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Global Spillovers of US Monetary Policy: New Insights from the Remittance Channel

Pablo Aguilar-Perez

Highlights

- We show that US monetary tightening generates global spillovers through the remittance channel, with outflows falling in source countries and amplifying the global financial cycle.
- We uncover an inverse U-shaped relationship between remittance dependence and output responses: moderate inflows buffer shocks, while high dependence (above 4% of GDP) magnifies recessionary effects.
- We document strong heterogeneity driven by migrant skill composition: low-skilled diasporas generate pro-cyclical remittances and higher vulnerability, whereas skilled or diversified diasporas stabilize remittance flows.

Abstract

This paper examines the global spillovers of US monetary policy through the remittance channel, in both sending and recipient countries. Using a dataset covering 8 remittance-sending and 41 recipient countries from January 1997 to December 2017, we apply a local projections framework to trace the dynamic effects of unexpected US monetary tightening. We find that remittance outflows decline in advanced economies following policy shocks, illustrating the pro-cyclicality of remittances in source countries and their role in amplifying global financial spillovers. Among recipient countries, our results show that in countries with low to moderate remittance dependence, inflows tend to increase following a contractionary shock – consistent with altruistic or insurance-driven motives. In contrast, remittances decline in highly dependent countries, aligning with self-interest or investment-driven behavior. We find that these heterogeneous responses are shaped by migrant profiles: countries with high remittance dependence typically have a larger share of low-skilled migrants and display more strongly pro-cyclical remittance patterns. In contrast, less dependent countries tend to have more skilled or diversified diasporas, resulting in more stable and less cyclical remittance flows.

Keywords

Global Spillovers, Remittances, US Monetary Policy, Emerging Markets.

JEL

F24, E52, F41, F44.

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RESEARCH AND EXPERTISE ON THE WORLD ECONOMY

Global Spillovers of US Monetary Policy:

New Insights from the Remittance Channel Policy and Life Insurance

Pablo Aguilar Pérez*

1. Introduction

In their efforts to mitigate the impact of international spillovers on their domestic economies, policymakers have sought to identify the channels through which monetary policy shocks originating from the United States (US) propagate and influence economies worldwide. Several key transmission mechanisms have been established, including the aggregate demand channel, the expenditure-switching channel, and the financial channel (Ca' Zorzi, Stracca, and Strasser 2020).

Recently, remittances have emerged as a potential channel for the transmission of US monetary policy across borders due to the remarkable growth of these capital flows, coupled with the US' position as the largest source of remittances (Ratha et al. 2023).[1] Despite this, the implications of US monetary policy shocks on remittance flows—particularly how these shocks propagate internationally—have remained underexplored.

In this paper, we aim to fill this gap by showing that remittances serve as a significant vehicle for transmitting US monetary policy effects to various remittance-sending and receiving countries. We hypothesize that an unexpected monetary tightening in the US could trigger a ripple effect on other remittance-sending countries due to their close trade and financial integration, and their increased synchronization resulting from the Global Financial Cycle, as described by Rey (2015). This ripple effect may lead to economic downturns in these remittance-sending nations, which could, in turn, result in a reduction in global remittance outflows. Consequently, the repercussions of US monetary tightening could spread across a wide range of recipient countries, thereby amplifying the global synchronization of business cycles. Beyond the extent of these spillovers, understanding their full impact also requires close attention to their timing, as monetary shocks may transmit across borders at a different pace or in a different sequence than they do within the US economy.

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[1] Remittances now surpass foreign direct investment and development aid in low- and middle-income countries. According to the last figures provided by the World Bank, personal remittances received have experienced remarkable growth, evolving from negligible amounts in 1980 to reach 766,85 billion current US$ in 2022 —equivalent to 0.8 percent of global GDP.

To empirically examine these cross-border effects, we use a comprehensive dataset that encompasses a wide range of countries —8 remittance-sending countries and 41 recipient countries— spanning the period from January 1997 to December 2017. We rely on a local projections empirical framework (Jordà 2005), which allows us to trace the dynamic responses of macro-financial variables in both remittance-sending and receiving countries to US monetary policy shocks. We instrument unexpected changes in the federal funds rate using the US monetary policy shock, incorporating the information channel as suggested by Miranda-Agrippino and Ricco (2021) and Jarociński and Karadi (2020). By estimating the impulse responses of macro-financial variables, we specifically investigate how the transmission of monetary shocks is shaped by the degree of reliance on remittances in recipient countries.

Consistent with the existing literature of the global financial cycle, we find that tightening US monetary policy is associated with widespread declines in output, prices, and credit in advanced economies. Importantly, these cross-border spillovers are not only widespread but also marked by important cross-country asymmetries in timing and intensity. While US monetary policy typically affects domestic output with a lag of several months, our results show a more immediate response in other remittance-sending countries. This faster adjustment underscores the high degree of financial integration and sensitivity of these economies to global monetary conditions. Importantly, the economic slowdown in these economies—many of which are also major sources of remittances—leads to a substantial and more immediate reduction in remittance outflows, illustrating the pro-cyclical nature of these flows in their countries of origin.

We also present a novel finding. Unlike remittance-sending countries, the impact of US monetary policy tightening on recipient countries varies based on their level of dependence on remittances. Specifically, countries with a lower reliance on remittances —less than 4 percent of GDP— exhibit counter-cyclical behavior in remittance flows, in contrast to those more heavily reliant. In other words, following an unexpected tightening of US monetary policy, most countries experience an economic slowdown, except for those with moderate reliance on remittances —1 to 4 percent of GDP—.

To better understand how a US monetary policy shock affect remittance behavior, we explore the channels through which these effects materialize—focusing on migrants' motivations for remitting and their skill composition. We distinguish between altruistic and self-interest motives by examining the cyclicality of remittance flows in response to external economic conditions. We also account for migrant heterogeneity by incorporating data on the educational attainment of diaspora populations, allowing us to assess how skill levels shape remittance resilience during downturns.

Our results reveal distinct patterns in remittance behavior that reflect both the economic context and the characteristics of migrant populations. In countries with low to moderate remittance dependence, inflows increase following US monetary tightening—consistent with altruistic or insurance-driven motives. By contrast, countries highly reliant on remittances experience a decline in inflows, indicating pro-cyclical dynamics aligned with self-interest motives. These patterns persist even after controlling for external economic conditions. We further show that this heterogeneity is structurally linked to migrant skill composition: countries with a predominance of low-skilled migrants—often the most remittance-dependent—exhibit stronger pro-cyclical responses, while those with more skilled or diversified diasporas benefit from more stable, counter-cyclical remittance flows. These findings illustrate the dual role of remittances as both amplifiers and stabilizers of the global business cycle, while also emphasizing how the scale and nature of remittance flows can either constrain or bolster the monetary policy autonomy of recipient countries.

This paper makes several contributions to the literature on global economic dynamics and the transmission of US monetary policy. First, while earlier studies have focused on direct financial channels —e.g., capital flows, exchange rates, and interest rates— (Rey 2015; Bruno and Shin 2015), our research shows that remittances play a significant role in shaping global economic outcomes.

Second, we extend the analysis of the remittance channel as a pathway for US monetary policy shocks to affect emerging markets and developing countries. Machasio and Tillmann (2023) find that tightening monetary policy by the Federal Reserve reduces remittance inflows in Latin America and the Caribbean, which in turn increases business cycle volatility. However, because many migrants from these countries reside in the US, their findings may not apply to other regions. By examining a broader range of countries, our paper offers a wider perspective on how US monetary policy influences economies through remittances.

Third, our study contributes to the policy discussion by highlighting the vulnerabilities of economies that depend heavily on remittances, especially amid global financial cycles driven by US monetary policy. We identify threshold effects where countries with high remittance dependence experience pro-cyclical impacts, while those with moderate dependence show counter-cyclical responses. In addition, we examine how migrant skills affect remittance flows and find that higher-skilled migrants tend to support more counter-cyclical transfer channels, thereby influencing the transmission of US monetary policy shocks.

The remainder of the paper is organized as follows: Section 2 provides some background on the impact of remittances in recipient countries and explores the potential mechanisms through which US monetary policy may be transmitted internationally via these

personal transfers. Section 3 describes our sample of countries, outlines the methodology for identifying US monetary policy shocks, and details the empirical framework employed in our analysis. In Section 4, we present our primary findings on the effects of US monetary policy on both remittance-sending and -receiving countries, while discussing pro and counter-cyclicality controlling for external economic conditions and considering the role of migrant skill levels. Section 5 conducts several robustness checks to validate our results. Section 6 concludes.

2. Remittances and US monetary policy

Remittances have been extensively studied for their role in supporting development in emerging and developing economies (Ahmed, Akinci, and Queralto 2021; Gapen et al. 2009; Giuliano and Ruiz-Arranz 2009). These financial flows provide a unique form of external funding, offering foreign currency to countries and additional income to households, which is then used for both consumption and investment purposes. However, as remittances grow in importance, they also present macroeconomic challenges. For instance, the literature has explored how remittances can trigger a “Dutch disease” effect, leading to an appreciation of the real exchange rate, which in turn suppresses exports and reduces competitiveness, potentially hindering emerging economies from overcoming the middle-income trap (Acosta, Lartey, and Mandelman 2009; Lartey, Mandelman, and Acosta 2012). Additionally, high levels of remittances can create a wealth effect, leading households to increase their leisure time, which may depress output over time (Vacaflores 2012).

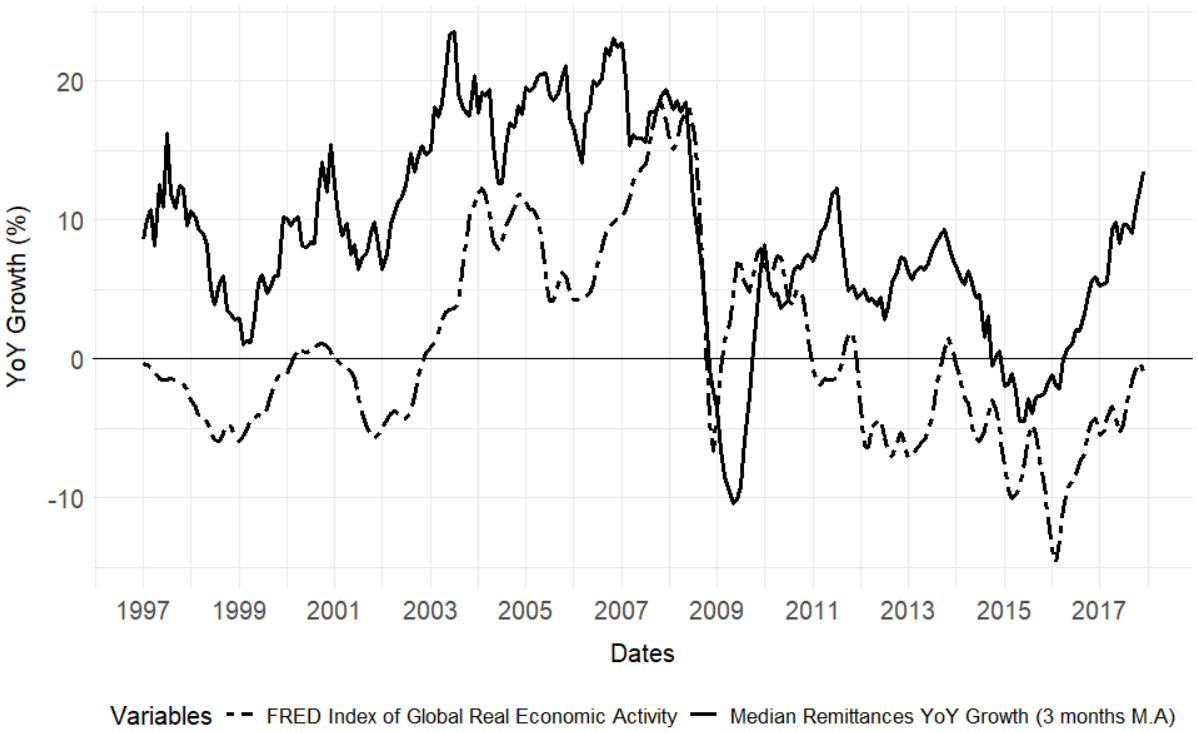
Remittances also present challenges for the implementation of monetary policy. When households rely heavily on remittances as a primary income source, the effectiveness of a country's monetary policy may be dampened. The reason lies in the dual impact of these foreign flows, which can either dampen or stimulate demand and consumer spending, depending on their cyclical nature. For instance, if remittance inflows increase during an economic expansion and the central bank raises interest rates to tighten monetary conditions, these inflows could counteract the intended tightening effect, potentially leading to higher inflation by elevating demand. Conversely, a reduction in remittance inflows might coincide with the central bank's tightening measures, thereby reinforcing their impact on real economic indicators (Acosta, Lartey, and Mandelman 2009; Giuliano and Ruiz-Arranz 2009; Sayan 2006).

Further research highlights the importance of remittances in the financial system, particularly emphasizing the key role banks play in transmitting monetary policy (Barajas et al. 2018). The interest rate channel effect is notably significant in countries with high levels of remittance inflows. When external financing conditions are favorable, allowing for borrowing at lower interest rates from abroad, domestic loan rates may become less responsive to

changes in the policy rate for two main reasons. First, substantial inflows can reduce the risk premium for households, diminishing the impact of monetary tightening on lending rates. Second, when foreign funds —arising from remittance inflows— are abundant, banks may choose not to increase lending rates in response to domestic monetary policy tightening. This decision is influenced by the higher levels of liquidity provided by remittances, which can lead banks to reduce their interest rate pass-through. As a result, banks may insulate themselves from the actions of the domestic central bank, thereby weakening a key channel of monetary policy transmission (Barajas et al. 2018).

Although a significant body of research has examined the influence of US monetary policy on capital flows—especially showing that expansionary measures boost capital inflows into emerging markets—the impact on remittances remains relatively underexplored (Calvo, Leiderman, and Reinhart 1993; Dahlhaus and Vasishtha 2020). To our knowledge, the only study examining the impact of US monetary policy on remittances finds that a surprise tightening is associated with a reduction in remittance inflows to Latin American and Caribbean countries. However, this analysis overlooks potential heterogeneities across countries within the sample and does not account for the broader business cycle implications for real domestic variables (Machasio and Tillmann 2023). US monetary policy spillovers are global in nature, with repercussions that extend far beyond regional boundaries, affecting economies worldwide. Figure 1 shows that remittance outflows move pro-cyclically with global economic activity, revealing how large remittance inflows may leave recipient countries especially vulnerable to external shocks.

Fig. 1 Procyclicality of remittance outflows



Note: The dotted line represents the year-over-year (YoY) growth of the Index of Global Real Economic Activity while the solid line represents the median YoY growth of remittance outflows. Source: Outward remittances from World Bank data - Personal remittances, paid (current US$) and Index of Global Real Economic Activity (IGREA) extracted from FRED.

The US plays a key role as a major sender of remittances, contributing over 20 percent of global remittance outflows from 2000 to 2022. The dominant role of the US as the main sender of remittances, coupled with its significant influence on global economic conditions, underscores the crucial role of US monetary policy on foreign economies via remittances. When US monetary policy tightens, it can slow domestic economic activity, leading to lower income and job opportunities for migrants. As remittances are a share of migrant earnings, reduced income means fewer remittances sent home. Additionally, tighter policy can reduce US demand for imports, further affecting foreign GDP and remittance flows. The effects on recipient countries' economies can be significant, though the overall impact may vary depending on various factors, including the structural characteristics of both remittance-receiving and -sending countries, as well as the monetary policy responses of foreign central banks.

3. Data and empirical methodology

Our approach includes three key elements: a comprehensive sample that covers a broad spectrum of remittance-receiving and -sending countries, a precise indicator for

identifying US monetary policy shocks, and the estimation of impulse response functions using local projections, as developed by Jordà (2005).

3.1. The sample

Remittances include all regular transfers, whether in cash or in kind, made by non-resident households to resident households (De Arcangelis et al. 2023). These transfers are primarily made by individuals who have migrated to foreign countries (Orrenius and Zavodny 2015). The International Monetary Fund (IMF) is the leading source of statistics on international remittances, compiling data from central banks. National authorities have updated their data collection methodologies and sources to align with the recommendations of the IMF's Balance of Payments and International Investment Position Manual, sixth edition (BPM6) (IMF 2014).

To identify countries that play a significant role in international remittance flows, we use bilateral data from the KNOMAD-World Bank matrix for 2021 (Ratha 2017). This level of granularity helps to identify the most significant remittance corridors and better understand the dynamics of remittance flows globally. Additionally, the dataset covers a broad range of countries, allowing to capture remittance flows with migration flows, giving a clearer picture than through balance of payments data and helping to understand the role of remittances on both sending and receiving economies. The main limitation of the matrix is that it covers only the year 2021 with an annual frequency, which does not allow for historical comparisons. Figure 14 in Appendix A shows the bilateral remittance flows derived from this dataset.

The matrix illustrates the US' predominant role in global remittance flows, while also highlighting the importance of other countries as regional players. For example, the Euro area constitutes a major source of remittances for nations in Eastern Europe, Latin America, and the Middle East and North Africa region nations. Similarly, Russia plays a key role in channeling remittances to former Soviet republics, such as Kyrgyzstan, Armenia, Azerbaijan, and Georgia. Additionally, the United Kingdom—reflecting its historical ties—serves as an influential remittance sender, with strong outflows to countries in Southeast Asia, East Africa, and the Middle East.

Drawing on these bilateral remittance flows, we identify countries that account for at least 1 percent of total global remittance outflows. However, due to data limitations, we limit our selection to 12 countries and exclude from the empirical analysis the regional economic area formed by the 6 Gulf Cooperation Council countries, which collectively contributed nearly 15 percent of global remittance outflows in 2021 but have only recently begun publishing quarterly and monthly statistics.

In selecting recipient countries, we apply specific criteria given the vast number of economies receiving transfers. We focus on countries that, according to KNOMAD data, received at least 0.1 percent of total global remittance inflows annually, on average, from 2000 to 2017.[2] Additionally, we exclude countries where remittance outflows surpass inflows, and those lacking a monthly output index or available data on personal transfers. Countries that do not meet these criteria account for a relatively minor share of total inflows (14 percent). When including China, which alone contributes 9.3 percent to global inflow figures, the unaccounted portion of flows increases to 23 percent.[3] Our final selection includes 41 remittance-receiving countries, which collectively represent an average of 50 percent of total global remittance inflows and 70 percent of inflows to non-Advanced Economies (AEs) between 2000 and 2023.

The descriptive statistics presented in Table 3 and Table 4 in Appendix A shed light on the average values of several key macroeconomic indicators for the sample of countries sending and receiving remittances. No distinct pattern is evident across these countries.

3.2. Identification of US monetary policy shocks

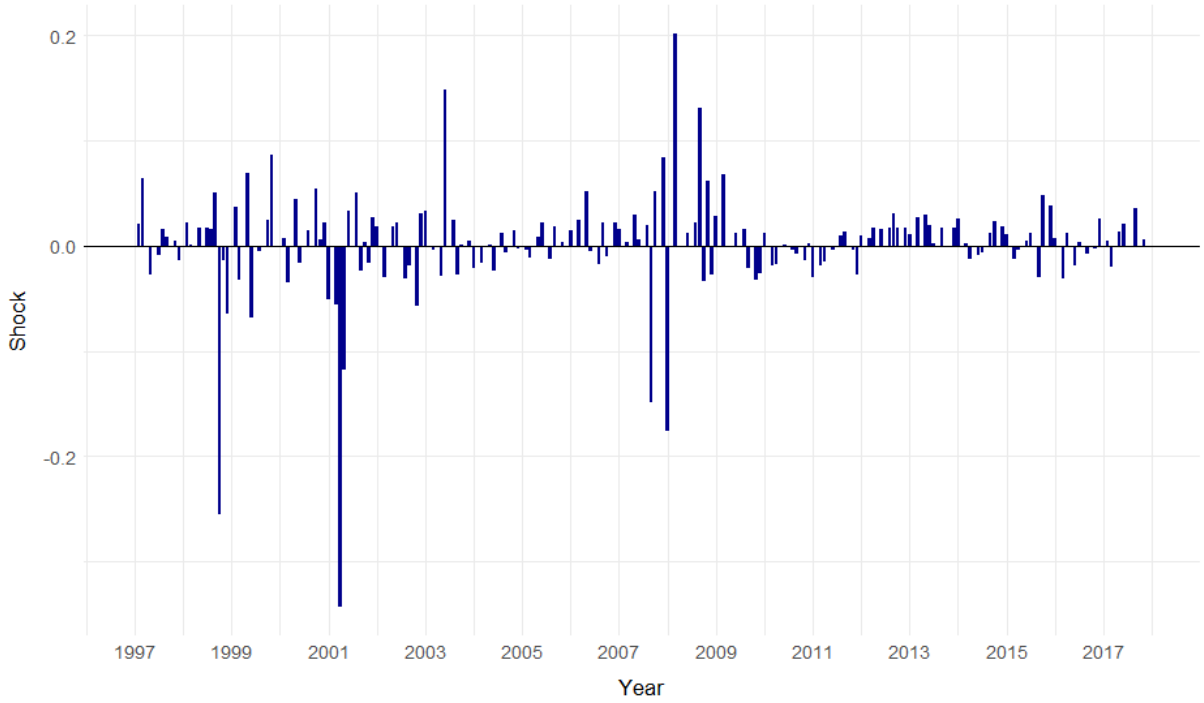
Monetary policy plays a significant role not only in directly influencing economic conditions but also in signaling the central bank's stance on the economy's current state and its expectations for future developments. This signaling aspect complicates the identification of the international spillover effects of the Federal Reserve's policy actions, as highlighted by Bernanke (2017). In evaluating the influence of US monetary policy on the global economy, it is important to distinguish between the actual shocks resulting from policy changes and the signals sent by the central bank regarding broader economic and financial conditions. Failing to separate these factors can lead to a misunderstanding of the true effects of US monetary policy on other countries and the broader impact of global economic shocks. Therefore, “high-frequency monetary policy shocks” based on changes in futures rates around central bank policy announcements have become the empirical standard in monetary economics (Kuttner 2001; Cochrane and Piazzesi 2002).

We opt to use the US monetary policy instrument developed by Miranda-Agrippino and Ricco (2021) shown in Figure 2 due to (i) its comparability, as it uses the benchmark fourth Fed Funds futures contract (FF4) shocks; (ii) its ability to isolate the pure recessionary shock from the central bank's information shock; (iii) its adoption of the Fed’s private (Greenbook) forecasts as in Romer and Romer (2004), thus combining the narrative and high frequency

[2] This threshold corresponds to an average annual inflow of 500 million US$.
[3] Countries excluded from the eligible sample due to data limitations include Albania, Algeria, Argentina, Bermuda, Bosnia, Brazil, Cambodia, China, Chile, Georgia, Ghana, Haiti, Jamaica, Kenya, Kosovo, Latvia, Moldova, Nepal, Nigeria, Senegal, Serbia, Slovakia, Sudan, Tajikistan, Ukraine, Uzbekistan, Yemen, and Zimbabwe. In the case of China, despite being the third-largest recipient in 2022 with 51 billion US$, remittances only account for 0.2 percent of their GDP.

approaches; (iv) its use in related literature for examining the international transmission of US monetary policy, which facilitates cross-country comparability (Degasperi, Hong, and Ricco 2020).

Fig. 2 US monetary policy shock



Note: This Figure illustrates the shock identified by Miranda-Agrippino and Ricco (2021) which displays a correlation of 0.69 with the shock identified by Jarociński and Karadi (2020). These high frequency shocks, recognized as the industry standard in recent monetary policy research, specifically address the information effect.

3.3. Empirical methodology

We derive impulse response functions using local projections (LP) following the approach developed by Jordà (2005). Unlike panel data approaches, we estimate individual country-specific IRFs, as this allows us to assess the effect of US monetary policy spillovers independently for each country. This specification facilitates a direct comparison with the methodology used by (Degasperi, Hong, and Ricco 2020). The LP method is favored for its straightforward nature in estimation and structural interpretation, as pointed out by Stock and Watson (2018). Its iterative framework produces more efficient parameter estimates compared to vector autoregressive (VAR) models, which tend to experience increasing bias when the model is misspecified. Moreover, although both LP and VAR approaches yield equivalent impulse responses (Plagborg-Møller and Wolf 2021), LPs are less sensitive to specification errors. This robustness is particularly advantageous given the inherent challenges of accurately specifying low-order autoregressive models (Marcellino, Stock, and Watson 2006;

Miranda-Agrippino and Ricco 2021).[4] Finally, LP inference remains robust when dealing with two common features in macroeconomic applications: highly persistent data and the estimation of impulse responses over long horizons (Montiel Olea and Plagborg-Møller 2021).

We begin by estimating the following linear model for each country in our sample:

$$y_{t+h} = \alpha_h + \sum_{s=l}^{h} \delta_h y_{t-s} + \beta_h USMP_t^{shock} + \sum_{s=l}^{h} \gamma_h X_{t-s} + \varepsilon_{t+h} \quad (1)$$

where $y_t$is the dependent variable, y_{t-s} represents the lagged dependent variable, and $\mathbf{X}_{t-s}$ is a vector of domestic variables. The identified US monetary policy shock is denoted by $USMP_t^{shock}$. Hence, the coefficient β_h measures the impact of a policy change at time t on the dependent variable h periods ahead. We consider $s = 12$ lags, following the common practice in monthly specifications and consistent with the approaches of Ramey (2016), Degasperi, Hong, and Ricco (2020) and Bauer and Swanson (2023).

We estimate Equation (1) using the LP approach across a dataset spanning from January 1997 to December 2017, covering 240 monthly periods.[5] Our country-specific sample size $(T = 240)$ is comparable to that of Jordà $(T = 300)$, thereby reducing the risk of small-sample bias (Herbst and Johannsen 2021). By plotting β_h against h, we obtain the impulse response function.

The LP estimator is potentially more robust to inaccuracies in the specification of the actual data generation process compared to the SVAR specification, due to its greater flexibility (Nakamura and Steinsson 2018). However, since the error term ε_{t+h} is expected to exhibit serial correlation for all horizons $h > 0$ (Ramey 2016), we estimate Equation (1) using OLS and apply the Newey and West (1987) correction to appropriately address this serial correlation.

For each country, we consider the following monthly variables: (i) remittance inflows (credit) or outflows (debit) in US$; (ii) nominal short-term interest rate; (iii) Nominal Effective Exchange Rate (NEER); (iv) trade balance with the US (scaled to GDP) (v) Consumer Price Index (CPI); (vi) real output; and (vii) real domestic credit. Except for short-term interest rates and the trade balance with the US, all variables are seasonally adjusted using the X-12-ARIMA method (Findley et al. 1998) and undergo logarithmic transformation. Further details regarding the data sources for each series are provided in Table 5 in Appendix A.

[4] The LP method, which involves incorporating an external instrument such as the US monetary policy shock, is comparable to the standard Structural Vector Autoregression (SVAR) methods that employ Choleski decomposition ordering the monetary policy shock first.
[5] The data regarding the US monetary policy shock developed by Miranda-Agrippino and Ricco (2021) is available until December 2017.

We classify countries as remittance senders or receivers based on their net debtor or creditor status in the personal transfers account of the balance of payments' secondary income. A country is identified as a sender if it holds a net debtor position for at least two-thirds of the sample periods, and as a receiver if it maintains a net creditor position for the same duration. Remittance-to-GDP ratios remain quite stable over time, with all countries staying at least 50 percent of the months in the 1997-2017 period within the same category, and more than half of the countries staying in the same category for 80 percent of the time.[6] Given this stability, a non-linear specification is less suited, as the group classifications do not exhibit the variation typically needed for such modeling approaches.

4. Results

While the impact of US monetary policy shocks on the US is direct, we assess the median dynamic responses for remittance-sending and -receiving countries separately. To achieve this, we compute the median response by horizon across groups of countries from the individual impulse response functions from the local projections, which are performed at the individual country-level. Our goal is to assess how a “median” economy, representing each group, would respond to such shocks. This method is especially valuable in datasets with outliers or high variability. By focusing on the median rather than the mean, the analysis becomes more resilient to extreme values, offering a clearer picture of the typical response. However, recognizing that this measure does not capture the full range of responses, we also report in Figure 15 in Appendix B the 25th, median (50th percentile), and 75th percentile responses for both sending and receiving countries, to give a more comprehensive picture of the impacts across countries.

4.1. US monetary policy transmission to remittance senders

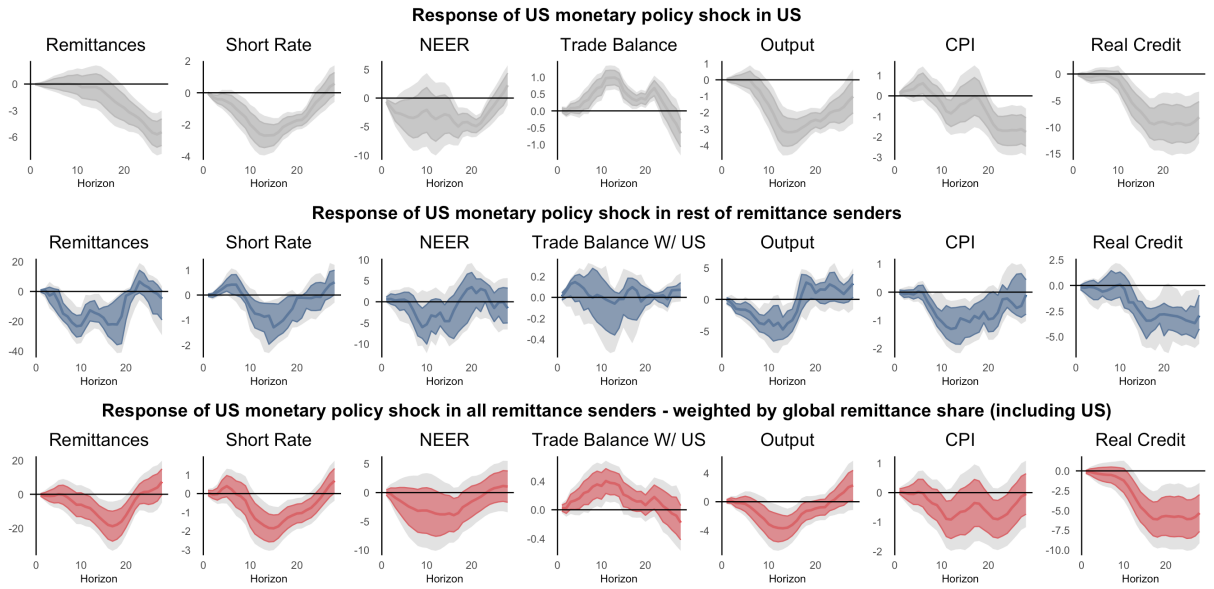
In response to a contractionary US monetary policy shock, the domestic economy experiences substantial recessionary effects, notably on output, prices, and credit, signaling a broad economic slowdown. The first row of Figure 3 captures these responses. Output contracts sharply, declining by nearly 3 percent within one to two quarters, while real domestic credit also falls significantly. Remittance outflows from the US show a delayed but considerable reduction, with a 6 percent decrease by the end of the cycle, as households respond to the economic downturn, adjusting their remittance behavior in line with lower income and declining price levels.

The analysis reveals significant inflation dynamics: core CPI responds more strongly to the monetary policy shock compared to overall CPI, as shown in the second row of Figure 16

[6] Figure 1 in the Online Appendix displays the stability of the remittance-to-GDP ratios over time.

in Appendix B. The core CPI, which excludes volatile items such as food and energy, reacts more immediately, reflecting underlying inflationary pressures, whereas overall CPI lags, driven in part by external factors such as commodity price fluctuations. However, focusing on core CPI may overlook important second-round effects. For countries other than the US, it is better to focus on overall CPI, as prior research highlights the significant role of US monetary policy in driving global inflation, especially through commodity prices (Breitenlechner, Georgiadis, and Schumann 2022; Miranda-Pinto et al. 2023). Figure 17 in Appendix B provides additional evidence, offering further insight into how rising unemployment and falling asset prices contribute to the transmission of monetary policy effects to households. This finding is consistent with the literature on the macroeconomic determinants of remittance outflows, which suggests that households tend to remit based on their economic circumstances, influenced by their income levels, unemployment, and wealth (Hathroubi and Aloui 2016; Vargas-Silva and Huang 2006).

Fig. 3 Responses of remittance senders to a US monetary policy shock[7]



Note: This chart provides a clear depiction of two distinct country clusters. The first cluster focuses on the US IRF. The second one presents a comprehensive overview of major net remittance-sending nations, deliberately excluding the US. The final grouping encompasses all remittance-sending countries, integrating the US. Median of country-by-country responses of endogenous variables to a contractionary one standard deviation US monetary policy shock, resorting to local projections with 12 lags and Newey-West corrected standard errors. Shaded areas correspond to 68 and 90 percent confidence intervals. Monthly sample 1997:01-2017:12.

Turning to the global transmission of US monetary policy, we focus on the effects across other major remittance-sending countries. The remaining rows of Figure 3 reveal that following

[7] This includes South Korea (KR), Japan (JP), Canada (CA), Russia (RU), Australia (AU), the Euro-area (EZ) and the United Kingdom (GB).

a US monetary tightening, short-term interest rates in these countries initially rise but eventually decline into negative territory. This delayed response indicates a lag in the global transmission of US policy. In other remittance-sending countries, key economic variables such as output, inflation, and real credit follow similar patterns to those seen in the US. The most notable finding is the substantial reduction in remittance outflows. This reduction is not only statistically significant but also more pronounced than the corresponding decrease in the US. Specifically, following a tightening of US monetary policy, remittance outflows contract by 20 percent within one year.

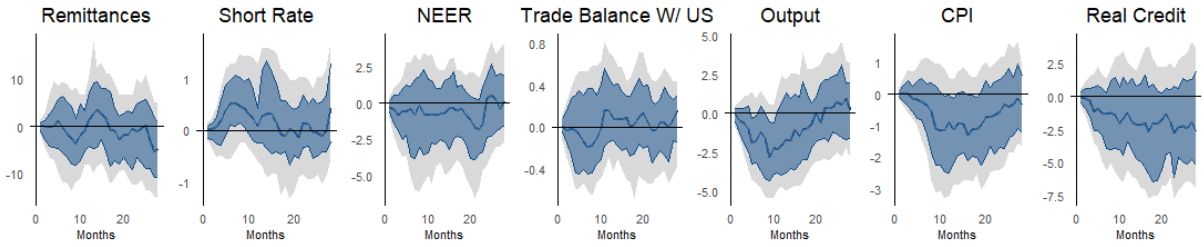
These results shed light into the role of US monetary policy in shaping global financial flows and economic conditions. While the US experiences significant domestic impacts, the spillover effects to other major remittance-sending countries are also pronounced, particularly in terms of remittance outflows. This is consistent with the literature on the global transmission of US monetary policy, which highlights its influence on both advanced and emerging economies (Bekaert, Hoerova, and Duca 2013; Bruno and Shin 2015; Rey 2016). Our findings suggest that US monetary policy shocks impact both domestic financial conditions and at the same time exert significant influence on global remittance flows, thereby increasing the interconnection between the US policy cycle and the global economy. Furthermore, the more immediate transmission of these shocks to other remittance-sending countries can be partly attributed to delayed cycles in their policy responses. Following a surprise US tightening, these economies tend to respond by increasing their short-term interest rates, likely as a preemptive measure to counteract potential currency devaluation. This rapid adjustment, however, triggers an immediate contraction in economic output, as it compounds the effects of both the global financial cycle induced by the US policy shift and the domestic tightening measures.

4.2. US monetary policy transmission to remittance recipients

After exploring the dynamics in remittance-sending countries, we now turn our attention to how US monetary policy shocks affect remittance-receiving countries.

Figure 4 presents the median IRFs for all recipient countries. This initial analysis reveals no strong statistical significance, except for a modest increase in the short-term interest rate and a slight decrease in output and prices.

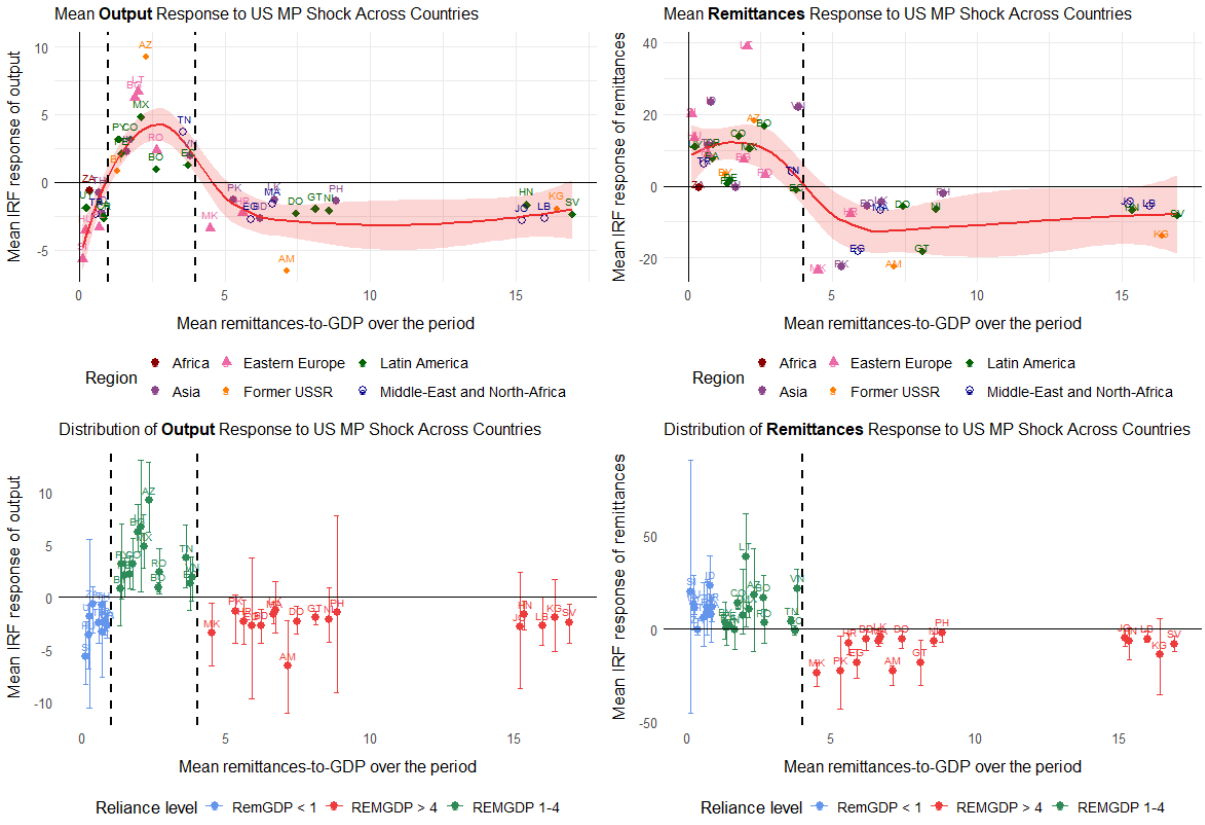
Fig. 4 Response of all remittance recipient countries to a US monetary policy shock



Note: Median of country-by-country responses to a contractionary one standard deviation US monetary policy shock resorting to local projections with 12 lags and Newey-West corrected standard errors. Shaded areas correspond to 68 and 90 percent confidence intervals. Monthly sample 1997:01-2017:12.

We then estimate the response of each endogenous variable to a US monetary policy shock on a country-specific basis over a two-year horizon. Figure 5 shows the average responses of output and remittances at the individual country level, alongside the distributions of the coefficients representing the 25th and 75th percentile responses over the horizon. These are analyzed as a function of the average remittances-to-GDP ratio over the period.

Fig. 5 Responses of recipient countries to a US monetary policy shock, by level of reliance to remittances



Note: Countries are classified based on the average remittances-to-GDP ratio over the 1997-2017 period. Mean output and remittances responses to a contractionary one standard deviation US monetary policy shock. Sample 1997:01- 2017:12. Each dot corresponds to the mean IRF response of

output/remittances to a US MP shock over the horizon t=24 for the top graphs while the bottom graphs also show the box plot 25th and 75th percentile response over the period. Vertical dashed lines at 1 and 4 percent show the threshold levels. Furthermore, the red line represents the non-linear trend line while the red shade corresponds to the corresponding loess standard errors.

The figures indicate that output and remittance IRF responses differ once remittance flows reach certain thresholds, specifically when they account for between 1 and 4 percent of GDP. This non-linear behavior suggests that below, within, or above these limits, the economic reactions to US monetary policy shocks vary. Moreover, these effects appear consistent across different geographical regions, emphasizing the broad relevance of these thresholds.

To confirm the statistical reliability and validate the accuracy of these thresholds, we employ the t-test and the Mann-Whitney U-test in Table 1. These tests specifically assess the statistical differences in the responses of groups categorized by their reliance on remittances to a US monetary policy shock. By applying these tests, we ensure that our threshold selections are not solely based on stylized facts but are also supported by robust statistical evidence, thereby enhancing the credibility of our findings.

Table 1 T-test of output and remittance coefficients

	Output coefficients		**Remittance coefficients**	
	T-test	**U-test**	**T-test**	**U-test**
Remittances-to-GDP < 1 vs 1–4	0.00002***	0.000001***	0.8147	0.4031
Remittances-to-GDP < 1 vs ≥ 4	0.8937	0.7114	0.00181***	2.0×10^{-7}***
Remittances-to-GDP 1–4 vs ≥ 4	0.000006***	8.0×10^{-9}***	0.000003***	7.0×10^{-9}***

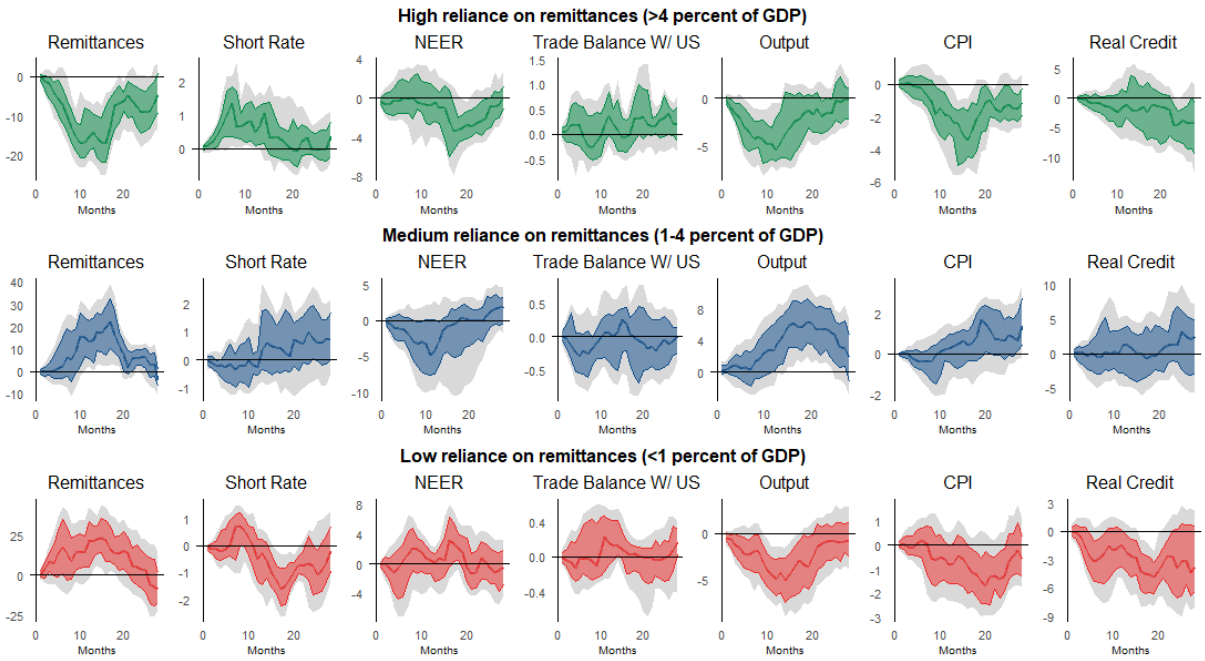
Note: Pairwise t-tests were conducted to compare estimated coefficients between groups categorized by their reliance on Remittances-to-GDP. The t-statistic measures the difference in means, while the p-value assesses statistical significance. A small p-value <0.05 indicates significant differences between groups.

The results clearly indicate significant differences between countries with moderate remittance-to-GDP ratios (1-4 percent of GDP) and other groups of countries. While the remittance coefficients are not statistically significant, the output coefficients show a significant difference between these countries and those with low remittance inflows (< 1 percent of GDP). Moreover, both test metrics are statistically significant, highlighting clear and significant differences in the remittances and output coefficients between these countries and those with high remittance-to-GDP ratios (> 4 percent). These findings imply that the international spillover effects of US monetary policy shocks depend on remittance inflow levels; in particular,

exceeding thresholds of 1 and 4 percent of GDP leads to marked changes in the responses of domestic variables.

Figure 6 presents the median outcomes for 41 recipient countries, categorized by their average remittances-to-GDP levels based on the previously defined thresholds.

Fig. 6 IRF median responses by degree of exposure to remittance flows[8]



Note: Median of country-by-country responses to a contractionary one standard deviation US monetary policy shock resorting to local projections with 12 lags and Newey-West corrected standard errors. Shaded areas correspond to 68 and 90 percent confidence intervals. Monthly sample 1997:01-2017:12. Countries are classified based on the average remittances-to-GDP ratio over the 1997-2017 period. This graph presents the average remittances as a percentage of GDP for various countries from 1997 to 2017.

The results indicate that following a tightening of US monetary policy, remittance inflows experience a statistically significant increase in recipient countries where remittances account for less than 4 percent of their GDP on average over the period. This increase amounts to nearly 20 percent, peaking after one year. Another notable observation is that output declines across all categories except for countries where remittances constitute 1-4 percent of GDP over the period. For all other categories, output decreases by an average of 5 percent over the initial 12 months. In contrast, the output response in Row (2) of Figure 6 shows a minimal

[8] Countries with remittances exceeding 4 percent include Guatemala (GT), Nicaragua (NI), Philippines (PH), Honduras (HN), Lebanon (LB), Jordan (JO), El Salvador (SV), Kyrgyzstan (KG), Croatia (HR), North Macedonia (MK), Dominican Republic (DO), Armenia (AM), Morocco (MA), Ecuador (EC), Egypt (EG), Pakistan (PK), Bangladesh (BD), and Sri Lanka (LK). Countries where remittances average 1-4 percent of GDP include Bulgaria (BG), Belarus (BY), Peru (PE), Colombia (CO), Mexico (MX), Bolivia (BO), Tunisia (TN), Vietnam (VN), Paraguay (PY), Romania (RO), Lithuania (LT), Azerbaijan (AZ), and India (IN). Conversely, countries where inflows represent less than 1 percent on average include Thailand (TH), Indonesia (ID), Turkey (TR), Uruguay (UY), South Africa (ZA), Slovenia (SI), Poland (PL), Hungary (HU), Panama (PA), and Costa Rica (CR).

effect during the first 12 months, followed by a 6 percent increase, peaking at 20 months after the monetary policy shock.

CPI responses also vary among recipient countries. In countries heavily reliant on remittances, a noticeable decline in the CPI is observed. However, the surge in remittance inflows for less dependent economies appears to lead to a divergence from the overall decrease in inflation observed in other countries, including those sending remittances. This divergence is particularly pronounced in countries where remittances make up less than 4 percent of GDP. By considering the classic channels of international monetary policy transmission outlined by Taylor (1995)—specifically the exchange rate and interest rate channels (the "money view") and the bank-lending channel (the "credit view")— we can evaluate the full impact of the remittance channel while also accounting for spillovers into these other channels (Acosta, Lartey, and Mandelman 2009; Barajas et al. 2018).[9]

When analyzing the median IRFs across countries where remittances represent at least 4 percent of GDP, several key observations emerge. Firstly, an unexpected tightening of US monetary policy results in a nearly 20 percent reduction in remittance inflows, peaking after 12 months. This decline can be attributed to households in sending countries experiencing decreased incomes, rising unemployment, and asset depreciation, consistent with prior research (Machasio and Tillmann 2023). Following this reduction, we observe a subsequent depreciation of the NEER, primarily because remittances often constitute a significant source of foreign currency reserves. Consequently, a decrease in remittances diminishes the demand for the local currency, leading to its depreciation.

These changes have a significant impact on the real economy, resulting in nearly a 6 percent decline in output and a 3 percent reduction in the price index. Interestingly, the short-term interest rate rises after a monetary tightening shock. This may seem counterintuitive, as short-term rates are generally expected to decrease following a contractionary shock to stimulate economic activity—similar to what is observed in remittance-sending countries, which are mainly advanced economies—. However, in countries highly dependent on remittances, the decline in remittance inflows, combined with the depreciation of the exchange rate, exerts upward pressure on short-term interest rates. This increase aims to counter capital outflows and stabilize the economy, but it further weakens economic activity. De Leo, Gopinath, and Kalemli-Ozcan (2024) attribute this response to emerging economies' banking sector relying on international markets for dollar funding, often supported by remittance inflows, which impairs the transmission of monetary policy (Barajas et al. 2018). Consequently, a significant

[9] The "money view" focuses on how monetary policy influences the prices and returns of financial assets. In our model, this is represented by the short-term interest rate and NEER. On the other hand, the "credit view" emphasizes the importance of the balance sheet and bank-lending channels. In our model, this is represented by the real credit variable.

drop in remittances in economies heavily reliant on these inflows triggers an increase in short-term interest rates. The trade balance with the US does not seem to have a significant overall impact.

Overall, our findings reveal a distinct pattern: in countries with moderate reliance on remittances, inflows tend to rise during periods of US monetary tightening, suggesting counter-cyclicality. Conversely, in countries heavily reliant on remittances, inflows often contract, indicating a pro-cyclical dynamic. This divergence reflects the dual role of remittances—acting both as a stabilizing buffer and as a transmission channel for external shocks.

4.3. Evidence on channels behind remittance responses

Our estimates identify significant heterogeneity in remittance responses to US monetary policy shocks, conditional on countries' dependence on these inflows. A key question in interpreting these results is through what channels these responses are shaped.

External conditions and remittance motive

We examine how US monetary policy shocks influence remittance behavior by focusing on the underlying motivations for remitting—namely, whether remittances are driven by altruistic or self-interest motives. Existing literature distinguishes between these motives based on the cyclicality of remittance flows: altruistic and insurance-driven remittances tend to rise during downturns in the recipient country (counter-cyclical), while strategic, investment, and inheritance-driven remittances generally increase during periods of economic strength (pro-cyclical), as evidence by Rapoport and Docquier (2006).

To empirically assess the strength of these motives, we extend our empirical strategy by incorporating externally weighted economic activity indices for both remittance-receiving and remittance-sending countries. For remittance-receiving countries, we follow Vacaflores (2018) and construct a weighted index of external economic activity using the KNOMAD bilateral remittances matrix to weight the industrial production indices of the ten most important remittance-sending countries. This allows us to account for how sensitive remittance inflows are to economic fluctuations in migrants' host countries, thereby endogenizing each receiving country's exposure to external business cycle conditions. For remittance-sending countries, we apply a symmetric approach: we use bilateral remittance outflow data to construct a weighted index reflecting the economic conditions of their main remittance-receiving partners. This second index is constructed by weighting recipient countries' industrial production by the share of remittances they receive from each sender. In doing so, we capture the external demand conditions that may influence both remittance behavior and broader macroeconomic adjustments in sending countries.

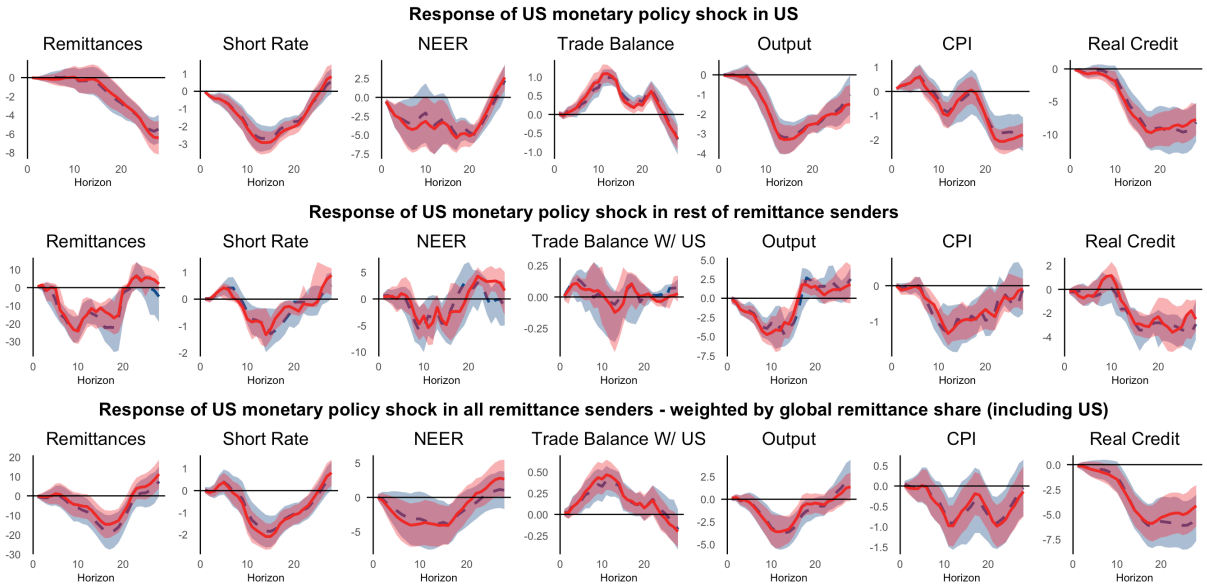
Both indices are included as exogenous variables in our median local projection specification to more accurately capture the differential exposure and responsiveness of remittance flows and output to US contractionary monetary policy. The augmented specification is as follows:

$$\boldsymbol{y_{t+h}} = \alpha_h + \sum_{s=l}^{h} \delta_h y_{t-s} + \beta_h \boldsymbol{USMP_t^{shock}} + \sum_{s=l}^{h} \gamma_h \mathrm{X}_{t-s} + \sum_{s=l}^{h} \boldsymbol{\sigma_h WEO_{t-s}} + \boldsymbol{\varepsilon_{t+h}} \quad (2)$$

where $\boldsymbol{y_t}$ is the dependent variable of interest, $\boldsymbol{y_{t-s}}$ represents its lagged values, $\mathbf{X_{t-s}}$ is a vector of domestic endogenous variables and $\mathbf{WEO_{t-s}}$ denotes the weighted external output index. The error term $\boldsymbol{\varepsilon_t}$ captures unobserved shocks.

Figure 7 shows a comparison between the median impulse response functions obtained from regressions that control for external conditions and those from our benchmark specification for remittance-sending countries. The extended specification consistently yields more precise estimates across variables, as reflected in the narrower confidence intervals. However, the overall picture remains unchanged. The response patterns for remittances, output, credit, and trade largely match those in the benchmark model. In particular, the timing asymmetry persists between the US and other remittance-sending countries. In non-US senders, remittance outflows decline more rapidly following the policy shock, with the response materializing in the early horizons. In contrast, the decline in remittances from the US exhibits a delay, peaking after several months. This finding suggests that migrants adjust transfers in response to deteriorating conditions in their own economic environments. Such behavior is consistent with self-interest motives, whereby remittances are more likely to be sent during favorable economic periods, when migrants have disposable income.

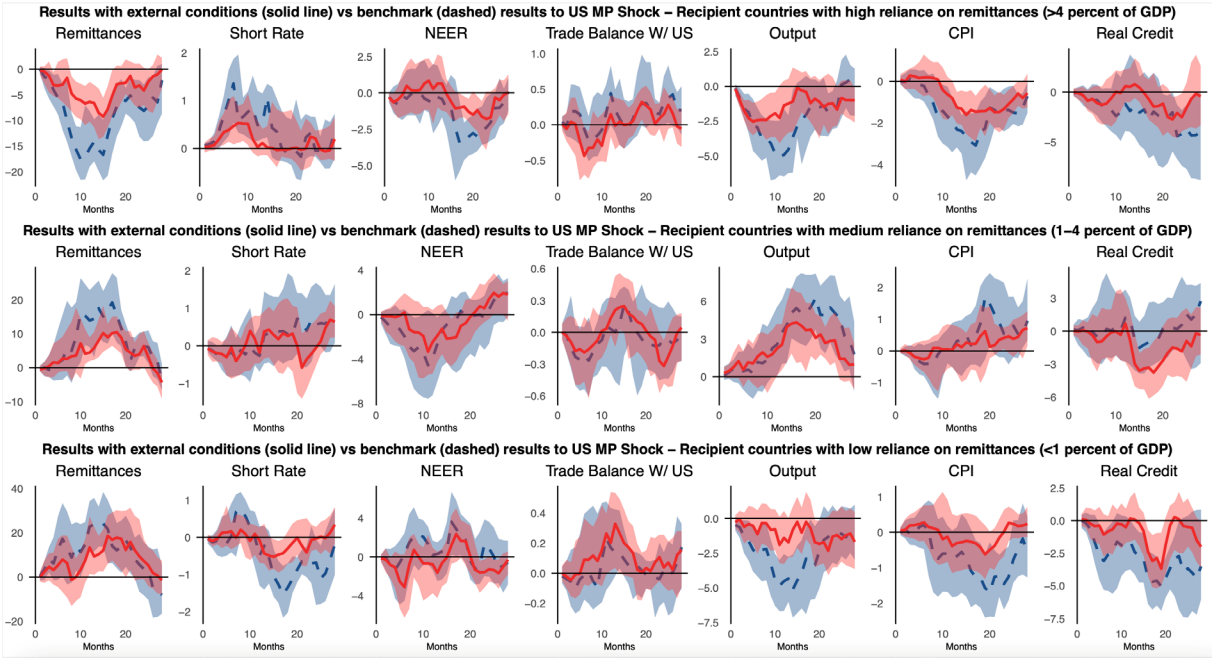
Fig. 7 Responses to a US monetary policy shock in remittance-sending countries: benchmark specification versus extended specification



Note: This figure displays the median impulse response functions of key macroeconomic variables and remittance flows to a one standard deviation contractionary U.S. monetary policy shock. The responses are shown separately for three groups: the United States, the rest of the remittance-sending countries, and all remittance senders weighted by their global remittance share (including the US). Each panel presents results from both the benchmark model (dashed blue line with shaded band) and an extended model incorporating weighted external output (solid red line with shaded band), with Newey-West corrected standard errors and 12 lags. The sample covers the period from January 1997 to December 2017.

Figure 8 presents the results for remittance-receiving countries grouped by their average remittances-to-GDP ratio—high, medium, and low. Again, the extended specification yields narrower confidence intervals across all groups, reflecting improved estimation precision. Importantly, the overall pattern remains consistent with our main results.

Fig. 8 Responses to a US monetary policy shock by remittance dependence: benchmark specification versus extended specification



Note: This figure presents the median country-specific responses to a one-standard-deviation contractionary U.S. monetary policy shock, estimated using local projections with 12 lags and Newey-West standard errors (±1 standard-deviation bands). The sample spans January 1997 to December 2017. Countries are grouped based on their average remittances-to-GDP ratio over the period: high dependence (≥4%), medium dependence (1-4%), and low dependence (<1%). For each group, the impulse response functions are shown for both the benchmark specification (dashed blue line with shaded band) and the extended specification that incorporates weighted external output (solid red line with shaded band).

Specifically, in countries with moderate and low reliance on remittances, inflows tend to rise following a contractionary US monetary policy shock, suggesting a counter-cyclical response consistent with altruistic or insurance motives. This dynamic is preserved in the extended specification, indicating that controlling for external conditions does not reverse the

underlying behavioral mechanism. In contrast, countries with high reliance on remittances continue to exhibit a pro-cyclical pattern, consistent with self-interest or investment-driven motives—remittance inflows decline following monetary tightening, with the contraction appearing somewhat later and less persistently once external conditions are accounted for. This suggests that in highly dependent countries, remittances are more sensitive to the economic constraints or incentives faced by migrants in host economies, reinforcing their role as a transmission channel rather than a buffer.

Migrant skill composition and the cyclicality of remittances

Beyond individual behavioral motives, the education and skill levels of migrants are also key determinants of remittance behavior. These attributes influence migrants' income stability, employment security, and access to financial services—factors that critically affect how remittances respond to external shocks. Research by Bollard et al. (2011) finds that higher-income and better-educated migrants tend to remit larger amounts per transfer, supported by their more stable earnings and stronger integration into financial networks. This financial resilience allows skilled migrants to adjust their remittance flows more flexibly in the face of economic disruptions in the host country. In contrast, low-skilled migrants, who are more likely to experience job insecurity and limited access to banking services, may be less able to sustain remittances during downturns.

Building on this, we introduce the skill composition of migrant populations as an important determinant of aggregate remittance cyclicality. To quantify this effect, we use data from the OECD's Database on Immigrants in OECD and non-OECD Countries (DIOC), classifying migrants into three skill groups based on educational attainment: low-skilled (ISCED 0–2), medium-skilled (ISCED 3–4), and high-skilled (ISCED 5A/5B–6). We calculate the average skill distribution of each country's diaspora using data from 2006, 2011, and 2021, and link this to the estimated impulse responses of remittances to a contractionary U.S. monetary policy shock.

Table 2 presents the average skill composition of migrant populations across countries grouped by their level of remittance dependence. It highlights a clear gradient: countries with higher remittance reliance tend to have a larger share of low-skilled migrants, while those with moderate or low dependence are more likely to have medium -skilled migrant populations. This distribution reflects long-standing differences in migration patterns and labor demand across host economies, and it has important implications for how countries experience remittance flows in response to external shocks.

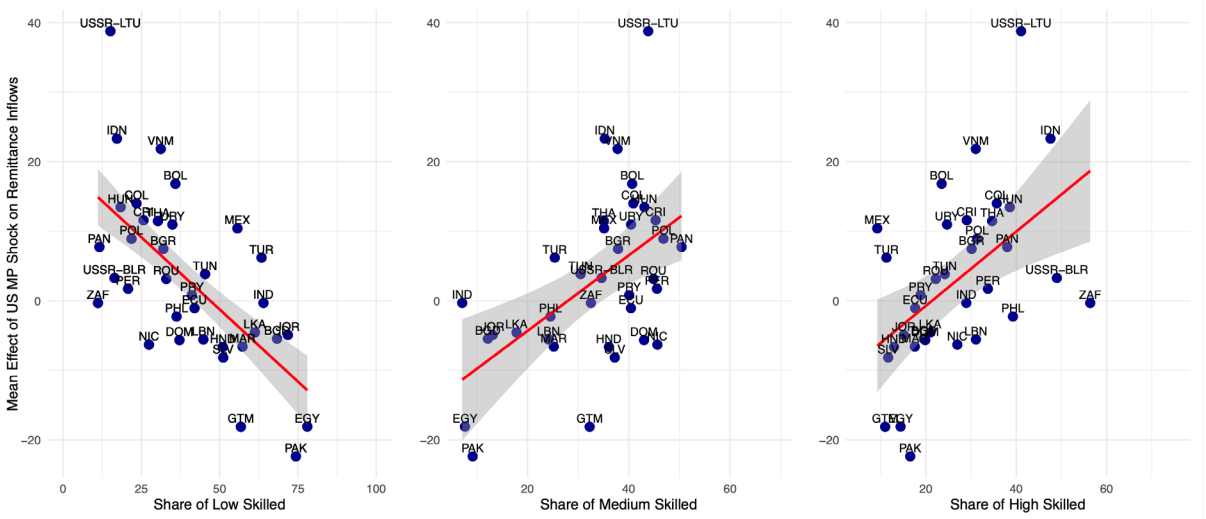
Table 2 Average migrant skill composition by remittance dependence level

Remittance dependence	Average remittances (in % of GDP)	Average migrant skill composition (%)		
		Low skilled	Medium skilled	High skilled
Low	0.6	26.0	39.4	34.6
Moderate	2.3	35.1	36.9	28.1
High	9.8	55.0	25.2	19.8

Note: Skill composition reflects the average share of low-, medium-, and high-skilled migrants in each remittance-dependence group. Values are calculated using the OECD DIOC data for the years 2006, 2011, and 2021.

Figure 9 builds directly on this insight by examining how the skill composition of migrants affects the cyclicality of remittances following a contractionary US monetary policy shock.

Fig. 9 Remittance responses to a US monetary policy shock by skill composition of migrant populations



Note: Mean remittances responses to a contractionary one standard deviation US monetary policy shock. Sample 1997:01- 2017:12. Each dot corresponds to the mean IRF response of remittances to a US monetary policy shock over the horizon t=24 for the y-axis, while the x-axis shows the share of the migrant population in each skill group, as derived from the OECD DIOC database. The red line represents the linear trend line while the grey shade corresponds to the corresponding standard errors.

The results show a clear pattern: countries with a higher share of low-skilled migrants experience significantly more negative remittance responses, while those with greater shares of medium- or high-skilled migrants display attenuated or even counter-cyclical responses. These patterns align with theoretical expectations. Low-skilled migrants, often concentrated in

informal and vulnerable employment, are more susceptible to income volatility during downturns and may struggle to sustain remittances. In contrast, higher-skilled migrants typically enjoy greater employment stability, higher earnings, and access to financial services, enabling them to smooth or even increase remittance flows when economic conditions tighten.

Therefore, Figure 9 provides evidence that differences in migrant skill levels align with the strength and direction of remittance responses, indicating that a country's remittance cyclicality is driven by its migrant population's skill composition. Countries with high remittance dependence—and a predominance of low-skilled migrants—are more likely to experience pro-cyclical remittance behavior, making them more vulnerable to external financial shocks. Conversely, countries with a more diversified or skilled diaspora may benefit from more stable or counter-cyclical remittance flows, reinforcing their resilience during global downturns.

5. Robustness checks

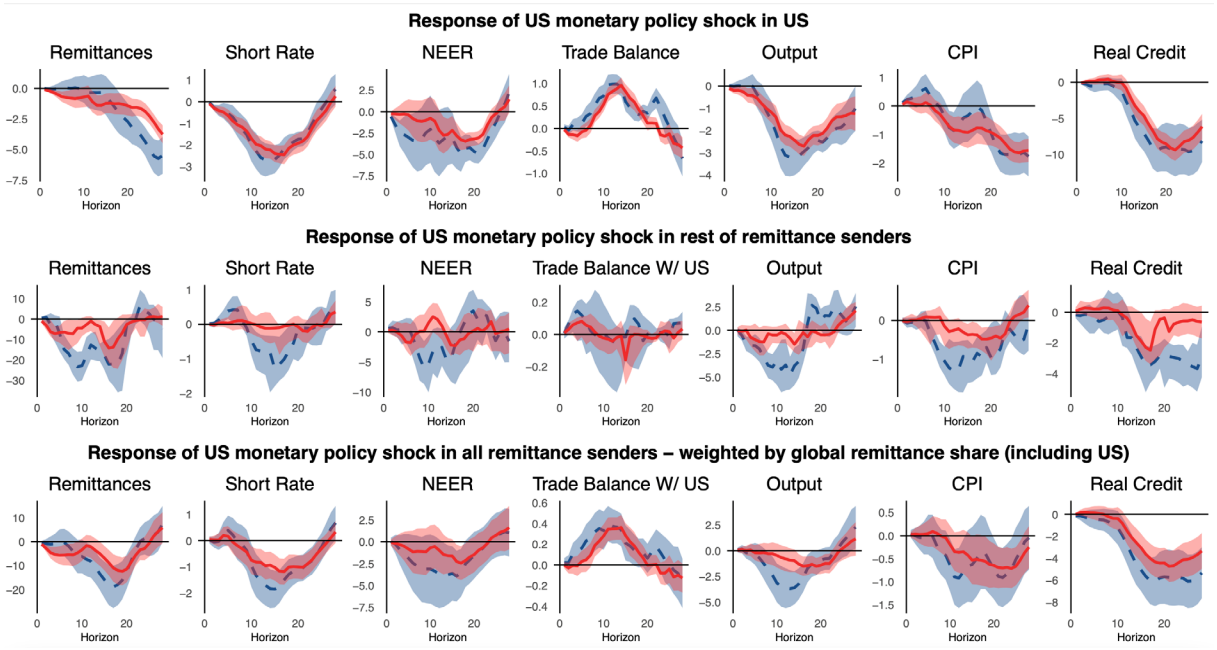
In this section, we conduct several robustness checks to ensure the reliability of our findings. These include analyzing an alternative high-frequency shock, adding control variables, examining various lag structures, and estimating a panel local projection model.

5.1. Using an alternative high-frequency shock

We compare the impulse responses obtained using two high-frequency monetary policy shocks. The main difference lies in how they each account for the central bank information (CBI) effect. The first is the Jarociński–Karadi (JK) shock (Jarociński and Karadi 2020), which captures both the surprise in policy rates and the CBI effect by exploiting the co-movement of stock prices around Federal Reserve announcements. The second is the Miranda-Agrippino–Ricco (MAR) instrument (Miranda-Agrippino and Ricco 2021), employed throughout our main analysis, which isolates the pure policy surprise by conditioning on the Fed's Greenbook forecasts to account for its information set at the time of each announcement.

Figure 10 illustrates the differential effects of US monetary policy shocks across remittance-sending countries, using these two high-frequency identification strategies.

Fig. 10 Robustness to high frequency US monetary policy shock: Jarociński and Karadi (2020) vs Miranda-Agrippino and Ricco (2021) - Median IRF in remittance-sending countries



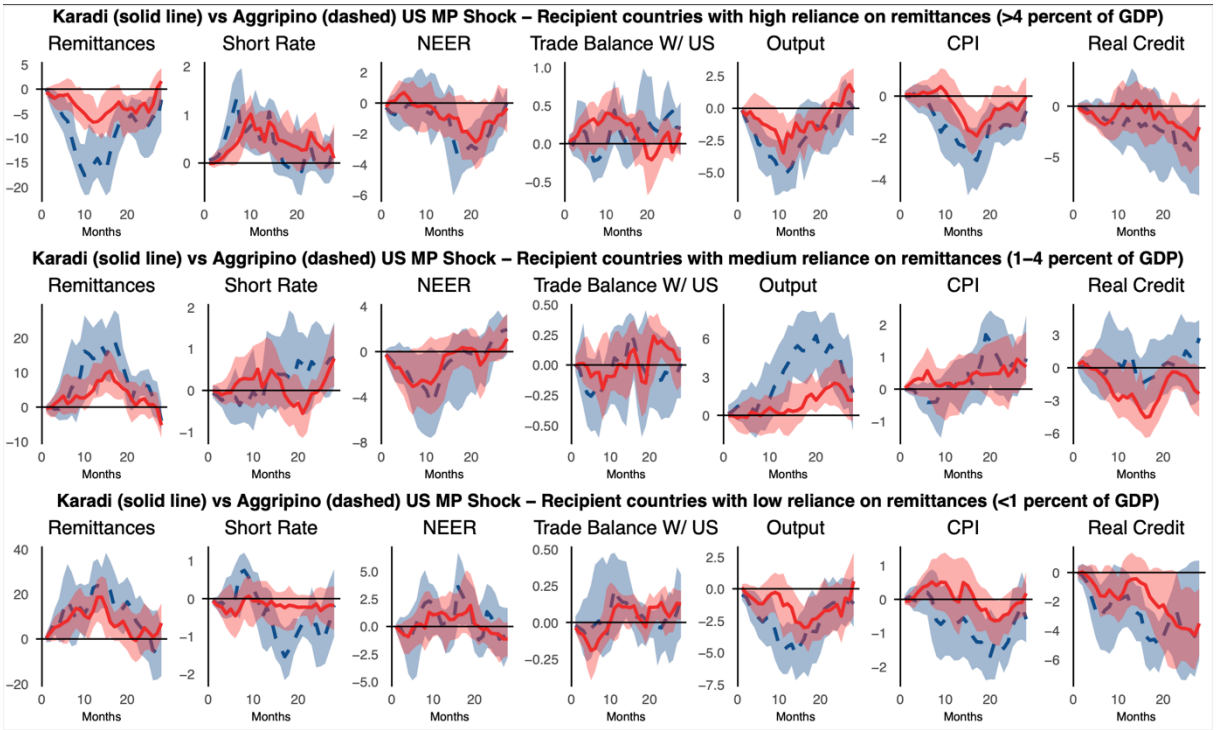
Note: Median of country-by-country responses to a contractionary one standard deviation US monetary policy shock resorting to local projections with 12 lags and Newey-West corrected standard errors and standard deviation error bands. Monthly sample 1997:01-2017:12. In each graph we show the median and standard errors for the US monetary policy shock estimated by Jarociński and Karadi (2020) (solid line and red shade) and the benchmark one estimated by Miranda-Agrippino and Ricco (2021) (dash line and blue shade).

This distinction in identification leads to notable differences in the magnitude and timing of macroeconomic responses. In the United States (top row), both shocks generate contractionary dynamics following a tightening: output, credit, and inflation fall, while interest rates and the exchange rate rise. However, the MAR shock produces substantially stronger declines, particularly for remittances. In the rest of the remittance-sending countries (middle row), the divergence between the two shocks becomes even more pronounced. The MAR shock results in steep declines in remittances, output, and credit, suggesting strong international spillovers when only the surprise policy component is considered. The JK shock, again, leads to more gradual and muted responses. Remittances in these countries also fall, but with a lag relative to output, suggesting a sequential transmission: US monetary tightening first slows economic activity in sending countries, which then leads to reduced remittance transfers. The bottom row shows global responses across all remittance-sending countries, weighted by remittance shares. Patterns are consistent: remittances, output, and credit fall across both shocks, but again with sharper movements under MAR.

In recipient countries (Figure 11) the JK shock leads to smaller movements in remittances. This is consistent with the pattern observed in remittance-sending countries,

where the contractionary effects—on output, credit, and remittance outflows—are also more moderate under the JK shock. Despite these differences in sensitivity, the overall pattern of transmission remains unchanged across the three categories of recipient countries: Specifically, for countries with remittances-to-GDP ratios above 4 percent, both measures of shock indicate a decrease in remittances and economic output, along with a rise in short-term interest rates, highlighting the vulnerability of these economies to sudden changes in US monetary policy. For countries with remittances-to-GDP ratios between 1 and 4 percent, the analysis consistently shows positive impacts on remittances and economic output from both shocks.

Fig. 11 Robustness to high frequency US monetary policy shock: Jarociński and Karadi (2020) vs Miranda-Agrippino and Ricco (2021) - Median IRF responses by degree of reliance to remittances as a share of GDP



Note: Median of country-by-country responses to a contractionary one standard deviation US monetary policy shock resorting to local projections with 12 lags and Newey-West corrected standard errors and 1 standard deviation error bands. Monthly sample 1997:01-2017:12. Countries are classified based on the average remittances-to-GDP ratio over the 1997-2017 period. In each graph we show the median and standard errors for the US monetary policy shock estimated by Jarociński and Karadi (2020) (solid line and red shade) and the benchmark estimated by Miranda-Agrippino and Ricco (2021) (dash line and blue shade).

Together, these findings show that while the choice of high-frequency shock alters the size and timing of cross-border spillovers, it does not change the underlying structure or direction of each country's response.

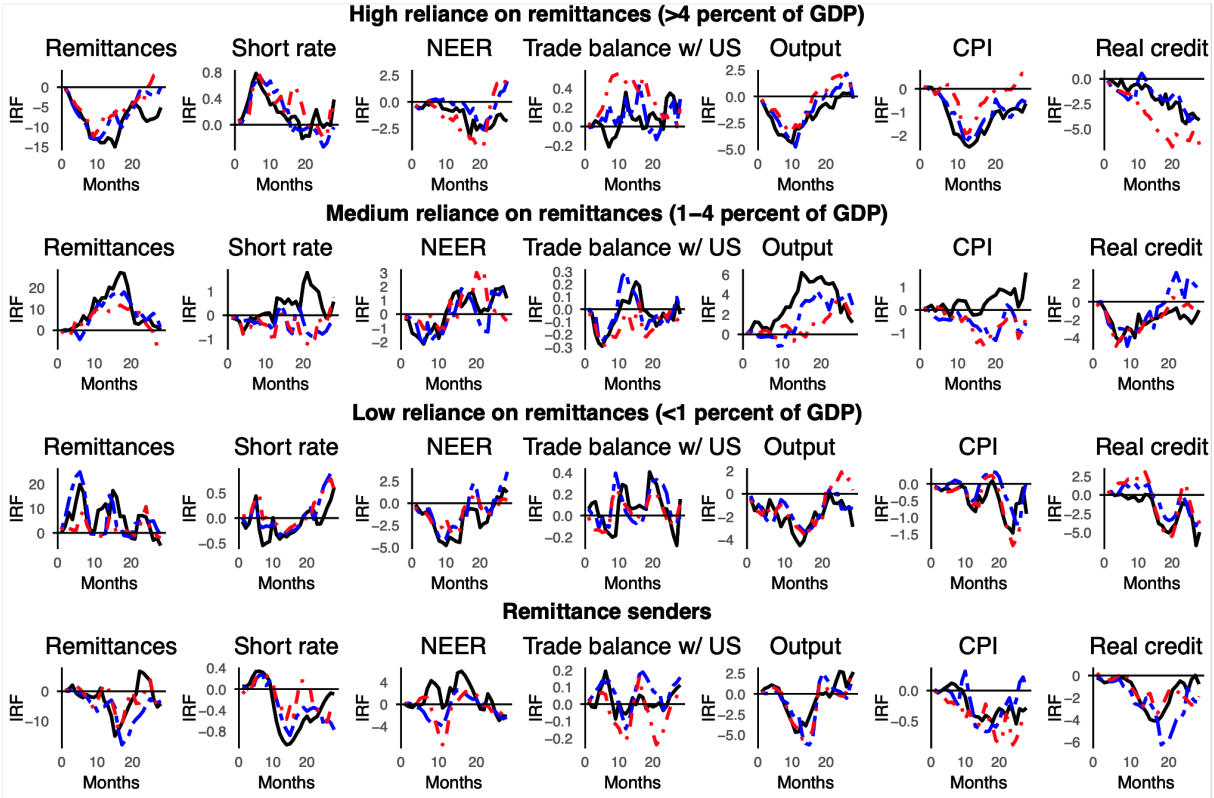
5.2. Adding control variables

We also add control variables to test the robustness of our results. All figures are presented in the Online Appendix. Figure 2 controls for the commodities cycle, Figure 3 addresses financial crises using the Financial Stress Index (Ahir et al. 2023), Figure 4 accounts for the excess bond premium as outlined by Gilchrist and Zakrajšek (2012), and Figure 5 controls for foreign exchange reserves held by central banks. All these specifications are consistent with the benchmark results, showing an inverse U-shaped effect of the US tightening shock on output, depending on the reliance on remittances as a share of GDP, and a negative effect on remittances in countries that are highly dependent on them.

5.3. Sensitivity to the choice of lag length

Figure 12 investigates the impact of lag length on our findings, systematically presenting the results from employing different lag lengths —6, 9, and 12— in our LP analysis.

Fig. 12 Robustness to lag specification (6, 9 and 12 lags) - Median IRF responses by degree of reliance to remittances as a share of GDP



Note: Median of country-by-country responses to a contractionary one standard deviation Miranda-Agrippino and Ricco (2021) US monetary policy shock resorting to local projections with 12 (black, solid), 9 (blue, two dash) and 6 (red, dot dash) lag specifications and Newey-West corrected standard errors. Monthly sample 1997:01-2017:12. Countries are classified based on the average remittances-to-GDP ratio over the 1997-2017 period while the last row corresponds to remittance-sending countries.

The main insight from this analysis is the remarkable consistency of the results across various lag configurations. Whether we use 6, 9, or 12 lags, our core conclusions remain unchanged, indicating that our findings are robust and not contingent upon a specific lag length. Moreover, with monthly data, the 12-lag specification is particularly relevant as it captures the full annual dynamics and seasonality, essential for analyzing macroeconomic indicators over the business cycle.

5.4. Estimating panel local projections

Finally, we employ an alternative econometric approach by applying panel LP to various subsamples. This method allows us to evaluate the effectiveness of using median responses from specific subgroups for analysis. Specifically, we estimate a linear panel model for each group of countries, categorized according to their dependence on remittances:

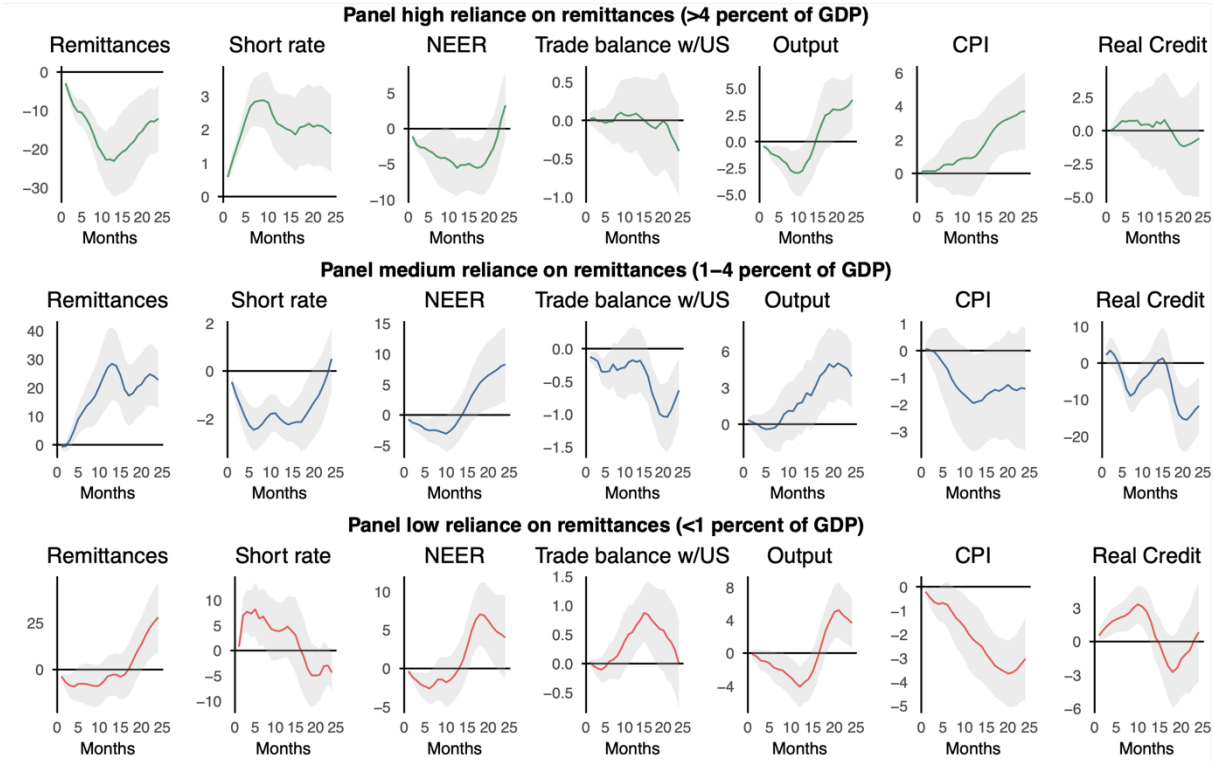
$$y_{i,t+h}^{(v)} = \alpha_{i,h} + \sum_{s=l}^{h} \delta_h^{(v)} y_{i,t-s}^{(v)} + \beta_h^{(v)} USMP_{i,t}^{shock} + \sum_{s=l}^{h} \gamma_h^{(v)} \mathrm{X}_{i,t-s}^{(v)} + \lambda_i + \varepsilon_{i,t+h} \qquad (3)$$

where v represents each of the dependent variables of interest: *Remittance*s, *Short rate*, *NEER*, *Trade balance with the US*, *Output*, *CPI,* and *Real credit.* $y_{i,t+h}^{(v)}$ is the dependent variable, $y_{i,t-s}^{(v)}$ is the lagged dependent variable, λ_i corresponds to the country fixed effects and $\mathrm{X}_{i,t-s}^{(v)}$ is a vector encompassing the rest of the lagged dependent variables as controls. The identified US monetary policy shock is denoted by $USMP_{i,t}^{shock}$. Thus, the coefficient $\beta_h^{(v)}$ measures the impact of a policy change at time t on the dependent variable v h periods ahead. We also consider $s = 12$ lags.

We estimate Equation (3) using the LP approach over a sample period from January 1997 to December 2017, resulting in 240 monthly periods, as in our benchmark specification. We employ Driscoll and Kraay (1998) robust standard errors to account for cross-sectional and serial correlation in panel models.

Figure 13 clearly illustrates how different levels of reliance on remittances affect our key economic indicators, corroborating our initial findings with median IRFs on a country-by-country basis.

Fig. 13 Robustness to panel local projections, by degree of reliance to remittances as a share of GDP



Note: Responses to a contractionary one standard deviation US monetary policy shock resorting to panel local projections with 12 lags and Driscoll and Kraay's corrected standard errors along with 1 standard deviation error bands. Monthly sample 1997:01-2017:12. Countries are classified based on the average remittances-to-GDP ratio over the 1997-2017 period.

For the panel of countries with a remittances-to-GDP ratio exceeding 4 percent, there is a noticeable drop in remittances accompanied by a downturn in output, confirming our previous results about these economies' vulnerability to external shocks. These countries also exhibit a significant decline in their NEER despite a rise in short-term interest rates, leading to an increase in prices. In contrast, the panel of countries with a remittances-to-GDP ratio of 1 to 4 percent shows a different pattern, with increases in both remittance inflows and economic output, alongside a decrease in short-term interest rates. This improvement is accompanied by a rise in NEER and a slight decrease in CPI. For the panel of countries with a remittances-to-GDP ratio below 1 percent, the effects are subtler and less clear-cut. Remittances dip briefly and then bounce back over the next few months, short-term interest rates inch down, output contracts, and prices edge lower. This limited reaction likely reflects the small role that remittance inflows play in these economies; it may also be that other factors dampen external shocks in ways our panel specification may not fully capture.

Overall, the panel data evidence supports the validity of our analysis for these countries by shedding light on the underlying mechanisms. The only substantial difference noted is a

decrease in short-term rates for countries with moderate reliance on remittances, following an increase in remittance flows. This specific pattern reveals that remittances can affect monetary policy autonomy—giving central banks the leeway to cut rates and better absorb external shocks.

6. Conclusion

This article expands the empirical evidence supporting the existence of a “Global Financial Cycle” linked to economic conditions in the “center country” (Rey 2015), with a particular focus on the unique role of remittance dependence within this framework. As remittances have now surpassed foreign direct investment and development aid in numerous countries, they have become a critical driver of growth and stability for recipient economies. Moreover, remittances are highly sensitive to monetary policy changes, serving as a significant transmission channel through which US monetary policy influences other nations' economies. This sensitivity amplifies the impact of US monetary tightening, particularly in countries that heavily rely on remittance inflows, affecting their economic resilience and stability.

We find that reliance on remittances has an inverse U-shaped effect on the output response to a US monetary policy shock. We identify a threshold of remittance inflows that shapes the spillover effects of a US monetary policy shock. When remittances constitute a moderate portion of a country's GDP —less than 4 percent— they tend to follow a counter-cyclical pattern after US monetary tightening. Specifically, for flows between 1 and 4 percent of a country's GDP, remittances can help soften and even counteract the global downturn triggered by tighter US monetary policy. On the other hand, countries more dependent on remittances —exceeding 4 percent of their GDP— face significant recessionary effects, with adverse impacts on various economic indicators, including remittances, output, prices, and credit. The direction of these responses across countries remains robust across various robustness checks, including alternative high-frequency shocks, different lag structures, and panel local projection model estimates.

Incorporating weighted external output indices confirms that self-interest motives dominate in high-dependence countries, whereas altruistic and insurance-based motives are more relevant in lower-dependence contexts. Furthermore, we document a clear gradient in remittance cyclicality by migrant skill composition: countries with a larger share of low-skilled migrants experience more pro-cyclical remittance responses, making them more vulnerable to external shocks. By contrast, countries with a more skilled diaspora benefit from more stable or even counter-cyclical remittance flows.

Our findings highlight the risks associated with heavy reliance on remittance flows. Contrary to previous literature suggesting that remittances help smooth economic cycles, our

results indicate that such dependence can exacerbate downturns and increase vulnerability—a sharp decline in remittances inflows can quickly translate into a weakening of domestic demand and output. Moreover, the resulting decline in foreign currency reserves may prompt counter-cyclical increases in short-term interest rates to prevent sharp currency depreciation, further deepening economic instability. Given the additional implications for financial sector stability, these findings call for regulatory oversight similar to that applied to other capital flows. Policymakers should recognize these vulnerabilities and consider strategies to reduce excessive reliance on remittances, thereby protecting monetary policy autonomy and overall economic stability.

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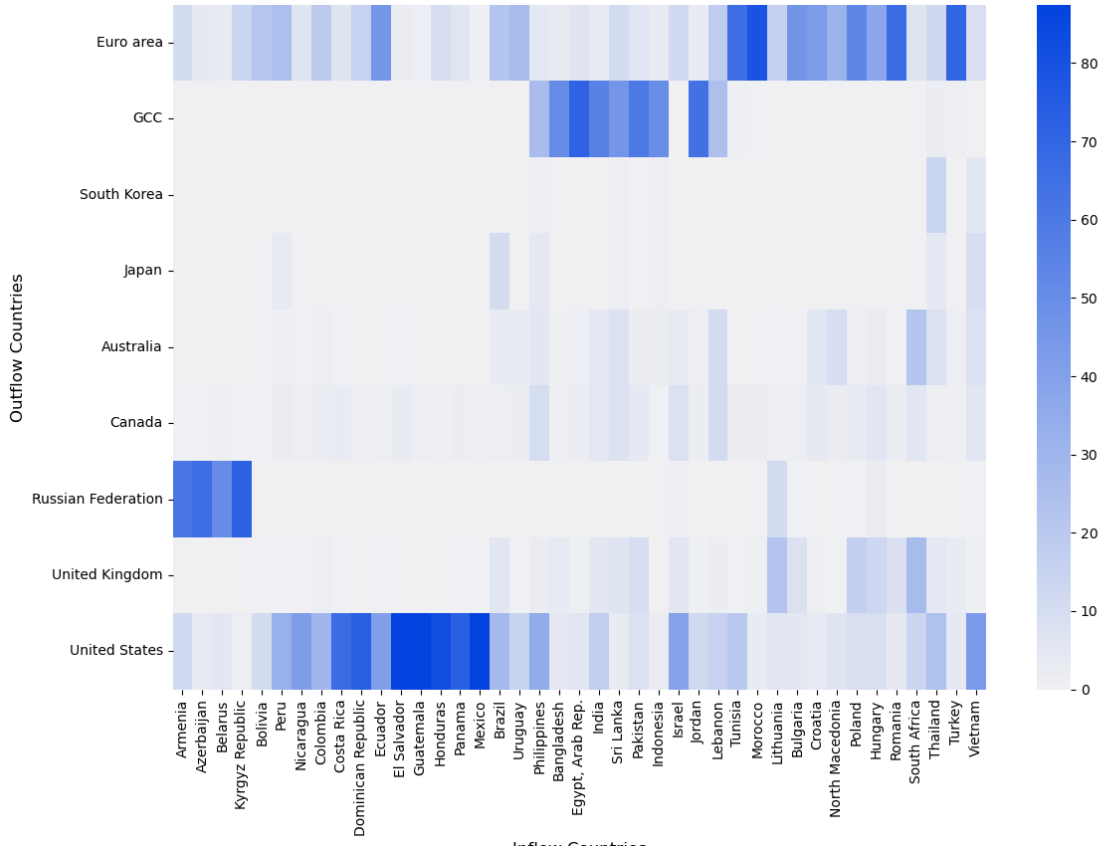
Appendix 1

Appendix A. Data and sample

Fig. 14 Bilateral remittances matrix



Note: The x-axis represents countries receiving remittances (inflow countries), while the y-axis represents countries sending remittances (outflow countries). The color gradient displays the share of remittances that each country receives from a particular outflow country, ranging from 0 (white) to 100 percent (dark blue). GCC corresponds to the Gulf Cooperation Council countries: Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain and Oman. Source: KNOMAD/World Bank Bilateral Remittance Matrix 2021, December 2022.

Table 3 Descriptive statistics – Recipient countries

Code	Country	Remittances-to-GDP (%)	ER Arrangement	KA openness	GDP PC (ppp)	Avg inflation (%)	Avg monthly growth (%)	Trade balance-to-GDP (%)	Trade balance w/ US (% GDP)	Share of trade w/ US (%)	Trade openness (%)
KG	Kyrgyzstan	16.2	Floating	Open	3 811.4	7.8	0.8	–29	–1.2	1.9	70.8
SV	El Salvador	17.5	Fixed	Open	7 218	2.6	0.2	–20.8	–0.6	43	54.2
LB	Lebanon	16.8	Fixed	Open	15 905.2	2.8	0.5	–2.9	–2.7	6.4	42.9
HN	Honduras	13.8	Intermediate	Closed	4 654.7	7.9	0.6	–25.9	1.9	96.5	57.3
JO	Jordan	15.6	Intermediate	Open	10 071.6	3.4	0.2	–38.4	–0.1	10.7	67.4
PH	Philippines	9.9	Floating	Closed	5 598.5	4.4	0.2	–3.4	2.5	20.2	53.7
GT	Guatemala	8.4	Intermediate	Open	6 945.9	5.9	0.4	–13.6	0.2	41.7	42.4
NI	Nicaragua	8.4	Intermediate	Open	4 561.9	8.0	0.3	–24.2	10.0	48.2	50.3
AM	Armenia	8.1	Intermediate	Open	8 053.6	4.1	1.8	–24.2	–0.7	4.4	45.7
DO	Dominican Republic	7.3	Intermediate	Open	11 737.6	8.7	0.5	–15.4	–1.9	51.3	43.1
LK	Sri Lanka	7.0	Intermediate	Closed	8 498.4	8.5	0.6	–9.1	5.8	14.2	39.8
BD	Bangladesh	7.2	Intermediate	Closed	3 288.2	6.7	1.4	–7.3	3.4	13.7	27.9
MA	Morocco	6.8	Intermediate	Closed	6 245.9	1.6	0.2	–15.9	–0.6	4.6	46.0
EG	Egypt	5.4	Intermediate	Open	9 844.1	9.0	0.3	–1.3	–1.9	11.1	33.2
PK	Pakistan	4.9	Intermediate	Closed	4 237.5	7.5	0.5	–6.1	1.1	11.3	21.3
HR	Croatia	5.4	Intermediate	Closed	22 475.6	2.3	0.1	–17.9	0.2	2.0	50.8
MK	North Macedonia	4.5	Intermediate	Closed	13 162.2	1.9	0.1	–20.8	1.3	2.7	77.2
EC	Ecuador	4.5	Fixed	Open	9 942.4	15.4	0.3	0.8	5.0	37.4	38.1

VN	Vietnam	4.0	Intermediate	Closed	5 485.8	6.4	2.1	–5.1	6.9	9.9	84.7
TN	Tunisia	3.6	Intermediate	Closed	9 369.4	3.8	0.1	–12.0	–0.3	2.6	62.8
BO	Bolivia	3.3	Intermediate	Open	6 344.4	5.0	0.4	1.3	0.5	11.1	45.6
BG	Bulgaria	2.0	Fixed	Open	14 375	70.8	0.3	–11.6	0.7	54.5	51.5
IN	India	1.7	Floating	Closed	3 556.4	6.8	0.7	–5.2	1.1	8.0	24.2
RO	Romania	3.2	Floating	Open	7 930	21.3	0.5	–9.0	0.5	2.4	55.9
MX	Mexico	1.9	Floating	Open	18 065.1	6.5	0.1	–0.8	5.3	68.3	44.9
CO	Colombia	1.7	Floating	Closed	11 486.7	6.7	0.3	–1.2	1.6	36.1	23.3
AZ	Azerbaijan	2.3	Intermediate	Closed	12 369	5.6	0.3	12.8	0.7	5.9	46.1
PE	Peru	1.6	Floating	Open	8 958.1	3.3	0.3	2.1	0.4	22.7	30.9
LT	Lithuania	2.4	Fixed	Open	23 507	2.4	0.6	–10.7	0.8	3.1	93.6
PY	Paraguay	1.4	Floating	Open	9 748.5	6.8	0.4	–8.3	–5.7	12.4	45.7
BY	Belarus	1.3	Floating	Closed	16 103.4	45.0	0.5	–8.3	0.7	1.0	96.9
ID	Indonesia	0.9	Floating	Open	7 645	10.2	0.4	7.0	2.8	11.1	35.7
CR	Costa Rica	0.9	Intermediate	Open	15 148.2	8.2	0.2	–8.9	3.5	50.9	57.1
TH	Thailand	0.6	Floating	Closed	12 910.3	2.5	0.1	1.5	5.8	12.3	88.4
PL	Poland	0.7	Floating	Closed	21 472.1	3.9	0.8	–4.9	0.2	2.1	53.8
TR	Turkey	0.5	Floating	Closed	19 238.7	25.5	0.3	–8.2	–0.2	5.9	31.8
ZA	South Africa	0.3	Floating	Closed	12 642	5.9	0.1	–0.8	0.7	9.9	34.3
HU	Hungary	0.2	Floating	Open	24 554.4	5.9	0.4	0.3	2.1	3.4	106.6
SI	Slovenia	0.10	Fixed	Open	29 852.4	3.9	0.2	–3.4	0.7	1.9	87.5
PA	Panama	0.8	Fixed	Open	19 598.9	2.4	0.9	–19.8	–13.9	63.8	23.2
UY	Uruguay	0.3	Floating	Open	17 069.8	8.9	0.2	–3.7	–0.8	11.5	26.7

Note: All data extracted from IHS Markit, national Central Bank data, S&P Global and St. Louis FRED.

Table 4 Descriptive statistics – Sending countries

Code	Country	Remittances-to-GDP (%)	ER Arrangement	KA openness	GDP PC (ppp)	Avg inflation (%)	Avg monthly growth (%)	Trade balance-to-GDP (%)	Trade balance w/ US (% GDP)	Share of trade w/ US (%)	Trade openness (%)
KR	South Korea	0.7	Floating	Closed	30 146.2	2.8	0.6	3.1	1.7	8.4	54.1
JP	Japan	0.1	Floating	Open	37 865.9	0.1	0.0	0.8	1.5	18.0	19.6
RU	Russia	0.8	Floating	Closed	20 561.4	16.0	0.4	10.4	1.1	5.4	34.4
AU	Australia	0.1	Floating	Open	37 980.2	2.5	0.2	–0.4	–1.2	10.6	26.3
GB	United Kingdom	0.1	Floating	Open	41 584.8	2.0	0.1	–5.4	0.2	10.9	30.8
CA	Canada	0.4	Floating	Open	44 189.2	1.8	0.1	2.0	4.1	71.7	47.9
US	United States	0.9	Floating	Open	53 279.6	2.2	0.1	–3.5	–3.5	100.0	17.0
EZ	Euro area	0.1	Floating	Open	31 548.3	1.7	0.1	1.1	0.7	3.7	53.2

Note: All data extracted from IHS Markit, national Central Bank data, S&P Global and St. Louis FRED.

Table 5 Data description for monthly time series

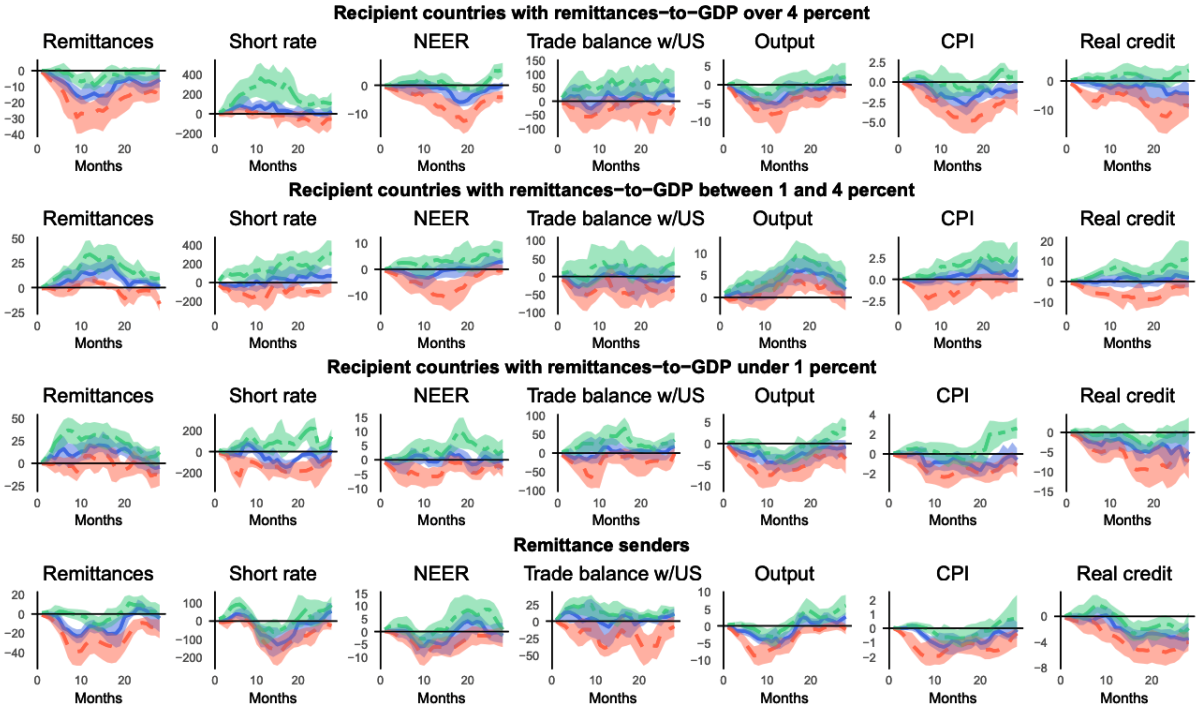
Variable	Description	Source	Coverage
Output	Production index, industry, harmonized / Coincident economic activity index based on data availability	IHS Markit; national central bank data	1997 m1 – 2017 m12
CPI	Harmonized Index of Consumer Price (HICP)	IHS Markit	1997 m1 – 2017 m12
Remittances	Secondary income: financial corporations, non-financial corporations, households & NPISHs; personal transfers	IHS Markit	1997 m1 / 1999 m6 – 2017 m12

	(credit/debit), BOP, US$ (millions)		
NEER	Nominal effective exchange rate (51 trading partners considered)	(Darvas 2012)	1997 m1 – 2017 m12
Short rate	Short-term rate: Treasury Bill yield (<365 days, aop) or Money Market rate (aop), depending on availability	IHS Markit	1997 m / 2000 m1 – 2017 m12
Real domestic credit	Depository corporations' claims on "other sectors" and on private sector (local currency), inflation-adjusted	IHS Markit	1997 m1 – 2017 m12
Trade balance with US	Monthly merchandise trade balance with US = Imports (CIF, MUSD) – Exports (FAS, MUSD), as % of nominal GDP (USD)	IHS Markit / U.S. Census Bureau	1997 m1 – 2017 m12
US MP instrument	High-frequency monetary policy instrument	(Miranda-Agrippino and Ricco 2021)	1997 m1 – 2017 m12
Core CPI	Consumer Price Index excluding energy and food	IHS Markit	1997 m1 – 2017 m12

Note: All data extracted from IHS Markit, national Central Bank data, S&P Global and St. Louis FRED.

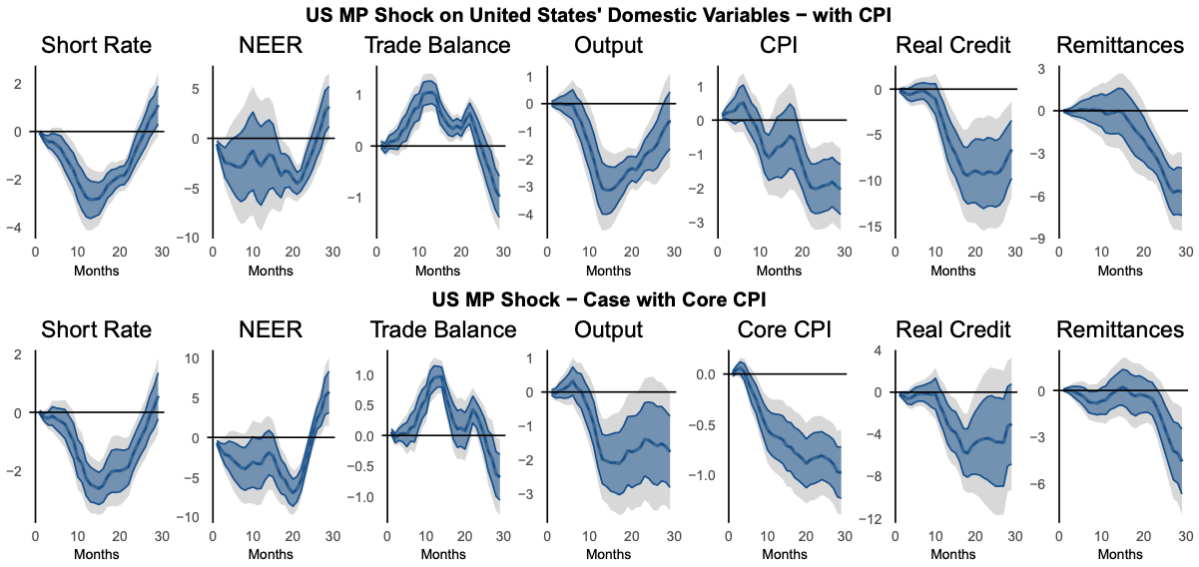
Appendix B – Additional results

Fig. 15 IRF 25th, median and 75th percentile responses by degree of exposure to remittance flows



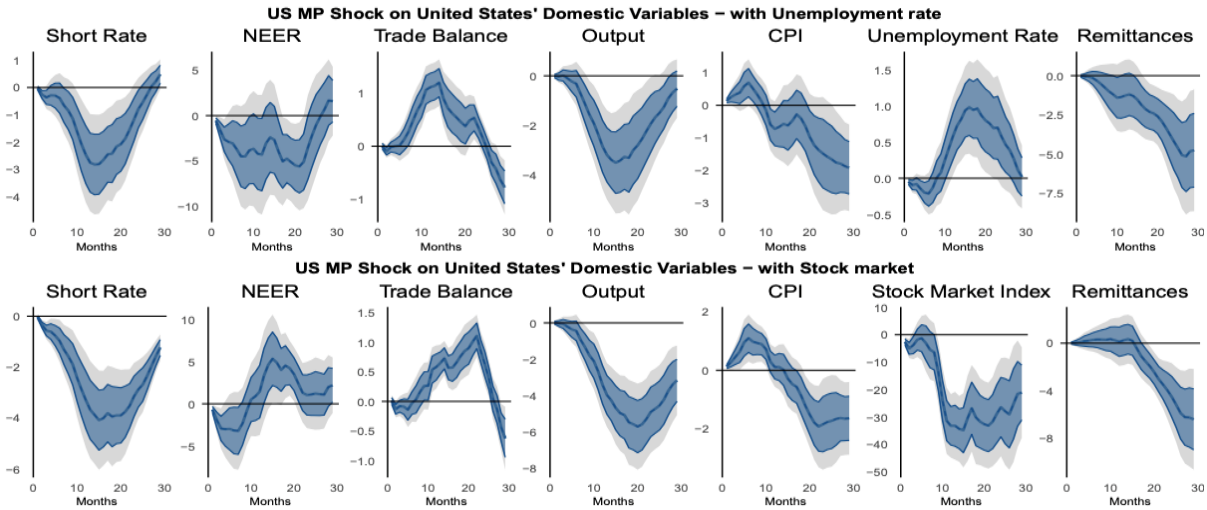
Note: Median of country-by-country responses to a contractionary one standard deviation US monetary policy shock resorting to local projections with 12 lags and Newey-West se. We report the results for the 68 percent confidence intervals. Monthly sample 1997:01-2017:12. Countries are classified based on the average remittances-to-GDP ratio over the 1997-2017 period. In each graph we show the median (blue shade), 25th (red shade) and 75th (green shade) percentiles of the endogenous variables' responses.

Fig. 16 Robustness – Domestic US response including core CPI



Note: Impulse responses of domestic endogenous US variables to a contractionary one standard deviation US monetary policy shock, resorting to local projections with 12 lags and Newey-West se. The core CPI denotes the Consumer Price Index for All Urban Consumers: All Items Less Food and Energy. Shaded areas correspond to 68 and 90 percent confidence intervals. Monthly sample 1997:01-2017:12.

Fig. 17 Robustness – Domestic US response including the unemployment rate and the stock market index



Note: Impulse responses of domestic endogenous US variables to a contractionary one standard deviation US monetary policy shock, resorting to local projections with 12 lags and Newey-West se. The unemployment rate corresponds to the U-3 rate reported by the BLS. The stock market index corresponds to the S&P 500 Composite Index. Shaded areas correspond to 68 and 90 percent confidence intervals. Monthly sample 1997:01-2017:12.