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# When the United States and the People's Republic of China Sneeze: Monetary Policy Spillovers to Asian Economies

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## Abstract

This paper examines monetary policy spillovers from the US and the People's Republic of China (PRC) to real and financial sectors in advanced and emerging Asian economies over the period 2000 to 2020. Using a structural vector autoregression (SVAR) approach, we find that Asian economies overall are more susceptible to spillovers to GDP, inflation, and the current account emanating from monetary policy shocks in the PRC than to those from the US. This is related to high interregional trade integration in Asia and is in line with previous research findings. However, while the prevailing literature has highlighted the dominant role of US monetary policy as a transmitter of shocks to global and Asian financial markets, we find more persistence in the response of advanced Asian interest rates to PRC monetary policy shocks. In addition, emerging Asian economies are found to be more susceptible to shocks emanating from the PRC in respect of equity markets and exchange rates. The rising synchronization of Asian financial markets in relation to the PRC as the financial account in the PRC has gradually opened as well as indirect effects via trade and regional value chains help to rationalize our findings.

**Keywords** Monetary Policy · Global Financial Cycle · International Spillovers · US · People's Republic of China

**JEL Classification** E44 · E52 · F33 · F42

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## 1 Introduction

The susceptibility of emerging economies to financial spillovers from advanced economies (mainly the US), particularly during crisis periods, is a well-established strand of the international finance literature. The dominant role of US monetary policy in affecting global financial market conditions is largely understood, given the position of the US as the world's largest economy as well as the role of the US dollar as a global reserve currency and its importance in international invoicing in trade and investment (e.g., Obstfeld 2020). That said, the rapid emergence of the People's Republic of China (PRC) as a global economic and financial heavyweight over the past decade or so may have had implications for the dynamics of global real and financial spillovers. In a recent paper, Miranda-Agrippino et al. (2020) found that US monetary policy dominates global spillovers via the financial channel, while the PRC's monetary policy influence outweighs that of the US on the real side at the global level, transmitting through international trade, commodity prices, and global value chains. This paper builds on that analysis by investigating advanced and emerging Asian economy groups in greater depth, testing monetary policy uncertainty shocks, and conducting an empirical examination of relative exposure to real and financial spillovers in relation to the US and the PRC over the period 2000 to 2020.

Examining the transmission of shocks to Asia is of interest given its diversity, involving both advanced and emerging economies. In addition, as an asset class, emerging Asia does not fit the profile of a typical emerging market economy (EME). Rooted in the aftermath of the Asian crisis of 1997–1998, many Asian economies have built up large foreign reserves, and many emerging Asian economies have run current account surpluses in recent years coupled with lower reliance on foreign currency-denominated external debt. Moreover, local currency bond markets have continued to develop strongly over the past 15 years or so (e.g., Beirne et al. 2021), which has helped to reduce exposure to foreign currency borrowing and to a certain degree insulate the economies from negative external financial shocks. However, at the same time, strong foreign investor participation, particularly in less developed Asian markets, may induce additional volatility. Also, with a further liberalization of capital accounts, financial integration has increased in these economies, while financial markets have also become deeper and more liquid. Rising financial integration can make economies susceptible to negative external shocks in a systematic manner, including through valuation effects. Local currency bond markets have helped to alleviate the extent to which external shocks lead to abrupt shifts in exchange rates however. So, in this way, financial integration has risen (potentially exposing economies to external shocks), while local currency bond markets mitigate associated financial stability risks. The question remains of whether these economies should be concerned about monetary policy shocks that may emanate from the PRC.

Trade integration in Asia has increased steadily over the past 30 years, with the PRC having a more prominent role over time. Trade between the PRC and the rest of Asia increased substantially from 1990 to 2019, from around 6% to 25% of its global trade, respectively. By contrast, the share of trade between Asia and the US

decreased over this period (see Fig. 1). In value terms, exports to Asia from the PRC and imports from Asia to the PRC outweigh those relating to the US by a factor of around two, demonstrating the strong role of trade as a transmission channel to Asia for shocks originating from the PRC (see Figure 9 in the Appendix).

By exploiting interest rate differentials abroad relative to the US and through arbitrage trading, investors activate the financial channel via capital flows as a transmission mechanism. The prevailing literature has downplayed the financial channel as a propagator of monetary policy shocks emanating from the PRC at the global level. Mwase et al. (2016) ascribed this partly to capital controls in the PRC, which have limited the extent of its financial integration globally. It is worth noting, however, that inflows and outflows of capital from the PRC remain substantial, particularly in relation to those of other Asian economies. After the global financial crisis, the PRC experienced net capital inflows due to a combination of the gradual liberalization of its capital account and higher interest rates relative to the US, while equity returns in the PRC have exhibited rising correlations with equity returns in other Asian markets over the past 20 years (e.g., Arslanalp et al. 2016). Therefore, although the main channel through which the PRC affects financial markets in other parts of Asia has tended to be trade, there is increasing evidence of growing direct financial linkages.

Unlike trade integration, historically, Asia has been more financially integrated at the global level than at the regional level (e.g., Kim et al. 2008; García-Herrero et al. 2009). This is partly due to the large current account surpluses in some Asian economies with respect to the US, with an accumulation of large shares of US financial assets. Nevertheless, there is some evidence to show that there are wide variations depending on the nature of financial investment, with intra-regional FDI integration being stronger in the Asian region than other more volatile types of flows (e.g., Didier et al. 2017). Greater financial integration through growing direct investment linkages may amplify the role of monetary policy spillovers via the financial channel for these economies. Furthermore, Chinese banks have significantly increased their exposure to other Asian economies in recent years, providing an avenue for the transmission of monetary policy shocks from the PRC. It is also worth noting that,

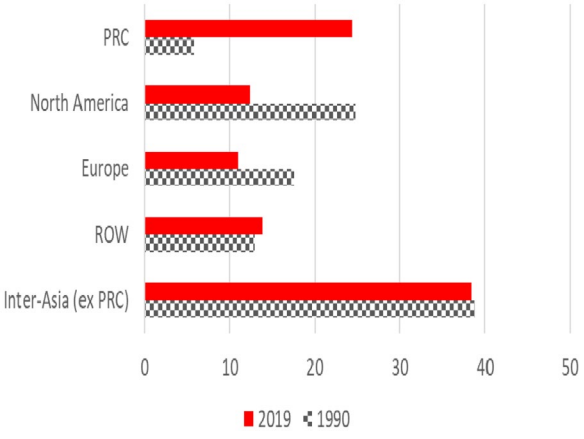


**Fig. 1** Trade Integration in Asia. Note: The figure reports the shares of total trade(exports plus imports) between Asia and other regions. Source: IMF Direction of Trade Statistics

in more recent years, cross-border portfolio capital flows into the PRC have risen substantially to around RMB5.7 trillion (US$837 billion) at the end of 2020, around eight times higher than the 2014 level (Lardy and Huang 2020).

As regards financial integration, Fig. 2 depicts a rising correlation between the equity returns in the PRC and those in the rest of Asia, similar in magnitude to the correlation of US equity returns with those of Asia (excluding the PRC) in 2019. In addition, while the global level of portfolio investment assets and liabilities in the PRC is much lower than that in the US (Miranda-Agrippino et al. 2020), portfolio inflows from Asia to the PRC have risen significantly over time (see Fig. 10 in the Appendix). In addition, the PRC has greater exposure than the US to Singapore and Hong Kong, China, two of the major international financial centers in Asia. This suggests an increasing importance of direct financial linkages between the PRC and the rest of Asia, affecting some key markets more substantially than others. While the prevailing literature has focused on the global propagation of monetary policy shocks, typically originating in the US, this paper provides an analysis of monetary policy spillovers to real and financial sectors by isolating the transmission to Asian economies both from the US and from the PRC. This approach allows us to perform a comparative assessment of the vulnerability of Asian economies to US-originating relative to PRC-originating monetary policy shocks. The structure of the remainder of the paper is as follows: Sect. 2 provides an overview of the related literature; Sect. 3 describes the data and methodology; Sect. 4 discusses the empirical findings; and, finally, Sect. 5 concludes.

## 2 Related Literature

This paper contributes to the literature on global real and financial integration and the transmission of international real and financial spillovers. Early work on these issues tended to focus on advanced economies only, in particular following major crisis episodes such as the 1987 US stock market crash (e.g., Hamao et al. 1990;

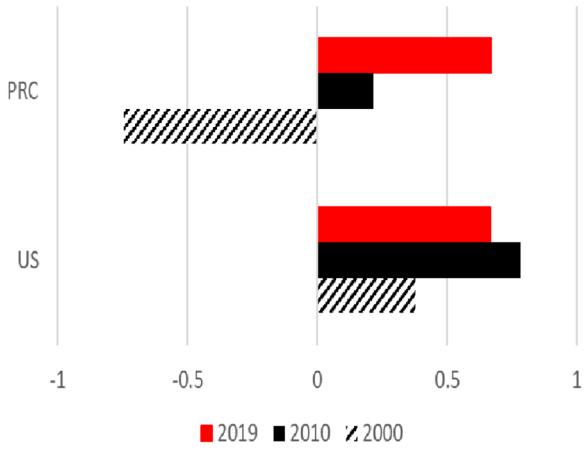


**Fig. 2** Financial Integration in Asia. Note: The figure reports the correlations of equity market indices in the PRC and the US using a simple average of equity market indices in Asia (excluding the PRC) based on daily data. Source: Bloomberg

King and Wadhwani 1990; Schwert 1990). As financial markets in emerging economies became more developed and integrated globally, studies were carried out on the transmission of shocks among emerging stock markets (e.g., Bekaert and Harvey 1997; Bekaert et al. 2005) as well as from mature to emerging stock markets (e.g., Beirne et al. 2010). In the case of Asia, and in the aftermath of the Asian financial crisis of 1997, a number of papers analyzed financial contagion effects via Asian stock markets (e.g., Ng 2000; Tay and Zhu 2000; Li and Rose 2008). These early papers showed that developments in advanced economies' financial markets, particularly in the US, drive the global transmission of financial shocks. More recent studies have also highlighted the important role of the US in affecting global markets. Bagliano and Morana (2012) found that the real effects of financial shocks in the US transmit abroad via asset prices. Georgiadis (2016) identified significant output spillovers from US monetary policy shocks at the global level, the magnitude of which depended on the level of trade and financial integration, de jure financial openness, exchange rate regime, financial market development, labor market rigidities, industry structure, and participation in global value chains.[1]

This paper also relates to the literature that has emerged on the global financial cycle (Rey 2013), indicating that a global factor that correlates with the VIX, a measure of global risk aversion in financial markets, underpins fluctuations in asset prices and capital flows across countries. Moreover, studies have shown that US monetary policy is the main driver of the global financial cycle, including via the leveraging of global banks (Bruno and Shin 2015). Furthermore, Miranda-Agrippino and Rey (2020) highlighted the US as the primary transmitter of financial spillovers abroad given the dominance of the US dollar in the international monetary system. In a study of financial cycle synchronization, Jorda et al. (2019) found that fluctuations in risk appetite in global equity markets are closely linked with US monetary policy, particularly for economies with fixed exchange rate regimes. Habib and Venditti (2019) provided further evidence showing that economies that are more open and operate with strictly pegged exchange rates are the most vulnerable to global risk via capital flows.

While developments in the US economy and US monetary policy have arguably been the main origins of real and financial shock propagations since the Great Depression of the 1930s, the emergence of the PRC as an economic powerhouse in the more recent period has called into question the global dominance of the US. Some literature has emerged on the role of the PRC and its monetary policy as an important underpinning of macroeconomic and financial developments in other parts of Asia and globally. Miranda-Agrippino et al. (2020) examined the global transmission of US and PRC monetary policy shocks. Supporting the prevailing literature, which has indicated that US monetary policy transmits globally via asset markets and capital flows, it is also found that monetary policy shocks from the PRC transmit globally through the effect on global value chains, international trade, and commodity prices. Belke et al. (2018) investigated bond yield spillovers from major advanced economies as well as the PRC to emerging Asia and found that,

[1] See also Aizenman, Chinn, and Ito (2017) and Apostolou and Beirne (2019) for other studies of US monetary policy spillovers.

despite the PRC's weight in the regional and global economy, international spillovers from its bond markets appear to be limited, a result that they ascribed to the still comprehensive controls on portfolio investment flows. Earlier work by Kozluk and Mehrotra (2009) examined the impact of monetary policy shocks from the PRC to East and Southeast Asian economies, finding some evidence of real spillovers, with output and inflation responding positively and significantly to a PRC monetary expansion. Erten (2012) finds a rather muted response of emerging Asia GDP growth to a contractive US treasury bill rate shock. Utlaut and van Roye (2010), in contrast, find that a contractive interest rate shock has a significant negative impact on real GDP in emerging Asia.

Research on the integration of the PRC at the global level has been a feature of other recent studies. Fang et al. (2021) examined spillovers and spillbacks from the PRC and other advanced G7 economies. While they found that the influence of the PRC on global financial markets has increased over time, the magnitude of the G7 spillovers to the PRC remains larger than that of spillbacks from the PRC. This is consistent with the previous literature that stressed the dominance of the US in affecting global financial conditions. In related work, Zhou et al. (2012) showed that Asian financial markets have become increasingly more interdependent over time, with a strong role for the PRC's stock market. Moreover, Mwase et al. (2016) noted the influential role of the PRC at the global level due to its centrality in commodities and international trade. In addition, these authors reported that the external effects of financial market developments in the PRC are most closely related to foreign exchange markets in emerging Asia and commodity exporters. However, in line with the work of Shu et al. (2015), the magnitude of these external effects is notably smaller than that of the effects that emanate from the US.

Arslanalp et al. (2016) found that financial spillovers from the PRC to other Asian economies have increased since the global financial crisis of 2007/08 and are more pronounced for higher levels of trade integration with the PRC. In more recent work, Ahmed et al. (2019) highlighted the large stock of non-financial corporate debt and local government debt in the PRC as a financial vulnerability that could have negative repercussions for financial markets globally, including those in EMEs, with the financial channel, specifically equity markets, playing an important role. In addition, the financial channel as a shock transmitter may be activated due to real disturbances, as occurred during the "China scare" episode of 2015–16, when concerns about the growth outlook in the PRC triggered equity market tensions that spread globally. Ahmed et al. (2019) found that, overall, direct financial linkages between the PRC and abroad could manifest through investor sentiment but that indirect effects, i.e., financial spillovers emanating from real shocks, would outweigh them.

Yang et al. (2019) examined international spillovers of the PRC's financial sector, noting that the PRC has the second-largest stock market in the world, while the four largest state-owned banks in the PRC are among the top 10 at the global level. They found that the financial sector in the PRC is particularly responsive to monetary policy in times of financial stress and that the systemic nature of the PRC's financial institutions is an important channel for transmission abroad. More specifically, they concluded that the financial sector in Japan is particularly interconnected with that

of the PRC. While the stock market in the PRC can be subject to bouts of volatility, Carpenter et al. (2015) made the point that financial reforms over the past decade have contributed to stronger external financial integration, with developments in the PRC stock market influencing corporate profitability in the US and similarities being apparent in the pricing of risk.

## 3 Data and Methodology

In this section, we describe the data and methodology used to examine the response of real and financial sectors in Asia to monetary policy shocks from the US and the PRC. Using a monthly data frequency, we estimate a structural panel vector autoregressive (VAR) model over the period 2000M01 to 2020M12 across 11 Asian economies, specifically Hong Kong, China; India; Indonesia; Japan; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; Thailand; and Viet Nam. The sample is separated into two sub-panels, advanced Asia and emerging Asia.[2] The core focus of the paper is on examining the response of real and financial variables in advanced and emerging Asia to monetary policy shocks and shocks to monetary policy uncertainty in the US and the PRC.

The variables of the real and financial sectors in Asia include the growth rate of real GDP; the ratio of the current account balance to GDP; the log of the consumer price index (CPI); the short-term interest rate; the log of stock prices; the log of the real effective exchange rate; capital flow volatility, measured as the ratio of the standard deviation to the absolute value of the mean of the net flows; and net capital flows (relative to GDP). Table 1 in the Appendix provides details of all the variables that we used as well as their sources.

We build a panel VAR model, which can be denoted in its reduced form as follows:

$$Y_{i,t} = A(L)Y_{i,t-1} + \alpha_i + \mu_{i,t}; i = 1, \cdots, N \tag{1}$$

where $Y_{i,t} = [X_{i,t}, E_{i,t}]'$ refers to a vector of our selected variables of country $i$ with $N = 11$; $X_{i,t}$ is a vector of domestic real and financial variables; $E_{i,t}$ denotes the US or Chinese monetary policy variable; $A(L) = A_0 - A_1L - \cdots - A_pL^p$ is a matrix of $p^{th}$ polynomial in the lag operator L; $\alpha_i$ denotes country-specific fixed effects to account for unobserved time-invariant heterogeneity across countries; and $\mu_{i,t}$ is a vector of the reduced form shocks. Hence, the panel VAR can be rendered in the following structural form:

$$B^{-1}Y_{i,t} = B^{-1}A(L)Y_{i,t-1} + B^{-1}\alpha_i + \epsilon_{i,t}; i = 1, \cdots, N \tag{2}$$

[2] Economies in advanced Asia include Japan; Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China. Economies in emerging Asia include India, Indonesia, Malaysia, Thailand, the Philippines, and Viet Nam. Data availability underpinned the sample period of analysis.

where B refers to a matrix of parameters containing identification information and $\epsilon_{i,t}=B^{-1}\mu_{i,t}$ is the vector of structural shocks. The goal of this paper is to examine the spillover effects of US and PRC monetary policy on real and financial factors in Asia. As such, we faced the usual identification problem for monetary policy changes. Instead of relying on a recursive restriction (Christiano et al. 1999), we use an external instrument (Stock and Watson 2018) to identify monetary policy shocks, specifically the column *B*, following Klein and Linnemann (2021). We assume that the external instrument is correlated with monetary policy shocks but not with other shocks. For the US, as the external instrument variable, we use the new monetary policy shock series from Bu et al. (2021), which is a summary measure of all monetary policy actions on Federal Open Market Committee (FOMC) announcement days. This shock series is appealing as it not only stably bridges conventional and unconventional policy regimes but also embodies no significant role for the central bank information effect on transmission, which can affect market expectations and is relatively unpredictable.

Identifying an accurate monetary policy shock series for the PRC is rather challenging. The main reason is that the People's Bank of China (PBoC) uses multiple policy instruments, including the required reserve ratio, central bank lending rate, and money supply (Reade and Volz 2012; Kamber and Mohanty 2018). Therefore, simply selecting a quantity or interest rate variable makes it hard to gauge the monetary policy stance accurately. To reflect the co-existence of quantity and price targeting in the PRC's monetary policy, this paper follows the concept of a "shadow policy rate" (Wu and Xia 2016), using the money supply and an estimated natural interest rate to construct the shadow policy rate (Xu and Jia 2019).[3] We then obtain the monetary policy shock series by assuming a Taylor-type rule for the monetary authority as an innovation of the shadow policy rate in a separate recursively identified VAR (Christiano et al. 1999).[4] We also check the strength of instruments for both US and PRC monetary policy shocks and find that the likelihood of weak instruments is low.[5]

## 4 Empirical Results

### 4.1 Baseline: US and PRC Monetary Policy Shocks

Figures 1, 2, 3 and 4 show the impulse responses of real and financial variables of advanced and emerging Asia to US and PRC monetary policy shocks. While the discussion focuses on the transmission to Asian economies, in order to illustrate the magnitude and direction of the shock imposed, as well as its duration, also shown is the response of the US Federal Funds rate and the PRC policy rate, as appropriate. We estimated the reduced-form panel VAR with 12 lags and normalized the scale of the monetary policy

[3] The estimated natural interest rate is a compilation of information on various interest rates. For details of the estimation, please refer to Xu and Jia (2019).

[4] We estimated a separate VAR model to obtain the PRC monetary policy shock series and assumed that the output, unemployment rate, and inflation rate do not react to the PRC monetary policy simultaneously.

[5] A first-stage F-statistic below 10 is an indication of potentially weak instruments (Stock, Wright, and Yogo, 2002). The first-stage F-statistic for US and PRC monetary policy shocks is 10.38 and 19.24, respectively.

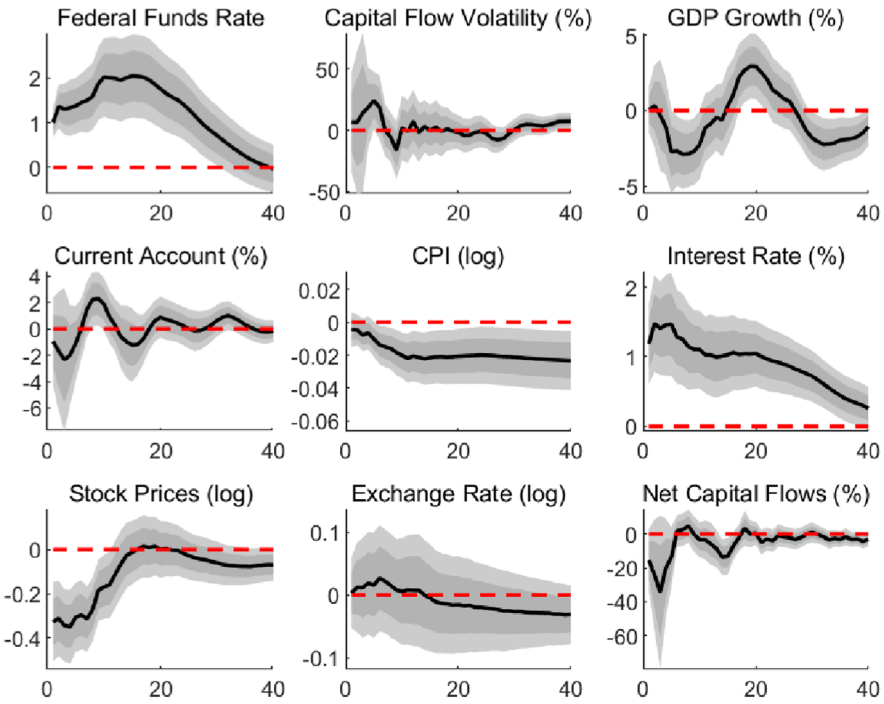


**Fig. 3** Impulse Responses to a US Monetary Policy Shock: Advanced Asia. Notes: The figure reports the median responses with 68% and 90% confidence bands. The vertical axis unit is percentage points, and the unit of the horizontal axis refers the number of months

shock such that it increases the policy rate by 1 percentage point. The figures also report 68% (dark shaded areas) and 90% (light shaded areas) confidence bands, which are generated by 5,000 bootstrap repetitions. We first consider the transmission of US monetary policy shocks to advanced Asian economies, as shown in Fig. 3.

Figure 3 shows that, for the transmission to interest rates in advanced Asia, the magnitude of the response to the US monetary policy shock is proportional to the shock itself during the first 20 months or so. This implies strong interconnectedness between financial markets in the US and advanced Asia, although the magnitude of the response declines sharply over the duration horizon. Regarding spillovers to advanced Asian stock markets, a US monetary policy shock has a dampening and statistically significant effect until around 18 months after the shock, at which point the effect largely dissipates. In relation to the capital flows in advanced Asia, a tightening of US rates leads to net capital outflows, in line with expectations, although the effect becomes insignificant after around 6 months. Similarly, the response of capital flow volatility in advanced Asia disappears after around 6 months. A US monetary policy shock has little effect on the real exchange rate in terms of significance. This may relate to the fundamental level of the exchange rate, with greater elasticity in the exchange rate to a tightening monetary policy shock evident where the exchange rate is overvalued (e.g., Aizenman et al. 2016). As regards

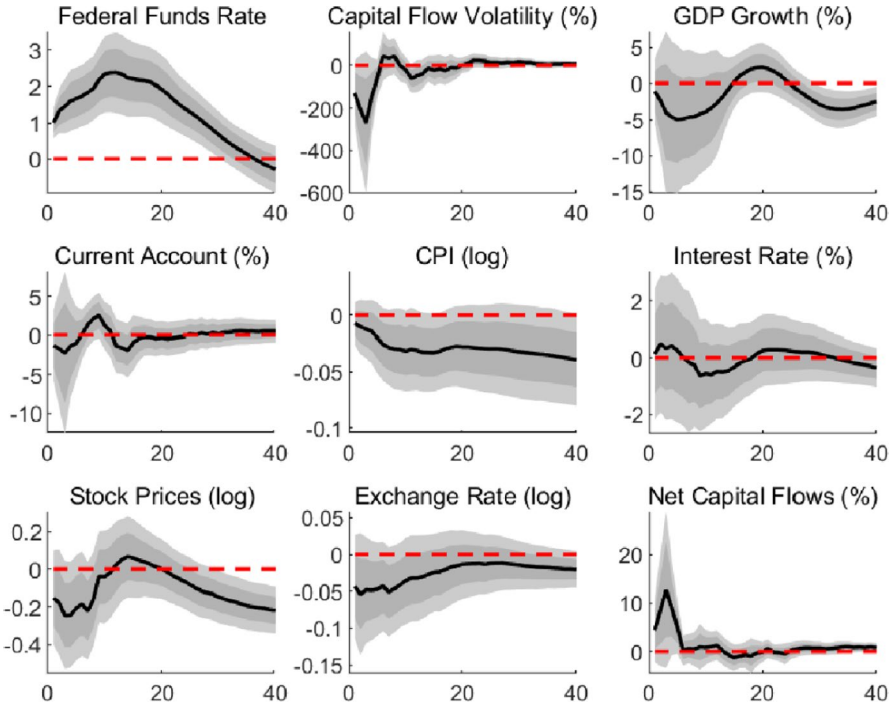


**Fig. 4** Impulse Responses to a US Monetary Policy Shock: Emerging Asia. Notes: The figure reports the median responses with 68% and 90% confidence bands. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

real spillovers, the CPI drops persistently and significantly in advanced Asia after a US monetary policy tightening shock while the effects on GDP growth and current account balance are time varying and ambiguous. Turning to emerging Asian economies, Fig. 4 shows the responses of emerging Asia to US monetary policy shocks.

Unlike the case for advanced Asia, local short-term interest rates in emerging Asia do not exhibit a statistically significant response to a tightening US monetary policy shock. The real exchange rate depreciates significantly, albeit marginally and with a low magnitude. The lack of more prominent exchange rate effects may also be related to mean-reverting properties over the long term. Regarding capital flows, unlike advanced Asia, we found that capital flow volatility initially declines, net capital inflows rise for a short period after the shock, before becoming insignificant. While this result opposes expectations, a possible explanation relates to higher real interest rate differentials in Asian EMEs relative to the US, thereby protecting the capital account. Equity markets are negatively affected, albeit to a much lesser extent in emerging than in advanced Asia. In addition, equity market responses show some statistical significance during the first 6 months, which then dissipates, before returning in the long-term. As regards real spillovers, there is little evidence of a transmission of US monetary policy shocks to GDP or the current account in emerging Asia. There is some evidence, however, of a pass-through to domestic CPI, with

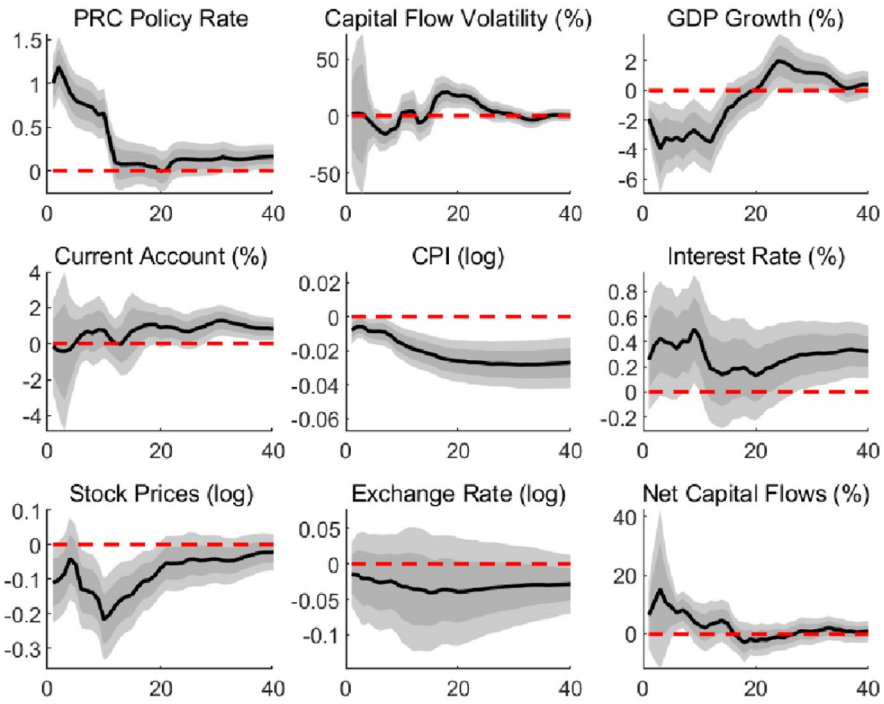


**Fig. 5** Impulse Responses to a PRC Monetary Policy Shock: Advanced Asia. Notes: The figure reports the median responses with 68% and 90% confidence bands. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

US monetary policy tightening leading to a dampening of consumer prices in Asia EMEs. The effect on CPI in Asian EMEs is broadly similar to that of advanced Asian economies, although with less pronounced statistical significance. Turning to monetary policy shocks that emanate in the PRC, Fig. 5 shows the spillover effects of a PRC monetary policy shock on advanced Asia.

Similar to the case of the US, a tightening monetary policy shock in the PRC persistently increases local short-term interest rates in advanced Asia. While the magnitude of the response by advanced Asian interest rates to a US shock is stronger at the initial stages, the effect wanes over time. In contrast the response to a PRC monetary policy shock exhibits persistence. In addition, the PRC shock has a significantly negative impact on stock prices, and this impact lasts comparatively longer than in the case of the US. The responses of net capital flows are largely insignificant due to the PRC's more restricted capital account. For the exchange rate, we did not find a significant response, as in the case of the US monetary shock for advanced Asia. For real spillovers, the shock persistently and significantly decreases CPI, while GDP growth drops significantly before returning to baseline after around 20 months. On the other hand, the current account balance responds only marginally, with some upward trajectory at longer horizons. Figure 6 shows the responses of emerging Asia to a PRC monetary policy shock.

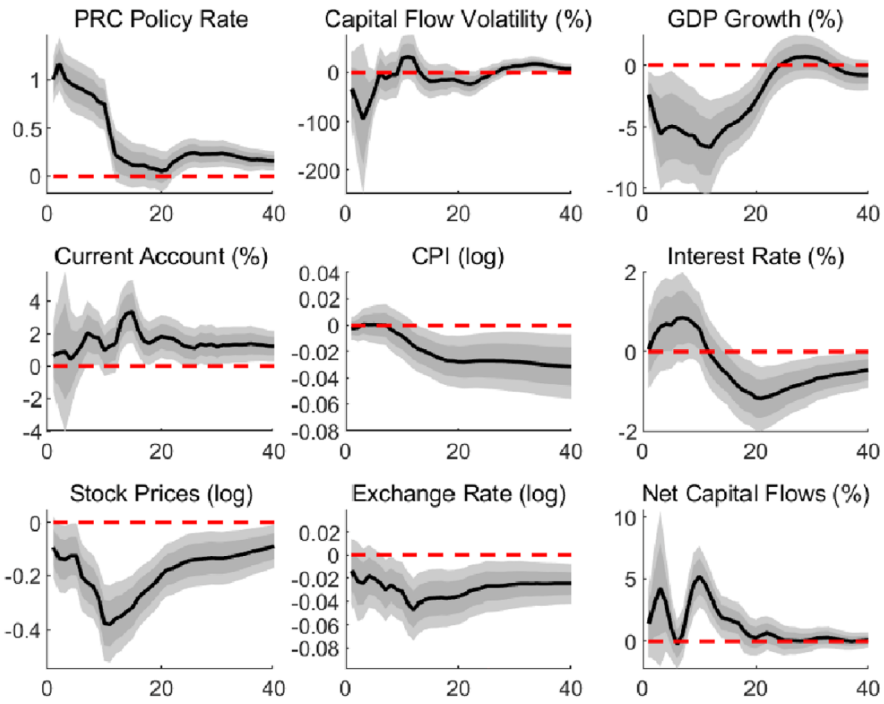


**Fig. 6** Impulse Responses to a PRC Monetary Policy Shock: Emerging Asia. Notes: The figure reports the median responses with 68% and 90% confidence bands. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

Unlike interest rates in advanced Asia, those in emerging Asia respond significantly and downward after around 18 months, while the exchange rate significantly and persistently depreciates immediately after the shock. The effect on the exchange rate is consistent with the appreciating impact on the renminbi of the tightening of monetary policy in the PRC, with close linkages via trade and regional value chains acting as important transmission channels. The effect on capital flows is mostly not statistically significant. The negative impact on stock prices is stronger than that for advanced Asia as well as that from shocks originating from the US. For spillovers to the real economy in emerging Asia, monetary policy shocks from the PRC significantly decrease GDP growth and CPI, showing a more effectiveness transmission than responses to US monetary policy shocks. In addition, the current account responds positively but with statistical significance only at longer horizons.

The exposure of emerging equity markets in Asia to monetary policy shocks from the PRC seems to be more important than US monetary policy shocks, both in terms of the size of the response to the shock and its statistical significance. As shown previously, equity markets in the PRC have become increasingly correlated with equity markets in the rest of Asia. Emerging Asian economies may be particularly susceptible to shifts in investor sentiment emanating from the PRC. Our estimates suggest an important role of both trade linkages and direct financial linkages via portfolio

investment exposure vis-à-vis the PRC. While Miranda-Agrippino et al. (2020) found that US monetary policy shocks dominate financial spillovers globally, this does not necessarily appear to be the case for Asia. The responses of stock prices and exchange rates to monetary policy shocks in emerging Asia are stronger and more persistent when the PRC is the origin rather than the US. For advanced Asia, interest rate responses to PRC monetary policy shocks also exhibit more persistence than US monetary policy shocks. There is also evidence of similar stock market responses in advanced Asia to both US and PRC monetary policy shocks. In addition, monetary policy shocks from the PRC affect output in Asia substantially, and this is to be expected given the high level of inter-regional trade in Asia and the scale of participation of Asian economies in regional trade-based supply chains. These findings on output spillovers are in accordance with those of Miranda-Agrippino et al. (2020) in the sense that real spillovers from monetary policy shocks seem to be more pervasive for those originating from the PRC than for those originating from the US.

### 4.2 Variance Decomposition Analysis

As a complement to the impulse response functions, we decompose the variance of real and financial variables of emerging and advanced Asian economies in our model to determine the variance share explained by US and PRC monetary policy shocks. The specification of the variance decomposition analysis follows our baseline panel VAR model, whereby the lag number is 12 and the time horizon is set to 40 periods. Figures 7 and 8 report the resulting variance decompositions due to US and PRC monetary policy shocks for advanced Asia and emerging Asia respectively.

The variance decomposition results show that US and, particularly, PRC monetary policy shocks are important and persistent drivers of all these variables for both advanced and emerging Asian economies. For advanced Asian economies, the share of the variations explained by PRC monetary policy shocks reaches about 28% at peak for GDP growth, 24% at peak for stock prices, and 18% at peak for capital flow

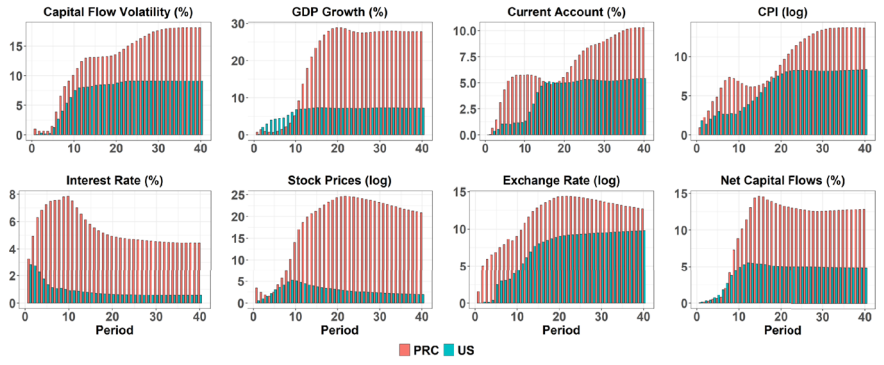


**Fig. 7** Variance Decomposition for Advanced Asia. Notes: The figure reports the percentage of variance due to US and PRC monetary policy shocks. The red bars refer to the contribution of PRC monetary policy shocks. The blue bars are the contribution of US monetary policy shocks. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

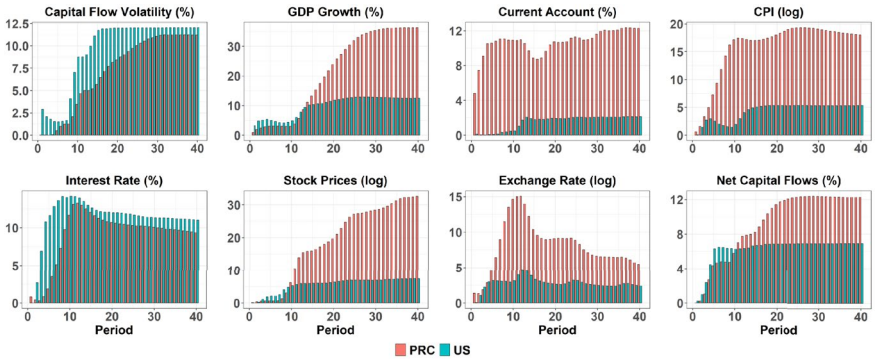


**Fig. 8** Variance Decomposition for Emerging Asia. Notes: The figure reports the percentage of variance due to US and PRC monetary policy shocks. The red bars refer to the contribution of PRC monetary policy shocks. The blue bars are the contribution of US monetary policy shocks. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

volatility. For emerging Asia, the share of the variations explained by PRC monetary policy shocks reaches about 35% at peak for GDP growth, 33% at peak for stock prices, 18% at peak for CPI, and 15% at peak for interest rate and exchange rate. A key finding, however, is that PRC monetary policy shocks contribute more than US monetary policy shocks to the variations of most real and financial variables in both advanced and emerging Asian economies. For example, the share of the variation of stock prices explained by PRC monetary policy shocks is almost 5 times larger than that accounted for by US monetary policy shocks. This finding supports the earlier impulse response function analysis that demonstrated the exposure of Asian economies to real and financial spillovers from monetary policy shocks in the PRC.

### 4.3 Robustness Checks: Alternative Monetary Policy Spillovers and Modifications to the Baseline

As a form of robustness check, we examined the spillover effect of monetary policy uncertainty shocks from the US and the PRC to advanced and emerging Asian economies. For the US, we obtained the monthly monetary policy uncertainty (MPU) series from the Baker–Bloom–Davis MPU Indices, which implement the approach that Baker et al. (2016) developed. For the PRC, we used the MPU series of Huang and Luk (2020). We updated both MPU indices to 2020M12.

Figures 11, 12, 13 and 14 in the Appendix show the impulse responses of real and financial variables of advanced and emerging Asia to US and PRC monetary policy uncertainty shocks, respectively. While the transmission of uncertainty in monetary policy entails different dynamics than those of our baseline shocks, particularly in terms of the direction of interest rate responses, consistent with the findings for monetary policy shocks, our results indicate that Asian stock markets are particularly vulnerable to spillovers from a rise in monetary policy uncertainty in the PRC compared with the US. Moreover, the magnitude of the effect is more pronounced for emerging Asia. Exchange rate responses are more muted to MPU shocks overall

compared to monetary policy shocks. In addition, we find that capital flow volatility in emerging Asia is particularly sensitive to MPU shocks from both the US and PRC, with higher persistence evident for the latter.

The estimated US and PRC monetary policy spillover effects from our baseline model are robust to other modifications. We first note that our results are consistent with results based on an estimation ending in 2019M12, eliminating concerns that the pandemic may be driving the overall effects found. The results are very similar to the baseline estimates, particularly as regards the significance and magnitude of the impulse responses. In addition, We examined the impulse responses for the Advanced Asia group where Hong Kong, China and Taipei, China are excluded. This allowed us to assess whether our results for this group were driven by economies that have a special administrative arrangement with the PRC (implying that they may be more sensitive to the PRC's monetary policy than that of the US). We find that the results for Advanced Asia excluding Hong Kong, China and Taipei, China are almost identical to the baseline estimates however.[6]

## 5 Conclusions

This paper examines real and financial spillovers to emerging and advanced Asian economies due to monetary policy shocks in the US and the PRC. Research has widely documented the historical dominance of US monetary policy as a transmitter of shocks abroad, reflecting the role of the US dollar as a global reserve currency and safe haven. In recent years, however, the influence of the PRC on global financial markets has become more prominent, notably during the "China scare" episode of 2015–16, when concerns about the growth outlook in the PRC triggered an equity market downturn that spread to other EMEs globally. Our findings indicate that emerging Asian economies have become more susceptible to equity market and exchange rate vulnerabilities emanating from monetary policy shocks in the PRC compared with those that originate in the US, reflecting the growing clout of the PRC in the monetary and financial domain in the Asian region. In addition, for advanced Asia, interest rate responses to PRC monetary policy shocks exhibit more persistence than US monetary policy shocks, while advanced Asian stock markets appear to be exposed in a similar way to both US and PRC monetary policy shocks. In addition, in line with the prevailing literature as well as the expectations, Asian economies are more susceptible to real spillovers from the PRC than to US monetary policy shocks. Our findings are broadly consistent with an alternative measure of financial transmission, namely monetary policy uncertainty in the US and the PRC, and robust to other modifications to the baseline. In addition, a variance decomposition analysis reinforces the finding on the exposure of Asian economies in particular to PRC monetary policy shock spillovers.

Our paper sheds light on the real and financial decoupling of Asian economies from the US. Given the increasingly dominant role of spillovers from the PRC, particularly for emerging Asian stock markets and currencies, this implies greater

[6] The results for the analysis that excludes the year 2020 and for the Advanced Asia group that excludes Hong Kong, China and Taipei, China are available from the authors upon request.

dependency of these economies on macroeconomic developments in the PRC. Asian economies have built up substantial cross-border financial holdings since the Asian crisis. Higher levels of financial integration imply also greater exposure to foreign financial shocks, understanding the origin and magnitude of these shocks is important from an international risk-sharing perspective. Our paper also provides important insights into the relative exposure of advanced compared with emerging Asia to real and financial shocks in the US and the PRC, helping policymakers to understand the elasticity of foreign shocks as well as their shock-absorbing capacities.

The growing intra-regional interdependencies and increasing relevance of macroeconomic spillovers from the PRC also highlight the importance of regional monetary and financial cooperation to mitigate financial stability risks. Together with Japan, the PRC has been the major backer of the Chiang Mai Initiative Multilateralization (CMIM), which was created after the Asian Financial Crisis to provide liquidity to countries that were hit by external shocks. The PRC has also entered bilateral swap agreements with many Asian countries. As Asian countries are increasingly exposed to real and monetary policy shocks emanating from the PRC, a further strengthening of the PRC's role as provider of liquidity to cushion potentially adverse effects on its neighbors would be welcome.

## Appendix

Tables 1 and 2
Figures 9, 10, 11, 12, 13 and 14

**Table 1** Overview of the Variables Used in the Empirical Analysis

| Variable | Data Source | Definition |
|---|---|---|
| US monetary policy shock | Bu et al. (2021) | A summary measure of all monetary policy actions on FOMC announcement days |
| Chinese monetary policy shock | Xu and Jia (2019) | Using the monetary supply and an estimated natural interest rate to construct the shadow policy rate; the estimated natural interest rate is a compilation of information on various interest rates |
| Capital flow volatility | Authors | The ratio of the standard deviation to the absolute value of the mean of the net flows |
| Net capital flows | IMF | The net capital flows (relative to GDP) |
| GDP growth | IMF and Bloomberg | The growth rate of the real GDP |
| Exchange rate | BIS and Bloomberg | The log of the real effective exchange rate |
| Short-term interest rate | Bloomberg | The short-term interest rate |
| CPI | Bloomberg | The log of the consumer price index |
| Current account balance/GDP | IMF | The ratio of the current account balance to the GDP |
| Stock prices | Bloomberg | The log of domestic stock market indices |
| US monetary policy uncertainty | Baker et al. (2016) | US monetary policy uncertainty index series |
| Chinese monetary policy uncertainty | Huang and Luk (2020) | Chinese monetary policy uncertainty index series |

**Table 2** Panel Unit Root Test

| Variables | Advanced Asia | | Emerging Asia | |
|---|---|---|---|---|
| | Test Statistics | p-value | Test Statistics | p-value |
| Capital Flow Volatility | -15.184 | 0.000 | -12.039 | 0.000 |
| GDP growth | -5.209 | 0.000 | -5.138 | 0.000 |
| Current Account Balance | -6.872 | 0.000 | -9.247 | 0.000 |
| CPI | -2.05 | 0.02 | -2.798 | 0.003 |
| Interest Rate | -2.057 | 0.02 | -1.349 | 0.089 |
| Stock Prices | -0.534 | 0.297 | 0.403 | 0.657 |
| Exchange Rate | -1.665 | 0.048 | 2.751 | 0.997 |
| Net Capital Flows | -11.785 | 0.000 | -10.807 | 0.000 |

Panel unit root test is based on Levin et al. (2002). We requested that the number of lags to include be selected based on the AIC with at most 12 lags

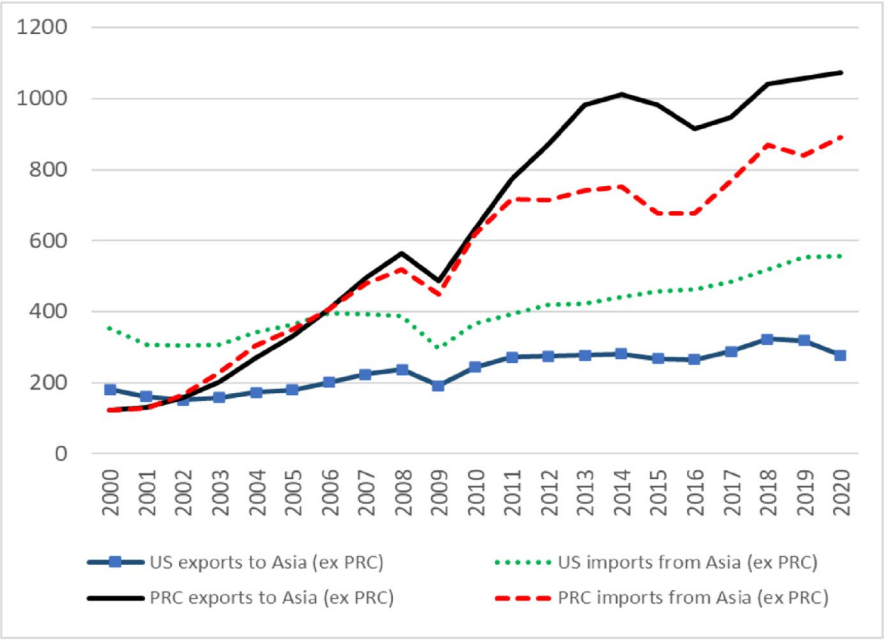


**Fig. 9** Exports and Imports in Asia (ex PRC) vis-à-vis the PRC and the US. Note: Total values in US$ billion. Source: IMF Direction of Trade Statistics (DOTS)

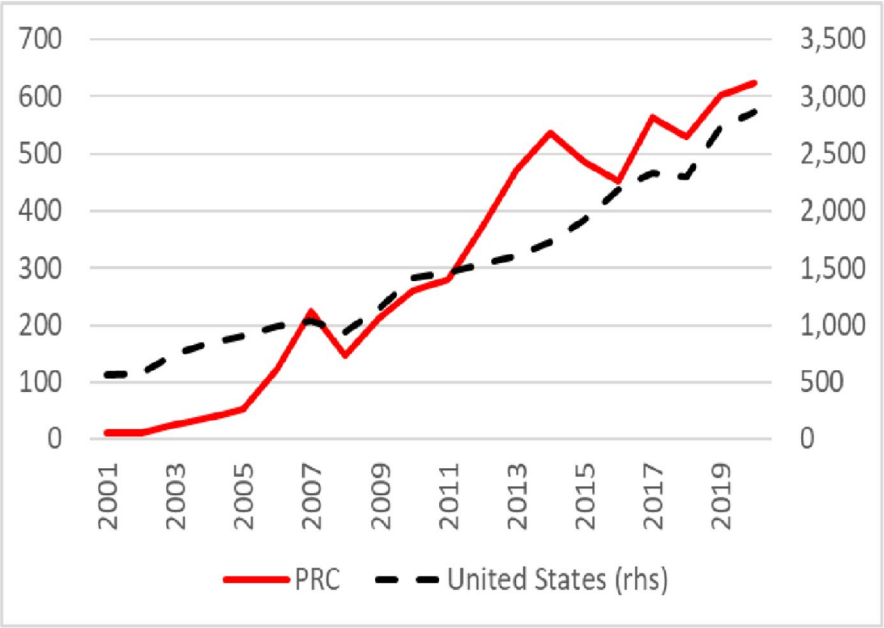


**Fig. 10** Portfolio Investment Flows from Asia (excluding the PRC) to the PRC and the US. Note: The total portfolio liability exposures (US$ billion) of the PRC and the US to Asia (excluding the PRC). Source: IMF Coordinated Portfolio Survey (CPIS)

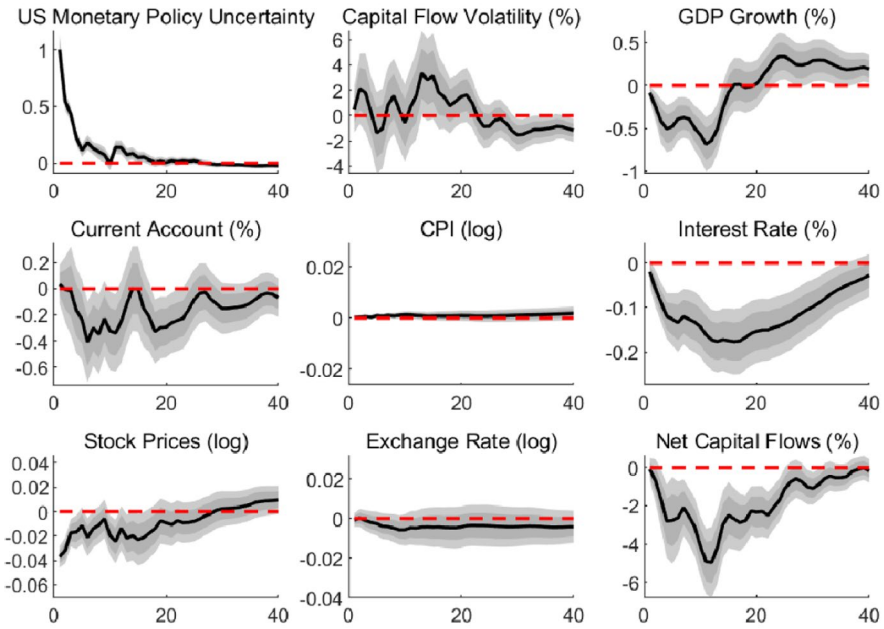


**Fig. 11** Impulse Responses to a US Monetary Policy Uncertainty Shock: Advanced Asia. Notes: The figure reports the median responses with 68% and 90% confidence bands. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

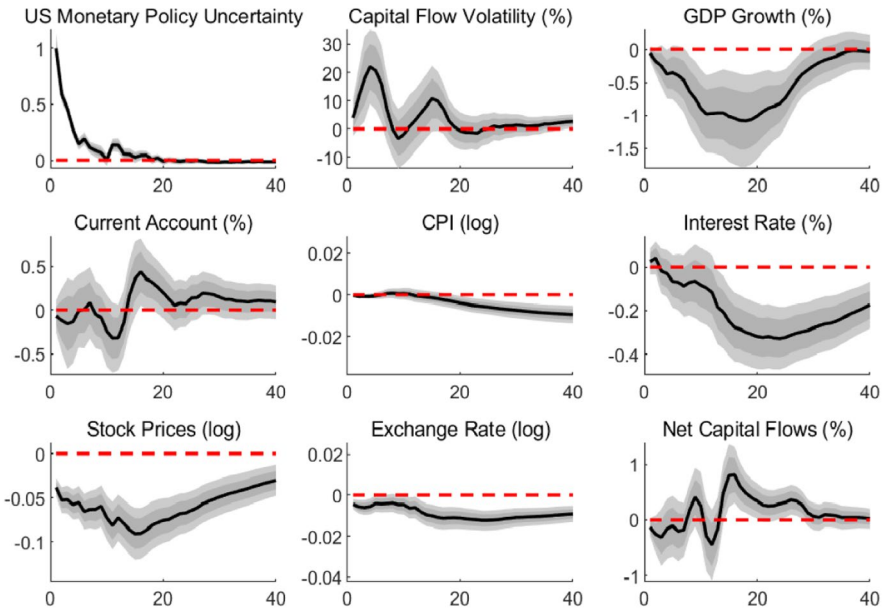


**Fig. 12** Impulse Responses to a US Monetary Policy Uncertainty Shock: Emerging Asia. Notes: The figure reports the median responses with 68% and 90% confidence bands. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

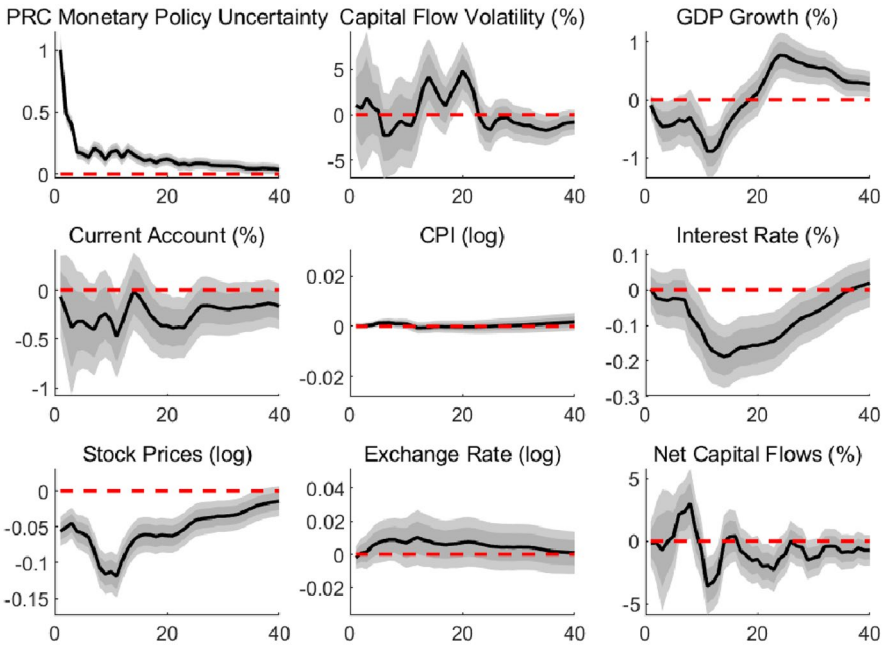


**Fig. 13** Impulse Responses to a PRC Monetary Policy Uncertainty Shock: Advanced Asia. Notes: The figures report the median responses with 68% and 90% confidence bands. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

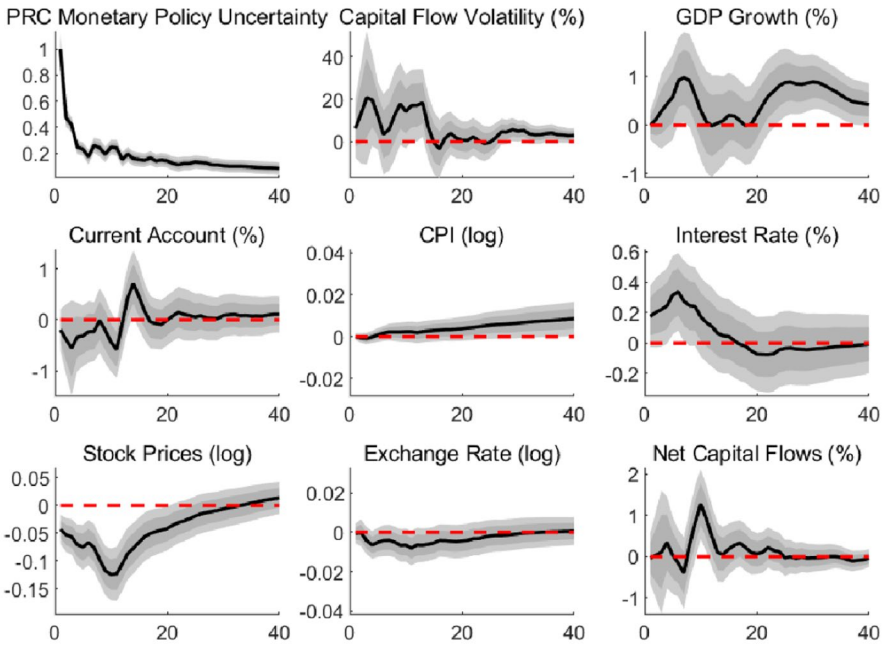


**Fig. 14** Impulse Responses to a PRC Monetary Policy Uncertainty Shock: Emerging Asia. Notes: The figure reports the median responses with 68% and 90% confidence bands. The vertical axis unit is percentage points, and the unit of the horizontal axis refers to the number of months

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## Declarations

**Disclaimer** The views expressed in this paper are the views of the authors and do not necessarily reflect the views or policies of ADBI, ADB, its Board of Directors, or the governments they represent.



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