Dissecting the International Transmissions of U.S. Monetary Policy*

Peidi Chen† Yang Jiao‡ Wenbin Wu§

January 31, 2025

Abstract

This paper examines the international transmission of U.S. monetary policy by differentiating between expected changes and unexpected shocks. We find that both pegged and floating exchange rate regimes without capital controls respond similarly to U.S. monetary shocks, supporting the "dilemma" proposed by Rey (2015). However, floating regimes do not react to expected changes, in line with Mundell-Fleming's "trilemma." Further empirical analysis and a quantitative evaluation of a small open economy model suggest that preemptive actions by the private sector in open floating economies, in response to expected changes in U.S. monetary policy, can help explain our findings. These results have implications on the debate of international transmissions of U.S. monetary policy, particularly as the importance of the expected component of U.S. policy has likely increased.

Keywords— Monetary Policy, International Monetary Transmission, Dilemma, Trilemma

*We thank Ding Dong, Xiang Fang, Leland Farmer, Shiyang Huang, Yang Liu, Wataru Miyamoto, Binchao Shen, Andrea Vedolin, Shang-Jin Wei, Haonan Zhou, along with seminar and conference participants at the HKU, Tsinghua PBCSF, Greater Bay Area Finance Workshop 2024, International Conference of China and Development Studies 2024, MNB – FISF Workshop 2024, and NUS Macro Workshop 2024 for helpful comments.

†The University of Hong Kong; pdchen@connect.hku.hk.

‡Singapore Management University; yangjiao@smu.edu.sg.

§International School of Finance, Fudan University; wenbinwu@fudan.edu.cn.

1 Introduction

The international transmission of U.S. monetary policy is a central topic in international macroeconomics and finance. According to textbook theory, floating exchange rates enable peripheral countries to maintain monetary autonomy when the central country adjusts its monetary policy. However, Rey (2015) contends that floating exchange rate regimes without capital controls do not offer complete insulation from the global financial cycle, leading to a shift from Mundell-Fleming's "trilemma" to a "dilemma." [1]

In this paper, we revisit this issue by decomposing changes in U.S. monetary policy into market-expected and shock components to gain a deeper understanding of their international transmission mechanisms. Our analysis is driven by a recent shift in U.S. monetary policymaking: the Federal Reserve's increasing use of unconventional tools, such as forward guidance, to shape public expectations (Bernanke 2020). With the increasing (decreasing) importance of the market-expected (shock) components in U.S. policy, [2] we specifically focus on examining how peripheral countries with varying policy regimes respond to market-expected and shock components of U.S. monetary policy separately, and exploring the reasons behind their reactions.

Our findings show that peripheral countries respond differently to U.S. monetary policy shocks and the expected component. In the absence of capital controls, countries with both pegged and floating exchange rates exhibit similar reactions to the shock component, highlighting the "dilemma" described by Rey (2015). However, only countries with pegged exchange rates adjust their monetary policies in response to the market-expected component, in line with Mundell-Fleming's "trilemma." Our results suggest that the greater monetary autonomy seen in floaters without capital controls, compared to peggers, is largely driven by the expected component of U.S. monetary policy. Importantly, these findings remain robust even after (1) controlling for indicators of the global financial cycle, and (2) accounting for the information effects of U.S. monetary policy.

[1] Recent literature has also proposed alternative mechanisms that can offer a certain degree of insulation for an economy from external monetary policy shocks. See Gourinchas et al. (2022), Egorov & Mukhin (2023), among others.

[2] We find that between 1994 and 2007, the shock component accounted for 22% of the variance in U.S. monetary policy changes. However, from 2010 to 2018, this figure decreased to 11%. Further details are reported in Online Appendix C.

We further investigate why countries with floating exchange rates but without capital controls respond differently to the two components of U.S. monetary policy. Our findings reveal that the private sector in these countries adjusts preemptively to the market-expected component. On Federal Open Market Committee (FOMC) announcement days, we observe that unexpected monetary tightening results in declines in stock prices, while the expected component elicits minimal reaction, indicating that the financial market has already incorporated this information. Moreover, our analysis of aggregate country-level capital formation and firm-level fixed-asset investment reveals that investment in these countries has decreased in anticipation of future U.S. monetary tightening, a trend not observed in pegged countries without capital controls.

To illustrate this transmission channel, we employ a New Keynesian Small Open Economy (NK-SOE) model. We assume that domestic intermediate firms face working capital constraints when purchasing investment goods from abroad. In this setup, higher U.S. nominal interest rates reduce domestic investment through two main channels: (1) higher capital costs and (2) increased local currency repayments on USD-denominated loans, driven by the appreciation of the USD. As a result, when U.S. monetary policy tightens unexpectedly, the local central bank has an incentive to stabilize its exchange rate in order to reduce firms' capital adjustment costs. However, this incentive diminishes if the market has already anticipated the change in U.S. policy rates, causing firms to proactively scale back their investment and smooth out the adjustment costs. If the local central bank aligns its policy with U.S. rate changes, the advantages of such alignment diminish, while the negative effects on domestic aggregate demand through the NK channel become more significant. Consequently, central banks may be more reluctant to respond aggressively to anticipated changes in U.S. monetary policy.

We quantitatively validate the mechanisms described above by calibrating our model to a typical emerging market with floating exchange rate regime, Peru. The investment behaviors of local firms, as predicted by the model in response to expected U.S. monetary policy news shocks, align with our empirical observations. By analyzing the central bank's optimal responses to both anticipated news and unexpected shocks, we demonstrate that it may be optimal for the central bank to respond less aggressively to the expected component, while closely following shocks to

U.S. monetary policy.

Related Literature This paper is closely related to several strands of literature. The first strand examines the international transmission of U.S. monetary policy changes. Obstfeld et al. (2005), Shambaugh (2004), Klein & Shambaugh (2015), and Obstfeld et al. (2019) support the conventional view of the trilemma, which asserts that floating exchange rate regimes enable monetary autonomy. In contrast, Rey (2015) argues that floating exchange rate regimes do not provide sufficient buffers for peripheral countries. She posits a "dilemma," arguing that only capital controls, rather than floating exchange rates, can provide an adequate buffer for these economies (see also Rey 2016, Kalemli-Özcan 2019, Degasperi et al. 2020, Dées & Galesi 2021). Additionally, Han & Wei (2018) introduce the concept of a "2.5-lemma," which lies between a dilemma and a trilemma. Their findings suggest that while floating exchange rates provide some degree of monetary autonomy when the central country raises interest rates, peripheral countries often align their rates with those of the central country when it lowers its rates.

Our study is also closely related to the work of Bluedorn & Bowdler (2010), which uses the shocks identified by Romer & Romer (2004) and Kuttner (2001). They demonstrate that identified interest rate changes (i.e., monetary shocks) align more closely with the concept of the impossible trinity (i.e., the "trilemma") than with actual rate changes. Our paper differs from theirs in at least three key ways. First, we use identified shocks based on the latest literature. Second, we investigate potential underlying explanations through both aggregate and firm-level investment data. Finally, we present a quantitative model to clarify the observed patterns.

Furthermore, our paper contributes to the literature on the investment channel of monetary policy. Classic studies have shown that policy changes can impact the real economy by altering the cost of capital (e.g., Jorgenson 1963, Hall & Jorgenson 1967). A substantial body of literature extends this analysis to international contexts, where changes in local monetary policy can spill over to foreign countries and influence their investment behaviors (see, e.g., Baxter & Crucini 1993, Neumeyer & Perri 2005, De Leo et al. 2022). The most relevant work in this area is by Vicondoa (2019), who analyzes the anticipated changes in U.S. monetary policy and demonstrates that emerging markets respond by preemptively reducing investment through a Panel VAR (PVAR)

analysis. Our paper distinguishes itself by connecting real investment adjustments to monetary policy decisions in open-floating economies. Using both PVAR and firm-level data, we provide empirical evidence that the private sector in open-floating regimes adjusts its investment based on expectations of U.S. monetary policy. This preemptive investment behavior reduces the need for policy authorities to respond when anticipated changes in U.S. monetary policy materialize, leading to a degree of insulation from international monetary transmission.

Finally, our results contribute to the understanding of monetary policy transmission through expectations. The seminal work by Schmitt-Grohé & Uribe (2012) highlights that forward-looking agents adjust to anticipated changes in exogenous fundamentals before they materialize. Within the context of monetary policy transmission, the role of the expected component has been emphasized by the increasing use of forward guidance. D'Amico & King (2023) find that expectations surrounding quantitative easing have both immediate and lasting effects on the domestic business cycle. Similarly, Haddad et al. (2023) use option prices to show that expectations of increased support in adverse conditions account for a significant portion of the impact of announcements. Our paper extends this literature by demonstrating that expected changes in U.S. monetary policy can influence monetary policy decisions and business cycle dynamics in peripheral countries.

The remainder of this paper is organized as follows. Section 2 outlines our empirical strategies. Section 3 presents an analysis of the baseline results. Section 4 discusses the core mechanism underlying our empirical findings. Section 5 introduces an NK-SOE model to illustrate the trade-offs in peripheral countries' monetary policy decisions in response to different types of U.S. monetary policy adjustments. Section 6 presents the quantitative exercises. Section 7 provides robustness checks, and Section 8 concludes.

2 Empirical Strategy and Data

In this section, we outline the empirical strategy employed in this paper. Our baseline specification follows Klein & Shambaugh (2015), wherein we decompose changes in U.S. monetary policy into market-expected and shock components to investigate their transmission mechanisms.

Additionally, we explore several extensions, including the informational effects of monetary policy as described by Nakamura & Steinsson (2018) and the asymmetric responses to policy tightening and easing as discussed by Han & Wei (2018).

2.1 Empirical Model

Our analysis is built on two primary specifications. The first follows the methodology of Klein & Shambaugh (2015), which examines the co-movement of monetary policies between peripheral countries and their base countries across different policy regimes. We begin with the following equation:

$$\Delta R_{it} = \alpha + \beta \Delta R_t + \boldsymbol{\zeta} \boldsymbol{X_t} + \mu_{it}, \tag{1}$$

where R_{it} denotes the nominal short-term interest rate of peripheral country i at time t, and R_t is the nominal interest rate of the base country (the U.S.) at the same time. Here, Δ represents the first-order difference operator. $\boldsymbol{X_t}$ is the vector of control variables, among which we emphasize the percentage change in the VIX index to capture a key factor that comoves with the global financial cycle, as highlighted in Rey (2015). The term μ_{it} is the error term cluster at country level, while α is a constant.

The interest rate pass-through coefficient, β, serves as an indicator of monetary policy autonomy. In our specification, we conduct sub-sample regressions for countries with varying levels of capital controls and distinct exchange rate regimes. We anticipate different patterns for β across these sub-samples. For economies with a pegged exchange rate to the U.S. and no capital controls (open economies), we expect β to be close to 1, as these countries must adjust their interest rates in tandem with their base country to stabilize the exchange rate. Conversely, for floating regimes with capital flow restrictions, we anticipate no significant difference between the estimated β and 0. According to the "trilemma theory," peripheral countries can achieve monetary autonomy by relinquishing either a pegged exchange rate or free capital mobility, leading us to expect β values of 0 for both open-floating and closed-peg countries. The "dilemma," as discussed by Rey (2015),

refers to significant deviations from 0 of β for open-floating economies, indicating that monetary autonomy cannot be assured under floating exchange rate regimes.

In our second specification, we decompose U.S. monetary policy into two components: the monetary policy shock mps_t, which represents the pure exogenous variation in U.S. monetary policy occurring on FOMC announcement days, and the expected change in U.S. monetary policy exp_t. Specifically, we estimate

$$\Delta R_{it} = \alpha + \beta exp_t + \gamma mps_t + \boldsymbol{\zeta} \boldsymbol{X_t} + \mu_{it} \tag{2}$$

on a regime-by-regime basis. This decomposition allows us to investigate the more nuanced transmission mechanisms of U.S. monetary policy across different policy regimes.

2.2 Expected U.S. Monetary Policy Change

In this subsection, we outline the empirical strategy for identifying expected U.S. monetary policy changes and U.S. monetary policy shocks.

We measure U.S. monetary policy shocks by analyzing high-frequency variations in futures prices within a narrow time window surrounding FOMC announcements. Given that all changes in policy indicators within a 30-minute window are primarily influenced by these announcements, this method is advantageous for addressing endogeneity issues (Nakamura & Steinsson 2018).

To quantify the expected component of U.S. monetary policy change, we employ several methodologies. Our initial approach involves calculating the residual after subtracting the high-frequency shock component from the realized change in U.S. monetary policy:

$$exp_t^R = \Delta R_t - mps_t, \tag{3}$$

The underlying assumption here is that all variations in the U.S. short rate not attributable to the FOMC announcement have been anticipated by the market. One potential concern with this identification method is that the units of high-frequency shocks may not align with the changes

in the short rate[3]. To address this, we regress all shocks on changes in U.S. short-term interest rates to rescale them. The expected components thus represent those changes in U.S. monetary policy not accounted for by high-frequency shock measures.

Our second measure, based on the studies of Drechsler et al. (2017) and Vicondoa (2019), assesses market-based expectations of U.S. monetary policy changes through price changes in Fed Funds futures across different maturities. The expected U.S. monetary policy change for the current quarter is calculated at the beginning of each quarter:

$$exp_t^a = E_{t-1}i_t - E_{t-1}i_{t-1}, \tag{4}$$

where i_{t+j} represents the average Fed Funds rate for futures contracts maturing within j quarters [4]. We utilize this series of expected U.S. monetary policy changes that are associated with U.S. business cycle variables to mitigate the potential biases caused by market overreactions or underreactions.

Finally, we employ survey data to directly measure changes in expectations regarding future short rates. This is proxied by the expectations for 3-month Treasury bills derived from the Survey of Professional Forecasters (SPF) dataset (Bocola et al. 2024). The expected U.S. monetary policy change indicated by survey data is calculated as follows:

$$exp_t^{tb} = E_{t-1}tb_t - E_{t-1}tb_{t-1}, \tag{5}$$

where $E_t tb_{t+j}$ denotes the mean expectation of professional forecasters for the 3-month Treasury bill rate j quarters ahead. During the contemporaneous quarter, professional forecasters do not have access to official data and thus must formulate their projections, justifying the inclusion of the expectation operator at $E_{t-1}tb_{t-1}$.

[3]For instance, Nakamura & Steinsson (2018) rescale the shocks so that their effect on the one-year nominal Treasury yield equals one.

[4]We thank Vicondoa (2019) for providing the series up to 2017.

2.3 Monetary Policy Shocks

In our baseline analysis, we employ two established measures of U.S. monetary policy shocks from the literature. The first measure is the NS shock, as identified by Nakamura & Steinsson (2018), which is the principal component derived from changes in five asset prices around FOMC announcements. Nakamura & Steinsson (2018) estimate the NS shock series for the period from 1995 to 2014, and Acosta & Saia (2020) extend this series through the second quarter of 2019. We combine the series from both studies to enhance our sample coverage.

The second measure is the BS shock, introduced by Bauer & Swanson (2022), which focuses on the first four quarterly Eurodollar futures contracts. Shocks occurring during scheduled FOMC announcements are aggregated to a quarterly frequency and normalized in accordance with the methodology outlined by Dedola et al. (2017)[5]. The time series for both BS and NS shocks utilized in our regressions are illustrated in Figure E1.

2.4 Data

We select our sample countries as follows. Utilizing the IMF-IFS dataset, we collect money market rates to represent short-term interest rates on a quarterly basis, following the methodology of Klein & Shambaugh (2015), which captures the real short-term borrowing costs in the financial market. In instances where money market rates are unavailable for certain countries, we substitute missing values with changes in short-term Treasury bill rates.

To avoid potential bias due to small sample sizes, we exclude countries with fewer than 20 quarters of data. Additionally, we eliminate extreme interest rate fluctuations in peripheral countries[6] and any periods of discontinuous data for specific countries (Klein & Shambaugh 2015). A detailed sample coverage list is provided in the appendix. Our data spans quarterly intervals from

[5]In the literature, it is common to use monetary policy shocks as external instruments when examining their effects on quarterly variables (Gertler & Karadi 2015, English et al. 2018, Wang et al. 2022, …). However, this approach limits our ability to directly specify the impact of monetary policy shocks on the monetary policies of peripheral countries. Therefore, we do not adopt this instrumental variable approach in order to investigate the distinct roles of the expected and shock components in international transmission. Our baseline results that utilize these shock measures as instruments are included in the appendix.

[6]Following Klein & Shambaugh (2015), we exclude observations where the quarterly money market rate changes exceed 8 percent, accounting for approximately 2.6% of the samples.

1995Q1 to 2019Q2.

We focus on countries that consider the U.S. their central country, totaling 68 countries. While most European nations identify Germany as their central country, we include only Germany in our sample for European countries, consistent with Han & Wei (2018).

We also utilize Shambaugh's exchange rate classification to define different regimes within the "Peg-Floating" spectrum. Specifically, we employ the strict measure of the indicator of "Peg" from Shambaugh (2004), where a value of 1 indicates a pegged exchange rate and 0 indicates a floating regime. All classifications by Shambaugh are on an annual basis[7].

Our measure of financial openness follows the approach established by Chinn & Ito (2008), which provides annual measurements of financial openness from 1970 to 2019. We utilize the inverse of the Chinn-Ito Index as our measure of capital control, in line with Han & Wei (2018); a lower value indicates a more open financial system. Countries with an index of 0 are classified as open economies, while those with higher values are classified as closed economies. In contrast to Klein & Shambaugh (2015), we categorize those "mid-range" countries as closed economies. Consequently, "open" countries in this paper refer to regimes with minimal capital controls, as classified by Han & Wei (2018).

For robustness checks, we also explore two alternative classifications for capital control stringency and exchange rate regimes. For the openness index, we consider the classification provided by the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) as discussed in Fernández et al. (2016) from 1995 to 2019. We designate samples with a money market restriction index (mm) of 0 as open economies, while the remaining are categorized as closed economies. For the exchange rate regime, we refer to the IMF's de facto exchange rate regime classification as presented by Ilzetzki et al. (2019). We denote Classification 1 as the Peg regime, while Classifications 2-6 correspond to Floating regimes. Additional data utilized in our analysis are discussed in Section A of the Appendix.

[7]We assume that the benchmark country and exchange rate regimes for a peripheral country remain stable over the course of a year.

3 Empirical Results

This section discusses the key finding of this paper: a "trilemma" exists in the transmission of the expected components of monetary policy, while a "dilemma" characterizes the transmission of monetary policy shocks. This conclusion remains robust after accounting for the information effects of U.S. monetary policy, as well as a bunch of robustness checks.

3.1 Baseline Results

We categorize our sample into four groups: Open-peg, Open-floating, Close-peg, and Close-floating. The regression results as shown in Table 1 for each subsample are presented in accordance with (1) and (2).

Panel A of Table 1 illustrates the interest rate pass-through patterns without distinguishing between expected and unexpected changes in U.S. monetary policy. Open-peg economies show the strongest response to adjustments in U.S. interest rates. Open-floating economies also exhibit a statistically significant positive interest pass-through, even after controlling for changes in the VIX. Conversely, countries with capital controls demonstrate no response to U.S. monetary policy, regardless of their exchange rate regime. This suggests that the floating exchange rate regime only partially insulates against the effects of U.S. monetary policy, aligning with existing literature (e.g., Klein & Shambaugh 2015, Han & Wei 2018).

We then decompose U.S. short-term interest changes into monetary policy shocks and expected components, presenting the results in Panels B and C based on the shocks defined by Nakamura & Steinsson (2018) and Bauer & Swanson (2022), respectively. The expected components are measured by the realized expected change, exp_t^R, as constructed above in Section 2.2. Following this decomposition, the expected interest rate pass-throughs for Close-peg and Close-floating regimes remain largely unchanged, and the coefficients for monetary policy shocks are not statistically significant. In contrast, Open-peg countries respond significantly to both components of U.S. monetary policy with similar magnitudes.

The Open-floating regime, however, displays differing responses to the two components after

Table 1: Baseline Results

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.636***	**0.244***	0.087	-0.024
	(0.138)	**(0.129)**	(0.132)	(0.117)
ΔVIX_t	0.158	**0.547***	-0.184	0.595***
	(0.103)	**(0.272)**	(0.224)	(0.169)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.00

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.632***	**0.013**	0.096	-0.067
	(0.150)	**(0.204)**	(0.158)	(0.117)
mps_t	0.650***	**0.920*** **	0.062	0.105
	(0.164)	**(0.24)**	(0.245)	(0.204)
ΔVIX_t	0.161	**0.675** **	-0.189	0.620***
	(0.092)	**(0.298)**	(0.248)	(0.174)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.00

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.630***	**0.063**	0.090	-0.064
	(0.168)	**(0.172)**	(0.146)	(0.119)
mps_t	0.656***	**0.868*** **	0.079	0.107
	(0.176)	**(0.182)**	(0.233)	(0.181)
ΔVIX_t	0.163*	**0.686** **	-0.186	0.626***
	(0.080)	**(0.294)**	(0.248)	(0.168)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.00

Notes: Each column presents sub-sample OLS estimates for specific regimes within our full sample. The dependent variable for each regression is the quarterly change in the money market rate of peripheral countries. The independent variables vary across the three panels: in Panel A, it is the quarterly change in the U.S. money market rate; in Panels B and C, it is the expected quarterly U.S. monetary policy changes and quarterly monetary policy shocks. The percentage change of VIX is controlled in each regression. The constant term is not displayed. Standard errors clustered at the country level are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

the decomposition. In Panel A of Table 1, its simple interest pass-through is significantly lower than that of the Open-peg regime. Yet, the response of Open-floating countries to shocks is approximately 1, while estimates for the expected components are nearly zero. T-tests in Table 2 indicate a significant difference in the magnitude of expected component pass-throughs between the two regimes, but not for the shock pass-throughs.

Table 2: T-test of Baseline Results

	β^{op}	β^{of}	$\beta^{op} - \beta^{of}$	χ^2	P-value
ΔR_t	0.636***	0.244*	0.392**	4.51	0.034
NS Shock	0.632***	0.013	0.618**	6.22	0.013
BS Shock	0.630***	0.063	0.567**	5.82	0.016

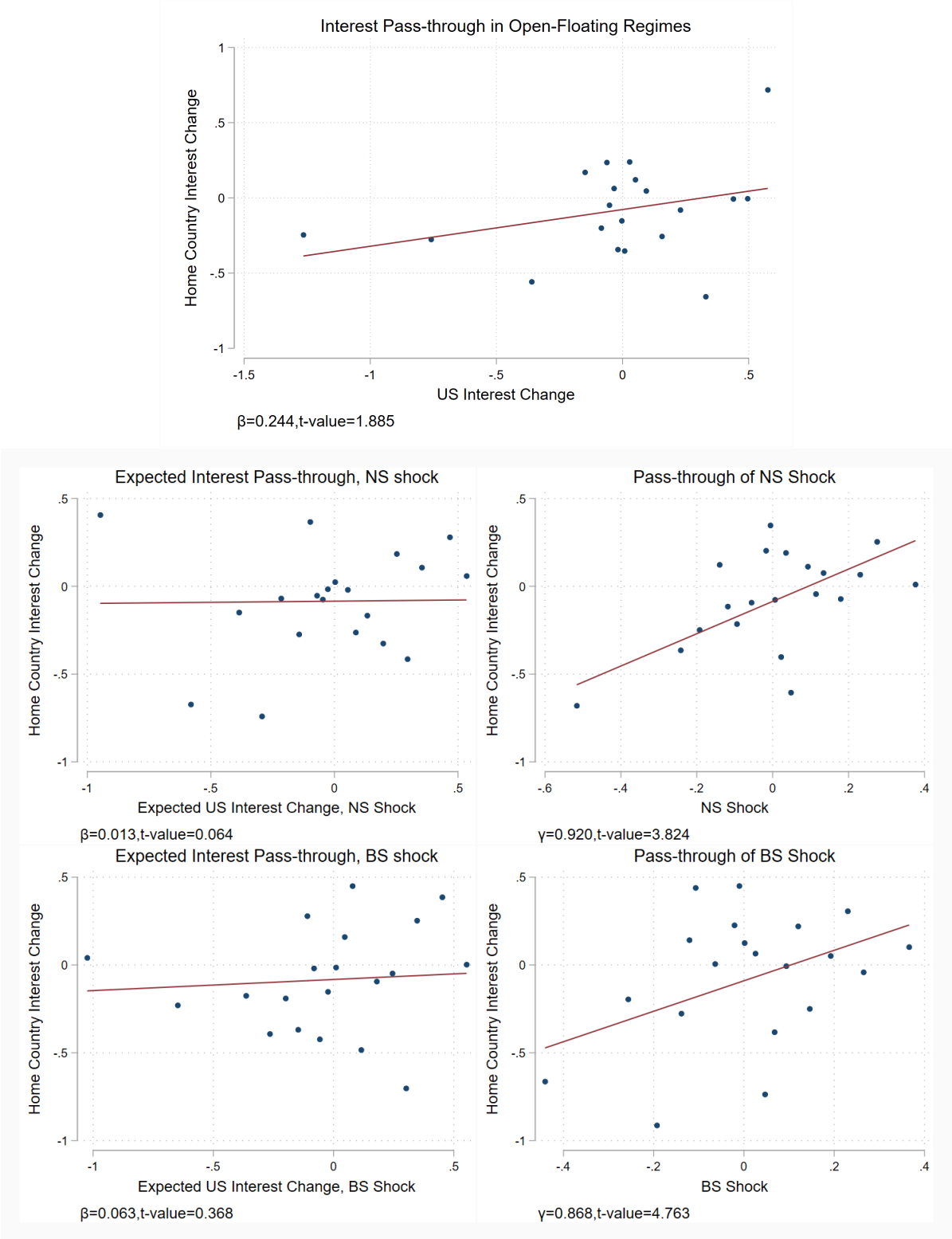
	γ^{op}	γ^{of}	$\gamma^{op} - \gamma^{of}$	χ^2	P-value
NS Shock	0.650***	0.920***	-0.270	0.89	0.345
BS Shock	0.656***	0.868***	-0.212	0.73	0.394

Notes: Each row provides the t-test for the difference in monetary policy pass-through between the Open-peg and Open-floating regimes from Table 1. *** p < 0.01, ** p < 0.05, * p < 0.1.

To illustrate our findings in a more transparent way, we visualize the above results in Fig 1 using bin-scatter plots. They show the relationship between the interest changes of peripheral countries (vertical axis) and the base country (horizontal axis) in the Open-floating regimes. All samples are placed in 20 evenly distributed bins and the mean of samples in these bins are presented in the scatter plot. The red line is the fitted linear regression. The top panel in the figure corresponds to the baseline results of Panel A in Table 1. The left column of the figure highlights the pattern of expected interest rate pass-through after controlling the monetary policy shocks. The right column emphasizes the effects of monetary policy shocks. The bin scatter plots reinforce our earlier finding of a distinct transmission pattern between expected changes and shocks in U.S. monetary policy, unaffected by extreme monetary policy adjustments[8].

In summary, our results indicate that floating regimes do not grant peripheral countries full policy autonomy concerning unexpected monetary changes from the center country, while capital

[8]Japan and Germany represent special cases among Open-floating countries, and their exclusion does not alter our findings.



Notes: This figure illustrates the relationship between interest rate changes in peripheral countries (on the vertical axis) and those in the base country (on the horizontal axis) within Open-floating regimes. The data points are organized into 20 evenly distributed bins, and the means of these samples are displayed. The red line represents the fitted linear regression.

Figure 1: Baseline Results for Open-floating Regimes

controls provide insulation from both expected monetary changes and shocks. Thus, a "trilemma" characterizes the international transmission of the expected components of U.S. monetary policy, whereas a "dilemma" pertains to shock transmission.

3.2 Alternative Measures of Expected Component

In this subsection, we expand our analysis by applying different measures of the expected change in U.S. monetary policy to reinforce the consistency of our prior findings.

Table 3 and Table 4 present results using two distinct measures for the expected change in U.S. monetary policy: one based on Fed Funds futures and the other on Survey of Professional Forecasters (SPF) data. In both cases, we find that Open-floating regimes are insulated from the expected component of U.S. monetary policy, while their pass-throughs for U.S. policy shocks remain close to 1.

Countries with an Open-peg exchange rate, under both measures, demonstrate responsiveness to both the expected components and U.S. monetary policy shocks. This reinforces our baseline specification that Open-floating regimes are shielded from the expected components of U.S. monetary policy.

3.3 The Fed Information Effect

In this subsection, we examine the relationship between our findings and the Fed's information effect. As noted by Nakamura & Steinsson (2018), announcements from the Fed can influence expectations regarding future U.S. economic fundamentals. We utilize this framework to assess whether monetary policies in peripheral countries are sensitive to the information effects of U.S. monetary policy.

Our first approach to incorporate the information effect is:

$$\Delta R_{it} = \alpha + \beta exp_t + \gamma mps_t + \boldsymbol{\psi'} \boldsymbol{\Delta E_t} + \zeta \Delta VIX_t + \mu_{it}, \tag{6}$$

where $\boldsymbol{\Delta E_t}$ is a vector to capture the information effect, defined as the change in market

Table 3: Baseline Results: Market Expected U.S. Monetary Policy Change

Panel A: Simple Interest Change in US + VIX				
	Open-Peg	**Open-Floating**	Close-Peg	Close-Floating
ΔR_t	0.636***	**0.244***	0.087	-0.024
	(0.138)	**(0.129)**	(0.132)	(0.117)
ΔVIX_t	0.158	**0.547***	-0.184	0.595***
	(0.103)	**(0.272)**	(0.224)	(0.169)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.00

Panel B: Market Expected Change + NS Shock				
	Open-Peg	**Open-Floating**	Close-Peg	Close-Floating
exp_t	0.493**	**-0.295**	0.161	-0.352*
	(0.164)	**(0.328)**	(0.225)	(0.184)
mps_t	0.480**	**1.105****	0.003	0.270
	(0.156)	**(0.372)**	(0.262)	(0.201)
ΔVIX_t	0.106	**0.775***	-0.240	0.808***
	(0.100)	**(0.374)**	(0.265)	(0.200)
N	434	**492**	1070	2333
R^2	0.08	**0.03**	0.00	0.01

Panel C: Market Expected Change + BS Shock				
	Open-Peg	**Open-Floating**	Close-Peg	Close-Floating
exp_t	0.506**	**-0.232**	0.153	-0.340*
	(0.171)	**(0.298)**	(0.225)	(0.183)
mps_t	0.495**	**1.025*****	0.045	0.251
	(0.192)	**(0.293)**	(0.245)	(0.169)
ΔVIX_t	0.125	**0.785***	-0.228	0.813***
	(0.095)	**(0.365)**	(0.263)	(0.192)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.00

Notes: Each column presents sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the market expected quarterly monetary policy change of U.S., measured by the average difference between Fed Funds futures in next quarter and contemporaneous quarter, following Vicondoa (2019); together with the monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Identify Expected Component by Survey of Professional Forecasters(SPF)

Panel A: Simple Interest Change in US + VIX				
	Open-Peg	**Open-Floating**	Close-Peg	Close-Floating
ΔR_t	0.636***	**0.244***	0.087	-0.024
	(0.138)	**(0.129)**	(0.132)	(0.117)
ΔVIX_t	0.158	**0.547***	-0.184	0.595***
	(0.103)	**(0.272)**	(0.224)	(0.169)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.00

Panel B: Expected Change by SPF + NS Shock				
	Open-Peg	**Open-Floating**	Close-Peg	Close-Floating
exp_t^{SPF}	1.128***	**-0.108**	0.446	0.629**
	(0.174)	**(0.667)**	(0.359)	(0.295)
mps_t	0.459**	**0.948****	-0.024	-0.012
	(0.166)	**(0.336)**	(0.265)	(0.198)
ΔVIX_t	0.045	**0.682***	-0.261	0.642***
	(0.077)	**(0.319)**	(0.254)	(0.168)
N	454	**508**	1100	2429
R^2	0.10	**0.02**	0.00	0.00

Panel C: Expected Change by SPF + BS Shock				
	Open-Peg	**Open-Floating**	Close-Peg	Close-Floating
exp_t^{SPF}	1.142***	**-0.048**	0.434	0.631**
	(0.198)	**(0.631)**	(0.359)	(0.297)
mps_t	0.456***	**0.887*****	0.011	-0.019
	(0.166)	**(0.267)**	(0.251)	(0.171)
ΔVIX_t	0.055	**0.689****	-0.252	0.639***
	(0.070)	**(0.312)**	(0.253)	(0.162)
N	454	**508**	1100	2429
R^2	0.10	**0.02**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the monetary policy shocks together with expected U.S. monetary policy change calculated from SPF. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

expectations for future economic fundamentals. here we incorporate the BRW information measure, which captures the monetary policy information effect as defined by Ciminelli (2020), into the regressions presented in Table 5. We also provide results using an alternative measure of the information effect—forward expectations of U.S. economic fundamentals—in Appendix Table E22.

The results in Table 5 indicate a high pass-through and statistical significance for the information shock in Open-floating regimes. Incorporating the information shock does not alter our previous conclusions regarding the impacts of U.S. monetary policy shocks and expected interest rate changes. Minor adjustments in point estimates for the shock terms suggest that monetary policies in peripheral countries are sensitive to U.S. monetary policy information, particularly in Open-floating regimes. Their lack of responsiveness to the expected component is therefore not attributable to information inertia (Illeditsch et al. 2021).

Alternatively, we address the information effect by utilizing a refined measure of monetary policy that is uncorrelated with the information effect. The corresponding regression is specified as follows:

$$\Delta R_{it} = \alpha + \beta exp_t + \gamma mps_t^* + \zeta \Delta VIX_t + \mu_{it}, \tag{7}$$

where mps_t^* denotes the information-free monetary policy shock measure. The results are displayed in Table 6, showing similar patterns to our baseline findings, with economic and statistical significance concentrated in Open-floating regimes. Notably, the pass-throughs of these shocks are larger than those of NS and BS shocks, indicating that "pure" shocks exert a greater impact on peripheral countries.

The findings above validate our baseline conclusions, demonstrating that monetary policy shocks are the primary drivers of the observed monetary dependence in Open-floating regimes, even after accounting for information effects.

Table 5: Baseline Results with Information Effect(BRW Info)

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.636***	**0.229**	0.089	-0.020
	(0.138)	**(0.139)**	(0.131)	(0.118)
ΔVIX_t	0.167*	**0.697****	-0.090	0.623***
	(0.093)	**(0.301)**	(0.198)	(0.175)
$Info_t$	0.103	**2.098****	1.082	0.384
	(0.252)	**(0.828)**	(0.655)	(0.447)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.00

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.633***	**0.0130**	0.113	-0.060
	(0.148)	**(0.205)**	(0.160)	(0.118)
mps_t	0.646***	**0.820*****	0.019	0.094
	(0.171)	**(0.224)**	(0.247)	(0.197)
ΔVIX_t	0.169*	**0.786****	-0.102	0.641***
	(0.082)	**(0.324)**	(0.220)	(0.181)
$Info_t$	0.100	**1.772****	1.109	0.332
	(0.256)	**(0.729)**	(0.684)	(0.415)
N	454	**508**	1100	2429
R^2	0.15	**0.03**	0.00	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.630***	**0.061**	0.096	-0.060
	(0.168)	**(0.177)**	(0.147)	(0.120)
mps_t	0.655***	**0.812*****	0.066	0.104
	(0.175)	**(0.172)**	(0.230)	(0.180)
ΔVIX_t	0.172**	**0.819****	-0.095	0.651***
	(0.070)	**(0.326)**	(0.222)	(0.177)
$Info_t$	0.102	**1.980****	1.085	0.366
	(0.248)	**(0.783)**	(0.660)	(0.437)
N	454	**508**	1100	2429
R^2	0.15	**0.03**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. The percentage change of VIX and the information effect of monetary policy from Bu et al. (2021) are controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Information-free Shocks

Panel A: Expected Interest Change + BRW Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.636***	**0.167**	0.126	-0.049
	(0.137)	**(0.147)**	(0.148)	(0.116)
mps_t	0.644*	**2.803****	-0.991	0.768
	(0.317)	**(1.051)**	(0.943)	(0.562)
ΔVIX_t	0.158	**0.360**	-0.092	0.536***
	(0.114)	**(0.236)**	(0.194)	(0.189)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.01

Panel B: Expected Interest Change + BS_orth Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.625***	**0.202**	0.085	-0.044
	(0.145)	**(0.139)**	(0.134)	(0.116)
mps_t	1.007	**1.997*****	0.146	0.677
	(0.588)	**(0.579)**	(0.483)	(0.486)
ΔVIX_t	0.151	**0.521***	-0.185	0.582***
	(0.111)	**(0.262)**	(0.221)	(0.170)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables are the expected quarterly monetary policy change of U.S. together with the monetary policy shocks, while the shock measure in panel A is monetary policy shock from Bu et al. (2021), in panel B is orthogonal shock in Bauer & Swanson (2022). The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

3.4 Robustness Checks

We conduct a set of robustness checks to assess the reliability of our baseline results. We confirm that these results remain robust when considering (1) local economic fundamentals; (2) expected changes in U.S. monetary policy as implied by Taylor's rule; (3) the Zero Lower Bound (ZLB) period; (4) alternative identifications of monetary policy shocks; (5) different resampling methods; (6) lagged change in short rates.

3.4.1 Local Economic Fundamentals

Besides responding to U.S. monetary policy change, the local central banks may also adjust their short rates in responses to local economic fundamentals. Here we control for other local factors to check whether our previous findings hold for the Open-floaters.

The results are shown in Table 7. In the first two columns we control for local real GDP and inflation also from IMF-IFS dataset. For the missing quarterly GDP data we collect from each country's office of statistics. Our baseline results still hold, that the floaters respond to the shock components more aggressively compared to the expected component. In Column (2) we show these results are not driven by Germany or Japan. In Column (3) and (4), we further control for other country-level statistics by fixed effect, where our findings are still unchanged.[9]

3.4.2 Taylor's Rule Implied U.S. Monetary Policy Change

Here we estimate the systematic component of U.S. monetary policy as described by Taylor's rule, and examine its transmission across various policy regimes.

Previously, we presented results based on different measures of the expected components of U.S. monetary policy. Each of these measures serves as an imperfect proxy for the expectations. In this subsection, we delve into the significance of the "systematic" component of changes in U.S. monetary policy.

The systematic change reflects the portion of U.S. monetary policy changes that are related to business cycle variables. Based on Taylor (1993), Taylor's rule is recognized as the underlying

[9]We do not control for the fixed effects in our baseline results following Klein & Shambaugh (2015)

Table 7: Baseline Results with Local Fundamentals

	Open-floating			
	(1)	(2)	(3)	(4)
exp_t	0.246	0.309	0.230	0.218
	(0.147)	(0.217)	(0.441)	(0.315)
mps_t	0.696***	0.921***	0.674*	0.514**
	(0.181)	(0.134)	(0.363)	(0.198)
ΔVIX_t	0.421	0.564	0.180	0.292
	(0.266)	(0.420)	(0.263)	(0.303)
ΔGDP_t	-0.002	-0.002	0.016	0.094***
	(0.013)	(0.014)	(0.012)	(0.012)
$Infl_t$	-0.045	-0.049	-0.030	0.092
	(0.030)	(0.038)	(0.078)	(0.047)
Δe_t				-0.005
				(0.026)
ΔR^i_{t-1}				-0.138
				(0.106)
FE	No	No	Country×Year	Country×Year
N	385	245	385	326
R^2	0.04	0.04	0.12	0.15

Notes: Each column contains sub-sample OLS estimates for Open-floaters. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables are the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. The percentage change of VIX, local contemporaneous real GDP growth and inflation are controlled in each regression. In Column (2) we drop Germany and Japan from our sample; Column (3) and (4) control for country and year fixed effect. We further control for local currency depreciation and lag interest change in Column (4). Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

policy framework of the Federal Reserve. Following Bauer & Swanson (2022), we reconstruct a standard version of Taylor's rule as follows:

$$R_t = r_t^* + \pi_t^* + \beta_t(\pi_t - \pi_t^*) + \gamma_t(y_t - y_t^*) + u_t \tag{8}$$

$$\Rightarrow R_t = r_t^* + (1 - \beta_t)\pi_t^* + \beta_t\pi_t + \gamma_t(y_t - y_t^*) + u_t \tag{9}$$

Assuming that the target real interest rate and target inflation remain constant over time, we estimate the short-term rate using the output gap and realized inflation. Thus, the U.S. interest rate can be expressed as:

$$R_t = \alpha_t^0 + \beta_t^0\pi_t + \gamma_t^0(y_t - y_t^*) + u_t^0 \tag{10}$$

$$\bar{R}_t = \alpha_t^0 + \beta_t^0\pi_t + \gamma_t^0(y_t - y_t^*) \tag{11}$$

We interpret $\bar{R}_t$ as the expected policy rate implied by Taylor's rule, with its first-order difference, $\Delta\bar{R}_t$, representing the systematic change in U.S. monetary policy. This is incorporated into the baseline identification as follows:

$$\Delta R_{it} = \alpha + \chi\Delta\bar{R}_t + \gamma mps_t + \zeta\Delta VIX_t + \mu_{it}, \tag{12}$$

The results presented in Table E6 and E7 reflect changes in U.S. interest rates derived from the Effective Federal Funds Rate (EFFR) and the 2-year U.S. Treasury rate, respectively.[10] The findings are consistent with our baseline results: systematic changes in U.S. monetary policy significantly influence only Open-pegged regimes, while Open-floating regimes remain unaffected; moreover, the point estimates for shock pass-through are similar across both regimes.

[10]The 2-year Treasury rate is employed to avoid issues related to the Zero Lower Bound, as noted in Gilchrist et al. (2015). We utilize the same data as in Bauer & Swanson (2022) to compute the changes in monetary policy implied by Taylor's rule. It may also capture the effects of forward guidance during FOMC meetings, as emphasized in Hanson & Stein (2015).

We also provide regression results in Tables E8 and E9 of:

$$\Delta R_{it} = \alpha + \chi \Delta \bar{R}_t + \beta exp_t + \gamma mps_t + \zeta \Delta VIX_t + \mu_{it}, \tag{13}$$

where our results are robust after considering the change of U.S. economic fundamentals.

This systematic measure of U.S. monetary policy change corroborates our baseline findings in two key ways: (1) Open-floating regimes are insulated from local U.S. economic indicators, indicating that our earlier results are not merely artifacts of underestimating or overestimating the U.S. economy; and (2) the responses of monetary policy in peripheral countries to the expected component of U.S. monetary policy are orthogonal to the U.S. economic fundamentals.

3.4.3 Zero Lower Bound Period

One may be concerned about the role of Zero Lower Bound periods when the FFR stayed at 0-0.25%. The U.S. short-term interest rates barely vary across the long ZLB period from 2009 to 2015, which may amplify the effect of monetary policy shocks. We examine whether the ZLB periods drive the key results.

Subsample before the Global Financial Crisis (GFC)

First, we conduct a regression analysis using a subsample from before the GFC (i.e., prior to 2009) to assess the robustness of our findings when the ZLB is not binding. The results of this subsample analysis are presented in Table E4. Compared to the baseline results obtained from the full sample, Panel A indicates that the point estimate for the interest rate pass-through remains positive and only slightly insignificant. We observe a similar trend to that in the baseline results: while the expected component of monetary policy shows no significance, monetary policy shocks exhibit a strong pass-through in open-floating regimes. Our main conclusions are robust when using the pre-GFC sample.

Wu-Xia Shadow Rate

To investigate the transmission of U.S. monetary policy post-GFC, we employ the Wu-Xia shadow rate as an alternative to the policy interest rate. This rate provides a monthly approximation of the U.S. policy rate during ZLB periods, enabling a rough estimation of the Fed's monetary policy when unconventional measures become significant (Wu & Xia 2016). Specifically, equation (2) is modified to:

$$\Delta R_{it} = \alpha + \beta^{WuXia}(\Delta WuXia - mps_t) + \gamma mps_t + \zeta \Delta VIX_t + \mu_{it}, \tag{14}$$

where $\Delta WuXia_t$ denotes the change in the Wu-Xia shadow rate. To maintain consistency with our previous data frequency, we use quarterly averages. The results are presented in Table E5.

We find that the results align with our baseline findings. In Panel A, open-peg economies exhibit significant interest pass-through. The estimate for $\Delta WuXia$ is marginally lower for open-floating economies compared to the baseline, while closed economies show no significant response to the Wu-Xia shadow rate. Relative to open-peg regimes, monetary policy shocks are more influential in open-floating countries. This supports our conclusion that monetary policy shocks are the primary reason for the loss of monetary autonomy in open-floating regime countries, even considering the ZLB period.

Maximum Likelihood Estimation

We also adopt a "truncated" maximum likelihood estimation (MLE) approach, following Han & Wei (2018), to address the ZLB problem. Since neither the NS shock nor the BS shock in our baseline results is binding by the ZLB, we only need to make minor adjustments to their model to include monetary policy shocks in ZLB episodes. We identify the effects of monetary policy

shocks through the following three-equation system:

$$\Delta R_{it} = \alpha + \beta \Delta R_t^{\#} + \gamma mps_t + \zeta \Delta VIX_t + \mu_{it} \tag{15}$$

$$\Delta R_t^{\#} = \begin{cases} \Delta R_t, R_{bit} > \text{Lower Bound} \\ \Delta R_t^*, R_{bit} = \text{Lower Bound} \end{cases} \tag{16}$$

$$R_{bit}^* = \theta_1 + \theta_2 \log Y_t + \theta_3 \log M_t + \epsilon_t \tag{17}$$

Using this estimation method, we infer the potential level of the U.S. interest rate during ZLB episodes based on log money supply M_t and log aggregate output Y_t, which allows us to calculate the model-implied change in the simple interest rate. The effect of monetary policy shocks in each regime is captured by the estimate for $\beta + \gamma$. After integrating the monetary policy term into the equation system, we estimate coefficients by maximizing the following likelihood function:

$$\begin{aligned} L = \prod_{i=1}^{N} (\phi(\frac{\Delta R_{it} - (\alpha + \gamma mps_t + \zeta \Delta VIX_t + \beta \Delta R_t)}{\sigma_\epsilon})(1 - \Phi(\frac{0 - (\theta_1 + \theta_2 Y_t + \theta_3 M_t)}{\sigma_\epsilon})))^{1-Z_i} \\ (\phi(\frac{\Delta R_{it} - (\alpha + \gamma mps_t + \zeta \Delta VIX_t + \beta(\theta_2 \Delta \log Y_t + \theta_3 \Delta \log M_t))}{\beta \sigma_{\epsilon_t - \epsilon_{t-1}} + \sigma_\epsilon}) \Phi(\frac{0 - (\theta_1 + \theta_2 Y_t + \theta_3 M_t}{\sigma_\epsilon}))^{Z_i} \end{aligned} \tag{18}$$

where $Z_i = 1$ indicates the ZLB period when $R_{bit} <$ Lower Bound[11]. The functions ϕ and Φ represent the PDF and CDF of the standard normal distribution, respectively. M_t denotes nominal M2 data from the St. Louis Fed, while Y_t refers to real GDP data from the U.S. BEA. For the parameter estimates, we use OLS estimates as the initial values[12]. We optimize the log-likelihood function using the Quasi-Newton algorithm, and we bootstrap the sample with replacement 100 times to derive statistical significance levels.

The results are summarized in the two panels on the right side of Table G24. The roles of expected changes in U.S. monetary policy and shocks are consistent with our baseline findings. Most standard deviations obtained via bootstrapping are slightly larger than those derived from OLS estimations, yet the statistical significance of the monetary policy shock terms remains largely

[11]The *LowerBound* is set at 0.25%, defining the ZLB period from 2009Q1 to 2015Q4

[12]Due to year-by-year changes in regime classifications, and the extreme imbalance of data during and outside the GFC for certain regimes, we conduct OLS estimation jointly for all regimes as in Han & Wei (2018), rather than running sub-sample regressions as in Klein & Shambaugh (2015).

unchanged.

3.4.4 Alternative Measures of Monetary Policy Shocks

We also present results using alternative measures of monetary policy shocks. Table E10 reports regression results based on changes in the current month's federal funds futures rate (GSS), the three-month federal funds futures rate (FF4), the three-month Eurodollar futures rate (ED4), and forward-guidance shocks from Swanson (2021) as indicators of U.S. monetary policy shocks.

All results exhibit similar patterns as in the baseline results: Open-peg regimes generally align with expected U.S. interest changes, while in Open-floating regimes, the simple interest pass-through is primarily driven by the monetary policy shock component. Most point estimates for these shocks are close to 1. While the shock pass-through from GSS is marginally insignificant, the other shocks display statistically significant pass-throughs in Open-floating regimes.

3.4.5 Data Resampling

Reclassifying Exchange Rate Regimes

For robustness, we utilize the exchange rate regime classification by Ilzetzki et al. (2019) as an alternative to Shambaugh's classification. Countries classified as having a "de facto peg" or a more strictly pegged regime will be referred to as "Peg," while all others are categorized as "Floating" economies.

Table E11 presents results for the 2×2 classifications using Ilzetzki et al. (2019) exchange rate regime and the Chinn-Ito index. The two classifications yield nearly identical Peg-Floating regime classifications for both Open and Closed countries, producing results consistent with Table 1: Open-floating regimes do not gain policy autonomy in response to unexpected policy changes, regardless of the exchange rate regime classification.

Redefining Capital Controls

Focusing on the money market rate as an indicator of short-term interest rates, we define capital controls based on restrictions in the money market. Countries identified by Fernández et al. (2016)

as having no money market restrictions are classified as open regimes. The results are detailed in Table E12.

This identification expands the sample for Open-floating regimes, where the simple interest pass-through remains negligible. Although the statistical significance of shock pass-through is slightly affected, the economic significance of point estimates persists. Overall, results align closely with the baseline findings, indicating that only Open-peg regimes respond to the expected changes in U.S. monetary policy. Even with a broader sample of Open-floating regimes, monetary policy shocks remain the primary driver of interest rate pass-through.

Mid-range Capital Control

The baseline analysis differentiates countries' capital controls into two categories. Countries without capital controls are termed Open economies, constituting about a quarter of all sampled economies. As illustrated in Fig E2, Closed samples can be further divided into mid-range and extremely "Closed" samples based on a Chinn-Ito index threshold of 0.8, which evenly separates our previous Closed samples. We run our baseline regressions using this refined classification in Table E13.

The Open samples remain unchanged, producing identical results to our baseline. For the Mid-range and Closed samples, findings reveal that in Peg regimes, the economic significance of both simple interest pass-through and shock pass-through decreases as capital controls intensify. While the shock pass-through for Floating regimes demonstrates a weaker but similar trend, it remains positive but statistically insignificant for Mid-Floating regimes. Additionally, Mid-range regimes exhibit the highest response to VIX changes before ΔVIX_t, whereas Closed regimes are insulated from the global financial cycle. Our findings support Rey (2015), suggesting that limited capital controls can diminish monetary independence. In summary, for both peg and floating regimes, the transmission of monetary policy shocks is negatively correlated with the intensity of capital controls.

3.4.6 Including Lagged Changes in Monetary Policy

We follow up our local projection results by controlling for lagged changes in monetary policy to capture the policy momentum (or policy space) available to the home country's central bank. In Table E17, we examine whether the lagged changes of the U.S. monetary policy matter. In countries without capital controls, the lag term is insignificant and does not alter the baseline pattern. However, a significantly positive pass-through is observed in Closed economies, potentially due to the delayed response of these regimes to U.S. monetary policy; over time, the gradual evolution of the global economy may compel closed regimes to align with U.S. monetary policies.

In Table E18, we control for lagged changes in the home country's monetary policy. This differs from Han & Wei (2018), who measure policy space for peripheral countries by level rather than change. Given the rapid quantitative easing and prolonged Zero Lower Bound period post-2000, using the home country's interest level to gauge available policy space may be challenging. Lagged changes in their own interest rates can also play a role as central banks aim for consistency in their monetary policies.

Regression results indicate that the magnitudes of these pass-throughs are relatively small, with significance found only in Closed-floating regimes. This supports our earlier prediction that central banks strive to maintain consistent monetary policies, particularly in Closed-floating countries with full policy autonomy. Furthermore, our baseline patterns remain robust after controlling for lagged terms.

4 Mechanisms

This section discusses mechanisms explaining the differing transmission patterns between the expected and shock components of U.S. monetary policy in open-floating economies. We argue that these Open-floating countries exhibit similar stock market responses to U.S. monetary policy around FOMC announcement days, reflecting the baseline results. Specifically, stock markets in peripheral countries appear to have already integrated the expected component of U.S. monetary policy, influenced by preemptive adjustments in fixed-asset investment prior to policy realization.

4.1 Evidence from Stock Market

We analyze global stock price data to illustrate financial market responses to U.S. monetary policy during FOMC announcement periods. Daily fluctuations in international stock prices provide insight into immediate private sector reactions to U.S. monetary decisions.

Using a specification akin to our baseline regression, we estimate

$$\Delta Ret_{it} = \alpha + \beta exp_t + \gamma mps_t + \zeta \Delta VIX_t + \mu_{it}, \tag{19}$$

where Ret_{it} represents daily log changes in stock prices across countries, measured by MSCI index close prices from Datastream. We designate the FOMC announcement day as $t = 0$, calculating returns over a two-day horizon to account for time zone differences.

Results in Table 8 confirm previous findings: stock prices in open-peg countries are significantly more sensitive to U.S. monetary policy changes than those in open-floating countries. Open-peg nations respond to both expected and shock components, whereas open-floating regimes primarily react to monetary policy shocks. Specifically, a 1% tightening shock leads to a 3.66% decline in stock prices in open-floating countries. The expected part of U.S. monetary policy is muted in the financial market of Open-floating countries, suggesting that the expected component of U.S. policy is already priced in, necessitating further exploration of underlying factors.

4.2 Evidence from Aggregate Investment

This subsection utilizes a Panel Vector Auto Regression (PVAR) model to demonstrate that floaters without capital controls preemptively reduce capital formation in anticipation of U.S. nominal rate increases. Identifying foreign responses to U.S. monetary policy is challenging due to the endogenous interlinking of macroeconomic variables. Following Vicondoa (2019), we estimate:

$$X_{it} = B_i + C(L)X_{i,t-1} + D(L)mps_t + E(L)exp_t + Fexp_{t+1} + Gexp_{t+2} + \epsilon_{i,t} \tag{20}$$

Table 8: Asset Market Response to U.S. Monetary Policy Change – Daily(-1 to 1)

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	-1.082***	**-0.611**	-0.108	-0.465**
	(0.290)	**(0.578)**	(0.441)	(0.221)
ΔVIX_t	-2.180	**-9.264*** **	-2.254	-6.863***
	(1.944)	**(1.705)**	(1.767)	(1.131)
N	775	**928**	729	3546
R^2	0.02	**0.09**	0.00	0.03

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	-0.859*	**0.015**	0.318	0.315
	(0.397)	**(0.460)**	(0.593)	(0.196)
mps_t	-2.236**	**-3.656***	-2.164	-4.371***
	(0.837)	**(1.777)**	(1.852)	(0.790)
ΔVIX_t	-1.946	**-8.447*** **	-1.597	-5.955***
	(1.999)	**(1.372)**	(1.527)	(1.059)
N	775	**928**	729	3546
R^2	0.02	**0.11**	0.01	0.05

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	-0.795*	**-0.015**	0.343	0.253
	(0.360)	**(0.475)**	(0.582)	(0.205)
mps_t	-2.731***	**-3.983***	-2.734	-4.382***
	(0.500)	**(1.946)**	(1.906)	(0.852)
ΔVIX_t	-1.808	**-8.316*** **	-1.432	-5.891***
	(1.998)	**(1.300)**	(1.413)	(1.048)
N	775	**928**	729	3546
R^2	0.02	**0.11**	0.01	0.05

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the change of the log MSCI index change in peripheral countries between 1 day before and after FOMC . The independent variables differ in three panels: in Panel A, it's the daily change of U.S. fed funds rate; in Panel B and C, it's the expected daily monetary policy change of U.S. together with the monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.



Figure 2: IRF of Investment Under 25bps Expected and Unexpected U.S. Rate Hike

Notes: This figure shows the impulse response of country-level real capital formation(% deviation from the growth path) estimated from Eq (20). The left panel shows the response to 25 bps expected U.S. rate hike that will materialize in 2 quarters; while the right panel shows the response to the shock. The red line is the impulse response, and the light red shaded area is the 10% confidence interval.

where i indexes countries and X_t includes key endogenous economic variables. We select variables that reflect both the macroeconomic fundamentals of peripheral countries and the various transmission channels of U.S. monetary policy (e.g., trade, risk appetite, etc.). These include the percentage change in CPI, exchange rate depreciation, trade balance-to-GDP ratio, short-term interest rates, VIX, and the U.S. BAA-10y spread, as well as the percentage deviation of real GDP and real investment (measured by real capital formation) from their linear trends.

We estimate $C(L), D(L), E(L), F$, and G in this PVAR system by the Least Square Dummy Variable(LSDV) estimator. Here, $C(L), D(L)$ and $E(L)$ refer to functions of the lag operator. We select a lag period of two for the endogenous variables and include a one-period lag for both monetary policy shocks and anticipated changes in U.S. monetary policy. To assess how the economy preemptively responds to expected changes in U.S. monetary policy, we also incorporate exp_{t+1} and exp_{t+2} into the regression.

Figure 2 illustrates the impulse response of real capital formation in peripheral countries to a 25 basis point contractionary shock from both the expected and shock components of US monetary

policy, with $t = 0$ marking the time of shock materialization. We assume that the expected U.S. monetary policy change was anticipated two periods in advance[13]. The light red area represents the confidence interval at the 10% significance level, calculated using bootstrap methods over 10,000 iterations. Our results indicate that the response to the anticipated part of U.S. monetary policy changes begins prior to its realization, with a 25 basis point expected tightening leading to a 0.5% decrease in real capital formation in open-floating countries. Notably, there is no significant response to the expected component following the realization of the U.S. monetary policy change. Conversely, the decline in investment after the materialization of monetary policy shocks is both drastic and persistent.

These findings enhance our understanding of how peripheral countries' real activities are influenced by U.S. monetary policy spillovers. Preemptive adjustments in capital formation suggest central banks need not respond to anticipated components, as their impacts diminish upon realization. However, substantial U.S. monetary shocks necessitate continued responsiveness from monetary authorities.[14].

4.3 Evidence from Firm-level Fixed Asset Investment

We provide additional evidence in this subsection at the firm level to demonstrate that the expected component of U.S. monetary policy is muted by the preemptive adjustments in fixed-asset investment.

We show this by regressing the real changes in firms' Net Plant, Property, and Equipment (NPPE) on the two components of U.S. monetary policy. We collect nominal, USD-denominated NPPE data from the Worldscope database and convert it into real, local-currency-denominated NPPE using data from two additional sources: exchange rate data from Datastream, processed according to Lustig et al. (2011), and quarterly headline CPI inflation data from Ha et al. (2023),

[13]This two-period expectation horizon is consistent with Vicondoa (2019), as longer horizons yield negligible economic and statistical responses. Structural estimation by Gomes et al. (2017) also supports a two-period news revelation model for U.S. macro data.

[14]Due to the data limitation, we can't run the PVAR in Open-pegged regime. We provide firm-level investment adjustment in Open-pegged countries in the following subsection

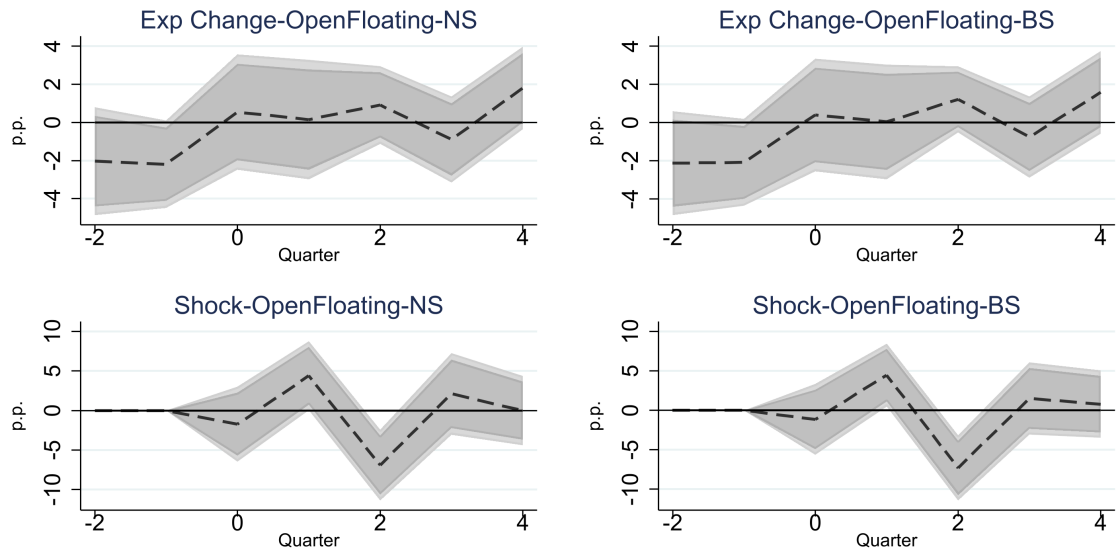


Figure 3: Dynamic Response of Net PPE to U.S. Monetary Policy in Open-floating Countries

Notes: This figure shows the impulse response of firm-level Net PPENT in Open-floating countries to U.S. MP adjustment, estimated from Eq (21). The left panel shows the response to the expected component as well as the shock component with the measure from Nakamura & Steinsson (2018); results measuring by Bauer et al. (2022) are on the right side. The black dashed line is the impulse response. The light grey shaded area is the 5% confidence interval, and the dark grey shaded area is the 10% confidence interval.

which offers broader sample coverage[15]. To minimize noise from extreme capital adjustments, the data is winsorized at the 1st and 99th percentiles, and financial firms are excluded following established literature.

We specify the dynamic responses at the firm level using the following equation:

$$\Delta NPPE_{m,t+j} = \alpha_j + \beta_j exp_t + \gamma_j \mathbb{1}_{\{j \geq 0\}} mps_t + \zeta_j \Delta VIX_t + \omega_{i,j}\mu_{i,t} + \lambda_m + \epsilon_{m,t+j}, \qquad (21)$$

where m indexes firms and $\mu_{i,t}$ is the country-level residual estimated from (2), capturing local monetary policy changes that are not correlated with U.S. monetary policy. We also control for firm-level fixed effects λ_m. Standard errors $\epsilon_{m,t+j}$ are clustered by time and industry.

We present the dynamic response of $\Delta NPPE$ in open-floating regimes in Figure 3. The point estimates are represented by the dashed line, with the dark grey band indicating the confidence area at the 10% significance level, and the light grey band at the 5% significance level. Responses

[15]This transformation addresses potential home currency biases in the private sector. See Coeurdacier & Gourinchas (2011), Burger et al. (2018).

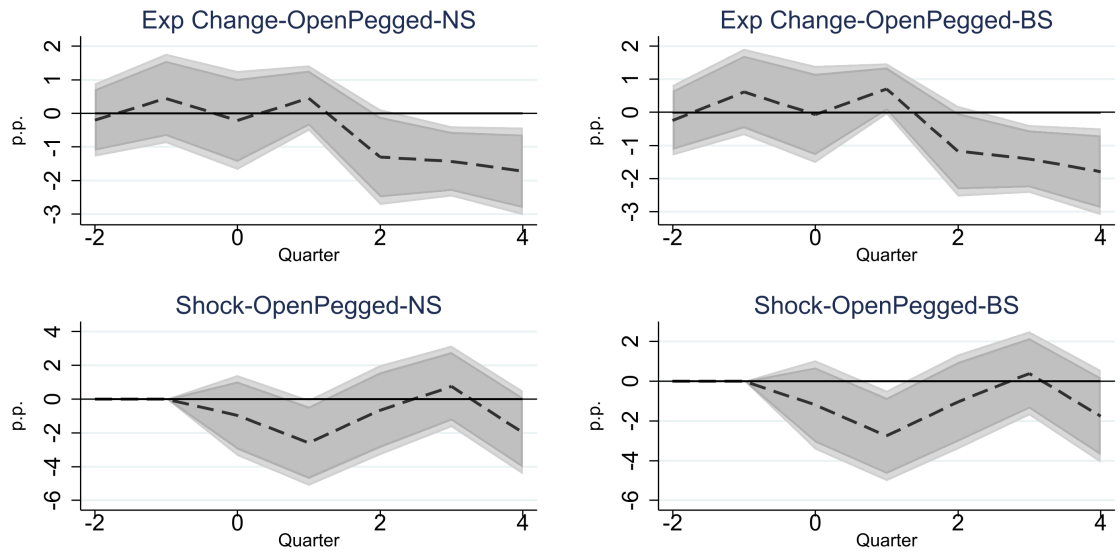


Figure 4: Dynamic Response of Net PPE to U.S. Monetary Policy in Open-pegged Countries

Notes: This figure shows the impulse response of firm-level Net PPENT in Open-pegged countries to U.S. MP adjustment, estimated from Eq (21). The left panel shows the response to the expected component as well as the shock component with the measure from Nakamura & Steinsson (2018); results measuring by Bauer et al. (2022) are on the right side. The black dashed line is the impulse response. The light grey shaded area is the 5% confidence interval, and the dark grey shaded area is the 10% confidence interval.

to the expected component of U.S. monetary policy are displayed in the upper two panels, while the lower panels show responses to shocks, differentiated by NS and BS shocks.

In open-floating economies, firms adjust their fixed capital investment in response to anticipated changes in U.S. monetary policy, starting two quarters in advance. A 1% expected increase in U.S. monetary policy leads firms to reduce their investment by approximately 2%. This finding aligns with our earlier results that aggregate investment in open-floating countries begins to react to expected U.S. monetary tightening two periods ahead. Firms likely adjust in advance to mitigate future convex capital adjustment costs amid rising funding costs in global financial markets(Hayashi 1982, Wang & Wen 2012, etc.). After $t = 0$, however, firms' investments show no significant responsiveness to the expected component, both economically and statistically, while still reacting sharply to monetary policy shocks. This necessitates ongoing adjustments in local monetary policy in response to U.S. monetary policy shocks.

Conversely, results from the open-pegged regime, presented in Figure 4, reveal a distinct pattern. Here, firms respond to the expected component only after the materialization of U.S. mone-

tary policy changes and do not take preemptive actions regarding anticipated future U.S. monetary decisions.

In summary, the evidence suggests that open-floating economies are insulated from the expected components of U.S. monetary policy changes due to proactive capital adjustments by the private sector. The stock markets in these countries similarly show no response to expected components. Therefore, local monetary policy should primarily focus on countering the effects of U.S. monetary policy shocks.

5 Model

In this section, we develop a New Keynesian small open economy (NK-SOE) model to explore the transmission mechanisms of the two components of U.S. monetary policy.[16] This model assumes that domestic firms face working capital constraints when importing foreign capital goods, allowing us to examine the potential reduction in investment resulting from anticipated U.S. monetary tightening. It provides a framework for analyzing how central banks respond to both expected and unexpected changes in foreign interest rates.

5.1 Households

The representative household in the SOE has preferences:

$$\mathbb{E}_t \sum_{i=0}^{\infty} \beta^i [U(C_{t+i}, L_{t+i})] = \mathbb{E}_t \sum_{i=0}^{\infty} \beta^i [\frac{C_{t+i}^{1-\gamma}}{1-\gamma} - \varsigma \frac{L_{t+i}^{1+\varphi}}{1+\varphi}], \tag{22}$$

where C_t denotes total consumption and L_t denotes employment. The parameter β is the household's subjective discount factor, ς represents the disutility from labor, $\frac{1}{\gamma}$ is the intertemporal elasticity of substitution of consumption, and $\frac{1}{\varphi}$ is the intertemporal elasticity of substitution of labor. Total consumption is modeled as a CES aggregation of domestic final goods C_t^H and

[16] For related models, see Adolfson et al. (2008), Christiano et al. (2011), Camara et al. (2024) among others.

imported foreign goods C_t^F:

$$C_t = \left[(1-\omega_c)^{\frac{1}{\eta_c}} \left(C_t^H\right)^{\frac{\eta_c-1}{\eta_c}} + \omega_c^{\frac{1}{\eta_c}} \left(C_t^F\right)^{\frac{\eta_c-1}{\eta_c}} \right]^{\frac{\eta_c}{\eta_c-1}}, \tag{23}$$

where ω_c measures home bias in preferences, and η_c reflects the elasticity of substitution between the two consumption goods. The household's budget constraint is expressed as:

$$P_t C_t + D_t + Z_t \zeta_t + \Theta_t^z(Z_t) = w_t L_t + (1+i_{t-1}) D_{t-1} + \zeta_t (1+i_{t-1}^*) Z_{t-1} + \pi_t^m + \pi_t^p, \tag{24}$$

The household is allowed to borrow from both the domestic financial market and the international market. Domestic borrowing D_t incurs a nominal interest rate i_t set by the local central bank. International borrowing, denoted by Z_t, incurs costs from the U.S. nominal interest rate i_t^* and the portfolio adjustment cost (PAC) $\Theta_t^z(Z_t)$, which is modeled as a convex function of Z_t:

$$\Theta_t^z(Z_t) = P_t \frac{\psi_Z}{2} Z_t^2, \tag{25}$$

where parameter ψ_Z captures the marginal adjustment cost. Additionally, international borrowing faces exchange rate risk, with ζ_t indicating the nominal exchange rate in USD. The household also receives profits rebated from intermediate goods firms, π_t^m as well as the lump-sum transfer of the international fund π_t^p. [17]

The consumer price index (CPI) for the economy can be derived as:

$$P_t = \left[(1-\omega_c)(P_t^H)^{1-\eta_c} + \omega_c (P_t^F)^{1-\eta_c} \right]^{\frac{1}{1-\eta_c}}, \tag{26}$$

where P_t^H is the domestic price level and P_t^F is the import price index. The inverse of the terms

[17] We assume the existence of international mutual funds that serve as intermediaries between local households and the U.S. bond market. These funds charge households fees in the form of portfolio adjustment costs (PAC) and are ultimately owned by domestic households. As a result, the PAC influences households' portfolio decisions without causing a loss of real goods in the economy.

of trade, S_t, is defined as:

$$S_t \equiv P_t^F / P_t^H = \zeta_t P_t^* / P_t^H, \tag{27}$$

where we have assumed that the law of one price holds, with foreign goods priced in USD (P_t^*) fixed at 1. The real exchange rate q_t is given by:

$$q_t \equiv \zeta_t P_t^* / P_t = \frac{S_t}{\left[(1-\omega_c) + \omega_c S_t^{1-\eta_c}\right]^{\frac{1}{1-\eta_c}}} \tag{28}$$

5.2 Firms

The model comprises two types of firms: production firms, which face working capital constraints and utilize capital and labor in production, and retail firms, which repackage domestic intermediate goods into final goods. We follow the literature by assuming that retail firms are subject to price stickiness.

5.2.1 Retail Firms

Following the framework of Gertler & Karadi (2011), retail firms aggregate the output from monopolistic intermediate firms indexed from 0 to 1 into final domestic output Y_t using a CES structure:

$$Y_t = [\int_0^1 (Y_t^j)^{\frac{\chi_t - 1}{\chi_t}} dj]^{\frac{\chi_t}{\chi_t - 1}}, \tag{29}$$

where $\chi_t > 1$ represents the elasticity of substitution between intermediate goods. We assume that the χ_t follows an AR(1) process(Dong et al. 2024):

$$\chi_t = \rho^\chi \chi_{t-1} + (1-\rho^\chi)\bar{\chi} + \epsilon_t^\chi, \tag{30}$$

and ϵ_t^{χ} can be regarded as the domestic markup shock. The demand curve for intermediate good Y_t^j is then derived from the cost minimization problem as

$$Y_t = (\frac{P_t^H}{P_t^j})^{-\chi_t} Y_t^j \tag{31}$$

In line with Christiano et al. (2005), price stickiness permits retailers to freely adjust prices with a probability of $1-\Gamma$. Otherwise, they can update prices by indexing them to lagged inflation raised to the power of γ_p. The optimization problem for retail firms is to set its price $\tilde{P}_t$:

$$\max_{\tilde{P}_t} E_t \sum_{i=0}^{\infty} \Gamma^i \beta^i \Lambda_{t,t+i} \left[\frac{\tilde{P}_t}{P_{t+i}^H} \prod_{k=1}^{i} \left(\Pi_{t+k-1}^h \right)^{\gamma_p} - P_{t+i}^m \right] Y_{t+i}^j, \tag{32}$$

where P_t^m denotes the price of intermediate goods, acting as the retailers' marginal cost, and Π_t^h represents domestic goods price inflation. The superscript j can be omitted under the symmetric equilibrium.

By the law of large numbers, the evolution of the domestic price is expressed as:

$$P_t^H = \left[(1-\Gamma) \left(\tilde{P}_t \right)^{1-\chi_t} + \Gamma \left((\Pi_{t-1}^H)^{\gamma_p} P_{t-1}^H \right)^{1-\chi_t} \right]^{1/(1-\chi_t)} \tag{33}$$

5.2.2 Intermediate Firms

The monopolistic competitive intermediate firm indexed by j has a Cobb-Douglas production function:

$$Y_t^j = A_t (K_t^j)^{\alpha} (L_t^j)^{1-\alpha}, \tag{34}$$

where K_t^j is capital input, L_t^j is labor input and A_t is the TFP of the economy. Here $\log A_t$ is exogenous following an AR(1) process:

$$\log A_t = (1-\rho^A)\bar{A} + \rho^A \log A_{t-1} + \epsilon_t^A \tag{35}$$

The optimization problem of the intermediate firm is to maximize the sum of its discounted future profit:

$$\max_{\{I_t^{Hj},\kappa_t^j,L_t^j\}} = \sum_{i=0}^{\infty} \mathbb{E}_t \beta^i \Lambda_{t,t+i} \pi_t^m = \sum_{i=0}^{\infty} \mathbb{E}_t \beta^i \Lambda_{t,t+i} [P_t^{mj} Y_t^j - P_t^H I_t^{Hj} - \kappa_t^j - w_t L_t^j] \tag{36}$$

subject to the constraints defined by equations 31 and 34. κ_t^j here is the total payment on importing U.S. investment goods. Following Camara et al. (2024), we consider the total capital investment, I_t, as a CES aggregation of domestic investment good input, I_t^H, and foreign investment good input I_t^F:

$$I_t = [\omega_I^{\frac{1}{\eta_I}} (I_t^H)^{\frac{\eta_I - 1}{\eta_I}} + (1 - \omega_I)^{\frac{1}{\eta_I}} (I_t^F)^{\frac{\eta_I - 1}{\eta_I}}]^{\frac{\eta_I}{\eta_I - 1}}, \tag{37}$$

where ω_I measures the home bias in investment; ϵ is the substitution of elasticity between investment goods. For simplicity, we assume that the prices of home and foreign investment goods align with those of their corresponding consumption goods in local currency.

To model the sensitivity of firm investment to U.S. interest rates, we introduce a working capital cost associated with acquiring foreign investment goods based on Neumeyer & Perri (2005) and Mendoza & Yue (2012). This may be required by exporters due to the lengthy shipping times and the inherent risks associated with international trade. Domestic intermediate firms need to raise a loan, denoted as κ_t, to pay for foreign investment goods in advance that will contribute to capital in the subsequent period. The timeline of issuing the loan is shown in Fig 5: at the beginning of each period, the U.S. interest rate, which pins down the loan's interest payment, is known to all. The intermediate firms then raise a USD loan to import foreign investment goods. After that, the local central bank adjusts monetary policy following a Taylor rule, which we will specify in Section 5.3. Intermediate firms then produce and sell the products to retailers in local currency. Right before the beginning of the next period, they repay their loans in USD. [18]

To be more specific, we assume that χ portion of the payment has to be through the USD

[18]The fact that firms in emerging markets borrow from foreign banks in USD is well documented in the literature, e.g. Bräuning & Ivashina (2020).

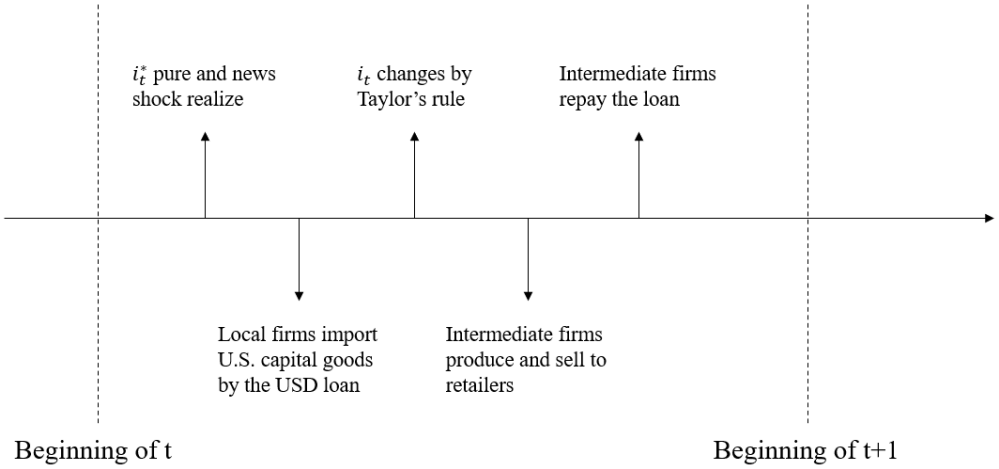


Figure 5: Timeline of Working Capital

loan,[19] i.e., intermediate firms' working capital constraint can be written as:

$$\kappa_t \geq \zeta I_t^F P_t^F \left[(1+i_t^*)\chi + (1-\chi)\right]. \tag{38}$$

If intermediate firms do not allocate borrowed USD for alternative purposes, our model operates under a consistently binding working capital constraint.

The evolution of capital is described by the following equation:

$$K_t - K_{t-1} = (1 - \tilde{S}(\frac{I_t}{I_{t-1}}))I_t - \delta K_{t-1}, \tag{39}$$

where δ is the depreciation rate of capital and $\tilde{S}(\cdot)$ measures the convex capital adjustment cost, with $\tilde{S}(1) = 0$ and $\tilde{S}'(1) = 0$.

[19]Here, the domain of $\chi \in [0, \infty)$. As $(1+i_t^*)\chi + (1-\chi) = 1 + \chi i_t^*$, the χ can be seen as capturing the exposure of local intermediate firms' borrowing cost to U.S. interest rate. When $\chi \to \infty$, the borrowing cost is equivalent to the financial autarky scenario as in Mendoza & Yue (2012).

5.3 U.S. Monetary Policy

The U.S. nominal interest rate is assumed to be exogenously set by the U.S. Fed. It follows an AR(1) process:

$$i_t^* = \rho^* \bar{i^*} + (1 - \rho^*) i_{t-1}^* + \hat{\epsilon}_t, \tag{40}$$

where $\bar{i^*}$ is the steady state of U.S. nominal interest rate; ρ^* measures the persistence. $\hat{\epsilon}_t$ is the innovation term. Following Gomes et al. (2017), we also postulate the innovation follows an AR(1) process:

$$\hat{\epsilon}_t = \rho^r \hat{\epsilon}_{t-1} + u_t, \tag{41}$$

where ρ^r measures the persistence of the innovation, and u_t is the shock in the innovation. We decompose u_t into two components: a pure shock ϵ (corresponding to mps_t) and a news shock ϵ^a (corresponding to exp_t):

$$u_t = \epsilon_t + \epsilon_{t-2}^a \tag{42}$$

As a baseline, we assume the news shock is revealed to the market two periods in advance for two reasons: (1) our empirical results indicate that the expected component begins to affect real capital investment two quarters before its realization; (2) as shown by the estimations in Gomes et al. (2017), a model with a single news shock revealed two periods ahead fits U.S. macro data best.

5.4 Domestic Monetary Policy

Our model focuses on open-floating countries as identified in our empirical sections. The domestic monetary policy is set according to a Taylor rule, similar to that in Adolfson et al.

(2008):

$$i_t = \rho^i i_{t-1} + (1-\rho^i)\left[\bar{i} - \kappa_y(y_t - \bar{y}) + \kappa_\pi \pi_t + \kappa_q \log q_t + \kappa_n \epsilon_t^n + \kappa_s \epsilon_t\right] \tag{43}$$

where ρ^i represents the persistence of monetary policy in SOE. Domestic monetary policy responds to conventional terms, including net local inflation π_t, the output gap $y_t - \bar{y}$ (where y_t is the log output and $\bar{y}$ is the log output of the economy in steady state), and the log real exchange rate $\log q_t$. The magnitudes of responses to these terms are represented by κ_π, κ_y, and κ_q, respectively. Domestic monetary policy also directly responds to U.S. monetary policy changes due to their immediate impact on investment. The exposures to the news shock and pure shock are represented by κ_n and κ_s, respectively.

5.5 Market Clearing

The domestic good market clearing condition requires:

$$P_t^H Y_t = P_t^H C_t^H + P_t^H I_t^D + \zeta_t EX_t \tag{44}$$

where EX_t denotes the foreign export demand curve for domestic consumption goods. Following Camara et al. (2024), we set the external demand curve (in terms of foreign goods) as:

$$EX_t = \bar{EX}\left(\frac{P_t^H}{P_t^F}\right)^{\varrho} exp(\epsilon_t^{EX}), \tag{45}$$

where ϱ measures the price elasticity of foreign demand. The foreign demand for export goods is also subject to an i.i.d. shock ϵ_t^{EX}. The balance of payment (BOP) of the economy is given by:

$$Z_t + [(1+i_t^*)\chi + (1-\chi)]I_t^F + C_t^F = (1+i_{t-1}^*)Z_{t-1} + EX_t. \tag{46}$$

6 Quantitative Exercise

This section presents the quantitative results of the aforementioned model. Calibrated to quarterly data from Peru, we analyze the optimal monetary policy for a small open economy in response to the two components of U.S. monetary policy. The quantitative results substantiate our empirical observations that the private sector tends to reduce investment ahead of anticipated U.S. monetary tightening in order to mitigate capital adjustment costs. This preemptive adjustment in aggregate supply prompts central banks to respond less aggressively to anticipated changes in U.S. monetary policy.

6.1 Calibration

The model is calibrated to quarterly data. To capture how investment in open-floating economies responds in advance to anticipated shifts in U.S. monetary policy, we specifically focus on Peru due to its stable policy environment and extensive data coverage.

We set $\beta = 0.99$ to align with the reference rate of the Central Bank of Peru, approximately $i \approx 3.72\%$ per annum from September 2003 to June 2024. Additionally, we set $\bar{i^*} = 0.4\%$ to correspond with the average U.S. effective Federal Funds rate over the same period. In the steady state, households are assumed to borrow from international markets. We assign $\psi_Z = 0.29$ to reflect Peru's FA/GDP ratio of approximately -2.4% from the first quarter of 1980 to the fourth quarter of 2021. All shocks in this model are assumed to follow normal distribution with mean 0, and we set the standard deviation of foreign demand shocks, $std(\epsilon_t^{EX}) = 15\%$, to match the volatility of Peru's export-to-GDP ratio of 3.43%. The persistence of TFP shock, $\rho^A = 0.99$ follows the convention in the literature, and the volatility of TFP $std(\epsilon_t^A)$ is set to 1.7% following the estimation from Hong (2020).

The parameters governing household home-bias are sourced from Camara et al. (2024), with $\omega_c = 0.47$ and $\eta_c = 1.43$. For firm-level investment parameters, we again refer to Camara et al. (2024), employing Bayesian estimation techniques based on Christiano et al. (2005) to match impulse response functions (IRFs). The parameters are estimated to be $\omega_I = 0.29$, $\eta_I = 1.20$, and

$\rho_i = 0.86$, with $\varrho = 2.04$. We assume the capital adjustment cost $\tilde{S}(\cdot)$ follows this functional form:

$$\tilde{S}(\frac{I_t}{I_{t-1}}) = \frac{\theta}{2}(\frac{I_t}{I_{t-1}} - 1)^2, \tag{47}$$

with the estimated value of $\theta = 3.14$.

Parameters for U.S. monetary policy components are primarily drawn from Gomes et al. (2017). Utilizing U.S. quarterly data from the first quarter of 1960 to the fourth quarter of 2010, they estimate $\rho^{i^*} = 0.86$ and $\rho^r = 0.25$. The standard deviations for the U.S. monetary policy shock, $std(\epsilon_t^a) = 0.17\%$, and the pure shock, $std(\epsilon_t) = 0.16\%$, are also derived from their baseline estimation.

For the parameters pertaining to domestic monetary policy in the small open economy, we set $\kappa_\pi = 1.5$ and $\kappa_y = -0.125$, following existing literature. The exposure to the real exchange rate is set to be $\kappa_q = 0.05$, which, as shown in Camara et al. (2024), should remain relatively low to maintain the near unit root characteristic of the exchange rate. This figure is comparable to estimates derived from Swedish data in Adolfson et al. (2008). The values for κ_n and κ_s will be addressed below.

Parameters related to price stickiness are obtained from Gertler & Karadi (2011), with $\bar{\chi} = 4.167$, $\Gamma = 0.779$, and $\gamma_p = 0.241$. The dynamic of χ is calibrated to Dong et al. (2024), where $\rho^\chi = 0.95, std(\epsilon_t^\chi) = 0.13$. Additional conventional macroeconomic parameters are set as follows: $\alpha = 0.33$, $\gamma = 2$, and $\varphi = 0.276$. The relative weight of disutility from labor, $\varsigma = 3.58$, is calibrated to match the effective working hours, $L = 0.33$. All parameters are summarized in Table 9.

6.2 Impulse Response Functions

Figures 6 and 7 illustrate the impulse response functions to a 25 basis point U.S. monetary tightening pure shock and a news shock occurring two quarters ahead, respectively. In both figures, we set $\kappa^n = 0.063$ and $\kappa^s = 0.868$, which are from our baseline specification for NS shock from Table 1.

The IRF responses to U.S. monetary policy shocks reveal a pronounced decline in U.S. in-

Table 9: Parameters

Parameter	Value	Source
Household		
γ	2	Conventional
β	0.99	Match Peru's nominal rate
φ	0.276	Gertler & Karadi (2011)
ς	3.58	Match effective working hour $L = 0.33$
ϱ	2.04	Camara et al. (2024)
ω_c	0.47	Camara et al. (2024)
η_c	1.43	Camara et al. (2024)
ψ_Z	0.29	Match Peru's FA/GDP ratio
Firm		
α	0.33	Conventional
ι	0.025	Conventional
θ	3.14	Camara et al. (2024)
ω_I	0.29	Camara et al. (2024)
η_I	1.20	Camara et al. (2024)
ρ^χ	0.95	Dong et al. (2024)
$\bar{\chi}$	4.167	Gertler & Karadi (2011)
Γ	0.779	Gertler & Karadi (2011)
γ_p	0.241	Gertler & Karadi (2011)
ρ^A	0.99	Conventional
Monetary Policy		
ρ^{i^*}	0.86	Gomes et al. (2017)
ρ^r	0.25	Gomes et al. (2017)
ρ^i	0.8	Conventional
κ_π	1.5	Conventional
κ_y	-0.125	Conventional
κ_q	0.05	Near random walk of real exchange rate
$\bar{i^*}$	0.004	U.S. avg. effective FFR from 2003M9-2024M6
Shocks		
$std(\epsilon_t^a)$	0.17%	Gomes et al. (2017)
$std(\epsilon_t)$	0.16%	Gomes et al. (2017)
$std(\epsilon_t^{EX})$	15%	Peru's Export/GDP volatility 3.4%
$std(\epsilon_t^\chi)$	0.13	Dong et al. (2024)
$std(\epsilon_t^A)$	1.7%	Hong (2020)

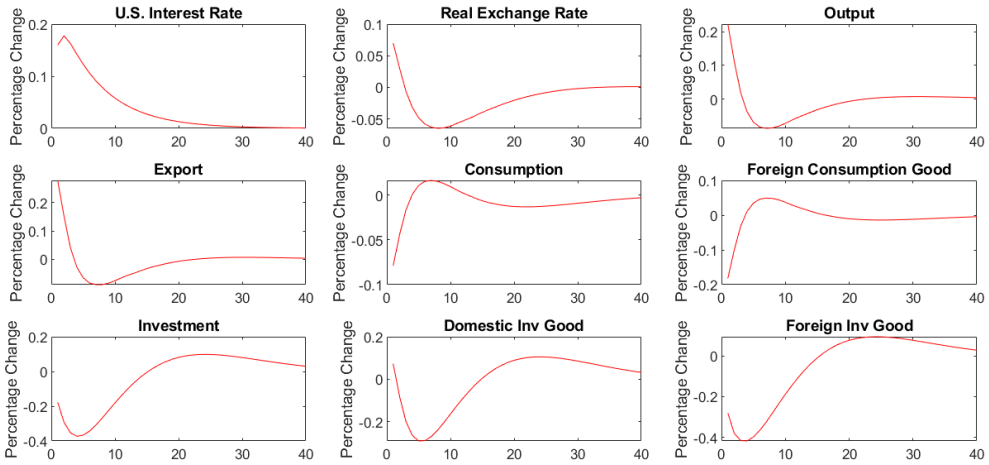


Figure 6: Impulse Response Function to 25 bps U.S. Pure Shock

Notes: This figure shows the impulse response of our benchmark model with 25 bps increase of U.S. rate that will materialize in two quarters. The calibration follows Table 9. For the parameters of responses to the two components of U.S. monetary policy, we use our empirical estimates from Table 1. All variables are in percentage deviation from their steady states.

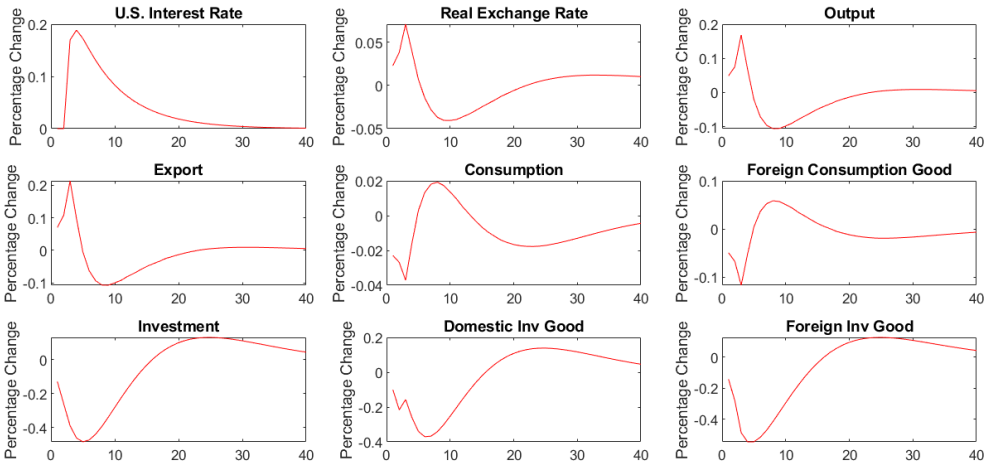


Figure 7: Impulse Response Function to 25 bps U.S. News Shock 2 Quarters ahead

Notes: This figure shows the impulse response of our benchmark model with 25 bps increase in contemporaneous U.S. short rate. The calibration follows Table 9. For the parameters of responses to the two components of U.S. monetary policy, we use our empirical estimates from Table 1. All variables are in percentage deviation from their steady states.

vestment goods. The tightening of U.S. monetary policy impacts investment in foreign goods through two main channels: (1) increased costs of loans, and (2) currency depreciation that places additional burdens on firms in the SOE, given that loans are typically denominated in USD. Consequently, exchange rate depreciation can exert a negative influence on aggregate supply.

This real effect on investment due to exchange rate depreciation motivates central banks to align with U.S. monetary policy shocks. Failing to do so would result in a substantial increase in the costs associated with procuring investment goods from abroad, compelling domestic firms to sharply reduce their investment. In such scenarios, an increase in nominal interest rates can help alleviate the significant capital adjustment costs faced by the economy, despite potentially contracting domestic aggregate demand.

Conversely, the anticipated component of U.S. monetary policy changes has different implications for the SOE. Prior to the realization of U.S. monetary policy adjustments, local currency depreciation may already occur. The production sector may begin to reduce investments in U.S. goods for two reasons: (1) the depreciation renders foreign capital goods more expensive, and (2) to smooth capital adjustment costs in light of expected U.S. monetary tightening. As a result, both domestic and foreign investment goods are likely to decline before the actual changes in U.S. monetary policy.

With this preemptive investment adjustment, it becomes even more challenging for monetary authorities in the SOE to raise nominal interest rates in anticipation. This not only impacts the immediate aggregate demand but also reduces firms' incentives to smooth capital adjustment costs due to prior currency appreciation. Ultimately, even if the central bank does not actively respond to the expected component of U.S. monetary policy, the private sector is likely to internalize information regarding future Fed policy adjustments to avert potential welfare losses.

In the Appendix Fig F3 - F5, we conduct local projection in Open-floating regimes to support our model predictions including: (1) these countries do not adjust monetary policy prior to the materialization of market-expected component in U.S. monetary policy; (2) non-financial firms' debt borrowing shrinks mildly in expectation to future U.S. monetary policy tightening, while it drops drastically upon U.S. monetary policy shock hits; (3) local currency depreciates mildly two

quarters before expected U.S. monetary tightening.

6.3 Optimal Monetary Policy

In this section, we explore the optimal monetary policy rule for the SOE. We define the welfare of the economy recursively as follows:

$$V_t = u(C_t, L_t) - \chi \pi_t^2 + \beta \times V_{t+1}, \tag{48}$$

where we assume that all profits from firms ultimately rebate to households. The term $-\chi\pi_t^2$ captures the social cost of welfare(Yang 2023), where we set $\chi = 10$. Focusing on optimal responses to the two components of U.S. monetary policy, we restrict our analysis to $\{\epsilon_t^a\}$ and $\{\epsilon_t\}$ in (43), while the other parameters are set to be constant following our calibration. We parameterize κ^n and κ^s on a grid of $[0, 1] \times [0, 1]$ with a step size of 0.01 for both parameters.[20] For each of the 101×101 grid combinations, we solve the model with second-order perturbation, and compute the conditional(theoretical) mean of the welfare in the economy.

I show the welfare calculated at each grid in Fig 8.The optimal responses are $\kappa^n = 0.30$ and $\kappa^s = 0.75$, as previously shown. These results align with our empirical findings as in Table 7, which suggest that the response to the expected component of U.S. monetary policy could somewhat be muted in the open-floating regime due to the private sector's preemptive investment adjustments.

6.4 Discussion

In our model setup above, local central bank responds to the pure shock component more aggressively compared to the news shock due to its motive of smoothing capital adjustment cost. In this section we verify this statement by optimal policies under different capital adjustment cost, θ.

In Fig 9 we conduct such an exercise. Under a smaller capital adjustment cost compared to

[20] As in Schmitt-Grohé & Uribe (2007), here the size of the intervals of the two parameters would be arbitrary. We feel that the local central banks would not be incentivized to overshoot their policy rate in response to the U.S., if they want to stabilize their exchange rate upon U.S. policy change.

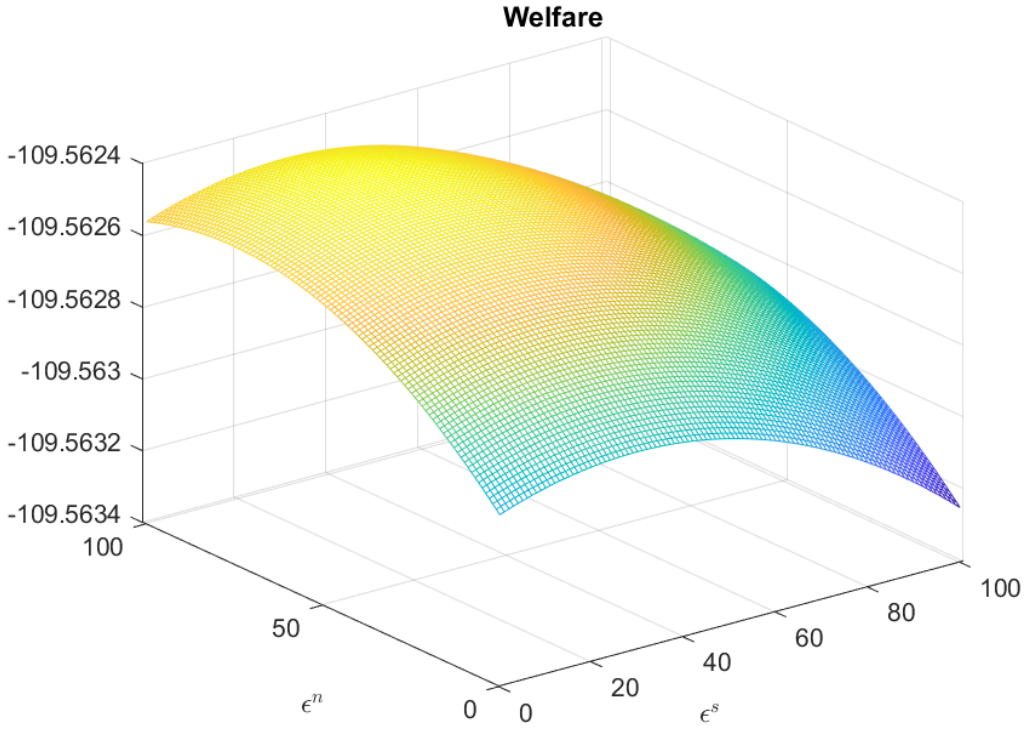


Figure 8: Welfare under Benchmark Calibration

Notes: This figure shows the welfare of the model calculated under calibration in Table 9. The x-axis is the response to the pure shock component, κ^s; the y-axis is the response to the news shock, κ^n. Both responses are calculated at interval [0,1] with step 0.01.

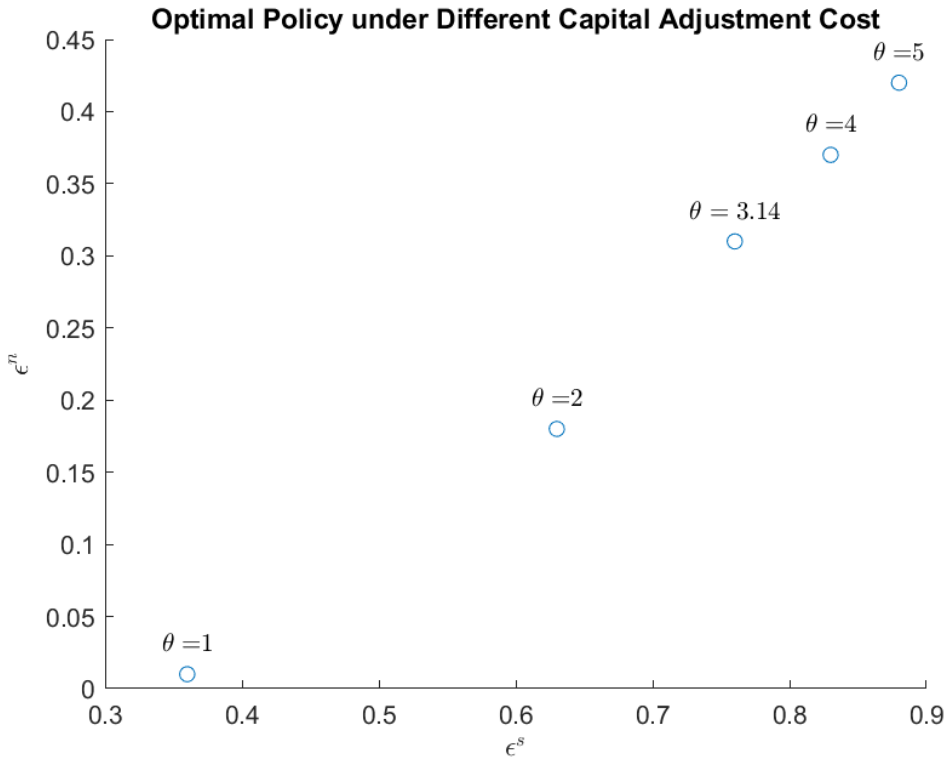


Figure 9: Optimal Policy under Different Capital Adjustment Cost Θ

Notes: This figure shows the optimal policy responses under different capital adjustment cost θ. The x-axis is the response to the pure shock of U.S. monetary policy κ^s, while the y-axis is the response to the news shock κ^n.

our benchmark, say $\theta = 1$, the optimal policy gets much less aggressive in response to U.S. shocks to $\kappa^n = 0.01, \kappa^s = 0.36$. With a larger adjustment cost, the optimal responses get larger at a decreasing speed. These results support our story above, where the firms' ability in smoothing their capital adjustment cost matters in the optimal policy of responding to the U.S. monetary policy changes.

7 Conclusions

We re-examine a fundamental question in international macroeconomics on the international transmission of U.S. monetary policy by distinguishing between policy shocks and market-expected policy changes. Our findings indicate that floating exchange rate regimes without capital controls grant monetary autonomy to peripheral countries from expected U.S. monetary policy changes, but

not from U.S. policy shocks. In other words, there is "trilemma" in the international transmission of expected U.S. monetary policy change, but "dilemma" in the transmission of U.S. monetary policy shock. The existing literature's observations of asymmetric responses to U.S. monetary tightening and loosening are largely driven by U.S. policy shocks.

The central banks in Open-floating countries do not respond to the expected component of U.S. monetary policy due to the preemptive response from their private sector. Around FOMC announcement days, the stock indices in Open-floating economies respond only to the monetary policy shock. Prior to U.S. monetary policy announcements, firms in Open-floating countries preemptively reduce fixed-asset investments when market expectations indicate a tightening of U.S. monetary policy. As a result, overall capital formation in the economy declines in anticipation of future U.S. monetary tightening, and private sector responses dampen central banks' reactions to expected changes.

Using a New Keynesian small open economy model, we validate the mechanisms: private sectors in small open economies respond differently to anticipated versus unanticipated changes in U.S. monetary policy. When firms in peripheral countries foresee a tightening of U.S. monetary policy, they preemptively reduce investment to mitigate capital adjustment costs. Conversely, unexpected U.S. monetary tightening leads to local monetary tightening, which helps stabilize the currency and eases firms' burdens in repaying USD loans, prompting peripheral countries to align more closely with U.S. policy shocks. Calibration to data from Peru suggests that optimal policies for addressing these two components of U.S. monetary policy changes align closely with our empirical results, supporting our mechanisms.

These findings shed new light on the understanding of international monetary transmission and offer significant policy implications regarding the choice of exchange rate regimes in small open economies. While floating exchange rate regimes afford central banks some policy autonomy, the uncertainties surrounding monetary policy decisions and the need for smoothing capital investment have real impacts even before U.S. monetary policy is realized. Meanwhile, although pegged exchange rates protect peripheral countries from "fear of floating," their private sectors remain vulnerable to systematic shifts in U.S. monetary policy. Optimal exchange rate regime policies

necessitate that authorities consider these trade-offs.

References

Acosta, M. & Saia, J. (2020), 'Estimating the effects of monetary policy via high frequency factors', Unpublished working paper. Columbia University .

Adolfson, M., Laséen, S., Lindé, J. & Villani, M. (2008), 'Evaluating an estimated new keynesian small open economy model', Journal of Economic Dynamics and Control **32**(8), 2690–2721.

Bauer, M. D., Pflueger, C. & Sunderam, A. (2022), Perceptions about monetary policy, Technical report, National Bureau of Economic Research.

Bauer, M. D. & Swanson, E. T. (2022), A reassessment of monetary policy surprises and high-frequency identification, Technical report, National Bureau of Economic Research.

Baxter, M. & Crucini, M. J. (1993), 'Explaining saving–investment correlations', The American Economic Review pp. 416–436.

Bernanke, B. S. (2020), 'The new tools of monetary policy', American Economic Review **110**(4), 943–983.

Bluedorn, J. C. & Bowdler, C. (2010), 'The Empirics of International Monetary Transmission: Identification and the Impossible Trinity', Journal of Money, Credit and Banking **42**(4), 679–713. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1538-4616.2010.00303.x.
URL: *https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1538-4616.2010.00303.x*

Bocola, L., Dovis, A., Jørgensen, K. & Kirpalani, R. (2024), Bond market views of the fed, Technical report, National Bureau of Economic Research.

Bräuning, F. & Ivashina, V. (2020), 'Us monetary policy and emerging market credit cycles', Journal of Monetary Economics **112**, 57–76.

Bu, C., Rogers, J. & Wu, W. (2021), 'A unified measure of Fed monetary policy shocks', Journal of Monetary Economics **118**, 331–349.
URL: *https://www.sciencedirect.com/science/article/pii/S0304393220301276*

Burger, J. D., Warnock, F. E. & Warnock, V. C. (2018), 'Currency matters: Analyzing international bond portfolios', Journal of International Economics **114**, 376–388.

Camara, S., Christiano, L. & Dalgic, H. (2024), 'The international monetary transmission mechanism', NBER Macroeconomics Annual **39**.

Chinn, M. D. & Ito, H. (2008), 'A New Measure of Financial Openness', Journal of Comparative Policy Analysis: Research and Practice **10**(3), 309–322. Publisher: Routledge _eprint: https://doi.org/10.1080/13876980802231123.
URL: *https://doi.org/10.1080/13876980802231123*

Christiano, L. J., Eichenbaum, M. & Evans, C. L. (2005), 'Nominal rigidities and the dynamic effects of a shock to monetary policy', Journal of political Economy **113**(1), 1–45.

Christiano, L. J., Trabandt, M. & Walentin, K. (2011), 'Introducing financial frictions and unemployment into a small open economy model', Journal of Economic Dynamics and Control **35**(12), 1999–2041.

Ciminelli, G. (2020), 'Fed Guidance and the International Transmission of U.S. Employment News: Evidence from Investment Funds', ASB Working Paper.

Coeurdacier, N. & Gourinchas, P.-O. (2011), When bonds matter: Home bias in goods and assets, Technical report, National Bureau of Economic Research.

De Leo, P., Gopinath, G. & Kalemli-Özcan, . (2022), Monetary policy cyclicality in emerging economies, Technical report, National Bureau of Economic Research.

Dedola, L., Rivolta, G. & Stracca, L. (2017), 'If the fed sneezes, who catches a cold?', Journal of International Economics **108**, S23–S41.

Dées, S. & Galesi, A. (2021), 'The global financial cycle and us monetary policy in an interconnected world', Journal of International Money and Finance **115**, 102395.

Degasperi, R., Hong, S. & Ricco, G. (2020), 'The global transmission of us monetary policy'.

Dong, F., Jiao, Y. & Wang, S. (2024), 'Asset bubbles and monetary policy in open economies', Available at SSRN 5057192 .

Drechsler, I., Savov, A. & Schnabl, P. (2017), 'The deposits channel of monetary policy', The Quarterly Journal of Economics **132**(4), 1819–1876.

D'Amico, S. & King, T. B. (2023), 'What does anticipated monetary policy do?', Journal of Monetary Economics .

Egorov, K. & Mukhin, D. (2023), 'Optimal policy under dollar pricing', American Economic Review **113**(7), 1783–1824.

English, W. B., Van den Heuvel, S. J. & Zakrajšek, E. (2018), 'Interest rate risk and bank equity valuations', Journal of Monetary Economics **98**, 80–97.

Fernández, A., Klein, M. W., Rebucci, A., Schindler, M. & Uribe, M. (2016), 'Capital Control Measures: A New Dataset', IMF Economic Review **64**(3), 548–574.
URL: *https://doi.org/10.1057/imfer.2016.11*

Gertler, M. & Karadi, P. (2011), 'A model of unconventional monetary policy', Journal of monetary Economics **58**(1), 17–34.

Gertler, M. & Karadi, P. (2015), 'Monetary Policy Surprises, Credit Costs, and Economic Activity', American Economic Journal: Macroeconomics **7**(1), 44–76.
URL: *https://www.aeaweb.org/articles?id=10.1257/mac.20130329*

Gilchrist, S., López-Salido, D. & Zakrajšek, E. (2015), 'Monetary Policy and Real Borrowing Costs at the Zero Lower Bound', American Economic Journal: Macroeconomics **7**(1), 77–109.
URL: *https://www.aeaweb.org/articles?id=10.1257/mac.20130324*

Gomes, S., Iskrev, N. & Mendicino, C. (2017), 'Monetary policy shocks: We got news!', Journal of Economic Dynamics and Control **74**, 108–128.

Gourinchas, P.-O., Ray, W. D. & Vayanos, D. (2022), A preferred-habitat model of term premia, exchange rates, and monetary policy spillovers, Technical report, National Bureau of Economic Research.

Ha, J., Kose, M. A. & Ohnsorge, F. (2023), 'One-stop source: A global database of inflation', Journal of International Money and Finance p. 102896.

Haddad, V., Moreira, A. & Muir, T. (2023), Whatever it takes? the impact of conditional policy promises, Technical report, National Bureau of Economic Research.

Hall, R. E. & Jorgenson, D. W. (1967), 'Tax policy and investment behavior', The American economic review **57**(3), 391–414.

Han, X. & Wei, S.-J. (2018), 'International transmissions of monetary shocks: Between a trilemma and a dilemma', Journal of International Economics **110**, 205–219.
URL: *https://www.sciencedirect.com/science/article/pii/S0022199617301393*

Hanson, S. G. & Stein, J. C. (2015), 'Monetary policy and long-term real rates', Journal of Financial Economics **115**(3), 429–448.

Hayashi, F. (1982), 'Tobin's marginal q and average q: A neoclassical interpretation', Econometrica: Journal of the Econometric Society pp. 213–224.

Hong, S. (2020), Emerging market business cycles with heterogeneous agents, Technical report, Working Paper.

Illeditsch, P. K., Ganguli, J. V. & Condie, S. (2021), 'Information inertia', The Journal of Finance **76**(1), 443–479.

Ilzetzki, E., Reinhart, C. M. & Rogoff, K. S. (2019), 'Exchange Arrangements Entering the Twenty-First Century: Which Anchor will Hold?*', The Quarterly Journal of Economics **134**(2), 599–646.
URL: *https://doi.org/10.1093/qje/qjy033*

Jarociński, M. & Karadi, P. (2020), 'Deconstructing monetary policy surprises—the role of information shocks', American Economic Journal: Macroeconomics **12**(2), 1–43.

Jorgenson, D. W. (1963), 'Capital theory and investment behavior', The American economic review **53**(2), 247–259.

Kalemli-Özcan, S. (2019), Us monetary policy and international risk spillovers, Technical report, National Bureau of Economic Research.

Klein, M. W. & Shambaugh, J. C. (2015), 'Rounding the Corners of the Policy Trilemma: Sources of Monetary Policy Autonomy', American Economic Journal: Macroeconomics **7**(4), 33–66.
URL: *https://www.aeaweb.org/articles?id=10.1257/mac.20130237*

Kuttner, K. N. (2001), 'Monetary policy surprises and interest rates: Evidence from the Fed funds futures market', Journal of Monetary Economics **47**(3), 523–544.
URL: *https://www.sciencedirect.com/science/article/pii/S0304393201000551*

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

Mendoza, E. G. & Yue, V. Z. (2012), 'A general equilibrium model of sovereign default and business cycles', The Quarterly Journal of Economics **127**(2), 889–946.

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

Neumeyer, P. A. & Perri, F. (2005), 'Business cycles in emerging economies: the role of interest rates', Journal of monetary Economics **52**(2), 345–380.

Obstfeld, M., Ostry, J. D. & Qureshi, M. S. (2019), 'A Tie That Binds: Revisiting the Trilemma in Emerging Market Economies', The Review of Economics and Statistics **101**(2), 279–293.
URL: *https://doi.org/10.1162/rest_a_00740*

Obstfeld, M., Shambaugh, J. C. & Taylor, A. M. (2005), 'The Trilemma in History: Tradeoffs Among Exchange Rates, Monetary Policies, and Capital Mobility', The Review of Economics and Statistics **87**(3), 423–438.
URL: *https://doi.org/10.1162/0034653054638300*

Rey, H. (2015), Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence, Technical Report w21162, National Bureau of Economic Research, Cambridge, MA.
URL: *http://www.nber.org/papers/w21162.pdf*

Rey, H. (2016), 'International channels of transmission of monetary policy and the mundellian trilemma', IMF Economic Review **64**(1), 6–35.

Romer, C. D. & Romer, D. H. (2004), 'A new measure of monetary shocks: Derivation and implications', American Economic Review **94**(4), 1055–1084.

Schmitt-Grohé, S. & Uribe, M. (2007), 'Optimal simple and implementable monetary and fiscal rules', Journal of monetary Economics **54**(6), 1702–1725.

Schmitt-Grohé, S. & Uribe, M. (2012), 'What's news in business cycles', Econometrica **80**(6), 2733–2764.

Shambaugh, J. C. (2004), 'The Effect of Fixed Exchange Rates on Monetary Policy*', The Quarterly Journal of Economics **119**(1), 301–352.
URL: *https://doi.org/10.1162/003355304772839605*

Swanson, E. T. (2021), 'Measuring the effects of federal reserve forward guidance and asset purchases on financial markets', Journal of Monetary Economics **118**, 32–53.

Taylor, J. B. (1993), Discretion versus policy rules in practice, in 'Carnegie-Rochester conference series on public policy', Vol. 39, Elsevier, pp. 195–214.

Vicondoa, A. (2019), 'Monetary news in the united states and business cycles in emerging economies', Journal of International Economics **117**, 79–90.

Wang, P. & Wen, Y. (2012), 'Hayashi meets kiyotaki and moore: A theory of capital adjustment costs', Review of Economic Dynamics **15**(2), 207–225.

Wang, Y., Whited, T. M., Wu, Y. & Xiao, K. (2022), 'Bank market power and monetary policy transmission: Evidence from a structural estimation', The Journal of Finance **77**(4), 2093–2141.

Wu, J. C. & Xia, F. D. (2016), 'Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound', Journal of Money, Credit and Banking **48**(2-3), 253–291. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/jmcb.12300.
URL: *https://onlinelibrary.wiley.com/doi/abs/10.1111/jmcb.12300*

Yang, Y. (2023), 'Redistributive inflation and optimal monetary policy', SSRN Working Paper (4275770).

Online Appendix

A Data Appendix

For robustness checks, we further discuss the effects of other shocks that are commonly used in the literature, including the changes of current month and three-month fed funds futures (denoted as GSS and FF4), three-month Eurodollar futures change (ED4) and forward guidance shock (FG)[21].

The data used to deal with the Fed information effect are constructed as the following: firstly, we replace the high-frequency shocks by two measures of information-free shocks, BRW shock from Bu et al. (2021) and *BS_orth* from Bauer & Swanson (2022)[22]; secondly, we plug the information shock calculated from Bu et al. (2021) (denoted as BRW Info) into Eq (6) to see if the baseline results will change after controlling the information effects of monetary policy.

For the macro data used in the VAR part, we collect U.S. BAA-10y spread from FRED. The exchange rate data is from the quarterly average depreciation of the currency by broad indices, a weighted average of exchange rates to 64 other countries calculated by BIS. All other macro series are also from IMF-IFS dataset, following Vicondoa (2019).

In checking our model's external validity, we also collect quarterly data from BIS Debt Securities Statistics for country-level non-financial cooperations' debt securities. All data are measure in market value.

B Sample Countries and Base Countries

Table B1: Sample Coverage and Regimes

IFS	Country Name	Regime	Start Time	End Time	AE	EM

[21] See Kuttner (2001), Jarociński & Karadi (2020), Swanson (2021), Bauer & Swanson (2022) etc.

[22] They orthogonalize BS shocks on a set of economic and financial variables to remove the Fed information effects.

134	Germany	OF	1995/1/1	2012/4/1	1	0
156	Canada	OF	1995/1/1	2017/4/1	1	0
158	Japan	CF	1995/1/1	1999/10/1	1	0
158	Japan	OF	2000/1/1	2017/4/1	1	0
193	Australia	CF	1996/1/1	2015/10/1	1	0
193	Australia	OF	1995/1/1	2018/10/1	1	0
199	South Africa	CF	1995/1/1	2018/10/1	0	1
213	Argentina	CF	2010/4/1	2018/4/1	0	0
218	Bolivia	CF	1995/1/1	2008/10/1	0	0
218	Bolivia	CP	2004/1/1	2018/10/1	0	0
223	Brazil	CF	2000/1/1	2018/10/1	0	1
228	Chile	CF	2000/1/1	2018/10/1	0	1
228	Chile	OF	2005/1/1	2007/10/1	0	1
233	Colombia	CF	1995/4/1	2018/10/1	0	1
243	Dominican Republic	CF	1998/1/1	2013/10/1	0	0
243	Dominican Republic	CP	1996/4/1	2017/4/1	0	0
253	El Salvador	CP	1997/4/1	1999/10/1	0	0
253	El Salvador	OP	2000/1/1	2004/7/1	0	0
258	Guatemala	CF	1997/4/1	2000/10/1	0	0
258	Guatemala	OF	2001/1/1	2004/10/1	0	0
258	Guatemala	OP	2005/1/1	2006/4/1	0	0
273	Mexico	CF	1997/1/1	2018/10/1	0	1
283	Panama	OP	2002/4/1	2018/10/1	0	0
288	Paraguay	CF	1996/1/1	2017/1/1	0	0
288	Paraguay	CP	1995/1/1	1995/10/1	0	0
293	Peru	CF	1996/1/1	1996/10/1	0	1
293	Peru	OF	1997/1/1	2016/10/1	0	1

293	Peru	OP	2017/1/1	2018/10/1	0	1
298	Uruguay	CF	1995/1/1	1999/10/1	0	0
298	Uruguay	OF	2000/1/1	2018/10/1	0	0
299	Venezuela, RB	CF	1996/4/1	2018/7/1	0	0
299	Venezuela, RB	CP	2004/1/1	2017/10/1	0	0
299	Venezuela, RB	OF	2000/1/1	2001/10/1	0	0
311	Antigua and Barbuda	CP	1996/1/1	2009/10/1	0	0
311	Antigua and Barbuda	OP	1995/1/1	1995/10/1	0	0
321	Dominica	CP	1995/1/1	2018/4/1	0	0
328	Grenada	CP	2002/1/1	2018/4/1	0	0
343	Jamaica	CF	1995/4/1	2018/10/1	0	0
343	Jamaica	OF	2000/1/1	2006/10/1	0	0
361	St. Kitts	CP	1995/1/1	2016/4/1	0	0
362	St. Lucia	CP	2002/1/1	2018/1/1	0	0
364	St. Vincent	CP	1995/1/1	2017/4/1	0	0
419	Bahrain	CP	1996/1/1	2008/10/1	0	0
419	Bahrain	OP	1995/1/1	2016/1/1	0	0
439	Jordan	CP	1999/4/1	2000/10/1	0	0
439	Jordan	OP	2001/1/1	2014/10/1	0	0
443	Kuwait	CF	2007/1/1	2014/10/1	0	0
443	Kuwait	CP	1996/1/1	2018/10/1	0	0
443	Kuwait	OP	1995/1/1	1995/10/1	0	0
449	Oman	OP	2004/4/1	2018/10/1	0	0
453	Qatar	OP	2004/10/1	2018/10/1	0	0
456	Saudi Arabia	CP	2009/10/1	2018/1/1	0	0
513	Bangladesh	CF	1997/7/1	2017/10/1	0	0
513	Bangladesh	CP	2000/1/1	2018/10/1	0	0

524	Sri Lanka	CF	2004/1/1	2018/10/1	0	0
524	Sri Lanka	CP	2002/1/1	2011/10/1	0	0
532	Hong Kong, China	OP	1995/1/1	2018/10/1	1	0
534	India	CF	1995/1/1	2018/10/1	0	1
536	Indonesia	CF	1996/1/1	2017/1/1	0	1
536	Indonesia	OF	1995/1/1	1995/10/1	0	1
542	Korea, Rep.	CF	1995/1/1	2015/10/1	1	1
542	Korea, Rep.	OF	2016/1/1	2018/10/1	1	1
548	Malaysia	CF	1995/1/1	2018/10/1	0	1
548	Malaysia	CP	1999/1/1	2005/10/1	0	1
564	Pakistan	CF	1995/1/1	2018/10/1	0	0
564	Pakistan	CP	2002/1/1	2007/10/1	0	0
566	Philippines	CF	1995/1/1	2018/10/1	0	1
578	Thailand	CF	1997/1/1	2018/10/1	0	1
578	Thailand	CP	1995/1/1	1996/10/1	0	1
614	Angola	CF	2004/10/1	2018/10/1	0	0
614	Angola	CP	2011/1/1	2013/10/1	0	0
636	Congo, Dem. Rep.	CF	2007/4/1	2011/10/1	0	0
636	Congo, Dem. Rep.	CP	2012/1/1	2018/10/1	0	0
644	Ethiopia	CF	1995/1/1	2008/10/1	0	0
644	Ethiopia	CP	2000/1/1	2006/10/1	0	0
652	Ghana	CF	1995/1/1	2018/10/1	0	0
652	Ghana	CP	2004/1/1	2006/10/1	0	0
656	Guinea	CF	1996/1/1	2016/10/1	0	0
656	Guinea	CP	1995/1/1	2018/10/1	0	0
672	Libya	CF	1998/4/1	2005/7/1	0	0
688	Mozambique	CF	1998/4/1	2018/10/1	0	0

688	Mozambique	CP	2002/1/1	2003/10/1	0	0
714	Rwanda	CF	1998/1/1	2018/10/1	0	0
714	Rwanda	CP	1996/10/1	2011/10/1	0	0
819	Fiji	CF	1995/1/1	2018/10/1	0	0
846	Vanuatu	CF	1999/1/1	2000/10/1	0	0
846	Vanuatu	OF	1995/1/1	1998/10/1	0	0
853	Papua New Guinea	CF	1995/1/1	2018/10/1	0	0
853	Papua New Guinea	CP	2005/1/1	2006/10/1	0	0
915	Georgia	CF	2001/7/1	2012/10/1	0	0
915	Georgia	OF	2013/1/1	2018/10/1	0	0
916	Kazakhstan	CF	1996/7/1	2008/1/1	0	0
916	Kazakhstan	CP	2001/1/1	2002/10/1	0	0
917	Kyrgyz Republic	CF	2001/4/1	2016/10/1	0	0
917	Kyrgyz Republic	CP	2012/1/1	2018/10/1	0	0
921	Moldova	CF	1998/1/1	2018/10/1	0	0
921	Moldova	CP	1996/10/1	2006/10/1	0	0
922	Russian Federation	CF	2000/1/1	2018/10/1	0	1
923	Tajikistan	CF	2002/4/1	2018/10/1	0	0
923	Tajikistan	CP	2007/1/1	2013/10/1	0	0
926	Ukraine	CF	1997/1/1	2018/10/1	0	0
926	Ukraine	CP	2001/7/1	2013/10/1	0	0
946	Lithuania	CP	1996/1/1	1996/10/1	1	0
946	Lithuania	OP	1997/1/1	2001/10/1	1	0
948	Mongolia	CF	2003/4/1	2018/10/1	0	0

C Variance Decomposition of U.S. Monetary Policy Changes

The table below presents the summary statistics for U.S. monetary policy changes, along with its two components: the expected and shock components. For the variance decomposition, we use the Wu-Xia shadow rate as the measure of U.S. monetary policy. This choice is due to the fact that, under the zero lower bound, the shock and expected components have opposite signs but the same magnitude by construction. Note that

$$var(\Delta WuXia) = var(mps_t^{NS}) + var(\Delta WuXia - mps_t^{NS}) + 2cov(mps_t^{NS}, \Delta WuXia - mps_t^{NS}).$$

Between 1994 and 2007, the corresponding decomposition is

$$0.229441 = 0.051529 + 0.182329 - 0.004417.$$

While between 2010 and 2018, the corresponding decomposition is

$$0.100489 = 0.010609 + 0.121104 - 0.031224.$$

	R_t	ΔR_t	$\Delta WuXia$	$\Delta WuXia - mps_t^{NS}$	mps_t^{NS}
Panel A: 1994 - 2018					
Mean	2.518%	-0.040%	-0.039%	-0.048%	0.009%
Std.	2.295%	0.339%	0.455%	0.419%	0.202%
Panel B: 1994 - 2007					
Mean	4.183%	-0.013%	-0.043%	-0.060%	0.017%
Std.	1.780%	0.433%	0.479%	0.427%	0.227%
Panel C: 2010 - 2018					
Mean	0.690%	0.058%	0.078%	0.048%	0.031%
Std.	0.693%	0.103%	0.317%	0.348%	0.103%

Table C2: Summary Statistics of U.S. Interest Change

D Asymmetric Responses

In this section, we explore the asymmetric responses in the transmission of monetary policy shocks. Han & Wei (2018) document that peripheral countries tend to follow the U.S. in instances of unexpected monetary easing. We investigate whether the expected component alters this behavior. To identify this, we introduce a dummy variable $\mathbb{1}_t^{pos}$, which equals 1 when the base country increases its short-term interest rate and 0 otherwise. We define $\mathbb{1}_t^{neg} = 1 - \mathbb{1}_t^{pos}$, allowing us to model the response as follows:

$$\Delta R_{it} = \alpha + \beta^{pos}\mathbb{1}_t^{pos} exp_t + \beta^{neg}\mathbb{1}_t^{neg} exp_t + \gamma^{pos}\mathbb{1}_t^{pos} mps_t + \gamma^{neg}\mathbb{1}_t^{neg} mps_t + \zeta \Delta VIX_t + \mu_{it}. \quad (49)$$

We first revisit the asymmetric response documented by Han & Wei (2018), which shows significant asymmetry in Open-floating regimes from 1999 to 2009. To ascertain whether the Global Financial Crisis and data limitations might affect this pattern, we replicate their analysis using: (1) quarterly frequency data; (2) a broader sample covering all our study periods; (3) all U.S.-based countries with available short-term data. The results validate the asymmetric response pattern and are detailed in Appendix Table E15 and Table E16.

Having confirmed the asymmetric response in a larger sample, we further examine how the two components of U.S. monetary policy respond to positive and negative U.S. interest rate changes, with results reported in Table D3.

Table D3, in the "Baseline" column, shows that during both monetary tightening and easing periods, the simple interest pass-through in Open-floating regimes does not respond significantly to U.S. monetary policy, with similar magnitudes observed. However, when accounting for monetary policy shocks, the pass-through of negative shocks slightly exceeds 1 for both NS and BS shocks, while the response to positive monetary policy shocks remains statistically insignificant.

These findings indicate that the observed asymmetric response pattern is driven solely by monetary policy shocks, rather than by the expected component. Furthermore, the lack of responsiveness to the expected component is consistent across both positive and negative U.S. policy rate changes.

Table D3: Asymmetric Responses with Money Market Rate

	Baseline	NS Shock	BS Shock
$\Delta R_t \times \mathbb{1}^{pos}_{mm,t}$	0.243		
	(0.345)		
$\Delta R_t \times \mathbb{1}^{neg}_{mm,t}$	0.245		
	(0.188)		
$exp_t \times \mathbb{1}^{pos}_{mm,t}$		0.255	0.311
		(0.368)	(0.371)
$exp_t \times \mathbb{1}^{neg}_{mm,t}$		-0.121	-0.070
		(0.227)	(0.221)
$mps_t \times \mathbb{1}^{pos}_{mm,t}$		0.524	0.360
		(0.585)	(0.585)
$mps_t \times \mathbb{1}^{neg}_{mm,t}$		1.141***	1.174***
		(0.366)	(0.393)
ΔVIX_t	0.547*	0.693**	0.707**
	(0.304)	(0.307)	(0.310)
N	508	508	508
R^2	0.01	0.03	0.02

Notes: This table contains OLS estimates for Open-floating regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three columns: in the first column, it's the quarterly change of U.S. money market rate; in the second and third, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. $\mathbb{1}^{pos}_{mm,t} = 1$ when the U.S. money market rate change is positive at time t, otherwise 0. $\mathbb{1}^{neg}_{mm,t} = 1 - \mathbb{1}^{pos}_{mm,t}$. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

E Additional Evidence

E.1 Zero Lower Bound

Table E4: Baseline Results before GFC

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.631***	**0.206**	0.091	-0.059
	(0.166)	**(0.136)**	(0.141)	(0.130)
ΔVIX_t	0.243	**0.309**	0.019	0.453
	(0.272)	**(0.308)**	(0.310)	(0.285)
N	236	**306**	638	1359
R^2	0.15	**0.01**	0.00	0.00

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.607***	**-0.055**	0.052	-0.126
	(0.175)	**(0.226)**	(0.168)	(0.120)
mps_t	0.701**	**0.985*** **	0.211	0.147
	(0.226)	**(0.312)**	(0.195)	(0.283)
ΔVIX_t	0.272	**0.592**	0.067	0.532
	(0.267)	**(0.388)**	(0.307)	(0.324)
N	236	**306**	638	1359
R^2	0.15	**0.02**	0.00	0.00

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.604**	**-0.010**	0.051	-0.124
	(0.198)	**(0.195)**	(0.162)	(0.122)
mps_t	0.725**	**0.996*** **	0.235	0.172
	(0.265)	**(0.252)**	(0.168)	(0.268)
ΔVIX_t	0.292	**0.668**	0.088	0.568*
	(0.254)	**(0.395)**	(0.293)	(0.332)
N	236	**306**	638	1359
R^2	0.15	**0.02**	0.00	0.00

Notes: Each column contains sub-sample OLS estimates for specific regimes from 1995 to 2008. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table E5: Wuxia Results

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
$\Delta WuXia_t$	0.508***	**0.189**	0.046	0.076
	(0.082)	**(0.108)**	(0.087)	(0.103)
ΔVIX_t	-0.003	**0.491**	-0.236	0.668***
	(0.079)	**(0.286)**	(0.222)	(0.156)
N	454	**508**	1100	2429
R^2	0.13	**0.01**	0.00	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
$\Delta WuXia_t - mps_t$	0.464***	**0.036**	0.040	0.069
	(0.094)	**(0.135)**	(0.100)	(0.099)
mps_t	0.718***	**0.920*** **	0.076	0.113
	(0.172)	**(0.230)**	(0.246)	(0.211)
ΔVIX_t	0.050	**0.669** **	-0.229	0.678***
	(0.072)	**(0.305)**	(0.251)	(0.162)
N	454	**508**	1100	2429
R^2	0.10	**0.02**	0.00	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
$\Delta WuXia_t - mps_t$	0.464***	**0.077**	0.036	0.070
	(0.101)	**(0.123)**	(0.093)	(0.101)
mps_t	0.765***	**0.879*** **	0.110	0.113
	(0.170)	**(0.177)**	(0.234)	(0.191)
ΔVIX_t	0.068	**0.673** **	-0.220	0.679***
	(0.064)	**(0.296)**	(0.250)	(0.155)
N	454	**508**	1100	2429
R^2	0.10	**0.02**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of shadow rate from Wu & Xia (2016); in Panel B and C, it's the difference between shadow rate and rescaled monetary policy shocks together with the monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

E.2 Systematic Change of U.S. Monetary Policy

Table E6: Expected Monetary Policy Change Implied by Taylor's Rule: U.S. Treasury 2Y

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.636***	**0.244***	0.142	-0.011
	(0.138)	**(0.129)**	(0.125)	(0.117)
ΔVIX_t	0.158	**0.547***	-0.206	0.656***
	(0.103)	**(0.272)**	(0.226)	(0.256)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
$\Delta \bar{R}_t$	0.033*	**-0.046**	-0.027	-0.019
	(0.016)	**(0.052)**	(0.025)	(0.026)
mps_t	0.699***	**0.923*** **	0.079	0.118
	(0.158)	**(0.227)**	(0.249)	(0.212)
ΔVIX_t	0.194**	**0.602***	-0.268	0.646***
	(0.083)	**(0.282)**	(0.243)	(0.163)
N	454	**508**	1100	2429
R^2	0.05	**0.03**	0.00	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
$\Delta \bar{R}_t$	0.029*	**-0.052**	-0.028	-0.019
	(0.014)	**(0.053)**	(0.026)	(0.027)
mps_t	0.689***	**0.892*** **	0.117	0.118
	(0.181)	**(0.182)**	(0.235)	(0.190)
ΔVIX_t	0.201**	**0.608** **	-0.259	0.649***
	(0.081)	**(0.278)**	(0.243)	(0.158)
N	454	**508**	1100	2429
R^2	0.05	**0.02**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the monetary policy shocks together with the Taylor's rule implied U.S. interest change as in Bauer & Swanson (2022) with 2-year U.S. Treasury rate. The percentage change of VIX and lag of the home country monetary policy change are controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table E7: Expected Monetary Policy Change Implied by Taylor's Rule: EFFR

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.636***	**0.244***	0.142	-0.011
	(0.138)	**(0.129)**	(0.125)	(0.117)
ΔVIX_t	0.158	**0.547***	-0.206	0.656***
	(0.103)	**(0.272)**	(0.226)	(0.256)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
$\Delta \bar{R}_t$	0.037**	**-0.041**	-0.026	-0.019
	(0.017)	**(0.052)**	(0.027)	(0.027)
mps_t	0.694***	**0.925*** **	0.080	0.119
	(0.157)	**(0.230)**	(0.249)	(0.212)
ΔVIX_t	0.202**	**0.610***	-0.268	0.645***
	(0.083)	**(0.285)**	(0.242)	(0.164)
N	454	**508**	1100	2429
R^2	0.05	**0.02**	0.00	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
$\Delta \bar{R}_t$	0.033*	**-0.047**	-0.027	-0.020
	(0.016)	**(0.053)**	(0.027)	(0.027)
mps_t	0.683***	**0.894*** **	0.119	0.120
	(0.180)	**(0.184)**	(0.235)	(0.191)
ΔVIX_t	0.209**	**0.615** **	-0.259	0.648***
	(0.081)	**(0.281)**	(0.242)	(0.259)
N	454	**508**	1100	2429
R^2	0.05	**0.02**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the monetary policy shocks together with the Taylor's rule implied U.S. interest change as in Bauer & Swanson (2022) with EFFR. The percentage change of VIX and lag of the home country monetary policy change are controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table E8: Baseline Results and U.S. Monetary Policy Change Implied by Taylor's Rule: 2-year

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.636***	**0.244***	0.142	-0.011
	(0.138)	**(0.129)**	(0.125)	(0.117)
ΔVIX_t	0.158	**0.547***	-0.206	0.656***
	(0.103)	**(0.272)**	(0.226)	(0.256)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.642***	**0.064**	0.209	-0.033
	(0.161)	**(0.171)**	(0.138)	(0.122)
mps_t	0.654***	**0.915*** **	0.085	0.116
	(0.162)	**(0.233)**	(0.248)	(0.215)
ΔVIX_t	0.144	**0.597***	-0.285	0.647***
	(0.082)	**(0.287)**	(0.244)	(0.163)
$\Delta \bar{R}_t$	-0.010	**-0.051**	-0.040*	-0.016
	(0.019)	**(0.042)**	(0.022)	(0.027)
N	454	**508**	1100	2429
R^2	0.15	**0.03**	0.00	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.639***	**0.115**	0.191	-0.028
	(0.179)	**(0.145)**	(0.130)	(0.124)
mps_t	0.664***	**0.882*** **	0.128	0.116
	(0.165)	**(0.183)**	(0.235)	(0.195)
ΔVIX_t	0.146*	**0.598***	-0.276	0.650***
	(0.077)	**(0.282)**	(0.243)	(0.157)
$\Delta \bar{R}_t$	-0.010	**-0.051**	-0.039*	-0.017
	(0.019)	**(0.046)**	(0.023)	(0.028)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the monetary policy shocks together, expected component and the Taylor's rule implied U.S. interest change as in Bauer & Swanson (2022) with 2-year Treasury. The percentage change of VIX and lag of the home country monetary policy change are controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table E9: Baseline Results and U.S. Monetary Policy Change Implied by Taylor's Rule: EFFR

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.636***	**0.244***	0.142	-0.011
	(0.138)	**(0.129)**	(0.125)	(0.117)
ΔVIX_t	0.158	**0.547***	-0.206	0.656***
	(0.103)	**(0.272)**	(0.226)	(0.256)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.642***	**0.061**	0.210	-0.032
	(0.163)	**(0.170)**	(0.138)	(0.122)
mps_t	0.654***	**0.919*** **	0.088	0.117
	(0.162)	**(0.236)**	(0.249)	(0.216)
ΔVIX_t	0.145*	**0.604***	-0.286	0.646***
	(0.081)	**(0.291)**	(0.243)	(0.164)
$\Delta \bar{R}_t$	-0.009	**-0.046**	-0.040*	-0.017
	(0.021)	**(0.042)**	(0.024)	(0.028)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.639***	**0.113**	0.192	-0.027
	(0.180)	**(0.144)**	(0.130)	(0.125)
mps_t	0.664***	**0.885*** **	0.131	0.118
	(0.165)	**(0.184)**	(0.236)	(0.197)
ΔVIX_t	0.148*	**0.604***	-0.277	0.649***
	(0.077)	**(0.285)**	(0.242)	(0.159)
$\Delta \bar{R}_t$	-0.009	**-0.055**	-0.039	-0.018
	(0.020)	**(0.046)**	(0.024)	(0.029)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the monetary policy shocks together, expected component and the Taylor's rule implied U.S. interest change as in Bauer & Swanson (2022) with EFFR. The percentage change of VIX and lag of the home country monetary policy change are controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

E.3 Alternative Shock Measures

Table E10: Robustness Check: Different Shock Measures

Panel A: Expected Interest Change + GSS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.582***	**0.165**	0.083	-0.088
	(0.168)	**(0.125)**	(0.152)	(0.135)
mps_t	1.041**	**0.908**	0.124	0.480*
	(0.448)	**(0.616)**	(0.360)	(0.283)
ΔVIX_t	0.206*	**0.624***	-0.179	0.656***
	(0.102)	**(0.310)**	(0.253)	(0.173)
N	454	**508**	1100	2429
R^2	0.16	**0.02**	0.00	0.01

Panel B: Expected Interest Change + FF4 Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.595***	**0.004**	0.014	-0.158
	(0.165)	**(0.191)**	(0.176)	(0.125)
mps_t	0.750***	**0.926*** **	0.310	0.364*
	(0.205)	**(0.243)**	(0.330)	(0.205)
ΔVIX_t	0.186*	**0.710** **	-0.126	0.692***
	(0.093)	**(0.311)**	(0.275)	(0.186)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.00	0.01

Panel C: Expected Interest Change + FG Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.656***	**0.175**	0.128	0.003
	(0.141)	**(0.156)**	(0.139)	(0.115)
mps_t	0.534**	**0.606*** **	-0.119	-0.164
	(0.179)	**(0.184)**	(0.292)	(0.314)
ΔVIX_t	0.145	**0.591***	-0.210	0.576***
	(0.097)	**(0.274)**	(0.224)	(0.165)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.00

Notes: Each column contains sub-sample OLS estimates for regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables are the expected change of U.S. MP together with the shocks. MP1 refers to change of current month fed funds rate; FF4 refers to change of three-month eurodollar; FG shock is the shock of forward guidance in Swanson (2021). The percentage change of VIX is controlled. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

E.4 Resample Data

Table E11: Robustness Check: RR exchange regime

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.612***	**0.229**	0.114	-0.036
	(0.138)	**(0.140)**	(0.112)	(0.114)
ΔVIX_t	0.221*	**0.506***	0.184	0.424***
	(0.116)	**(0.259)**	(0.238)	(0.150)
N	458	**504**	805	2724
R^2	0.15	**0.01**	0.00	0.00

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.596***	**-0.012**	0.049	-0.054
	(0.152)	**(0.220)**	(0.149)	(0.120)
mps_t	0.658***	**0.929*** **	0.310	0.018
	(0.155)	**(0.249)**	(0.238)	(0.176)
ΔVIX_t	0.232*	**0.603** **	0.229	0.434***
	(0.107)	**(0.274)**	(0.259)	(0.154)
N	458	**504**	808	2724
R^2	0.15	**0.02**	0.00	0.00

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.592***	**0.051**	0.066	-0.056
	(0.169)	**(0.183)**	(0.146)	(0.121)
mps_t	0.676***	**0.841*** **	0.269	0.029
	(0.164)	**(0.185)**	(0.215)	(0.166)
ΔVIX_t	0.239**	**0.606** **	0.226	0.438***
	(0.095)	**(0.271)**	(0.259)	(0.149)
N	458	**504**	805	2724
R^2	0.15	**0.02**	0.00	0.00

Notes: Each column contains sub-sample OLS estimates for regimes in our full sample. Different from the baseline result, we identify exchange rate regime by Ilzetzki et al. (2019) here. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table E12: Robustness Check: AREAER Capital Control Index

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.667***	**0.083**	0.086	0.004
	(0.149)	**(0.160)**	(0.130)	(0.124)
ΔVIX_t	0.347**	**0.637****	-0.255	0.579***
	(0.145)	**(0.282)**	(0.218)	(0.175)
N	448	**742**	1106	2195
R^2	0.09	**0.01**	0.00	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.653***	**-0.108**	0.096	-0.033
	(0.170)	**(0.239)**	(0.154)	(0.121)
mps_t	0.707**	**0.611**	0.055	0.117
	(0.266)	**(0.425)**	(0.219)	(0.198)
ΔVIX_t	0.354**	**0.753****	-0.262	0.599***
	(0.131)	**(0.330)**	(0.238)	(0.176)
N	448	**742**	1106	2195
R^2	0.09	**0.01**	0.00	0.00

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.702***	**-0.064**	0.072	-0.033
	(0.162)	**(0.211)**	(0.144)	(0.125)
mps_t	0.558*	**0.571**	0.130	0.126
	(0.268)	**(0.398)**	(0.217)	(0.175)
ΔVIX_t	0.322**	**0.767****	-0.245	0.606***
	(0.124)	**(0.338)**	(0.237)	(0.170)
N	448	**742**	1106	2195
R^2	0.09	**0.01**	0.00	0.00

Notes: Each column contains sub-sample OLS estimates for regimes in our full sample. Different from the baseline result, we identify capital control by Fernández et al. (2016) here. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table E13: Robustness Check: Mid-range Chinn-ito Index

Panel A: Simple Interest Change in US + VIX						
	Open-peg	**Open-floating**	Mid-Peg	Mid-Floating	Close-peg	Close-floating
ΔR_t	0.636***	**0.244***	0.255	-0.018	-0.047	-0.023
	(0.138)	**(0.129)**	(0.206)	(0.164)	(0.177)	(0.157)
ΔVIX_t	0.158	**0.547***	0.481*	0.779***	-0.740*	0.362
	(0.103)	**(0.272)**	(0.233)	(0.178)	(0.364)	(0.291)
N	454	**508**	527	1324	580	1132
R^2	0.15	**0.01**	0.01	0.01	0.01	0.00

Panel B: Expected Interest Change + NS Shock						
	Open-peg	**Open-floating**	Mid-Peg	Mid-Floating	Close-peg	Close-floating
exp_t	0.632***	**0.013**	0.159	-0.106	0.065	-0.017
	(0.150)	**(0.204)**	(0.259)	(0.172)	(0.24)	(0.165)
mps_t	0.650***	**0.920*** **	0.550*	0.240	-0.368	-0.041
	(0.164)	**(0.240)**	(0.271)	(0.289)	(0.396)	(0.265)
ΔVIX_t	0.161	**0.675****	0.521**	0.837***	-0.824*	0.360
	(0.092)	**(0.298)**	(0.243)	(0.202)	(0.423)	(0.289)
N	454	**508**	527	1324	580	1132
R^2	0.15	**0.02**	0.01	0.01	0.01	0.00

Panel C: Expected Interest Change + BS Shock						
	Open-peg	**Open-floating**	Mid-Peg	Mid-Floating	Close-peg	Close-floating
exp_t	0.630***	**0.063**	0.142	-0.082	0.060	-0.040
	(0.168)	**(0.172)**	(0.252)	(0.166)	(0.196)	(0.177)
mps_t	0.656***	**0.868*** **	0.618*	0.175	-0.404	0.034
	(0.176)	**(0.182)**	(0.308)	(0.259)	(0.379)	(0.230)
ΔVIX_t	0.163*	**0.686****	0.540**	0.832***	-0.842*	0.373
	(0.080)	**(0.294)**	(0.247)	(0.193)	(0.414)	(0.279)
N	454	**508**	527	1324	580	1132
R^2	0.15	**0.02**	0.01	0.01	0.01	0.00

Notes: Each column contains sub-sample OLS estimates for regimes in our full sample. Different from the baseline result, we break down the "Closed" countries in baseline results into "Mid-range" and "Closed" here. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

E.5 Asymmetric Response in Extended Sample

Table E14: Asymmetric Response with Policy Rate

	Baseline	NS Shock	BS Shock
$\Delta R_t \times \mathbb{1}_{pr,t}^{pos}$	0.342		
	(0.340)		
$\Delta R_t \times \mathbb{1}_{pr,t}^{neg}$	0.211		
	(0.178)		
$exp_t \times \mathbb{1}_{pr,t}^{pos}$		0.366	0.376
		(0.418)	(0.402)
$exp_t \times \mathbb{1}_{pr,t}^{neg}$		-0.068	0.001
		(0.203)	(0.198)
$mps_t \times \mathbb{1}_{pr,t}^{pos}$		0.292	0.271
		(0.743)	(0.767)
$mps_t \times \mathbb{1}_{pr,t}^{neg}$		1.045***	0.994***
		(0.343)	(0.367)
ΔVIX_t	0.540*	0.714**	0.733**
	(0.305)	(0.309)	(0.314)
N	508	508	508
R^2	0.01	0.03	0.02

Notes: This table contains OLS estimates for Open-floating regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three columns: in the first column, it's the quarterly change of U.S. money market rate; in the second and third, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. $\mathbb{1}_{pr,t}^{pos} = 1$ when the U.S. policy rate change is positive at time t, otherwise 0. $\mathbb{1}_{pr,t}^{neg} = 1 - \mathbb{1}_{pr,t}^{pos}$. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table E15: Replication of Asymmetric Response in Han & Wei (2018)

	Han & Wei (2018)	Replication	1990-2009	1990-2019
ΔR_t^{pos}	0.224	0.034	-0.090	0.111
	(0.252)	(0.258)	(0.367)	(0.260)
ΔR_t^{neg}	0.520***	0.606***	0.750***	0.581***
	(0.169)	(0.166)	(0.241)	(0.173)
ΔVIX_t	-0.034	-0.367	-0.931	-0.519
	(0.218)	(0.452)	(0.727)	(0.510)
Δgdp_t	0.087	-0.026	-0.125	-0.034
	(0.074)	(0.058)	(0.086)	(0.049)
Δcpi_t	0.355*	0.405*	0.626***	0.415***
	(0.160)	(0.111)	(0.148)	(0.099)
$r_{i,t-1}$	-0.119***	-0.120***	-0.125	0.029
	(0.028)	(0.028)	(0.086)	(0.027)
N	143	148	198	307
R^2	0.32	0.30	0.13	0.10

Notes: The first column documents the subsample regression result of Open-floating regimes by Han & Wei (2018) through 1999-2009; the second column documents our replication results; in the last two columns we extend their samples to longer horizon.

Table E16: Extend Asymmetric Response of Han & Wei (2018) to U.S.-based with Available Data

	1999-2009	1999-2009	1995-2019	1995-2019
ΔR_t^{pos}	-0.495	-0.529	-0.258	-0.275
	(0.358)	(0.338)	(0.273)	(0.266)
ΔR_t^{neg}	0.326	0.346*	0.204	0.211
	(0.213)	(0.204)	(0.169)	(0.167)
ΔVIX_t	-0.062	-0.416	-0.484	-0.660
	(0.589)	(0.564)	(0.484)	(0.473)
Δgdp_t		0.024		-0.004
		(0.062)		(0.033)
Δcpi_t		0.125***		0.135***
		(0.030)		(0.028)
$r_{i,t-1}$		-0.045***		-0.022
		(0.014)		(0.014)
N	186	186	404	404
R^2	0.02	0.14	0.01	0.07

Notes: Here we include all countries with Open-floating regime whose base country is U.S. in sample that have available data(22 countries in total)

E.6 Lag Change of Interest Rate

Table E17: Baseline Results with Lag of U.S. Monetary Policy Change

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.656***	**0.083**	-0.213	-0.215
	(0.209)	**(0.188)**	(0.173)	(0.156)
ΔVIX_t	0.167	**0.485**	-0.352	0.562***
	(0.131)	**(0.274)**	(0.256)	(0.168)
$\Delta R_{b,t-1}$	0.028	**0.221**	0.485**	0.296**
	(0.112)	**(0.251)**	(0.218)	(0.119)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.01	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.652**	**-0.189**	-0.208	-0.269*
	(0.228)	**(0.214)**	(0.193)	(0.157)
mps_t	0.666***	**0.753****	-0.226	-0.077
	(0.208)	**(0.331)**	(0.272)	(0.224)
ΔVIX_t	0.168	**0.607***	-0.354	0.587***
	(0.120)	**(0.304)**	(0.273)	(0.174)
$\Delta R_{b,t-1}$	-0.027	**0.264**	0.484**	0.304**
	(0.115)	**(0.243)**	(0.218)	(0.119)
N	454	**508**	1100	2429
R^2	0.15	**0.03**	0.01	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.650**	**-0.108**	-0.209	-0.256
	(0.245)	**(0.206)**	(0.187)	(0.160)
mps_t	0.674***	**0.706****	-0.224	-0.093
	(0.200)	**(0.262)**	(0.256)	(0.199)
ΔVIX_t	0.171	**0.623***	-0.354	0.591***
	(0.107)	**(0.300)**	(0.275)	(0.170)
$\Delta R_{b,t-1}$	-0.027	**0.232**	0.485**	0.299**
	(0.115)	**(0.250)**	(0.218)	(0.119)
N	454	**508**	1100	2429
R^2	0.15	**0.02**	0.01	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes. The dependent variable is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly U.S. MP change with the MP shocks. The percentage change of VIX and lag of the U.S. MP are controlled. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table E18: Baseline Results with Lag of Home Country Monetary Policy Change

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.674***	**0.245***	0.146	0.023
	(0.158)	**(0.128)**	(0.127)	(0.110)
ΔVIX_t	0.191	**0.545***	-0.206	0.687***
	(0.118)	**(0.279)**	(0.226)	(0.158)
$\Delta R_{i,t-1}$	-0.089	**0.003**	0.078	0.091***
	(0.053)	**(0.037)**	(0.053)	(0.026)
N	450	**508**	1089	2412
R^2	0.16	**0.01**	0.01	0.03

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.672***	**0.014**	0.169	-0.022
	(0.168)	**(0.204)**	(0.145)	(0.110)
mps_t	0.680***	**0.921*** **	0.079	0.156
	(0.184)	**(0.239)**	(0.249)	(0.201)
ΔVIX_t	0.192	**0.673** **	-0.220	0.713***
	(0.109)	**(0.305)**	(0.251)	(0.167)
$\Delta R_{i,t-1}$	-0.089	**0.004**	0.078	0.091***
	(0.052)	**(0.038)**	(0.052)	(0.026)
N	450	**508**	1089	2412
R^2	0.16	**0.02**	0.01	0.03

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.673***	**0.064**	0.152	-0.019
	(0.186)	**(0.171)**	(0.136)	(0.112)
mps_t	0.676***	**0.868*** **	0.125	0.158
	(0.187)	**(0.183)**	(0.239)	(0.175)
ΔVIX_t	0.191*	**0.685** **	-0.211	0.720***
	(0.098)	**(0.301)**	(0.252)	(0.161)
$\Delta R_{i,t-1}$	-0.089	**0.003**	0.078	0.091***
	(0.052)	**(0.037)**	(0.053)	(0.026)
N	450	**508**	1089	2412
R^2	0.15	**0.02**	0.01	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. The percentage change of VIX and lag of the home country monetary policy change are controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

E.7 Robustness check: MM results

Table E19: Baseline Results with Unfilled data

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.633***	**0.244***	0.126	-0.031
	(0.138)	**(0.129)**	(0.170)	(0.117)
ΔVIX	0.158	**0.547***	-0.255	0.629***
	(0.108)	**(0.272)**	(0.250)	(0.154)
N	434	**508**	920	2242
R^2	0.15	**0.01**	0.00	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.615***	**0.013**	0.151	-0.079
	(0.149)	**(0.204)**	(0.189)	(0.125)
mps_t	0.684***	**0.920*** **	0.041	0.107
	(0.164)	**(0.240)**	(0.323)	(0.192)
ΔVIX	0.168	**0.675****	-0.276	0.655***
	(0.098)	**(0.298)**	(0.288)	(0.154)
N	434	**508**	920	2242
R^2	0.15	**0.02**	0.00	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.614***	**0.063**	0.160	-0.076
	(0.169)	**(0.172)**	(0.182)	(0.123)
mps_t	0.694***	**0.868*** **	0.010	0.108
	(0.179)	**(0.182)**	(0.287)	(0.175)
ΔVIX	0.172*	**0.686****	-0.285	0.662***
	(0.086)	**(0.294)**	(0.282)	(0.150)
N	434	**508**	920	2242
R^2	0.15	**0.02**	0.00	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes in our full sample except from the data filled by three-month treasury bill. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of shadow rate from Wu & Xia (2016); in Panel B and C, it's the difference between shadow rate and rescaled monetary policy shocks together with the monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

E.8 Robustness Check: Unscheduled FOMC Meetings

Table E20: Robustness Check: Baseline Results including Unscheduled FOMC Meetings

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.636***	**0.244***	0.087	-0.024
	(0.138)	**(0.129)**	(0.132)	(0.117)
ΔVIX_t	0.158	**0.547***	-0.184	0.595***
	(0.103)	**(0.272)**	(0.224)	(0.169)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.00

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.583***	**0.207**	0.167	-0.152
	(0.135)	**(0.154)**	(0.165)	(0.126)
mps_t	0.714**	**0.295**	-0.044	0.172
	(0.242)	**(0.170)**	(0.188)	(0.175)
ΔVIX_t	0.171	**0.553***	-0.208	0.626***
	(0.106)	**(0.278)**	(0.239)	(0.174)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.596***	**0.163**	0.095	-0.123
	(0.150)	**(0.148)**	(0.144)	(0.123)
mps_t	0.727***	**0.423****	0.067	0.210
	(0.227)	**(0.174)**	(0.202)	(0.185)
ΔVIX_t	0.167	**0.563***	-0.186	0.616***
	(0.100)	**(0.276)**	(0.232)	(0.168)
N	454	**508**	1100	2429
R^2	0.15	**0.01**	0.00	0.00

Notes: Each column contains sub-sample OLS estimates for regimes in our full sample. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables differ in three panels: in Panel A, it's the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. Different from the baseline result, we include unscheduled FOMC meetings when calculating quarterly monetary policy shocks. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

E.9 Extended Discussion: Instrumental Variable

Table E21: Extended Discussion: Instrumental Variable

Panel A: NS Shock Second Stage				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.648***	**0.825*** **	0.071	0.105
	(0.133)	**(0.275)**	(0.235)	(0.191)
ΔVIX_t	0.162	**0.701** **	-0.222	0.696***
	(0.138)	**(0.314)**	(0.218)	(0.187)
N	454	**508**	1100	2429
R^2	0.15	**0.00**	0.00	0.00

Panel B: BS Shock Second Stage				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.654***	**0.787*** **	0.105	0.099
	(0.138)	**(0.293)**	(0.247)	(0.197)
ΔVIX_t	0.163	**0.691** **	-0.215	0.694***
	(0.138)	**(0.314)**	(0.219)	(0.187)
N	454	**508**	1100	2429
R^2	0.15	**0.00**	0.00	0.00

Notes: This table presents the second-stage results of using monetary policy shocks as the instrumental variable of simple interest change in the baseline regression. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variable is the quarterly change of U.S. money market rate. In Panel A and B, the IV is NS shock and BS shock, respectively. The percentage change of VIX is controlled in each regression. Constant term is not displayed. Standard errors clustered at the country level are reported in the parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

E.10 Robustness Check: Info Effect(Forward Looking Fundamentals)

E.11 Time Series of BS and NS shock

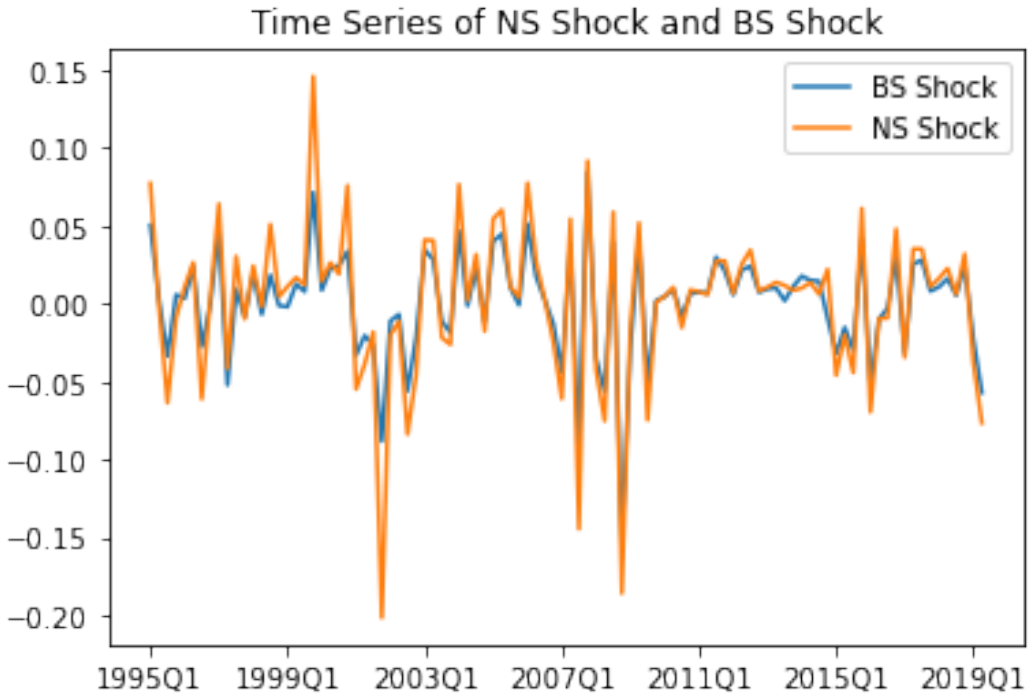


Figure E1: Time Series of BS and NS Shock

Table E22: Baseline Results with Information Effect(Forward Fundamentals Expectation)

Panel A: Simple Interest Change in US + VIX				
	Open-peg	**Open-floating**	Close-peg	Close-floating
ΔR_t	0.635***	**0.257***	0.079	0.038
	(0.144)	**(0.132)**	(0.133)	(0.122)
ΔVIX_t	0.117	**0.026**	-0.774**	0.057
	(0.302)	**(0.181)**	(0.330)	(0.252)
$rgdp_t^1$	-0.000	**-0.154****	-0.176***	-0.240***
	(0.065)	**(0.060)**	(0.064)	(0.060)
$pcpi_t^1$	-0.044	**-0.122**	-0.084*	-0.012
	(0.025)	**(0.108)**	(0.040)	(0.034)
N	414	**472**	1037	2261
R^2	0.15	**0.03**	0.01	0.01

Panel B: Expected Interest Change + NS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.633***	**0.022**	0.121	0.010
	(0.151)	**(0.212)**	(0.160)	(0.121)
mps_t	0.639***	**0.955*****	-0.049	0.122
	(0.188)	**(0.264)**	(0.261)	(0.213)
ΔVIX_t	0.118	**0.225**	-0.814**	0.085
	(0.306)	**(0.235)**	(0.364)	(0.265)
$rgdp_t^1$	-0.000	**-0.147****	-0.178***	-0.238***
	(0.066)	**(0.060)**	(0.063)	(0.060)
$pcpi_t^1$	-0.044	**-0.113**	-0.086*	-0.010
	(0.025)	**(0.107)**	(0.042)	(0.034)
N	414	**472**	1037	2261
R^2	0.15	**0.04**	0.01	0.01

Panel C: Expected Interest Change + BS Shock				
	Open-peg	**Open-floating**	Close-peg	Close-floating
exp_t	0.631***	**0.067**	0.110	0.001
	(0.171)	**(0.180)**	(0.149)	(0.124)
mps_t	0.645***	**0.929*****	-0.027	0.160
	(0.192)	**(0.203)**	(0.243)	(0.189)
ΔVIX_t	0.121	**0.240**	-0.808**	0.101
	(0.286)	**(0.224)**	(0.356)	(0.257)
$rgdp_t^1$	-0.000	**-0.150****	-0.177***	-0.239***
	(0.065)	**(0.060)**	(0.063)	(0.060)
$pcpi_t^1$	-0.044*	**-0.112**	-0.085**	-0.009
	(0.024)	**(0.107)**	(0.041)	(0.034)
N	414	**472**	1037	2261
R^2	0.15	**0.04**	0.01	0.01

Notes: Each column contains sub-sample OLS estimates for specific regimes. The dependent variable is the quarterly money market rate change of peripheral countries. The independent variables in Panel A, is the quarterly change of U.S. money market rate; in Panel B and C, it's the expected quarterly U.S. MP change together with the MP shocks. The percentage change of VIX is controlled. We further control for the quarterly change of Fed's expectation on GDP growth and CPI in the next period. Standard errors clustered at the country level are reported in the parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

E.12 Distribution of Chinn-Ito Index

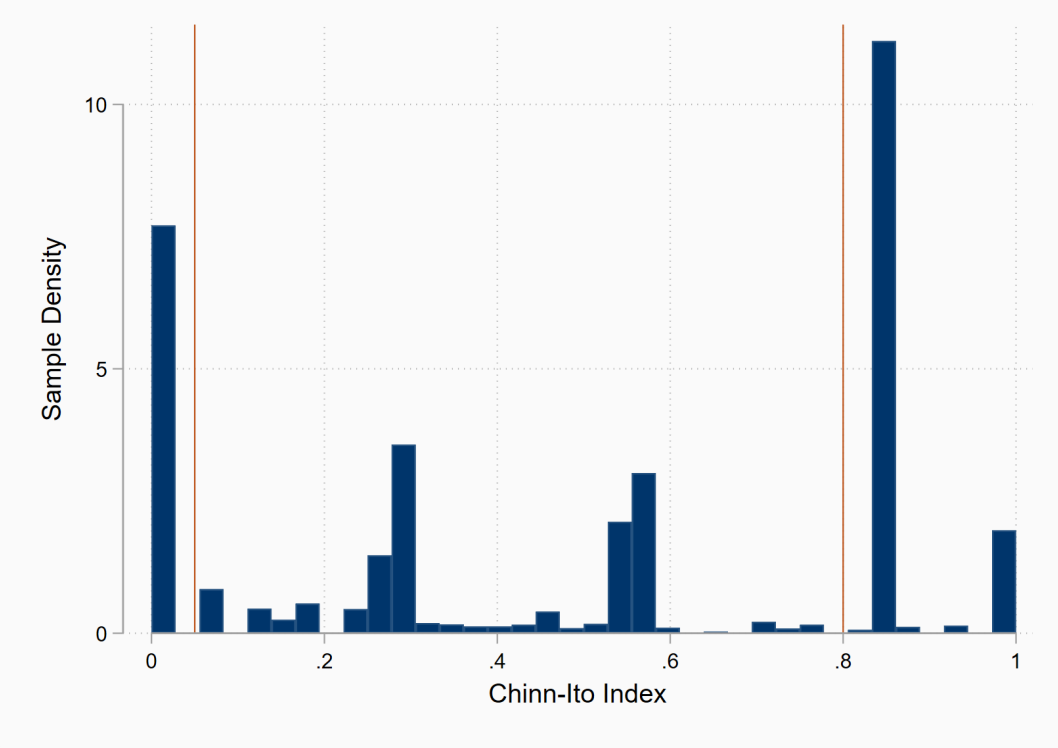


Figure E2: Distribution of Chinn-Ito Index in Sample

F External Validity

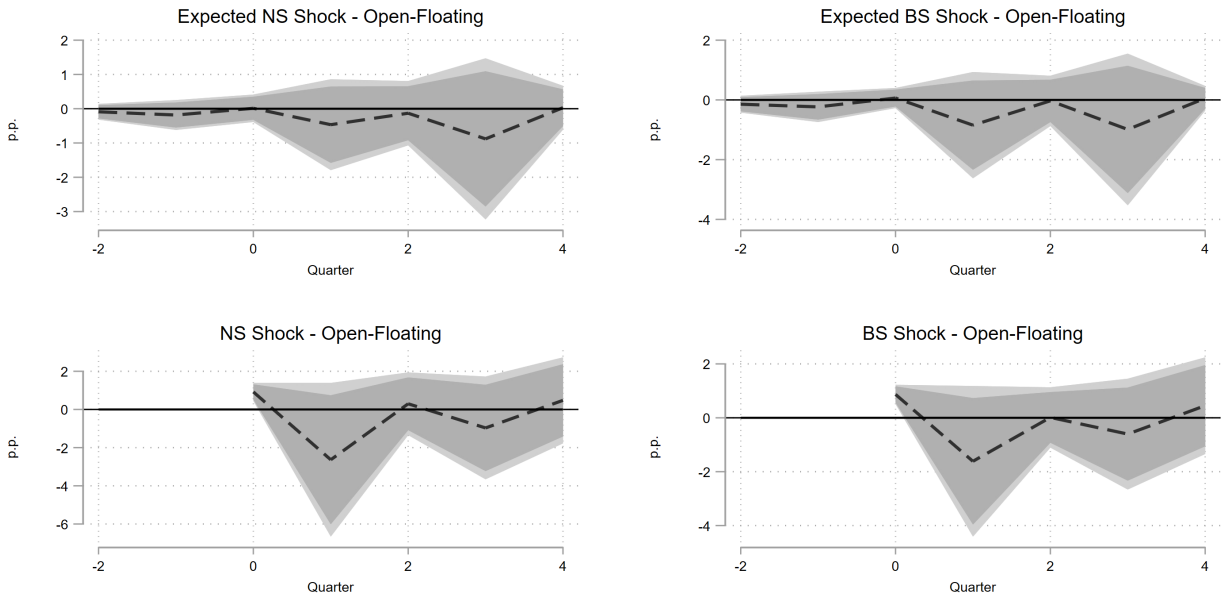


Figure F3: Local Projection for Money Market Rate Change in Open-floating Regimes

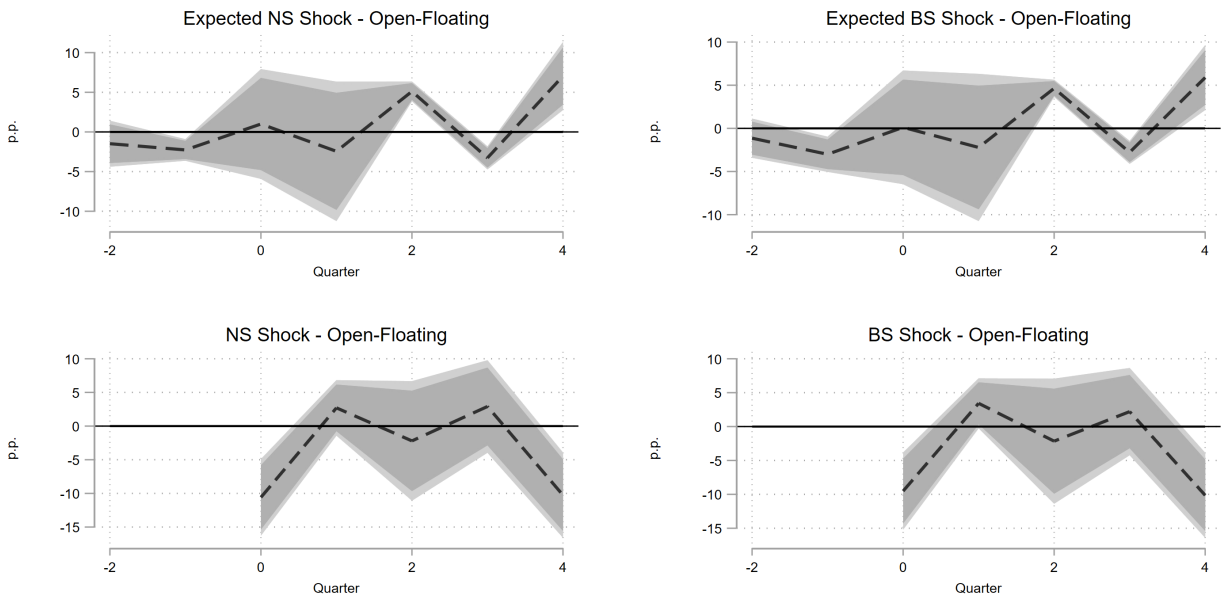


Figure F4: Local Projection for Non-financial Corporation Debt Change in Open-floating Regimes

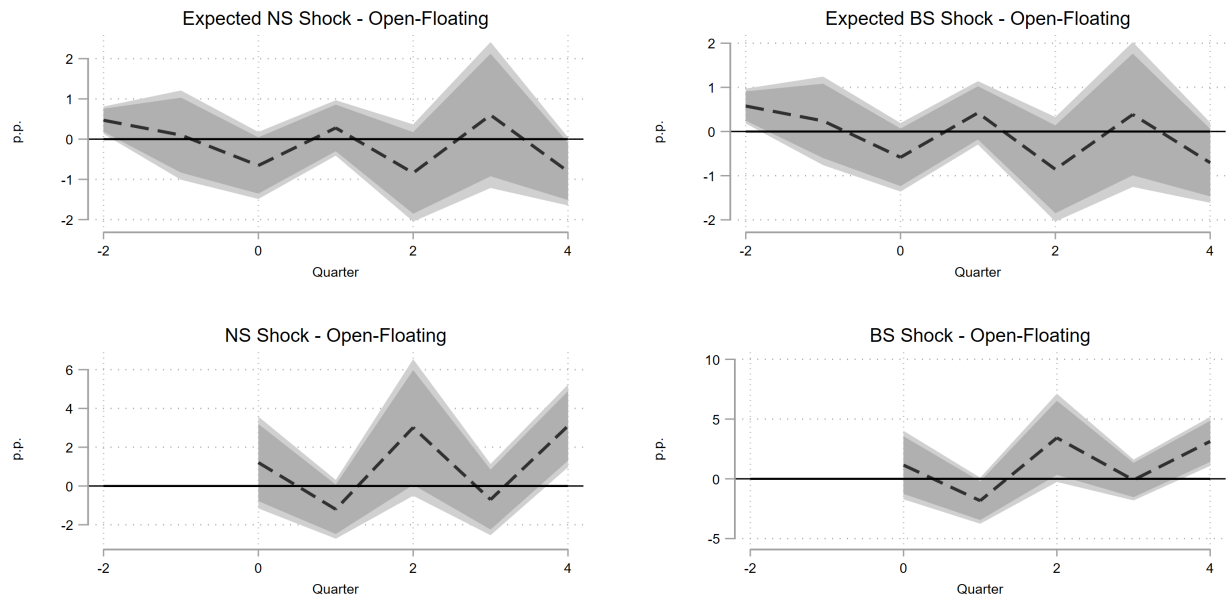


Figure F5: Local Projection for Exchange Rate Change in Open-floating Regimes

G MLE Results

Table G23: Baseline results by MLE

	KS's Results				KS's Results + NS shock				KS's Results + BS shock			
	OLS		MLE		OLS		MLE		OLS		MLE	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
β^{op}	0.651*	0.193	0.651*	0.090	0.632*	0.231	0.623*	0.114	0.628*	0.228	0.615*	0.112
$\boldsymbol{\beta^{of}}$	**0.239**	**0.174**	**0.239**	**0.192**	**0.020**	**0.206**	**0.023**	**0.224**	**0.074**	**0.201**	**0.078**	**0.215**
β^{cp}	0.128	0.133	0.128	0.126	0.111	0.154	0.111	0.151	0.103	0.152	0.102	0.149
β^{cf}	-0.055	0.084	-0.055	0.100	-0.090	0.098	-0.090	0.112	-0.084	0.097	-0.084	0.111
γ^{op}					0.709*	0.393	0.724*	0.159	0.726*	0.400	0.751*	0.163
$\boldsymbol{\gamma^{of}}$					**0.860***	**0.361**	**0.862***	**0.293**	**0.787***	**0.380**	**0.799***	**0.289**
γ^{cp}					0.183	0.258	0.174	0.224	0.215	0.264	0.202	0.232
γ^{cf}					0.053	0.167	0.053	0.219	0.042	0.171	0.043	0.208
ζ	0.363*	0.118	0.363*	0.111	0.390*	0.120	0.390*	0.112	0.395*	0.121	0.395*	0.112
θ_1			-62.957*	2.469			-62.931*	2.465			-62.938*	2.467
θ_2			35.459*	1.325			35.446*	1.323			35.450*	1.323
θ_3			-15.702*	0.555			-15.696*	0.554			-15.698*	0.555

Notes: This table presents OLS and MLE estimates from the models in paper. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables in OLS are the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. In MLE results we further plug in the U.S. GDP and M2. The MLE results take the OLS estimates as initial points. Quasi-Newton algorithm is used to optimize the maximum likelihood function. The percentage change of VIX is controlled in each model. An asterisk means significant at the 10% level.

Table G24: Baseline results by MLE

	Simple Interest Pass-through				NS shock				BS shock			
	OLS		MLE		OLS		MLE		OLS		MLE	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
β^{op}	0.636*	0.138	0.635*	0.092	0.632*	0.150	0.626*	0.115	0.630*	0.168	0.622*	0.112
$\boldsymbol{\beta^{of}}$	**0.244***	**0.129**	**0.250***	**0.196**	**0.013**	**0.204**	**0.024**	**0.225**	**0.063**	**0.172**	**0.079**	**0.216**
β^{cp}	0.087	0.132	0.092	0.129	0.096	0.158	0.107	0.151	0.090	0.146	0.102	0.149
β^{cf}	-0.024	0.117	-0.032	0.100	-0.067	0.117	-0.080	0.112	-0.064	0.119	-0.077	0.111
ζ^{op}	0.158	0.103	0.158	0.126	0.161	0.092	0.170	0.131	0.163*	0.080	0.178	0.128
ζ^{of}	0.547*	0.272	0.549*	0.236	0.675*	0.298	0.677*	0.254	0.686*	0.294	0.694*	0.252
ζ^{cp}	-0.184	0.224	-0.177	0.247	-0.189	0.248	-0.193	0.252	-0.186	0.248	-0.192	0.256
ζ^{cf}	0.595*	0.169	0.596*	0.165	0.620*	0.174	0.623*	0.166	0.626*	0.168	0.632	0.167
θ_1			-62.906*	2.461			-62.873*	2.457			-62.880*	2.458
θ_2			35.431*	1.321			35.414*	1.318			35.418*	1.318
θ_3			-15.690*	0.553			-15.682*	0.552			-15.684*	0.553
γ^{op}					0.650*	0.164	0.668*	0.166	0.656*	0.176	0.680*	0.166
$\boldsymbol{\gamma^{of}}$					**0.920***	**0.240**	**0.919***	**0.306**	**0.868***	**0.182**	**0.870***	**0.304**
γ^{cp}					0.062	0.245	0.042	0.230	0.079	0.233	0.053	0.242
γ^{cf}					0.105	0.204	0.111	0.222	0.107	0.181	0.115	0.212

Notes: This table presents OLS and MLE estimates from the models in paper. The dependent variable in each regression is the quarterly money market rate change of peripheral countries. The independent variables in OLS are the expected quarterly monetary policy change of U.S. together with the monetary policy shocks. In MLE results we further plug in the U.S. GDP and M2. The MLE results take the OLS estimates as initial points. Quasi-Newton algorithm is used to optimize the maximum likelihood function. The percentage change of VIX is controlled in each model. An asterisk means significant at the 10% level.