correlations as low as 0.3 and even agree in sign only about half the time. Similarly, Boehm and Kroner (2024) argue that existing high-frequency monetary shocks explain surprisingly little of the variation in stock prices and exchange rates around FOMC announcements.

Table 3: % Points Change in USD Forward Discount and Monetary Policy Shock for the US from Bu, Rogers, & Wu (2021)

	(1)	(2)	(3)	(4)
	% Points Change: EUR	% Points Change: CHF	% Points Change: GBP	% Points Change: JPY
Bu, Rogers, & Wu	0.768***	0.899***	0.684***	1.014***
	(7.75)	(8.13)	(7.01)	(9.09)
Observations	226	226	226	226
R Square	0.211	0.228	0.180	0.270

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the % point change in the one-year forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the monetary policy shock for the US from Bu, Rogers, & Wu (2021).

Appendix D presents similar results using other high-frequency monetary shocks for the US, including those from Jarocinski (2024), Gurkaynak, Sack, and Swanson (2005), Jarocinski and Karadi (2020), and Nakamura and Steinsson (2018). These additional results help establish two further features of monetary surprises based on covered interest rate parity. First, the relationship between covered interest parity-based high-frequency surprises and existing high-frequency shocks aligns more closely with theoretical expectations when the comparison is made with target rate shocks–such as those from Gurkaynak, Sack, and Swanson (2005)-or a single monetary policy shock, such as the one developed by Nakamura and Steinsson (2018). Second, monetary surprises based on covered interest rate parity are not well suited to capture the *path* component of monetary policy shocks, as represented by the path factor in Gurkaynak, Sack, and Swanson (2005). This is expected, since the covered interest parity approach focuses on short-term interest rate changes and forward discount movements, which primarily reflect immediate policy rate surprises rather than anticipated future policy paths.

Figure 3 presents covered interest parity-based monetary surprises for the UK and the high-frequency UK monetary policy shocks constructed by Braun, Miranda-Agrippino, & Saha (2025). Table 4 presents regression results of covered interest parity-based monetary surprises for the UK on the high-frequency UK monetary policy shocks constructed by Braun, Miranda-Agrippino, & Saha (2025). Braun, Miranda-Agrippino, & Saha (2025) identified three measures of MP shock. These results suggest that a one % point high frequency monetary shock identified in 30 minutes window leads to almost 1% point depreciation of GBP during the two days window and validates the argument that % point change in the forward discount in two days window around monetary policy announcement is a reasonable measure of monetary surprises. Also, these results suggest that the % point change in the forward discount in a two-day window around the monetary policy announcement captures the target shock and not the path shock, which is similar to the case with the US.

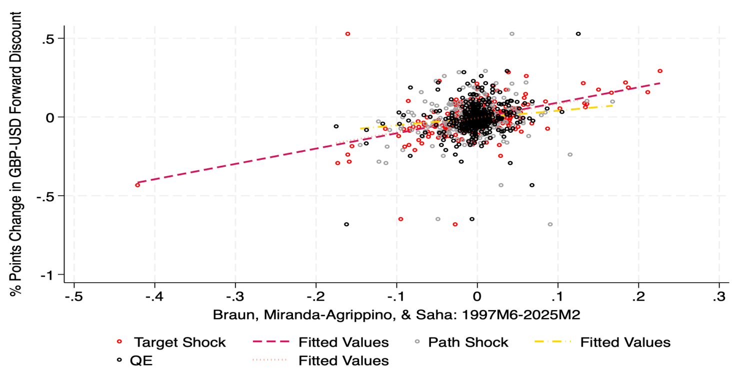


Figure 3: % points change in the one-year GBP-USD forward discount in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) and monetary policy shock for the UK from Braun, Miranda-Agrippino, & Saha (2025).

Table 4: % Points Change in GBP-USD Forward Discount and Monetary Policy Shock for the UK from Braun, Miranda-Agrippino, & Saha (2025)

	(1) % Points Change	(2) % Points Change	(3) % Points Change
Target	0.974***		
	(10.37)		
Path		0.463***	
		(3.02)	
QE			0.905***
			(5.49)
Observations	370	370	370
R Square	0.226	0.0242	0.0757

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the % point change in the one-year forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the monetary policy shock for the UK from Braun, Miranda-Agrippino, & Saha (2025).

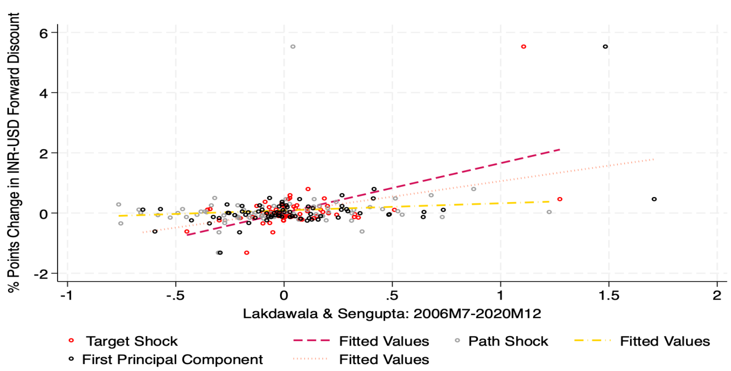


Figure 4: % points change in the one-year INR forward discount with respect to US in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) and monetary policy shock for India from Lakdawala & Sengupta (2024)

Table 5: % Points Change in INR-USD Forward Discount and Monetary Policy Shock for India from Lakdawala & Sengupta (2024)

	(1) % Points Change	(2) % Points Change	(3) % Points Change
Target	1.650***		
	(5.84)		
Path		0.236	
		(1.05)	
First Principal Component			1.028***
			(5.41)
Observations	72	72	72
R Square	0.328	0.0155	0.295

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in the one-year forward discount on INR with respect to the USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t). The independent variable is the monetary policy shock for India from Lakdawala & Sengupta (2024).

Figure 4 displays the monetary policy surprises for India based on covered interest parity, alongside the high-frequency monetary policy shocks constructed by Lakdawala and Sengupta (2024). Table 5 presents the corresponding regression results of the covered interest parity-based surprises on these high-frequency Indian monetary policy shocks. Lakdawala and Sengupta (2024) identify two types of monetary policy shocks, in the spirit of Gurkaynak, Sack, and Swanson (2005). The results suggest that a 1 percentage point monetary policy shock- captured by the principal component identified by Lakdawala and Sengupta (2024)- leads to nearly a 1 percentage point depreciation of the Indian rupee over a two-day window. This finding supports the validity of using percentage changes in the forward discount over a two-day window around monetary policy announcements as a reasonable measure of monetary policy surprises. Furthermore, the results reinforce earlier findings for the US and UK: the forward discount changes primarily capture the target component of monetary policy shocks, rather than the path component.

Overall, the regression results provide strong evidence that a 1% monetary policy shock identified through high-frequency methods causes approximately a 1% change in the forward discount implied by covered interest parity over a two-day window. This supports the claim that forward discount-based monetary surprises, as constructed in this paper, are a valid and informative measure. In particular, this identification strategy is valuable for countries like India that lack instruments such as federal funds futures–which are commonly used in the US-to isolate monetary policy shocks.

4 Empirical Framework

We estimate the response of variables due to monetary policy shocks using the local projection regression based on Cloyne et al. (2023) and Jorda (2005). We estimate the equation given by: We estimate a similar regression in a panel framework for emerging economies

$$Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$$

where Y_{it} is one of the dependent variables in country i at time t. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks identified above. We control for four lags of monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, and yield on one and ten-year government bonds, respectively and the log of equity index. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of the US economic policy uncertainty, and the yield on three-month US treasury. The rich set of control variables helps in orthogonalizing the monetary surprises in the spirit of Bauer and Swanson (2023) and gives response due to monetary surprises devoid of central bank information effect. β^h is the coefficient of interest which gives the cumulative effect of monetary policy shock at $t = 0$ on Y at time $t = h$. We estimate the above model for the monetary policy rate, one-month yield, one, five, and ten-year yields, log of nominal USD exchange rate, log of nominal and real effective exchange rate, and log of benchmark equity index. For consumer price and index of industrial production, we first calculate year-on-year inflation and growth and use these as dependent variables. This strategy also mitigates the different seasonality patterns in different countries. Thereafter, we estimate the model given by:

$$Y_{i,t+h} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$$

where Y_{it} is year on year inflation and growth in country i at time t. β^h is the coefficient of interest which gives the effect of monetary policy shock at $t = 0$ on Y at time $t = h$. We also estimate the two models described above using high-frequency monetary surprises as instrumental variables for the one-year government bond yield, thereby identifying monetary policy shocks. As discussed in Stock and Watson (2018), the rationale for using this instrumental variable (IV) approach lies in the fact that monetary policy surprises observed around monetary policy announcements may capture only a subset of all monetary policy shocks. For instance, Swanson (2023) documents that in the US, speeches by the Federal Reserve Chair represent an important additional source of monetary shocks not captured by announcement-day surprises. This concern, however, is likely to be less relevant for emerging market economies, where central banks typically communicate less frequently outside of scheduled monetary policy meetings. Thus, the use of announcement-based monetary surprises as instruments may be more valid in these settings, Checo et al. (2024).

Following Cloyne et al. (2023), we further explore the direct and indirect effects of monetary policy shocks on inflation using the model given below

$$Y_{i,t+h} = f_{i,t}\beta^h + f_{i,t} \times \text{ER}_{i,t}\theta^h + \text{ER}_{i,t}\phi^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$$

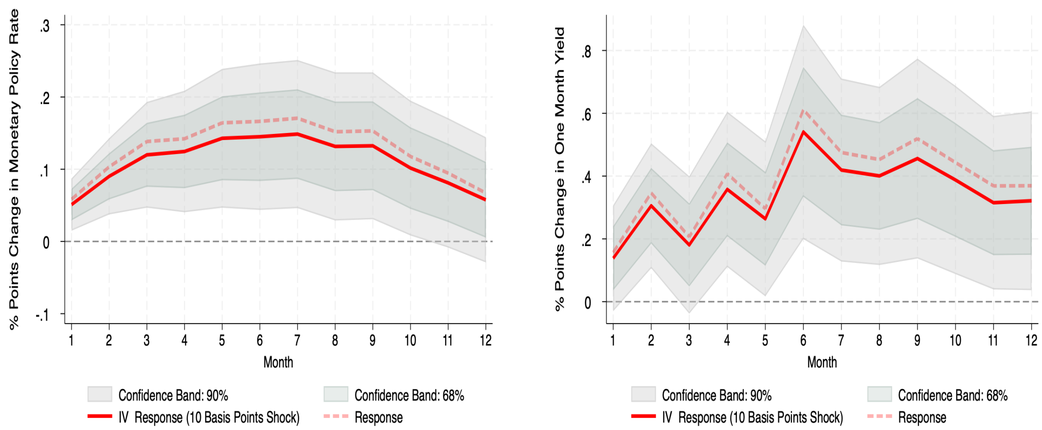
In this specification, Y_{it} denotes year-on-year inflation in country i at time t, and ER_{it} is the logarithm of the exchange rate of country i's currency against the US dollar.

The coefficient β^h captures the direct effect of a monetary policy shock at time $t = 0$ on inflation at horizon $t = h$, while θ^h reflects the indirect effect operating through the exchange rate channel, as emphasized by Cloyne et al. (2023). The motivation behind this model is that monetary policy can influence inflation through both a demand channel (direct effect) and an exchange rate channel (indirect effect). These channels may work in opposite directions, particularly in emerging markets where exchange rates often depreciate in response to interest rate tightening. This empirical regularity is well-documented in studies such as Kohlscheen (2014), Hnatkovska, Lahiri, and VÃ©gh (2016), Aruoba et al. (2021), and Bolhuis et al. (2024). A depreciation of the exchange rate may lead to higher domestic prices due to incomplete exchange rate pass-through, a phenomenon widely documented in the literature (see Burstein and Gopinath, 2014; Amiti et al., 2014). Therefore, this regression framework is useful for isolating the direct effect of monetary policy shocks on inflation, net of the potentially offsetting

5 Results

Monetary Policy Transmission to Interest Rates

Figure 5 gives the response of the monetary policy rate and one-month zero coupon yield due to monetary surprises. We estimate two sets of surprises. First, using these monetary surprises directly, and second, using these monetary surprises as an instrumental variable for one-year yield that generates a response of 10 basis points of one-year yield at the impact. As we can see from Figure 5, these monetary surprises lead to less than a 10 basis point increase in the monetary policy rate at the impact. The response of the monetary policy rate shows a strong and persistent increase, peaking around the sixth month at slightly less than 20 basis points before gradually tapering off. This pattern suggests that central banks in emerging markets tend to reinforce monetary shocks over time, possibly due to inertia in policy adjustment or a gradual buildup of policy credibility. Importantly, the reduced form responses closely align with the IV estimates, lying well within the 68%, and 90% confidence bands. The one-month yield follows a similar pattern and rises up to 60 basis points by 6 months before declining. Interestingly, the one-month yield remains higher by 40 basis points even after a year.



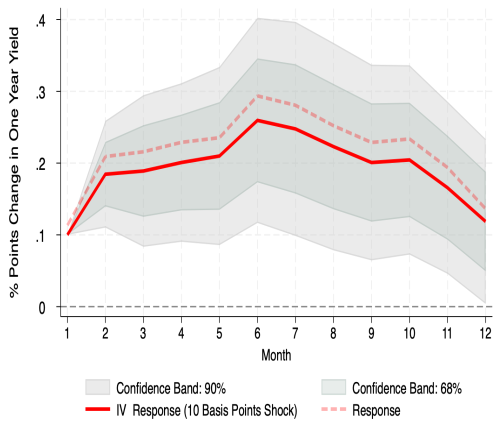
(a) Response of Monetary Policy Rate

(b) Response of One Month Yield

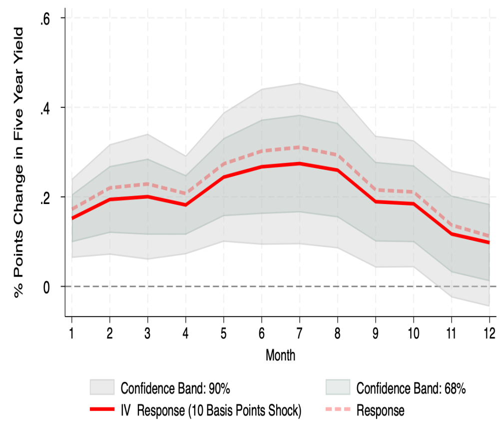
Figure 5: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

Figure 6 presents the impulse responses of one-, five-, and ten-year government bond yields to high-frequency monetary policy surprises. The one-year yield shows a clear and persistent increase, peaking around month six at approximately 30 basis points. This suggests that markets revise their short-term interest rate expectations upward in response to monetary tightening. The five- and ten-year yields also rise but in a more muted and delayed fashion. The upward shift in the entire yield curve indicates that monetary policy surprises affect both near- and longer-term expectations, albeit to varying degrees.

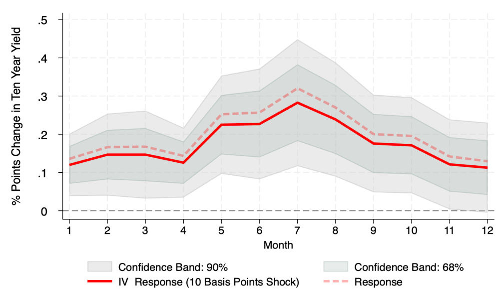
It is important to clarify the relationship between the size of monetary surprises and the yield responses. Based on covered interest parity, a 1 percentage point monetary surprise does not translate one-to-one into a 1 percentage point increase in the one-year yield at a monthly frequency. But this is as expected. As shown before, the 1% point monetary surprises based on covered interest rate parity generate 1% point interest rate shock in a tight window, which is not necessarily the same as 1% point increase in the monthly 1-year yield.



(a) Response of One Year Yield



(b) Response of Five Year Yield



(c) Response of Ten Year Yield

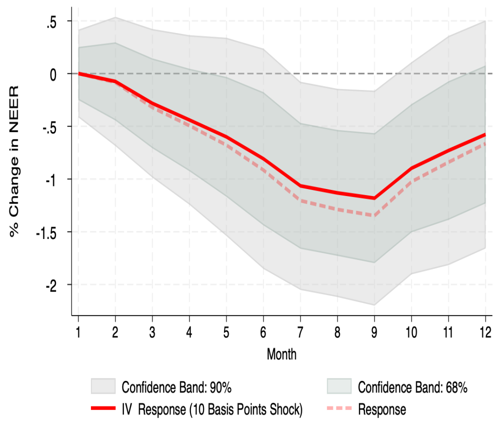
Figure 6: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands, respectively, from IV estimates.

If that had been the case, then one could have identified monetary policy shocks directly by observing the change in the yield in a tight window. In our reduced-form regressions, the response of the one-year yield to a 1 percentage point monetary surprise is closer to 10 basis points. Accordingly, our IV estimation is scaled to reflect a 10 basis points increase in the one-year yield, ensuring interpretability and comparability. This alignment is crucial, as it allows us to interpret the reduced-form responses as being driven by a 10 basis point yield shock.

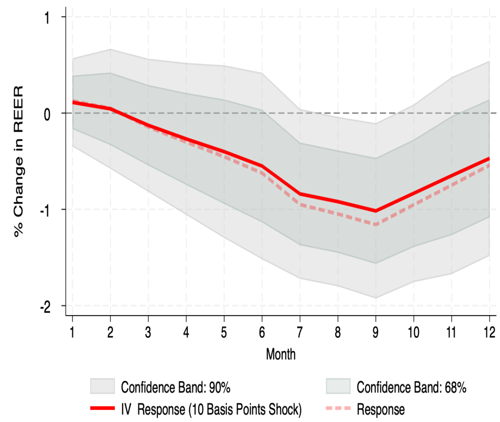
Monetary Policy Transmission to Exchange Rates

Figure 7 shows the impulse responses of the spot exchange rate, as well as nominal and real effective exchange rates, to high-frequency monetary policy surprises. The results indicate that a 10 basis point shock to the one-year yield leads to a significant depreciation of local currencies against the USD, with the spot exchange rate depreciating by nearly 2% over nine months. This behavior is consistent with previous findings in the literature, including Kohlscheen (2014), Hnatkovska, Lahiri, and Vegh (2016), Aruoba et al. (2021), and Bolhuis et al. (2024). The depreciation is not limited to the bilateral USD exchange rate; both nominal and real effective exchange rates also decline, indicating a broad-based depreciation and an improvement in external competitiveness.

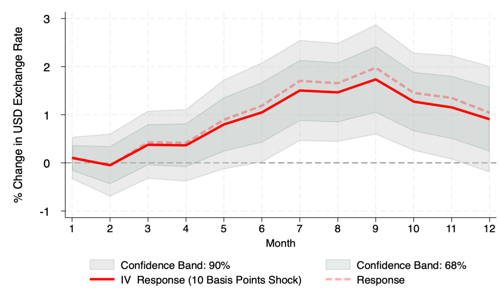
However, this response of the exchange rate poses challenges for the effectiveness of monetary transmission in these economies. In theory, an interest rate hike is expected to dampen domestic demand, reduce inflationary pressures, and slow output. Yet, the observed depreciation can counteract these effects: weaker currencies may spur external demand by improving competitiveness and increase domestic inflation due to higher import prices, especially when pass-through is incomplete. Thus, the indirect exchange rate channel could undermine or even offset the intended direct effects of monetary tightening, complicating the conduct of monetary policy in these economies.



(a) Response of Nominal Effect Exchange Rate



(b) Response of Real Effect Exchange Rate



(c) Response of USD Exchange Rate

Figure 7: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands, respectively, from IV estimates.

Monetary Policy Transmission to Equity Market

Figure 8 illustrates the response of equity indices to high-frequency monetary policy surprises. A 10 basis point interest rate shock initially causes a marginal and statistically insignificant increase in the equity index, but from the second month onward, the index begins to decline. This pattern suggests a limited role for the information effect in the spirit of Jarocinski and Karadi (2020), who argue that positive co-movement between interest rate shocks and equity prices is indicative of such an effect. The observed negative response peaks when the interest rate impact is strongest, and the equity index remains approximately 2 percentage points lower even after one year, reinforcing the absence of a strong information channel.

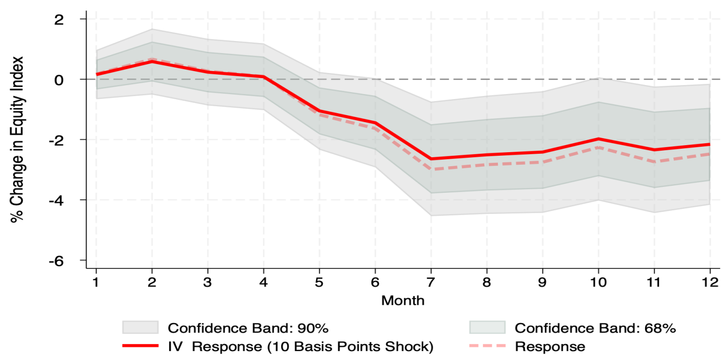
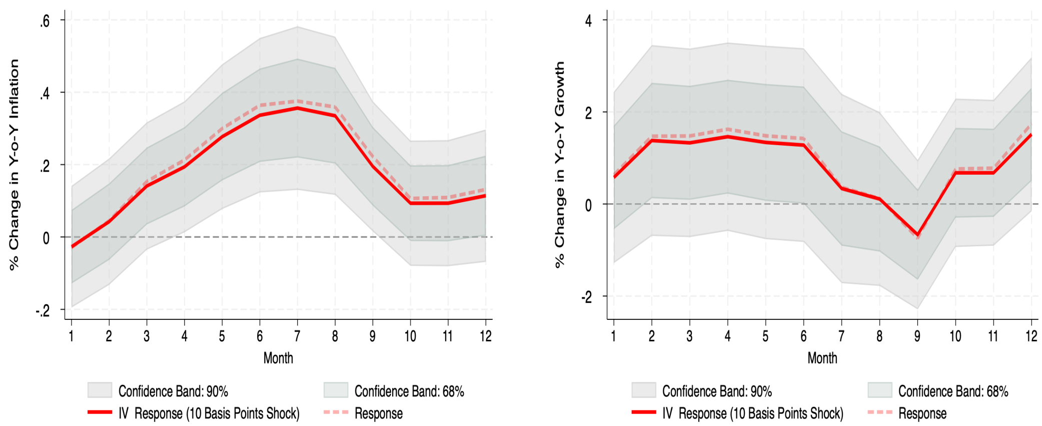


Figure 8: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands, respectively, from IV estimates.

Monetary Policy Transmission to Real Economy

Figure 9 presents the impulse responses of year-on-year inflation and industrial output growth due to a 10 basis point interest rate shock. Interestingly, these responses deviate from theoretical expectations. One possible explanation is the central bank information effect, as discussed by Nakamura and Steinsson (2018), where monetary tightening coincides with positive economic signals. However, this explanation appears less plausible in our case, as the equity index does not exhibit the positive response typically associated with such effects. A more likely interpretation is that the indirect effects of interest rate shocks, particularly through exchange rate depreciation, are driving the observed inflation dynamics. As noted earlier, monetary tightening leads to a depreciation of both nominal and real effective exchange rates, which could in turn raise inflation (price puzzle). The timing of the significant inflationary response closely mirrors that of exchange rate depreciation, supporting this view. For output growth, the direct contractionary effect of higher interest rates may be offset by the stimulative impact of improved external competitiveness, resulting in an insignificant net response.



(a) Response of Y-o-Y Consumer Inflation (b) Response of Y-o-Y Output Growth

Figure 9: Red line gives response β^h from $Y_{i,t+h} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands, respectively, from IV estimates.

Exchange Rate Pass-Through, Direct Effect of Interest Rate Shock, & Price Puzzle

Figure 10 isolates the direct effect of interest rate shocks on year-on-year inflation by controlling for the exchange rate channel. Once this indirect effect is accounted for, the price puzzle vanishes: inflation exhibits a steady and statistically significant decline starting around the ninth month. Comparing Figures 9 and 10 reveals that the price puzzle likely arises from exchange rate depreciation, a factor often overlooked in the existing literature. This mechanism is particularly relevant for emerging markets, where currency depreciation following rate hikes contrasts with advanced economies like the U.S. (Bolhuis et al., 2024), where monetary tightening tends to appreciate the currency. In such cases, both direct and indirect effects reinforce each other in reducing inflation. Appendices E and F confirm the robustness of these findings by replicating the results after excluding Japan and Thailand and removing overlapping monetary surprises, yielding qualitatively similar outcomes. Appendix G presents additional robustness results using the change in three-month forward discount (annualised) in a two-day window around policy announcement dates as an instrumental variable for one-year yield, and these results are qualitatively similar to the results reported here.

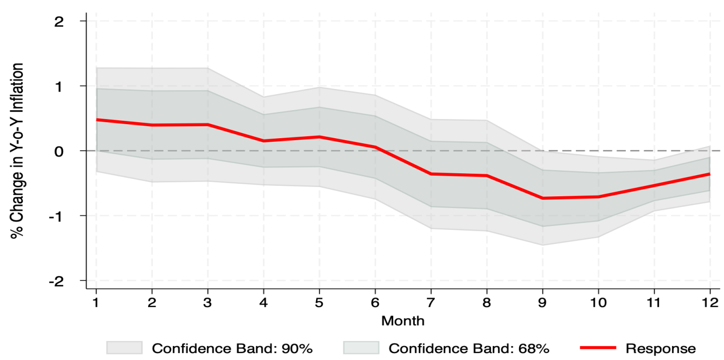


Figure 10: Red line gives response β^h from $Y_{i,t+h} = f_{i,t}\beta^h + f_{i,t} \times \text{ER}_{i,t}\theta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands, respectively, from IV estimates.

6 Concluding Remarks and Policy Implications

This paper contributes to the literature by developing a novel HFI approach for identifying monetary policy shocks in eight Asian economies- three advanced and five emerging. Our approach is based on covered interest parity (CIP), which implies that a country with higher interest rates relative to the U.S. should experience currency depreciation, reflected in a higher forward discount. Assuming that U.S. interest rates and factors driving deviations from CIP remain constant in the two day window around monetary policy announcements in these economies, we interpret the change in forward discount in this window as a market-based measure of unexpected monetary policy tightening or easing as these reflects the change in the interest rate in these economies only. We show that the two crucial assumptions- stability of the US interest rate and factors affecting deviation from uncovered interest rate parity in the two-day window- required for this measure to be informative, monetary surprises are valid in the data. Further, we show that the monetary surprises based on forward discount in these countries are credible measures of true monetary surprises and are comparable to existing high-frequency monetary surprises from the US, UK, and India.

We find that Monetary policy surprises in these economies cause a persistent upward shift in all interest rates, including monetary policy rates, and particularly at the short end of the yield curve. However, in contrast to the predictions of the information effect (Jarocinski and Karadi, 2020), equity markets respond negatively to these surprises. This is expected as we use lags of a large number of variables, including monetary surprises, as the control variable in the local projection regressions to tease out any potential role of central bank information effects. We find that the exchange rate depreciates in these economies due to monetary tightening, unlike the evidence from advanced economies. The exchange rate depreciation is broad-based, affecting both nominal and real effective exchange rates. We find that interest rate tightening leads to higher inflation and an insignificant but positive effect on industrial growth. We show that these inflationary effects of interest rate are driven by the indirect effect of interest rate through exchange rate depreciation. This suggests that the price puzzle observed in the literature could be due to the indirect effect of interest rate through exchange rate, a mechanism often overlooked in existing studies. This channel is particularly relevant in emerging markets, where monetary tightening tends to weaken the currency, unlike in advanced economies such as the U.S. (Bolhuis et al., 2024), where it typically leads to appreciation. These findings highlight the complex trade-offs faced by central banks in emerging markets when using interest rate policy for inflation control.

References

[1] Acosta, M., Brennan, C.M. and Jacobson, M.M., 2024. Constructing high-frequency monetary policy surprises from SOFR futures. Economics Letters, 242, p.111873.

[2] Alberola, E., Cantu, C., Cavallino, P. and Mirkov, N., 2021. Fiscal regimes and the exchange rate. Bank for International Settlements, Monetary and Economic Department.

[3] Avdjiev, S., Du, W., Koch, C. and Shin, H.S., 2019. The dollar, bank leverage, and deviations from covered interest parity. American Economic Review: Insights, 1(2), pp.193-208.

[4] Altavilla, C., Brugnolini, L., Gurkaynak, R.S., Motto, R. and Ragusa, G., 2019. Measuring euro area monetary policy. Journal of Monetary Economics, 108, pp.162-179.

[5] Amiti, M., Itskhoki, O. and Konings, J., 2014. Importers, exporters, and exchange rate disconnect. American Economic Review, 104(7), pp.1942-1978.

[6] Andrade, P. and Ferroni, F., 2021. Delphic and odyssean monetary policy shocks: Evidence from the euro area. Journal of Monetary Economics, 117, pp.816-832.

[7] Aruoba, S.B., Fernandez, A., Guzman, D., Pasten, E. and Saffie, F., 2021. Monetary policy surprises in chile: Measurement & real effects. Banco Central de Chile..

[8] Avdjiev, S., Du, W., Koch, C. and Shin, H.S., 2019. The dollar, bank leverage, and deviations from covered interest parity. American Economic Review: Insights, 1(2), pp.193-208.

[9] Baba, N., Packer, F. and Nagano, T., 2008. The spillover of money market turbulence to FX swap and cross-currency swap markets.

[10] Bauer, M.D. and Swanson, E.T., 2023. An alternative explanation for the "fed information effect". American Economic Review, 113(3), pp.664-700.

[11] Bolhuis, Marijn A., Sonali Das, and Bella Yao. "A New Dataset of High-Frequency Monetary Policy Shocks." (2024).

[12] Borio, C.E., McCauley, R.N., McGuire, P. and Sushko, V., 2016. Covered interest parity lost: understanding the cross-currency basis. BIS Quarterly Review September.

[13] Braun, R., Miranda-Agrippino, S. and Saha, T., 2025. Measuring monetary policy in the UK: The UK monetary policy event-study database. Journal of Monetary Economics, 149, p.103645.

[14] Brennan, C.M., Jacobson, M.M., Matthes, C. and Walker, T.B., 2024. Monetary Policy Shocks: Data or Methods? (No. 2024-011). Board of Governors of the Federal Reserve System (US).

[15] Bu, C., Rogers, J. and Wu, W., 2021. A unified measure of Fed monetary policy shocks. Journal of Monetary Economics, 118, pp.331-349.

[16] Burstein, A. and Gopinath, G., 2014. International prices and exchange rates. In Handbook of international economics (Vol. 4, pp. 391-451). Elsevier.

[17] Checo, Ariadne, Francesco Grigoli, and Damiano Sandri. Monetary policy transmission in emerging markets: proverbial concerns, novel evidence. No. 2024/093. International Monetary Fund, 2024.

[18] Cloyne, J., Jorda, O. and Taylor, A.M., 2023. State-dependent local projections: Understanding impulse response heterogeneity (No. w30971). National Bureau of Economic Research.

[19] Dao, M. and Gourinchas, P.O., 2025. Covered Interest Parity in Emerging Markets: Measurement and Drivers (No. 2025/057). International Monetary Fund.

[20] De Leo, P., Gopinath, G. and Kalemli-Ozcan, S., 2024. Monetary Policy and the Short-Rate Disconnect in Emerging Economies.

[21] Du, W. and Schreger, J., 2022. CIP deviations, the dollar, and frictions in international capital markets. In Handbook of International Economics (Vol. 6, pp. 147-197). Elsevier.

[22] Dornbusch, R., 1976. Expectations and exchange rate dynamics. Journal of political Economy, 84(6), pp.1161-1176.

[23] 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), pp.975-1009.

[24] Engel, C. and Wu, S.P.Y., 2023. Liquidity and exchange rates: An empirical investigation. The Review of Economic Studies, 90(5), pp.2395-2438.

[25] Gertler, M. and Karadi, P., 2015. Monetary policy surprises, credit costs, and economic activity. American Economic Journal: Macroeconomics, 7(1), pp.44-76.

[26] Gurkaynak, R., Sack, B. and Swanson, E., 2005. Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements. International Journal of Central Banking, 1(1).

[27] Hnatkovska, V., Lahiri, A. and Vegh, C.A., 2016. The exchange rate response to monetary policy innovations. American Economic Journal: Macroeconomics, 8(2), pp.137-181.

[28] Jarocinski, M. and Karadi, P., 2020. Deconstructing monetary policy surprises-the role of information shocks. American Economic Journal: Macroeconomics, 12(2), pp.1-43.

[29] Jarocinski, M., 2024. Estimating the Fed's unconventional policy shocks. Journal of Monetary Economics, 144, p.103548.

[30] Jiang, Z., Krishnamurthy, A. and Lustig, H., 2021. Foreign safe asset demand and the dollar exchange rate. The Journal of Finance, 76(3), pp.1049-1089.

[31] Jorda, O., 2005. Estimation and inference of impulse responses by local projections. American economic review, 95(1), pp.161-182.

[32] Kim, S. and Roubini, N., 2000. Exchange rate anomalies in the industrial countries: A solution with a structural VAR approach. Journal of Monetary economics, 45(3), pp.561-586.

[33] Kohlscheen, E., 2014. The impact of monetary policy on the exchange rate: A high frequency exchange rate puzzle in emerging economies. Journal of International Money and Finance, 44, pp.69-96.

[34] Kuttner, K.N., 2001. Monetary policy surprises and interest rates: Evidence from the Fed funds futures market. Journal of monetary economics, 47(3), pp.523-544.

[35] Lakdawala, A. and Sengupta, R., 2024. Measuring monetary policy shocks in emerging economies: Evidence from India. Journal of Money, Credit and Banking.

[36] Miranda-Agrippino, S. and Ricco, G., 2021. The transmission of monetary policy shocks. American Economic Journal: Macroeconomics, 13(3), pp.74-107.

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

[38] Schmitt-Grohe, S. and Uribe, M., 2022. The effects of permanent monetary shocks on exchange rates and uncovered interest rate differentials. Journal of International Economics, 135, p.103560.

[39] Stock, J.H. and Watson, M.W., 2018. Identification and estimation of dynamic causal effects in macroeconomics using external instruments. The Economic Journal, 128(610), pp.917-948.

[40] Swanson, E.T., 2023, May. The importance of fed chair speeches as a monetary policy tool. In AEA papers and proceedings (Vol. 113, pp. 394-400). 2014 Broadway, Suite 305, Nashville, TN 37203: American Economic Association.

[41] Swanson, E.T., 2021. Measuring the effects of federal reserve forward guidance and asset purchases on financial markets. Journal of Monetary Economics, 118, pp.32-53.

[42] Witheridge, W., 2024. Monetary Policy and Fiscal-led Inflation in Emerging Markets. JMP NYU University.

Appendix

A Data

A.1 Monetary Policy Meeting Dates

- Japan, Korea, Thailand, India https://github.com/henryrweiland/Central-Bank-Meeting-Da tab=readme-ov-file
- Singapore: https://www.mas.gov.sg/news?content_type=Monetary%20Policy%20Statements
- Indonesia https://www.bi.go.id/en/publikasi/laporan/Pages/mpr_0207.aspx
- Philippines: https://www.bsp.gov.ph/Pages/PriceStability/ScheduleOfMeetingsOfTheAdv aspx
- Malaysia:https://www.bnm.gov.my/monetary-stability/mpc-meetings/-/tag/mpc-2025

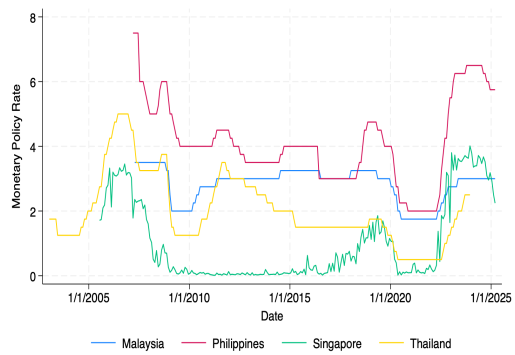
A.2 US and UK Monetary Surprises

Table A.1: US Data

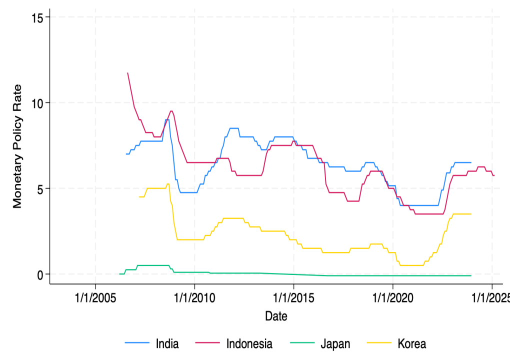
Variable	Start	End
USD Forward Discount EUR	01/05/1995	01/01/2024
USD Forward Discount CHF	01/05/1995	01/01/2024
USD Forward Discount JPY	01/05/1995	01/01/2024
USD Forward Discount GBP	01/05/1995	01/01/2024
Gurkaynak, Sack & Swanson: Target	01/05/1995	01/01/2024
Gurkaynak, Sack & Swanson: Path	01/05/1995	01/01/2024
Jarocinski: Target	01/05/1995	01/01/2024
Jarocinski: Odyssean forward guidance	01/05/1995	01/01/2024
Jarocinski: LSAP	01/05/1995	01/01/2024
Jarocinski: Delphic forward guidance	01/05/1995	01/01/2024
Bu, Rogers, & Wu	01/05/1995	01/09/2023
Nakamura & Steinsson	01/05/1995	01/01/2024
Jarocinski & Karadi	01/07/1995	01/12/2016
Braun, Miranda-Agrippino, & Saha	06/06/1997	06/02/2015 height

Notes: The USD forward discount is calculated using spot and forward rates obtained from LSEG. The LSEG codes for these are TDEURSP; TDCHFSP; TDJPYSP; TDGBPSP; TDEUR1Y; TDCHF1Y; TDJPY1Y; TDGBP1Y.

B Country-Specific Variables and Corresponding Sample Periods



(a) Monetary Policy Rates



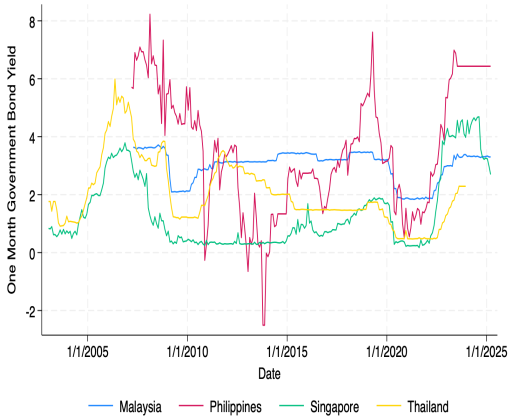
(b) Monetary Policy Rates

Figure B.1: Monetary Policy Rates.

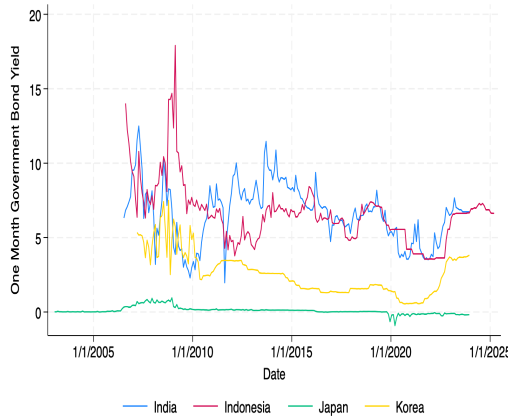
Table B.1: Monetary Policy Rate (MPR)

Country	Start	End
Indonesia	01/08/2006	01/02/2025
India	01/07/2006	01/12/2023
Japan	01/03/2006	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/07/2005	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: Monetary policy rates for all countries except Singapore have been obtained from BIS. For Singapore, the MPR has been obtained from LSEG (SPSORA). For Singapore, we do not have a policy rate. Since 1981, Singapore's monetary policy has been centered on the exchange rate. MAS manages the Singapore dollar against a basket of currencies of Singapore's major trading partners and maintains it within an undisclosed target band. SORE is the volume-weighted average rate of borrowing transactions in the unsecured overnight interbank SGD cash market in Singapore between 8 am and 6.15 pm.



(a) One Month Yield on Government Bond



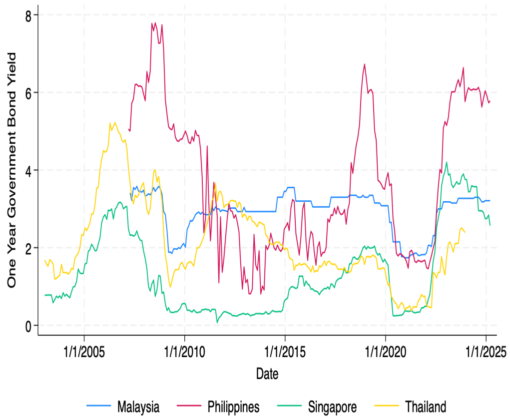
(b) One Month Yield on Government Bond

Figure B.2: One Month Zero Coupon Yield on Government Bonds.

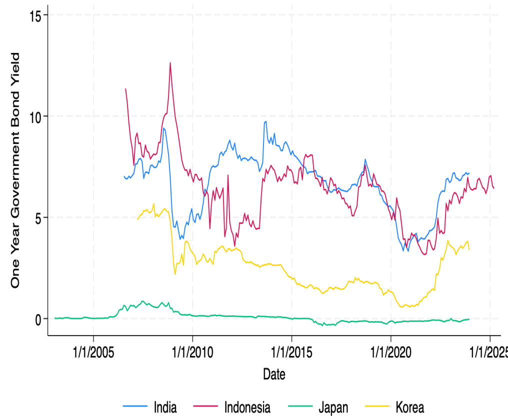
Table B.2: One Month Zero Coupon Yield

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: One-month zero coupon yield for respective country obtained from LSEG. The LSEG codes for these are IDR1MZC; INR1MZC; JPY1MZC; KRW1MZC; MYR1MZC; PHP1MZC; SGD1MZC; THB1MZC.



(a) One Year Yield on Government Bond



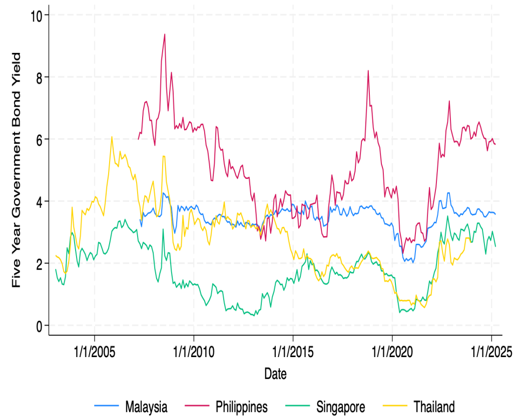
(b) One Year Yield on Government Bond

Figure B.3: One Year Yield on Government Bond.

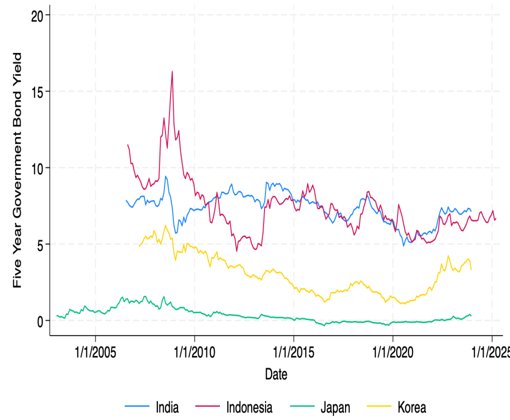
Table B.3: 1 Year Yield on Government Bond

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: One-year yield for respective country obtained from LSEG. The LSEG codes for these are TRID1YT; TRIN1YT; TRJP1YT; TRKR1YT; TRMY1YT; TRPH1YT; TRSG1YT; TRTH1YT.



(a) Five Year Yield on Government Bond



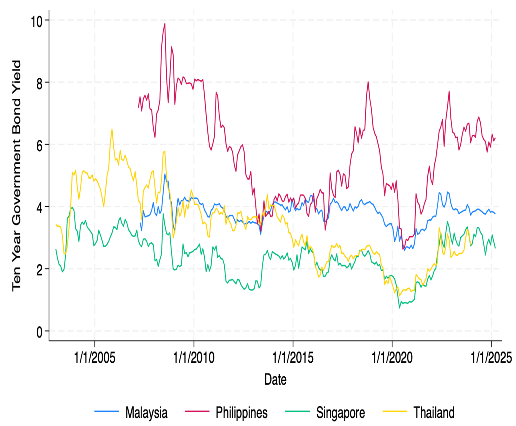
(b) Five Year Yield on Government Bond

Figure B.4: Five-Year Yield on Government Bonds.

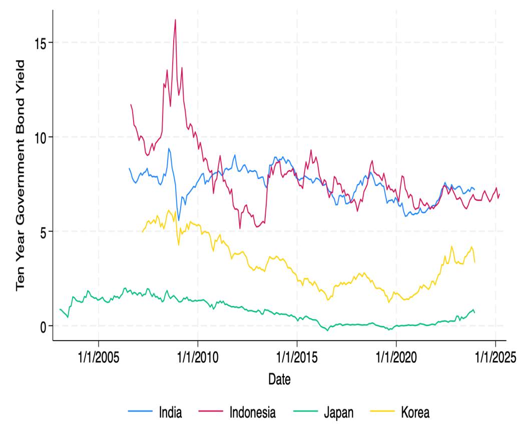
Table B.4: 5 Year Yield on Government Bond

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: Five-year yield for respective country obtained from LSEG. The LSEG codes for these are TRID5YT; TRIN5YT; TRJP5YT; TRKR5YT; TRMY5YT; TRPH5YT; TRSG5YT; TRTH5YT.



(a) Ten Year Yield on Government Bond



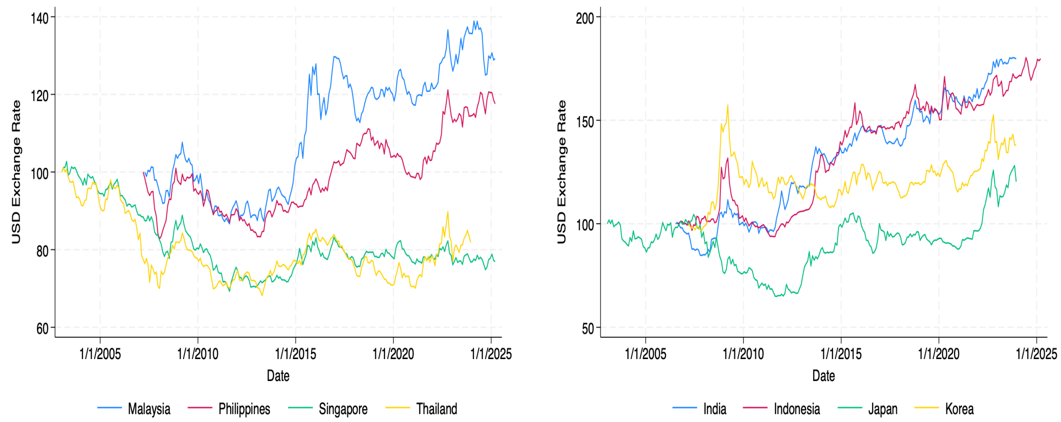
(b) Ten Year Yield on Government Bond

Figure B.5: Ten-Year Yield on Government Bonds.

Table B.5: 10 Year Yield on Government Bond

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: Ten-year yield for respective country obtained from LSEG. The LSEG codes for these are TRID10T; TRIN10T; TRJP10T; TRKR10T; TRMY10T; TRPH10T; TRSG10T; TRTH10T.



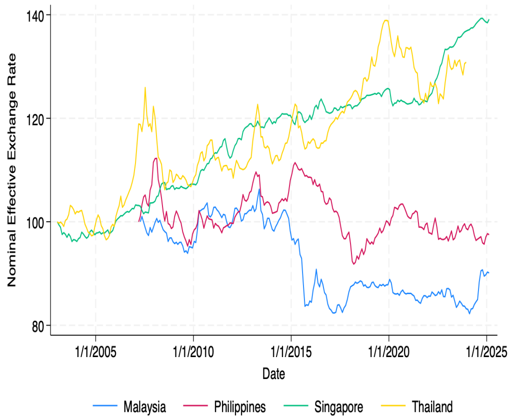
(a) USD Exchange Rates (b) USD Exchange Rates

Figure B.6: USD Exchange Rates. This is indexed to 100 for the first observation for each country.

Table B.6: USD Exchange Rate

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: Exchange rate with respect to USD for respective country obtained from LSEG. These LSEG codes are TDIDRSP; TDINRSP; TDJPYSP; TDKRWSP; TDMYRSP; TDPHPSP; TDSGDSP; TDTHBSP.



(a) Nominal Effective Exchange Rates

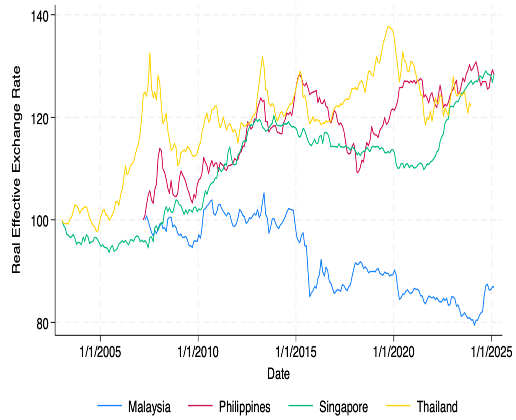
(b) Nominal Effective Exchange Rates

Figure B.7: Nominal Effective Exchange Rates. This is indexed to 100 for the first observation for each country.

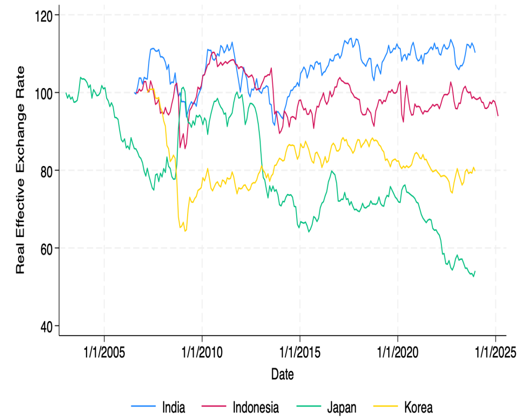
Table B.7: Nominal Effective Exchange Rate (NEER)

Country	Start	End
Indonesia	01/08/2006	01/02/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/02/2025
Philippines	01/03/2007	01/02/2025
Singapore	01/01/2003	01/02/2025
Thailand	01/01/2003	01/12/2023

Notes: Broad (64 economies) NEER obtained from BIS.



(a) Real Effective Exchange Rates



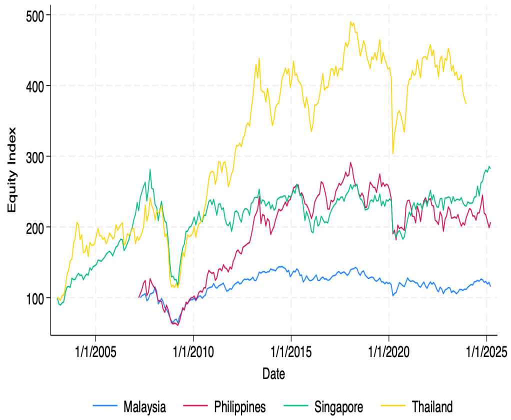
(b) Real Effective Exchange Rates

Figure B.8: Real Effective Exchange Rates. This is indexed to 100 for the first observation for each country.

Table B.8: Real Effective Exchange Rate (REER)

Country	Start	End
Indonesia	01/08/2006	01/02/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/02/2025
Philippines	01/03/2007	01/02/2025
Singapore	01/01/2003	01/02/2025
Thailand	01/01/2003	01/12/2023

Notes: Broad (64 economies) REER obtained from BIS



(a) Benchmark Equity Indices

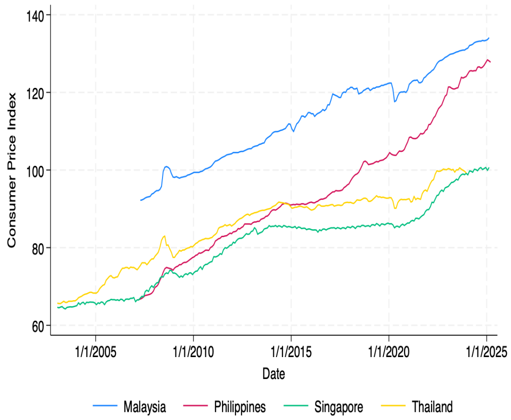
(b) Benchmark Equity Indices

Figure B.9: Benchmark Equity Indices. This is indexed to 100 for the first observation for each country.

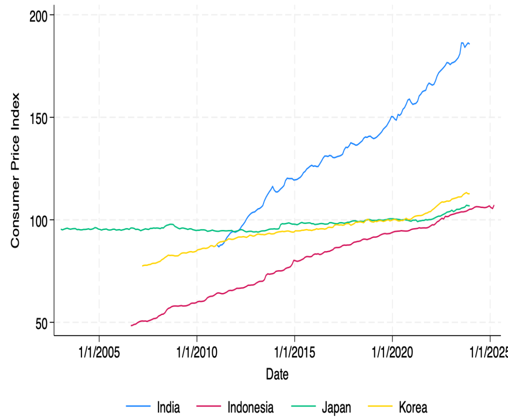
Table B.9: Equity Index

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: Benchmark index for respective country obtained from LSEG. The LSEG code for these are JAKCOMP; IBOMSEN; JAPDOWA; KORCOMP; FBMKLCI; PSECOMP; SNGPORI; BNGKSET.



(a) Consumer Price Indices



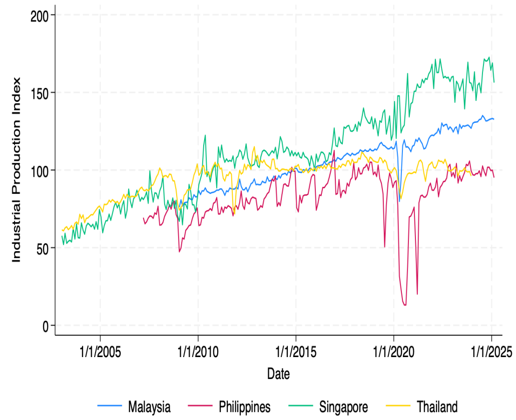
(b) Consumer Price Indices

Figure B.10: Consumer Price Indices. This is indexed to 100 for the first observation for each country.

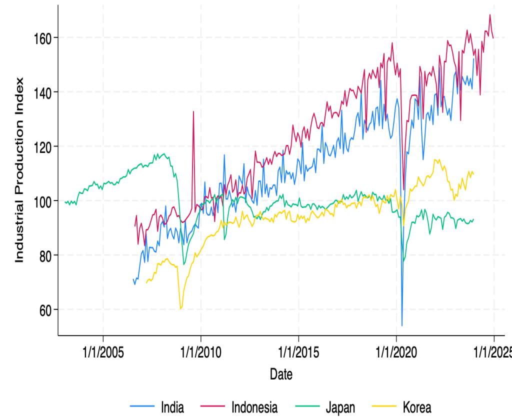
Table B.10: Consumer Price Index

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/01/2011	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/02/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/02/2025
Thailand	01/01/2003	01/12/2023

Notes: Consumer price index for respective country obtained from LSEG. The LSEG code for these are IDCONPRCF; INCONPRCF; JPCONPRCF; KOCONPRCF; MYCONPRCF; PHCONPRCF; SPCONPRCF; THCONPRCF.



(a) Indices of Industrial Production



(b) Indices of Industrial Production

Figure B.11: Indices of Industrial Production. This is indexed to 100 for the first observation for each country.

Table B.11: Index of Industrial Production

Country	Start	End
Indonesia	01/08/2006	01/12/2024
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/01/2009	01/02/2025
Philippines	01/03/2007	01/02/2025
Singapore	01/01/2003	01/02/2025
Thailand	01/01/2003	01/12/2023

Notes: Industrial production index for respective country obtained from LSEG. The LSEG code for these are IDIPTOT.H; INIPTOT.H; JPCIND..G; KOIPTOT.G; MYIPTOT.G; PHIPMAN.F; SPCIND..G; THCIND..G.

B.1 Global Control Variables

- DCOILBRENTEU Crude Oil Prices: Brent - Europe, Dollars per Barrel, Monthly, Not Seasonally Adjusted

- VIXCLS CBOE Volatility Index: VIX, Index, Monthly, Not Seasonally Adjusted

- DGS3MO Market Yield on U.S. Treasury Securities at 3-Month Constant Maturity, Quoted on an Investment Basis, Percent, Monthly, Not Seasonally Adjusted

C Results: Validity of the Identification Strategy

Table C.1: Change in Cross-Currency Basis and US interest Rate during Monetary Policy Meeting Dates

	(India) $\Delta\lambda_{t-1,t+1}$	(India) $\Delta r^{US}_{t-1,t+1}$	(Indonesia) $\Delta\lambda_{t-1,t+1}$	(Indonesia) $\Delta r^{US}_{t-1,t+1}$
MPD	0.0343	-0.244	-0.0245	-0.0645
	(0.58)	(-1.29)	(-0.44)	(-0.31)
Observations	4909	4909	4908	4908
R Square	0.000111	0.000299	0.0000240	0.0000167

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in the cross-currency basis and US interest rate in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the country c. The independent variable is the dummy variable reflecting monetary policy dates in the respective country.

Table C.2: Change in Cross-Currency Basis and US interest Rate during Monetary Policy Meeting Dates

	(Japan) $\Delta\lambda_{t-1,t+1}$	(Japan) $\Delta r^{US}_{t-1,t+1}$	(Korea) $\Delta\lambda_{t-1,t+1}$	(Korea) $\Delta r^{US}_{t-1,t+1}$
MPD	-0.00542	-0.252**	-0.0128	-0.206
	(-1.15)	(-2.41)	(-0.68)	(-1.38)
Observations	5805	5805	4717	4717
R Square	0.000281	0.000879	0.0000879	0.000400

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in the cross-currency basis and US interest rate in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the country c. The independent variable is the dummy variable reflecting monetary policy dates in the respective country.

Table C.3: Change in Cross-Currency Basis and US interest Rate during Monetary Policy Meeting Dates

	(Malaysia) $\Delta\lambda_{t-1,t+1}$	(Malaysia) $\Delta r^{US}_{t-1,t+1}$	(Philippines) $\Delta\lambda_{t-1,t+1}$	(Philippines) $\Delta r^{US}_{t-1,t+1}$
MPD	0.00879	0.0225	0.00243	-0.0240
	(1.00)	(0.15)	(0.17)	(-0.17)
Observations	4717	4717	4717	4717
R Square	0.000197	0.00000442	0.00000486	0.00000571

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in the cross-currency basis and US interest rate in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the country c. The independent variable is the dummy variable reflecting monetary policy dates in the respective country.

Table C.4: Change in Cross-Currency Basis and US interest Rate during Monetary Policy Meeting Dates

	(Singapore) $\Delta\lambda_{t-1,t+1}$	(Singapore) $\Delta r^{US}_{t-1,t+1}$	(Thailand) $\Delta\lambda_{t-1,t+1}$	(Thailand) $\Delta r^{US}_{t-1,t+1}$
MPD	0.0118	0.170	-0.0159	-0.286**
	(0.52)	(0.65)	(-0.47)	(-2.31)
Observations	5805	5805	5806	5806
R Square	0.0000963	0.0000804	0.0000578	0.000777

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in the cross-currency basis and US interest rate in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the country c. The independent variable is the dummy variable reflecting monetary policy dates in the respective country.

D Additional Results: Validity of the Identification Strategy

Table D.1: % Points Change in USD Forward Discount and Target Shock for the US from Jarocinski (2024)

	(1) % Points Change: EUR	(2) % Points Change: CHF	(3) % Points Change: GBP	(4) % Points Change: JPY
Jarocinski: Target	0.555***	0.453***	0.396***	0.784***
	(4.94)	(3.56)	(3.64)	(6.18)
Observations	230	230	230	230
R Square	0.0966	0.0527	0.0548	0.144

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the % point change in the one-year forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the target shock for the US from Jarocinski (2024).

Table D.2: % Points Change in USD Forward Discount and Jarocinski (2024) Odyssean Forward Guidance Shock

	(1) % Points Change: EUR	(2) % Points Change: CHF	(3) % Points Change: GBP	(4) % Points Change: JPY
Jarocinski: Odyssean Forward Guidance	0.587***	0.678***	0.600***	0.776***
	(4.87)	(5.11)	(5.30)	(5.65)
Observations	230	230	230	230
R Square	0.0942	0.103	0.110	0.123

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the % point change in the one-year forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the Odyssean forward guidance shock for the US from Jarocinski (2024).

Table D.3: % Points Change in USD Forward Discount and Jarocinski (2024) LSAP Shock

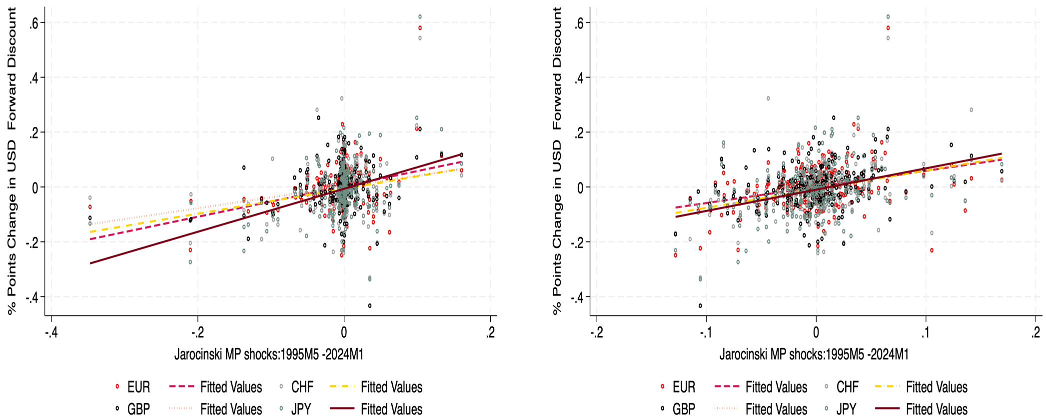
	(1) % Points Change: EUR	(2) % Points Change: CHF	(3) % Points Change: GBP	(4) % Points Change: JPY
Jarocinski: LSAP	0.337*	0.300	0.221	0.331
	(1.73)	(1.39)	(1.19)	(1.47)
Observations	230	230	230	230
R Square	0.0130	0.00845	0.00621	0.00934

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the % point change in the one-year forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the LSAP shock for the US from Jarocinski (2024)

Table D.4: % Points Change in USD Forward Discount and Jarocinski (2024) Delphic Forward Guidance Shock

	(1) % Points Change: EUR	(2) % Points Change: CHF	(3) % Points Change: GBP	(4) % Points Change: JPY
Jarocinski: Delphic Forward Guidance	-0.181	-0.167	-0.0198	-0.306
	(-0.58)	(-0.48)	(-0.07)	(-0.84)
Observations	230	230	230	230
R Square	0.00147	0.00103	0.0000195	0.00312

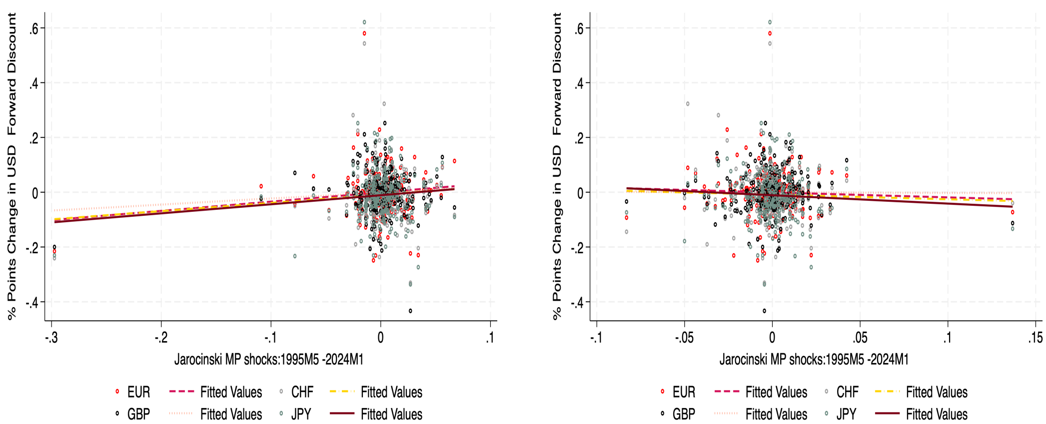
Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the % point change in the one-year forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the Delphic forward guidance shock for the US from Jarocinski (2024).



(a) Jarocinski (2024) Target Shock

(b) Jarocinski (2024) Odyssean Forward Guidance Shock

Figure D.1: The y-axis represents % point change in the forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t). The x-axis represents Jarocinski's (2024) shocks.



(a) Jarocinski (2024) LSAP Shock

(b) Jarocinski (2024) Delphic Forward Guidance Shock

Figure D.2: The y-axis represents % point change in the forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t). The x-axis represents Jarocinski's (2024) shocks.

Table D.5: % Points Change in USD Forward Discount and Gurkaynak, Sack & Swanson (2005) Target Shock

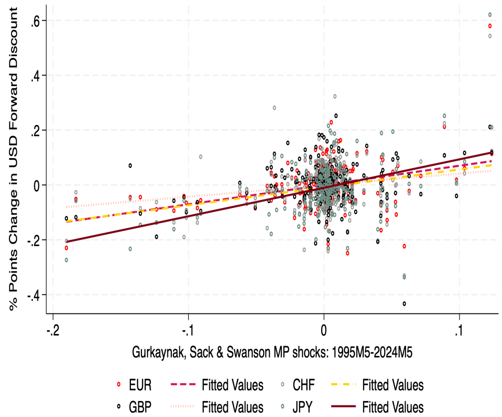
	(1)	(2)	(3)	(4)
	% Points Change: EUR	% Points Change: CHF	% Points Change: GBP	% Points Change: JPY
Gurkaynak, Sack & Swanson: Target	0.704***	0.652***	0.422***	1.037***
	(5.14)	(4.23)	(3.15)	(6.79)
Observations	230	230	230	230
R Square	0.104	0.0728	0.0416	0.168

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the target shock for the US from Gurkaynak, Sack & Swanson (2005). The Gurkaynak, Sack & Swanson (2005) shocks are updated by Acosta (2024).

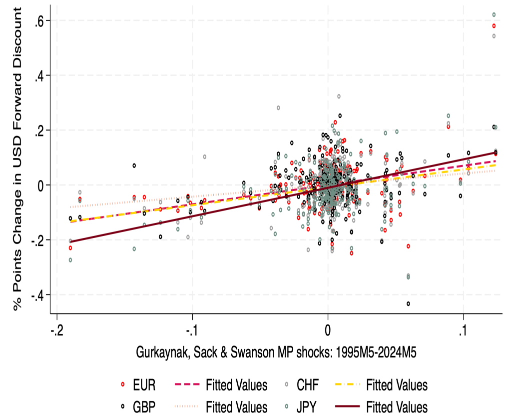
Table D.6: % Points Change in USD Forward Discount and Gurkaynak, Sack & Swanson (2005) Path Shock

	(1)	(2)	(3)	(4)
	% Points Change: EUR	% Points Change: CHF	% Points Change: GBP	% Points Change: JPY
Gurkaynak, Sack & Swanson: Path	0.172***	0.231***	0.212***	0.242***
	(3.21)	(3.96)	(4.25)	(3.96)
Observations	230	230	230	230
R Square	0.0433	0.0644	0.0733	0.0644

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the path shock for the US from Gurkaynak, Sack & Swanson (2005). The Gurkaynak, Sack & Swanson (2005) shocks are updated by Acosta (2024).



(a) Gurkaynak, Sack & Swanson (2005) Target Shock



(b) Gurkaynak, Sack & Swanson (2005) Path Shock

Figure D.3: The y-axis represents % point change in the forward discount on USD in a two-day window (t-1,t+1) around monetary policy announcement on the day (t). The x-axis represents the Gurkaynak, Sack & Swanson (2005) shocks updated by Acosta (2024).

Table D.7: % Points Change in USD Forward Discount and Jarocinski & Karadi (2020) Shock

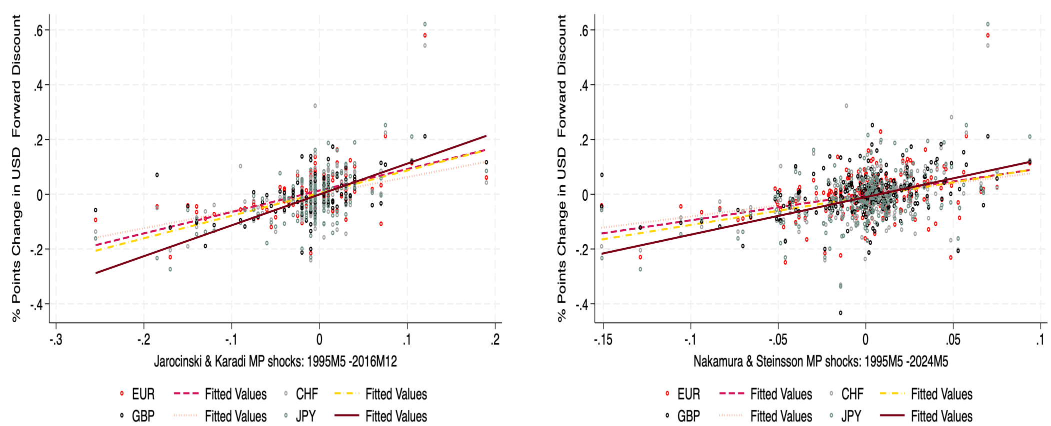
	(1) % Points Change: EUR	(2) % Points Change: CHF	(3) % Points Change: GBP	(4) % Points Change: JPY
Jarocinski & Karadi	0.783***	0.825***	0.622***	1.127***
	(6.54)	(6.12)	(6.23)	(8.22)
Observations	127	127	127	127
R Square	0.255	0.230	0.237	0.351

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the monetary policy shock for the US from Jarocinski & Karadi (2020).

Table D.8: % Points Change in USD Forward Discount and Nakamura & Steinsson (2018) Shock

	(1) % Points Change: EUR	(2) % Points Change: CHF	(3) % Points Change: GBP	(4) % Points Change: JPY
Nakamura & Steinsson	0.946***	1.037***	0.809***	1.370***
	(6.08)	(6.02)	(5.41)	(7.98)
Observations	230	230	230	230
R Square	0.139	0.137	0.114	0.218

Notes: *, **, and *** denote significance at 10%, 5%, and 1% significance levels respectively. The dependent variable is the change in forward discount on USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t) in the US. The independent variable is the monetary policy shock for the US from Nakamura & Steinsson (2018). The Nakamura & Steinsson (2018) shocks are updated by Acosta (2024).



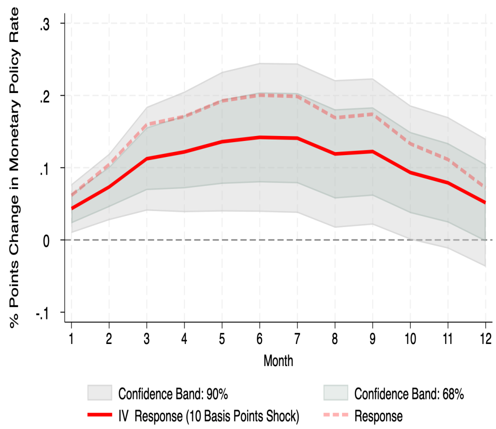
(a) Jarocinski & Karadi (2020) Shock

(b) Nakamura & Steinsson (2018) Shocks

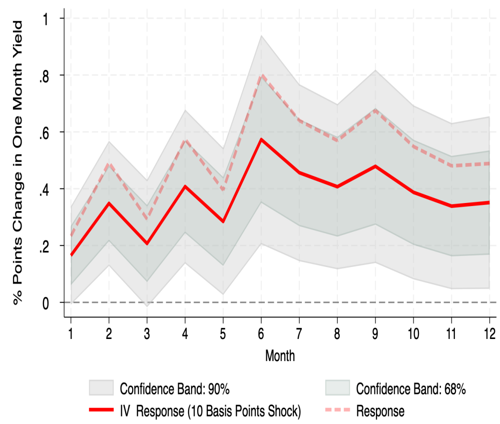
Figure D.4: The y-axis represents % point change in the forward discount on USD in a two-day window (t-1,t+1) around monetary policy announcement on the day (t). The x-axis represents the Nakamura & Steinsson (2018) shocks updated by Acosta (2022).

E Additional Results Excluding Japan and Thailand

Monetary Policy Transmission to Interest Rates

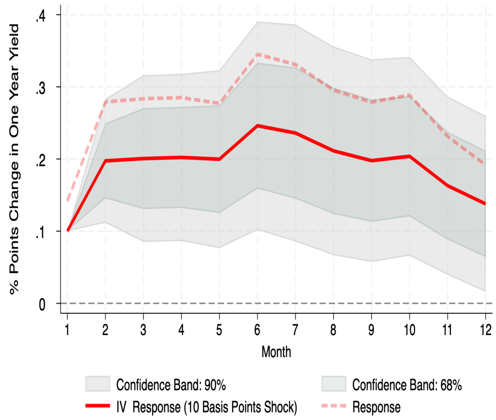


(a) Response of Monetary Policy Rate

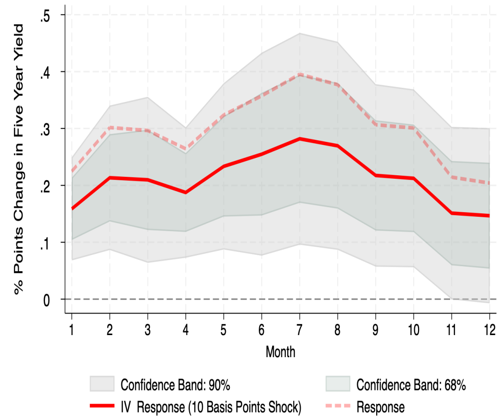


(b) Response of One Month Yield

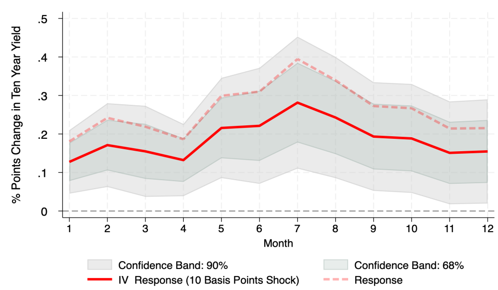
Figure E.1: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.



(a) Response of One Year Yield



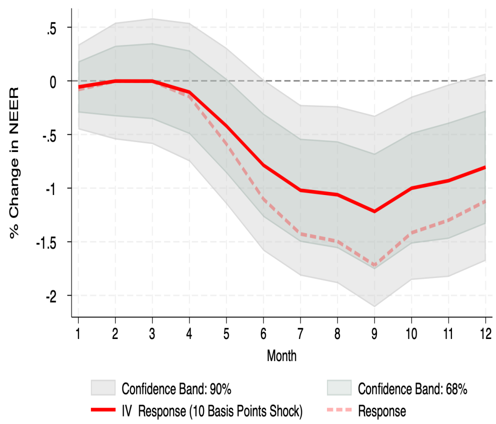
(b) Response of Five Year Yield



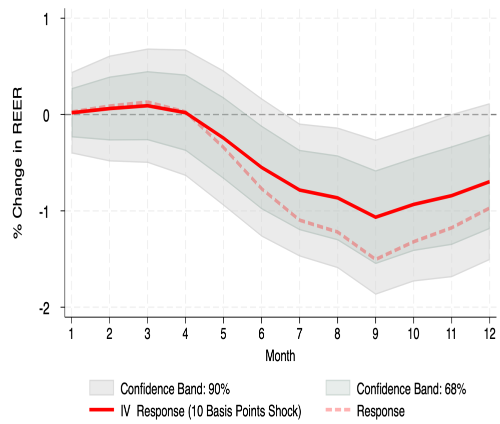
(c) Response of Ten Year Yield

Figure E.2: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

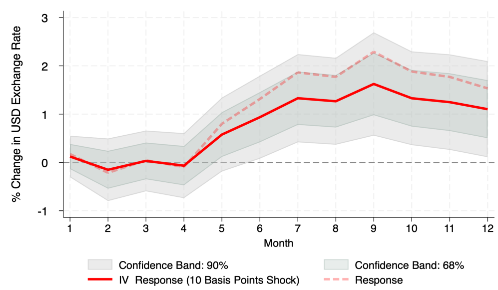
Monetary Policy Transmission to Exchange Rates



(a) Response of Nominal Effect Exchange Rate



(b) Response of Real Effect Exchange Rate



(c) Response of USD Exchange Rate

Figure E.3: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

Monetary Policy Transmission to Equity Market

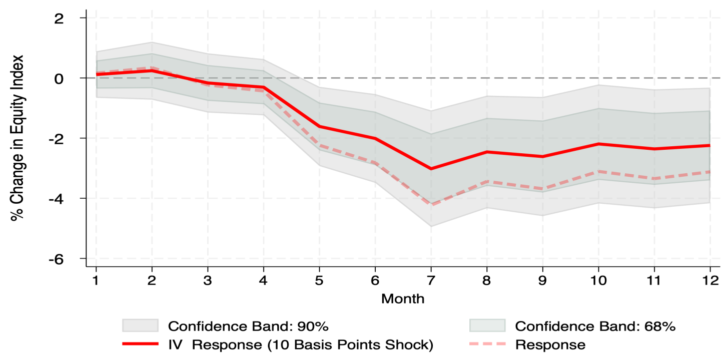
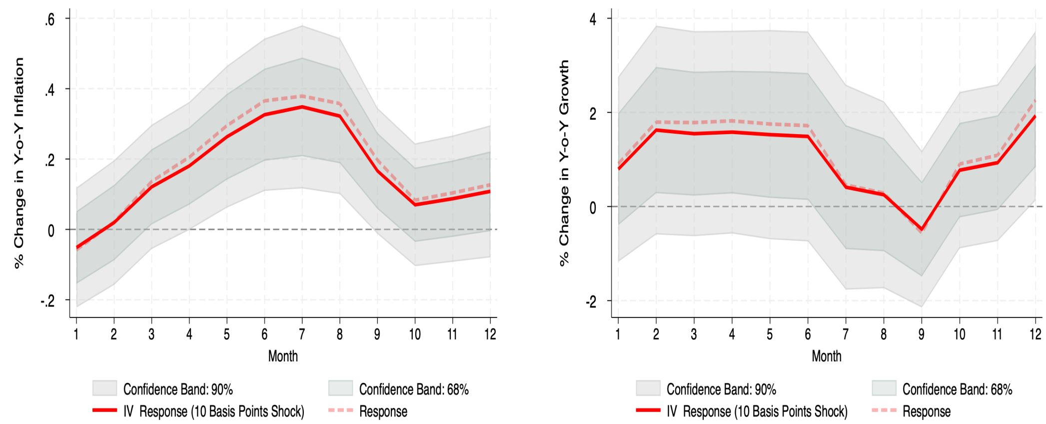


Figure E.4: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

Monetary Policy Transmission to Real Economy



(a) Response of Y-o-Y Consumer Inflation

(b) Response of Y-o-Y Output Growth

Figure E.5: Red line gives response β^h from $Y_{i,t+h} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands, respectively, from IV estimates.

Exchange Rate Pass-Through, Direct Effect of Interest Rate Shock, & Price Puzzle

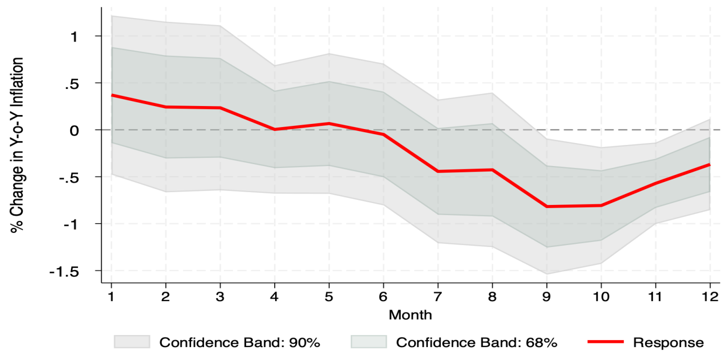
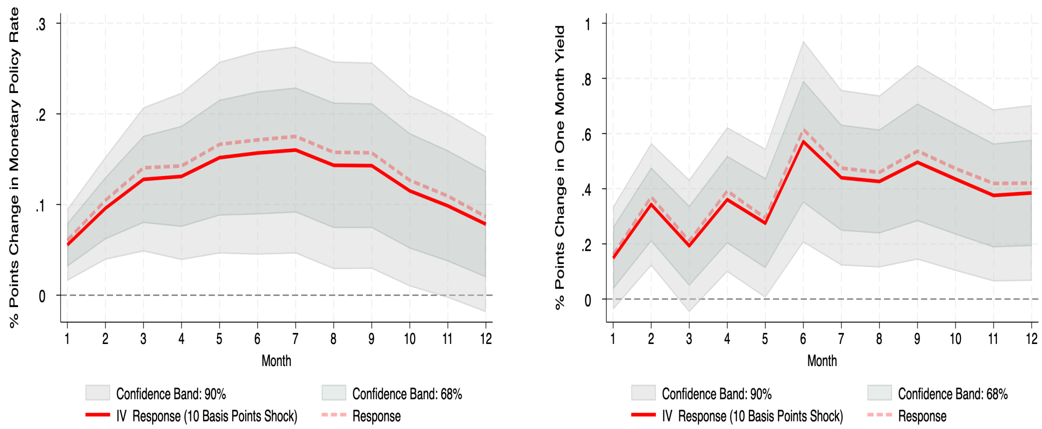


Figure E.6: Red line gives response β^h from $Y_{i,t+h} = f_{i,t}\beta^h + f_{i,t} \times \text{ER}_{i,t}\theta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively.

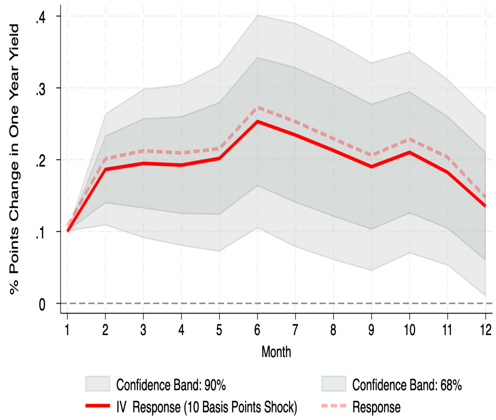
F Additional Results: Removing Overlapping Meeting Dates

Monetary Policy Transmission to Interest Rates

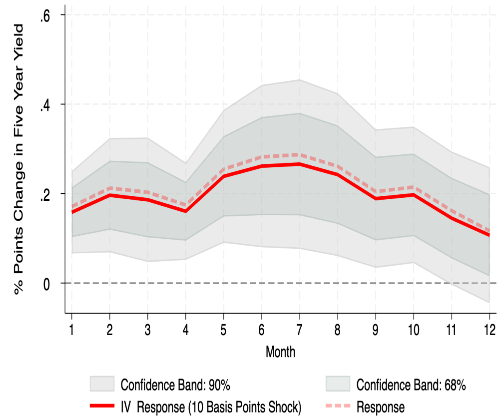


(a) Response of Monetary Policy Rate (b) Response of One Month Yield

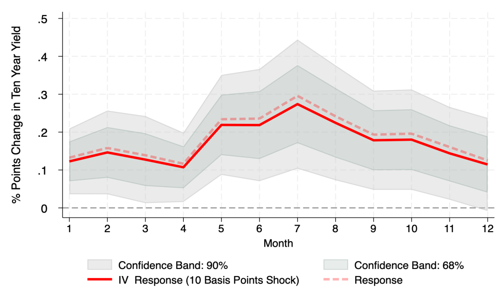
Figure F.1: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.



(a) Response of One Year Yield



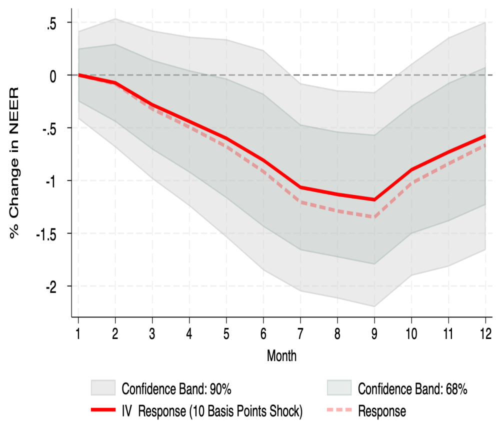
(b) Response of Five Year Yield



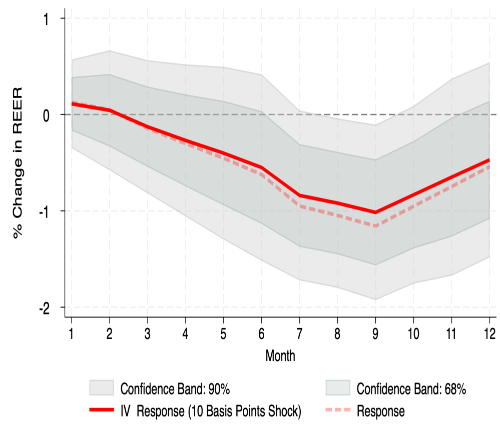
(c) Response of Ten Year Yield

Figure F.2: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

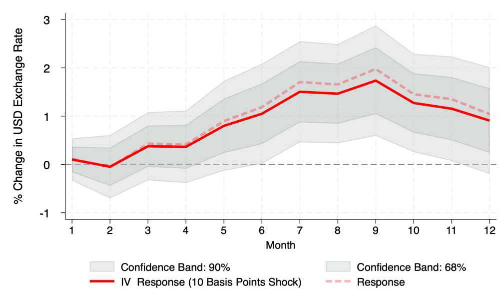
Monetary Policy Transmission to Exchange Rates



(a) Response of Nominal Effect Exchange Rate



(b) Response of Real Effect Exchange Rate



(c) Response of USD Exchange Rate

Figure F.3: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

Monetary Policy Transmission to Equity Market

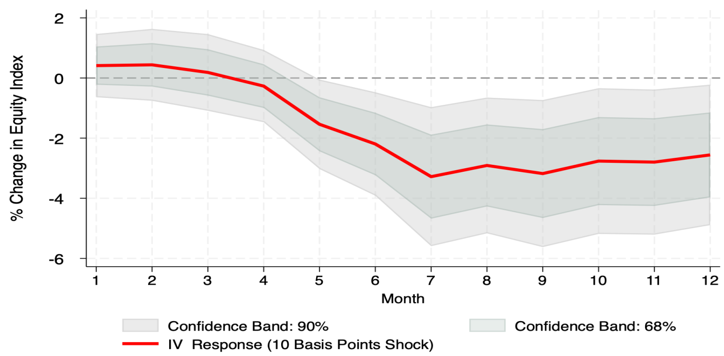
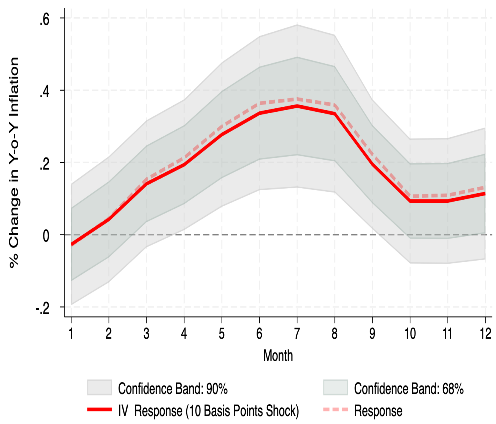
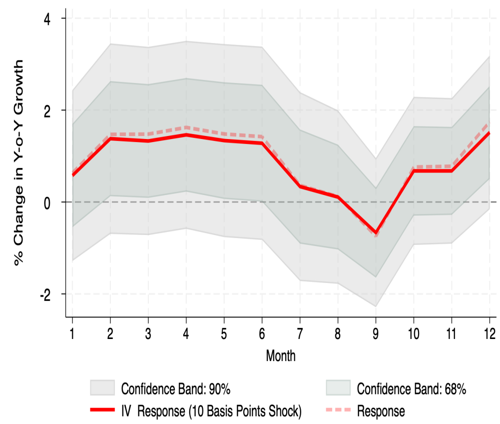


Figure F.4: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

Monetary Policy Transmission to Real Economy



(a) Response of Y-o-Y Consumer Inflation



(b) Response of Y-o-Y Output Growth

Figure F.5: Red line gives response β^h from $Y_{i,t+h} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

Exchange Rate Pass-Through, Direct Effect of Interest Rate Shock, & Price Puzzle

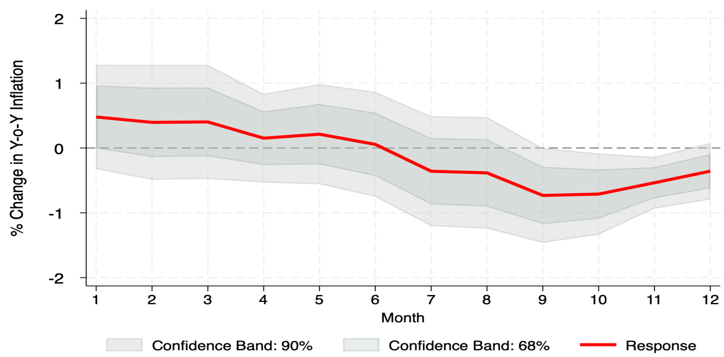
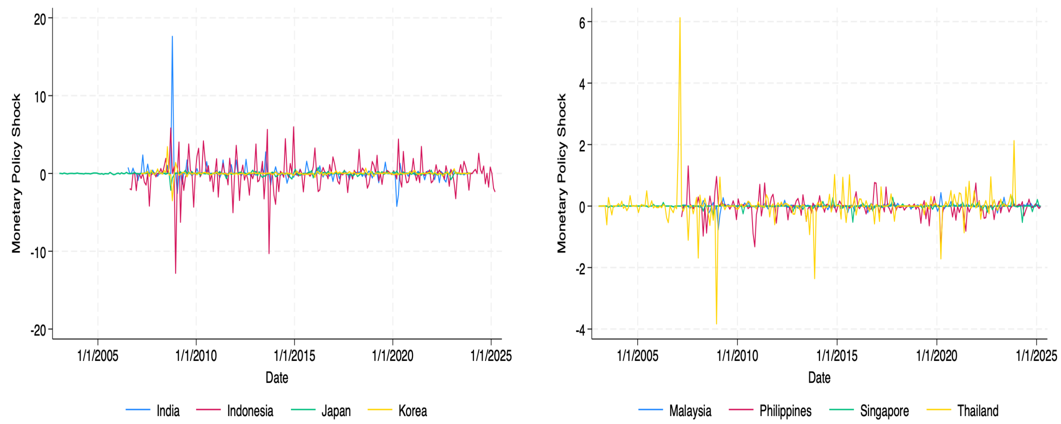


Figure F.6: Red line gives response β^h from $Y_{i,t+h} = f_{i,t}\beta^h + f_{i,t} \times \text{ER}_{i,t}\theta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively.

G Additional Results: Alternative MP Shocks



(a) Monetary Policy Shock (b) Exchange Rate Depreciation

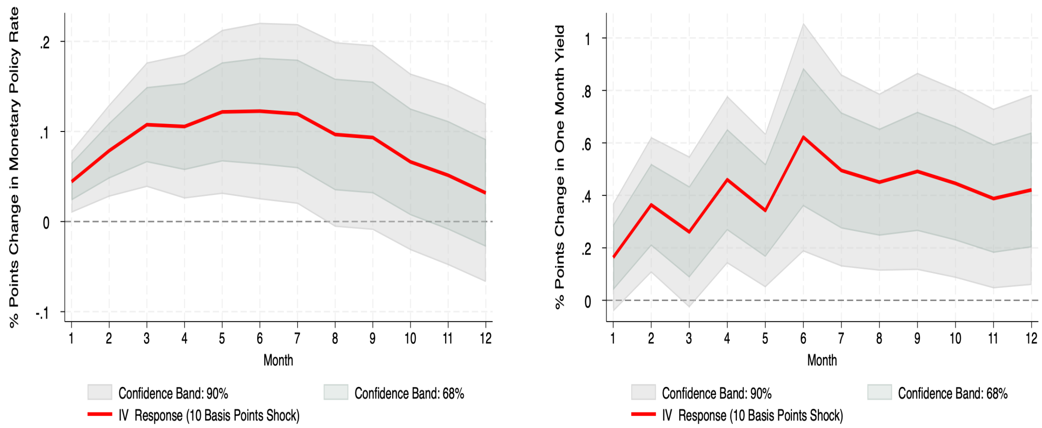
Figure G.1: Monetary policy shocks are obtained from % points different in the three-month forward discount for each currency with respect to USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t).

Table G.1: Monetary Policy Shock

Country	Start	End
Indonesia	01/08/2006	01/03/2025
India	01/07/2006	01/12/2023
Japan	01/01/2003	01/12/2023
Korea	01/03/2007	01/12/2023
Malaysia	01/04/2007	01/03/2025
Philippines	01/03/2007	01/03/2025
Singapore	01/01/2003	01/03/2025
Thailand	01/01/2003	01/12/2023

Notes: The three-month forward discount for each country with USD is calculated using spot and forward rates with respect to USD obtained from LSEG. The LSEG codes for these are TDIDRSP; TDINRSP; TDJPYSP; TDKRWSP; TDMYRSP; TDPHPSP; TDSGDSP; TDTHBSP; PDIDR3M; PDINR3M; TDJPY3M; TDKRW3M; TDMYR3M; TDPHP3M; TDSGD3M; TDTHB3M. Monetary policy shocks are obtained from % points different in the three-month forward discount for each currency with respect to USD in a two-day window (t-1,t+1) around the monetary policy announcement on the day (t).

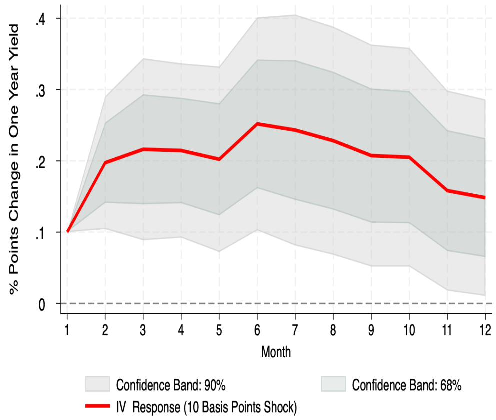
Monetary Policy Transmission to Interest Rates



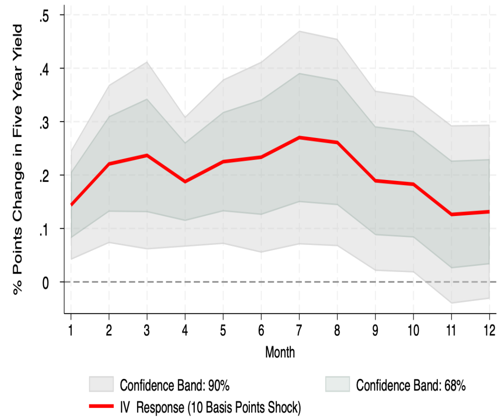
(a) Response of Monetary Policy Rate

(b) Response of One Month Yield

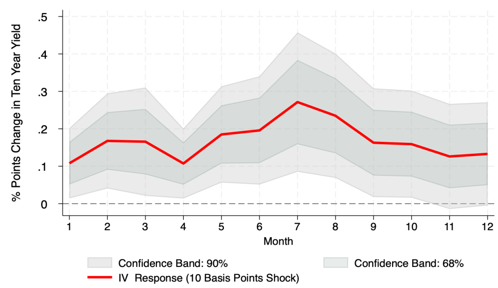
Figure G.2: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.



(a) Response of One Year Yield



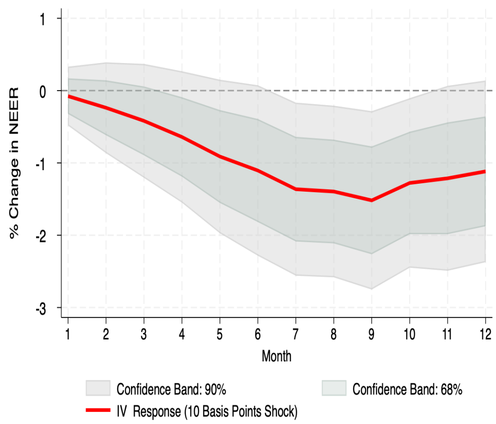
(b) Response of Five Year Yield



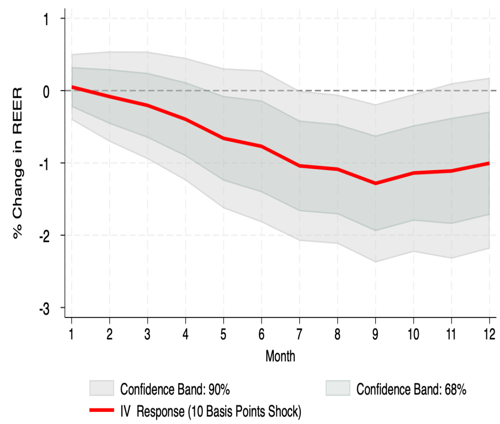
(c) Response of Ten Year Yield

Figure G.3: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

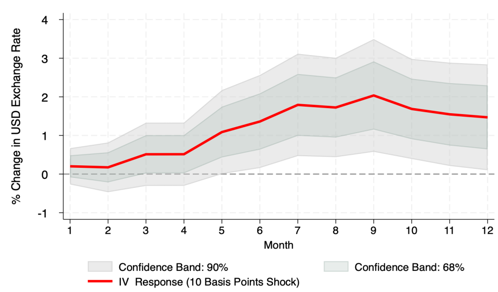
Monetary Policy Transmission to Exchange Rates



(a) Response of Nominal Effect Exchange Rate



(b) Response of Real Effect Exchange Rate



(c) Response of USD Exchange Rate

Figure G.4: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

Monetary Policy Transmission to Equity Market

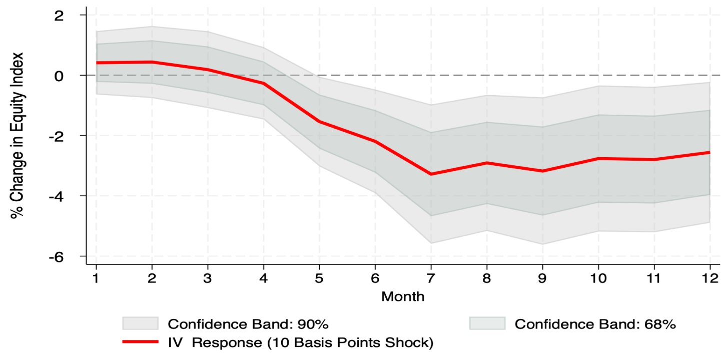
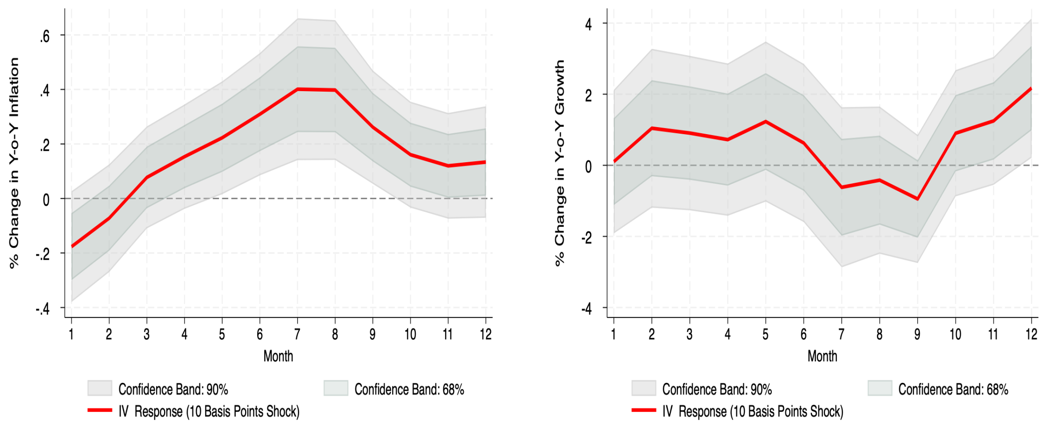


Figure G.5: Red line gives response β^h from $Y_{i,t+h} - Y_{i,t-1} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands respectively, from IV estimates.

Monetary Policy Transmission to Real Economy



(a) Response of Y-o-Y Consumer Inflation (b) Response of Y-o-Y Output Growth

Figure G.6: Red line gives response β^h from $Y_{i,t+h} = f_{i,t}\beta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands, respectively, from IV estimates.

Exchange Rate Pass-Through, Direct Effect of Interest Rate Shock, & Price Puzzle

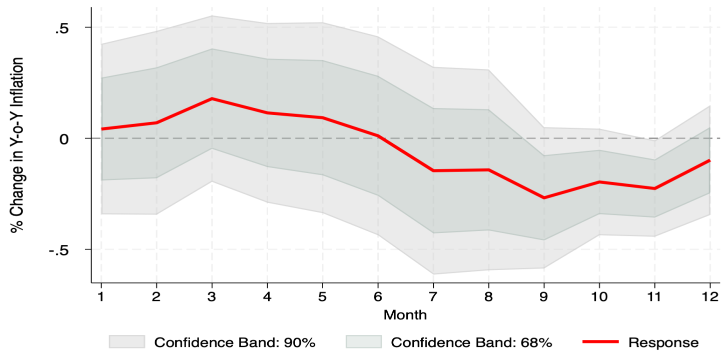


Figure G.7: Red line gives response β^h from $Y_{i,t+h} = f_{i,t}\beta^h + f_{i,t} \times \text{ER}_{i,t}\theta^h + \sum_{j=-1}^{j=-4} f_{i,t+j}\gamma_i^h + \sum_{j=-1}^{j=-4} x_{i,t+j}\delta_i^h + \sum_{j=-1}^{j=-4} z_{t+j}\phi_i^h + \mu_i^h + \mu_m^h + \mu_y^h + e_{i,t+h}$. μ_i^h, μ_m^h, and μ_y^h are country, month and year fixed effects respectively. $f_{i,t}$ is monetary policy shocks. $x_{i,t}$ includes the log of the USD exchange rate, the log of the real effective exchange rate, the log of the consumer price index, the log of the industrial production index, log of equity index, and the yield on one and ten-year government bonds, respectively. z_t includes the log of Brent crude oil price, the log of CBOE volatility index (VIX), the log of US economic policy uncertainty, and the yield on three-month US treasury. Shaded areas represent 68% and 90% confidence bands, respectively.