WORKING paper

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Federal Reserve shocks: which securities really flow?[1]

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ABSTRACT

This paper challenges the conventional wisdom that US monetary policy tightening attracts foreign capital through purchases of US Treasuries. Using bilateral data on US foreign assets and liabilities, we show that much of the observed capital inflows into the US is actually due to US investors repatriating funds from foreign equities. This highlights important heterogeneity between domestic and foreign investors. Extending the analysis to Central Bank Information shocks—monetary surprises conveying additional economic information—we document a distinct global portfolio rebalancing characterized by risk-on behavior, with US investors increasing foreign equity holdings and foreign investors shifting into US equities.

Keywords: Monetary Policy; Spillovers; Capital Flows

JEL classification: F44, E52

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NON-TECHNICAL SUMMARY

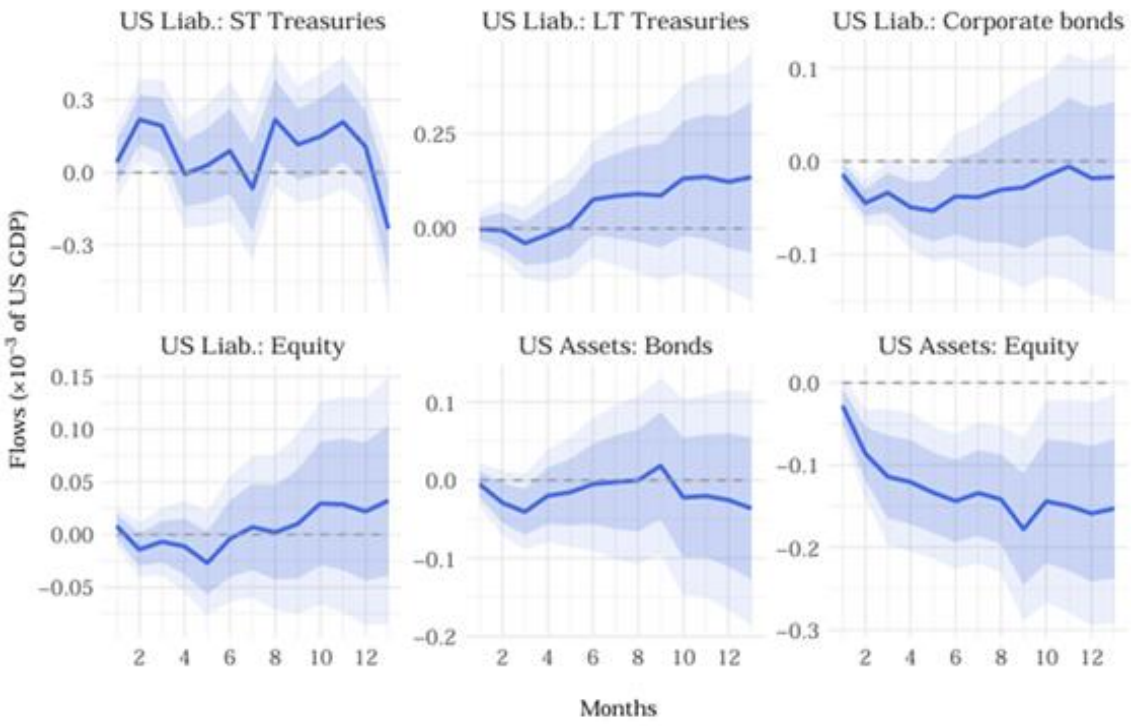
This paper examines how US monetary policy shapes international capital flows between the United States and foreign investors. A precise understanding of these flows is critical, as they determine which global markets are most at risk and whether the global response to monetary tightening is stabilizing or destabilizing. Following an unexpected monetary tightening by the Federal Reserve, capital typically flows into the United States. These inflows are often attributed to increased foreign purchases of US Treasuries. Using detailed bilateral data on cross-border portfolio flows from 1994 to 2019, we show that this explanation is incomplete. A large share of observed inflows following a US monetary tightening actually reflects US investors bringing funds back from foreign equity markets. In other words, the response is driven less by foreign demand for US safe assets and more by US investors reducing exposure to risky assets abroad.

This distinction underscores important heterogeneity between domestic and foreign investors, as well as across asset classes.

We also study a second type of monetary surprise: *Central Bank Information shocks*, which arise when Federal Reserve announcements reveal new information about the economic outlook. Unlike conventional tightening shocks, positive information shocks, by signaling strong economic perspectives, trigger a global "risk-on" portfolio adjustment, i.e. an increase in risk-taking. US investors increase their purchases of foreign equities, while foreign investors simultaneously expand their holdings of US equities.

Overall, the paper shows that identifying which investors adjust their portfolios is crucial for understanding how US monetary policy spills over to global financial markets.

Figure1. Effects of monetary policy shocks on bilateral capital flows



Note: This figure shows the response of bilateral capital flows to a 100-basis-point US monetary policy tightening. *US Liab.* denotes US liabilities, i.e. foreign investors' holdings of US securities, while *US Assets* denote US investors' holdings of foreign securities.

Chocs de la Réserve Fédérale : quels titres expliquent réellement les flux ?

RÉSUMÉ

Cet article remet en question la vision communément admise selon laquelle un resserrement de la politique monétaire américaine attire les capitaux étrangers par l'achat de bons du Trésor américain. En utilisant des données bilatérales sur les actifs et passifs extérieurs des États-Unis, nous démontrons qu'une grande partie des entrées de capitaux observées est en réalité due au rapatriement, par les investisseurs américains, de fonds investis dans des actions étrangères. Ce résultat met en évidence une hétérogénéité importante entre investisseurs domestiques et étrangers. En étendant l'analyse aux chocs d'information des banques centrales — c'est-à-dire aux surprises monétaires véhiculant une information économique supplémentaire —, nous documentons un rééquilibrage distinct des portefeuilles mondiaux caractérisé par un comportement de prise de risque ('*risk-on*'), les investisseurs américains augmentant leurs détentions d'actions étrangères tandis que les investisseurs étrangers se tournent vers les actions américaines.

Mots-clés : politique monétaire, effets de débordement, flux de capitaux

1 Introduction

"Why the dollar has strengthened is no mystery. Seeing both high inflation and strong growth, the Federal Reserve has been raising interest rates faster than other big central banks, drawing capital flows toward the US." —Barry Eichengreen, Financial Times, 26 July 2022

Monetary tightening is commonly associated with capital inflows into the United States. At the same time, a large literature on the global financial cycle (Rey, 2015) shows that US monetary policy shocks drive global financial conditions, leading to broad contractions in risky asset prices and international capital flows by both US and foreign investors. What remains unclear is, therefore, who actually adjusts their international portfolios when monetary policy tightens. Do inflows to the US arise because foreign investors increase their purchases of US safe assets, or because US investors retrench from foreign risky markets? This distinction matters: identifying the investor that actually rebalances influences which markets are most concerned, through which channels spillovers operate, and whether the global response to monetary tightening is stabilizing or destabilizing.

This is the starting point of our analysis. We study how US and foreign investors adjust their external positions across asset classes in response to monetary tightening. In theory, if all investors interpret a shock identically, prices should adjust without generating flows (French and Roll, 1986; Chaboud et al., 2004). Monetary tightening may raise the relative attractiveness of US assets, but actual observable flows only emerge when valuations or portfolio constraints differ across investor types. Such heterogeneity is essential: US residents might rebalance only their domestic portfolios, or—if balance-sheet constraints bind globally—may also unwind foreign risky positions, while foreign investors may simultaneously also adjust their holdings of US assets. Therefore, identifying which scenario prevails is essentially an empirical question.

Despite the prominence of capital flows in discussions of global monetary spillovers, system-

atic evidence remains scarce.[1] Much of the existing empirical work, particularly within the global financial cycle (GFC) literature, often focuses on asset price reactions or relies on aggregate flow measures that combine equity, bond, and banking flows (Miranda-Agrippino and Rey, 2020b,a).[2] Consequently, we still lack direct evidence on how portfolio flows—flighty, procyclical, and systemically important—respond to US monetary policy across investor types and asset classes.

This distinction is particularly important because capital flows exhibit varying degrees of global synchronization depending on the asset class in question. A granular look at the GFC reveals a divergence that further motivates our analysis. As shown in Figure 1, the strong commonality typical of risky asset prices—both equity and portfolio debt—does not translate uniformly to capital flows. While debt and banking flows display a pronounced common component that tracks the global factor, equity flows exhibit markedly weaker commonality across borders. This heterogeneity in the data suggests that bilateral adjustments are far from uniform, reinforcing the need to decompose flow responses by both investor identity and asset class.

In this respect, our paper makes three main contributions. First, we provide an investor-level decomposition of US monetary policy spillovers through international portfolio flows, exploiting granular TIC data that separately track US investors' foreign positions and foreign investors' US positions. This allows us to distinguish whether observed inflows reflect foreign purchases of US assets or US retrenchment from foreign markets. Second, by separating flows across asset classes, we document that foreign equity positions, rather than bonds, drive the response to tightening, in line with the risk-taking channels of international transmission. Third, we complement this

[1] Studies relying on mutual fund flows provide only partial coverage of true portfolio rebalancing, while other work concentrates on crisis-period "sudden stops" rather than normal times. Recent work has begun to explore investor heterogeneity in international rebalancing, but these studies typically focus on debt securities and on foreign investors' responses rather than on the joint adjustment of US and foreign portfolios across asset classes. For example, Faia et al. (2024) document that active euro-area investors retrench from emerging-market debt after global monetary tightening, but their analysis does not include equities or US investors.

[2] For example, the global flow indices in Miranda-Agrippino and Rey (2020b) and Miranda-Agrippino and Rey (2020a) combine banking, equity, and bond flows, preventing identification of the investor type or instrument behind the response. Surveys such as Gourinchas and Rey (2014) and Gourinchas et al. (2019) emphasize the importance of external positions but do not study flow reactions to monetary policy shocks.

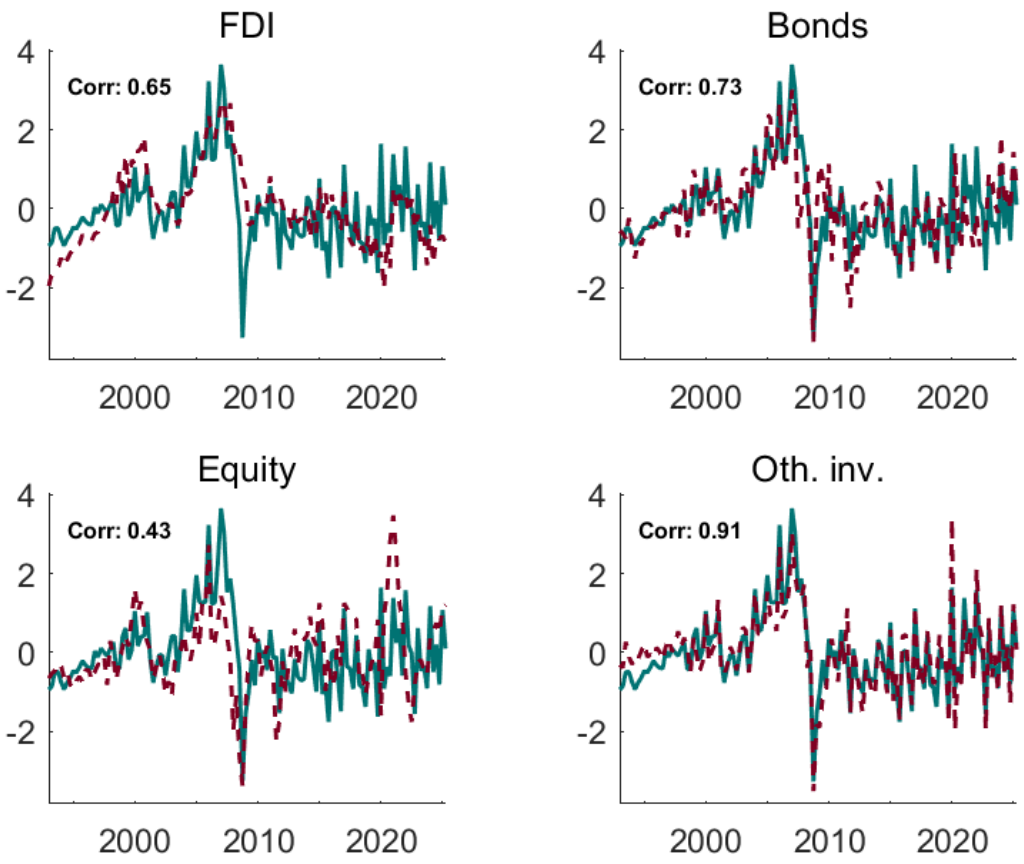


Figure 1: Global financial cycle estimates by asset class

Notes: The green line depicts the first global factor using the total of capital inflows and the total of capital outflows (taken from the IMF Balance of Payments Statistics) and following the methodology described in Miranda-Agrippino and Rey (2021). The red line depicts the first factor extracted from data only comprising the respective asset class: Foreign direct investment (FDI), portfolio debt, portfolio equity and other investments (Oth. inv.); the latter largely comprises bank flows. 'Corr' designates the correlation between both components.

work and demonstrate that different components of Federal Reserve shocks produce distinct global portfolio adjustments. We show in particular that Central Bank Information shocks generate flow patterns opposite to 'pure' monetary shocks.[3]

To do so, we conduct a local projection analysis of monetary policy shocks on bilateral US capital flows. Our dataset on US cross-border capital flows is based on Bertaut and Tryon (2007); Bertaut and Judson (2014), which provide data on both US holdings of foreign securities (asset side) and foreign holdings of US securities (liability side). The data are disaggregated by instrument type (e.g., US Treasuries, US agency bonds, US corporate bonds, and US corporate stocks on the liability side; bonds and stocks for US claims), by counterparty country, and are available at a monthly frequency, covering the period from March 1994 to June 2019. For monetary policy shocks, we use Jarociński and Karadi (2020)'s series to measure the effects of 'pure' monetary policy shocks — namely "unexpected changes in the policy rate that are orthogonal to any changes in perceived macroeconomic fundamentals". The series by Jarociński and Karadi (2020) also allow us to identify central bank information shocks.

We find that contractionary US monetary policy shocks do indeed generate net capital inflows into the United States. However, these inflows are not driven primarily by increased foreign demand for US safe assets. Instead, the dominant response comes from US investors repatriating foreign equity holdings. This retrenchment is strong and persistent: a 100 basis-point monetary tightening leads to a cumulative repatriation of roughly $2.4 billion in foreign equities over nine months, around 5% of the average US foreign equity position. To the extent that flows only arise when there is heterogeneity in beliefs or constraints, we interpret this finding as an indication of balance sheet constraints binding more tightly for US investors in response to monetary policy tightening. This interpretation is in line with the preliminary evidence in Figure 1, where equity

[3] A growing literature studies the international spillovers of CBI shocks (Pinchetti and Szczepaniak, 2021; Georgiadis and Jarocinski, 2022; Ciminelli et al., 2022; Faia et al., 2024). Our contribution differs from these studies by jointly analyzing the portfolio adjustments of both US and foreign investors and by distinguishing between equity and bond flows.

flows exhibit weaker global commonality than debt flows, pointing to more heterogeneous portfolio adjustments in equity markets.

Finally, we explore exceptions to Eichengreen's view —cases in which the familiar pattern linking GDP growth, higher interest rates, and dollar appreciation breaks down. For example, during the 2008 financial crisis the Federal Reserve sharply reduced policy rates amid severe economic turmoil, yet the dollar appreciated, reflecting its safe-haven role rather than higher relative returns. Indeed, the monetary policy stance may convey broader information about economic conditions. Such considerations are also reflected in the literature on monetary policy shock identification, accounting specifically for central bank information (CBI) which we consider in our analysis. Although their exact nature - whether private Fed insights or unexpected public news - remains debated, we show that CBI shocks generate capital flow responses that differ markedly from those induced by 'pure' monetary policy shocks. In particular, positive CBI shocks trigger a broader global portfolio reallocation characterized by "risk-on" behavior: US investors expand their holdings of foreign equities, while foreign investors increase their exposure to US equities. These findings provide new evidence on how information embedded in Federal Reserve communications shapes global capital flows.

Taken together, our results identify the marginal investor behind international portfolio rebalancing after US monetary tightening: US investors withdrawing from foreign risky assets. This mechanism clarifies how monetary policy transmits globally through portfolio flows and refines our understanding of why capital flows into the US when interest rates rise.

The rest of this article is organized as follows. Section 2 reviews the related literature. Section 3 details the data used in terms of both monetary policy shocks and capital flows, while Section 4 describes our empirical specification. Section 5 provides the main results, while Section 6 extends the analysis to CBI shocks. Section 7 offers robustness exercises and Section 8 concludes.

2 Literature Review

Our paper connects to several strands of the literature, particularly those examining the impact of US monetary policies on international capital flows. A large body of work has explored these effects using investment fund data, such as Emerging Portfolio Fund Research (EPFR) (Fratzscher et al. (2018), Kroencke et al. (2015), Cenedese and Elard (2021), Ciminelli et al. (2022)).[4] For instance, Ciminelli et al. (2022) study how US monetary policy affects international mutual fund investments, finding that interest rate hikes lead to significant outflows from emerging markets, while information shocks have no such effect. While insightful, their reliance on mutual fund data provides only a partial perspective on capital flows. In contrast, our study captures a broader range of investor reactions, offering a more comprehensive understanding of the impact of US shocks on capital flows.

Several other studies have expanded beyond mutual fund data to offer a more comprehensive analysis of the impact of monetary policy. For example, Chari et al. (2021) use US Treasury International Capital (TIC) data to analyze the effects of US monetary policy on capital flows to emerging markets. They show that policy shocks lead to substantial changes in US holdings of emerging market assets, particularly in equity markets. However, their analysis does not account for information shocks, a gap that our paper addresses by integrating both monetary policy and information shocks into the framework. Similarly, Pinchetti and Szczepaniak (2021) and Georgiadis and Jarocinski (2022) decompose these shocks and find that information shocks have distinct spillover effects, with positive shocks leading to risk-on behaviors and capital inflows in emerging markets. Faia et al. (2024) further highlight the role of investor types, showing that the impact of monetary policy shocks on foreign debt holdings differs not only by the type of shocks but also by investor sector. We extend these studies by examining both US and foreign investors' reactions to shocks, considering at the same time US and emerging market securities. Unlike Faia et al. (2024), we also

[4] See Bubeck et al. (2018) for a more exhaustive view on this subject, summarized in Table 1 of Appendix A.

place particular emphasis on distinguishing between bond and equity flows, further enriching our understanding of investor behavior.

Our paper also contributes to the literature on the Global Financial Cycle, which explores global co-movements in asset prices, capital flows, risk premia, and leverage, with a particular focus on US monetary policy as a key driver of these dynamics (Rey (2015)). While some studies focus primarily on the co-movements in capital flows, such as Davis et al. (2021), who find that a global factor explains a significant portion of the variance in capital flows to advanced economies, we extend this literature by analyzing the impact of two key global shocks—US monetary policy and information shocks—on capital flows. Additionally, we make a distinct contribution by differentiating between the responses of US and foreign investors.

Lastly, a growing body of work emphasizes the risk-taking channel of monetary policy, which helps explain some of our findings. Gertler and Karadi (2015) and Borio and Zhu (2012) argue that monetary tightening impacts the macroeconomic environment, indirectly increasing term premia, while Hanson and Stein (2015) suggests that tightening prompts investors that target a certain return to shift from long-term bonds to shorter-term assets, raising long-term yields. In addition, tightening may limit risk-taking by financial intermediaries due to increased regulation or investor risk aversion. Drechsler et al. (2018) argue that tighter monetary policy increases the cost of holding liquid assets, limiting risk-taking, while Kekre and Lenel (2022a) show that it redistributes wealth to more risk-averse households, further dampening risk-taking. These dynamics help explain the shifts in investor behavior observed in our study.

3 Data

3.1 US Monetary Policy and CBI shocks

To evaluate the effects of the Fed shock on capital flows, we use Jarociński and Karadi (2020) shocks. The authors decompose the surprise component of FOMC announcements into two parts: a monetary policy shock (MP), which captures unexpected changes in the policy stance, and a central bank information shock (CBI), which can reflect news about the central bank's assessment of the economic outlook.[5] They use a combination of principal component analysis and sign restrictions to identify these shocks. First, they construct a "policy indicator" by extracting the first principal component of surprises in US interest rate derivatives with maturities from one month to one year. This indicator captures the overall surprise in financial markets following an FOMC announcement. Then, the authors impose sign restrictions to disentangle MP and CBI shocks from the "policy indicator".[6] They argue that a contractionary MP shock should raise interest rates and lower stock prices, while a positive CBI shock, signaling a more favorable economic outlook, should raise both interest rates and stock prices. The median rotation method is then applied to the "policy indicator" to obtain 'pure' MP and CBI shocks that satisfy these sign restrictions. This procedure ensures that the estimated shocks are consistent with the theoretical predictions about the effects of MP and CBI shocks on financial markets.

[5] An alternative interpretation of this shock is the "Fed Response to News" proposed by Bauer and Swanson (2023). This perspective suggests that both the Federal Reserve and private sector forecasters respond to incoming, publicly available economic news, with the Fed's response often being more pronounced than anticipated by markets. While distinct in their underlying mechanisms—CBI suggesting private information and "Fed Response to News" emphasizing a reaction to public news—both interpretations acknowledge that the Fed's communication or actions convey non-pure monetary policy information. Ignoring this information component in monetary policy surprises can lead to biased estimates of international spillovers and atypical findings, such as seemingly expansionary impacts from monetary tightening.

[6] In a similar vein, Miranda-Agrippino and Ricco (2021) address informational rigidities effects around the Fed's announcements by purging interest-rate surprises of internal Fed forecast information.

3.2 US Cross-Border Securities Data

The data on the US cross-border capital flows come from Bertaut and Tryon (2007) and Bertaut and Judson (2014). The authors use the databases collected through the Treasury International Capital (TIC) system to estimate monthly series on positions, flows and valuation adjustment for foreign holdings of US securities and for US holdings of foreign securities. The data on US liabilities (foreign holdings of US securities) are separated by country for four security types: US Treasuries, US agency bonds, US corporate bonds, and US corporate stocks. As for the data on US claims, they are available by country, for two security types: bonds and stocks.

The TIC reporting system conducts several surveys on cross-border securities positions and transactions, at different frequency and time. The TIC annual surveys (SHL/SHC collections) represent the most accurate information on cross-border securities holdings by the United States and the rest of the world, but their low frequency diminishes their attractiveness for research purpose. In parallel, a monthly survey on transaction data (TIC S) is collected by the TIC system. Despite their regularity, the transaction data suffer from several shortcomings, and particularly those caused by financial center transactions bias (see Warnock and Mason (2001), Griever et al. (2001), Warnock and Cleaver (2003), Bertaut and Tryon (2007) and Bertaut and Judson (2014)). Indeed, the TIC S data are recorded according to country of the first cross-border counterparty, not the country of the ultimate buyer or actual seller or issuer of the security. This "transactions bias" in the TIC S can make it particularly difficult to analyze US investor portfolio responses to emerging market risk episodes because transactions in emerging market economy bonds are likely to be recorded against major financial centers. Similarly, measured transactions often do not fully account for transactions made on behalf of official foreign investors as official investors may purchase Treasuries through foreign private intermediaries.

In order to improve the flow data, Bertaut and Tryon (2007) combine annual survey data and monthly transactions data to generate monthly estimates of holdings, by country of foreign holder

(for US securities) and country of issuer (for US holdings of foreign securities). These monthly series are further decomposed into recorded net flows, estimated valuation changes arising from stock or bond price changes and exchange rate changes, and a monthly residual "gap" reflecting the apparent over- or under-statement of the valuation change estimates when new survey data became available. The valuation changes are based on market indices, weighted to account for the portfolio composition of foreign holdings (known from reporting in the TIC data, including information about maturity structure). This approach was further developed by Bertaut and Judson (2014) after the introduction in 2011 of the new, monthly TIC survey (TIC-SLT) on the cross-border securities holdings, which improved the quality of the estimated position and flow series.[7] The authors strongly recommend that researchers use the SLT-based estimated transactions when analyzing US cross-border securities flows (Bertaut and Judson (2022)). They also provide a file of similarly-constructed estimated monthly transactions and valuation change based on the Bertaut and Tryon (2007) methodology for the period before 2011.[8] In a recent work, Tabova and Warnock (2021) use a novel dataset on foreign Treasuries portfolios, based on confidential security-level surveys, to create survey-consistent flows series that can be used to check the quality of publicly available capital flows data. The comparison with their new dataset make them conclude that for historical flows estimates the researchers should use the Bertaut and Tryon (2007) and Bertaut and Judson (2014) data rather than transactions from TIC S data.

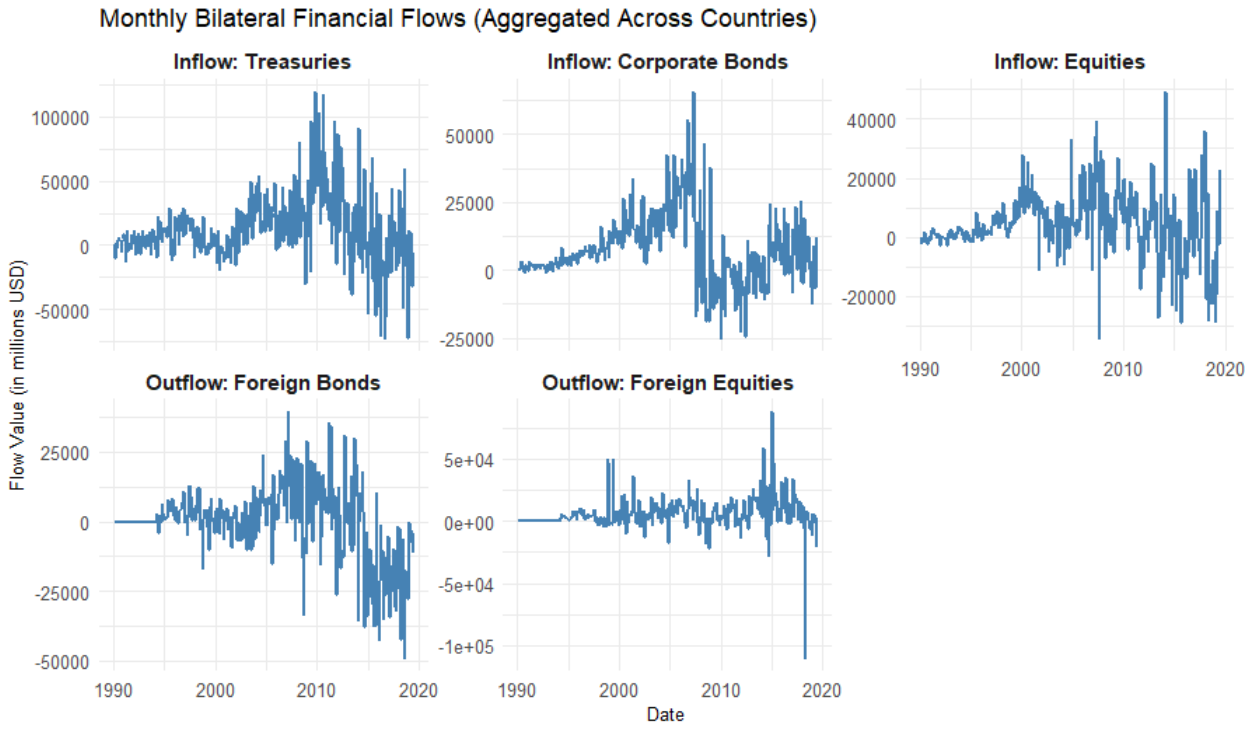
[7] SLT stands for "Securities Long-Term." In the TIC system, long-term securities are those with an original maturity of more than one year.

[8] The quality of Bertaut and Tryon (2007) and Bertaut and Judson (2014) data may vary through time, as they depend on the frequency of the underlying security-level surveys that provide the methodology's important fixed points for the positions. The security-level surveys were conducted approximately every five years between 1974 and 2000, and then annually since 2003. The monthly aggregate-level data collection on positions began in 2012. While the best available monthly time series for positions and transactions, Bertaut and Tryon (2007) and Bertaut and Judson (2014) are likely of lower quality when the surveys have been conducted less frequently. See the discussion in Tabova and Warnock (2021).

3.3 Descriptive Statistics

Here, we report some descriptive statistics based on these US TIC data. First, we plot the aggregate time series for each security instrument and instrument type (US versus foreign investors).

Figure 2: Evolution of US TIC data by security instrument and investor type



One notices a sharp increase in flows since the GFC. Then, although TIC SLT data reduce the transaction bias compared to TIC S, some extreme values remain for financial centers like Singapore or the UK (e.g., April 2018 for foreign equities).

In Table 1, we also report some summary statistics and specifically differentiate between advanced economies (AEs), emerging markets (EMEs) and financial centers. This table highlights the high volatility and skewness of capital flows across country groups. The distributions are characterized by numerous small or zero flows, alongside occasional large transactions. As expected,

Table 1: Descriptive Statistics of Average Country Bilateral Flows by Group

Variable	Statistic	AEs (all)	AEs excl. hubs	EMEs
US Liab.: LT Treasuries	Median	31.6	12.4	3.5
	Mean	435.7	252.1	65.9
	SD	1452.0	691.4	355.0
US Liab.: Corporate Bonds	Median	5.4	3.8	5.1
	Mean	199.4	-27.1	32.1
	SD	1123.6	278.8	99.3
US Liab.: Equities	Median	78.4	78.4	4.0
	Mean	168.3	118.3	5.8
	SD	297.2	141.4	15.1
US Assets: Foreign Bonds	Median	-166.3	-166.3	10.3
	Mean	133.2	23.2	16.1
	SD	1295.4	1254.6	120.1
US Assets: Foreign Equities	Median	55.3	35.1	8.8
	Mean	247.6	134.9	29.7
	SD	559.0	214.7	73.8

Note: All values are in millions of USD. "SD" denotes standard deviation. "AEs" stands for "Advanced Economies", while "EMEs" is for "Emerging Economies". The lists of countries entering each group are available in the Appendix.

AEs display significantly higher mean values for both asset and liability positions, reflecting their deeper and more developed financial markets. As mentioned before, financial hubs continue to account for a substantial share of overall flow volumes and volatility, underscoring their outsized role in global financial intermediation.

4 Empirical strategy

We estimate the dynamic response of international capital flows to US monetary policy (MP) shocks using panel local projections. Our baseline specification is:

$$f_{j,t+h} = \sum_{l=1}^{3} f_{j,t-l} + \alpha_h MP_t^{US} + \sum_{l=1}^{3} \Psi_l Z_{t-l} + \mu_h + \epsilon_{j,t+h} \tag{1}$$

where $f_{j,t+h}$ denotes the cumulative capital flow at horizon h, scaled by lagged US GDP.[9] We treat equity and bond flows separately. The shocks MP_t^{US} are identified as described in Section 3. Control variables Z_t include the 1-year Treasury yield, US CPI and industrial production (in logs), and the excess bond premium (Gilchrist and Zakrajšek), capturing broader macro-financial conditions.[10] Depending on the specification, μ^h denotes either country fixed effects or a constant. Standard errors are clustered at the time level. The coefficient of interest, α^h, captures the effect of 'pure' monetary policy shocks over time.

We consider two alternative definitions of the dependent variable. *First*, we construct *net-net flows* using US Treasury International Capital (TIC) data. For each instrument, bonds or equity, we define:

$$f_{j,t} = \text{Net US purchases of foreign securities} \; - \text{Net foreign purchases of US securities} \; .$$

A positive value indicates a net capital outflow from the United States, while a negative value corresponds to a net inflow. This aggregate measure summarizes net capital movements irrespective of their country of origin.

Second, we analyze bilateral gross capital flows by defining the dependent variable at the country level. In this case, $f_{j,t}$ captures either US investors' net purchases of foreign assets in country j (US assets) or foreign investors' net purchases of US assets from country j (US liabilities), scaled by lagged US GDP. This decomposition allows us to study the behavior of each investor group separately. On the asset side, we distinguish between bond and equity flows. On the liability side, we consider flows into long-term US Treasury bonds, corporate bonds, and equities. Since TIC data

[9] We scale flows by lagged US GDP to account for differences in magnitudes and to provide a normalized measure.

[10] Including the VIX as an additional control alongside the excess bond premium leaves the results qualitatively unchanged.

only cover long-term Treasury securities, we complement the analysis by constructing short-term Treasury flows using changes in short-term Treasury holdings.[11]

4.1 Economic intuition and testable predictions

The theoretical link between monetary policy shocks and capital flows is a priori ambiguous. If a shock uniformly affects the fundamental value of an asset and is commonly understood by all investors, prices should adjust without necessarily generating trade (French and Roll (1986), Chaboud et al. (2004)). As a result, the direction and magnitude of capital flows in response to monetary policy shocks are ultimately an empirical question.

That said, existing arguments provide guidance on plausible patterns. We summarize these as follows. A common view is that US monetary tightening increases the relative attractiveness of US assets, potentially generating capital inflows. *For net-net flows*, this implies negative responses to monetary policy tightening shocks.

Looking beyond aggregate flows, disaggregated data allow us to distinguish responses across investor types and asset classes.

On the liability side, higher US interest rates are likely to increase the attractiveness of safe, dollar-denominated assets. This suggests stronger demand from foreign investors for US Treasuries, particularly at short maturities, which are most directly affected by monetary policy. By contrast, riskier US assets—such as corporate bonds and equities— may face reduced demand, as tighter monetary policy and a weaker economic outlook dampen investors' risk appetite (Bauer et al., 2023).[12]

On the asset side, US investors' response is even less clear-cut. Tighter monetary conditions

[11] These series are available at the bilateral level only from January 2011. As aggregate data exist since 2003, we report results using aggregate measures over a longer sample in the Appendix.

[12] Consistent with this idea, we find that contractionary monetary policy shocks are associated with a significant increase in global risk aversion and the VIX (see Figure 20 in the Appendix). This rise in risk aversion supports the view that tighter monetary conditions reduce investors' willingness to hold risky assets, contributing to the observed retrenchment from foreign equity markets.

may induce a retrenchment from foreign positions, especially in riskier assets, consistent with a balance sheet channel in which higher funding costs and reduced risk-bearing capacity lead to deleveraging (Drechsler et al. (2018)). Alternatively, if monetary policy primarily affects domestic asset valuations, US investors may rebalance within domestic portfolios without significantly adjusting their foreign exposures.

Taken together, these considerations suggest that any aggregate capital flow response may mask heterogeneous dynamics across asset classes and investor types, which we explore in the empirical analysis below.

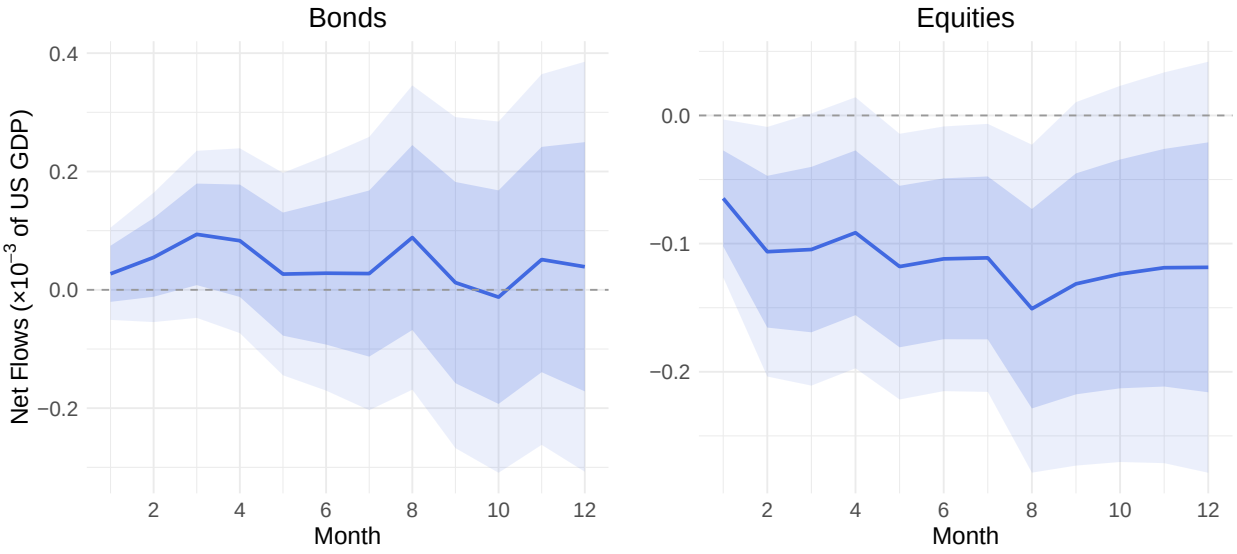
5 Results

5.1 Net-Net Flows

Starting with net–net flows, the right panel of Figure 3 shows a negative response, indicating capital inflows to the United States. Interestingly, this effect does not stem from bond flows—which display no significant reaction to the shock—but rather from equities, contrary to the idea that higher bond yields attract foreign capital.[13]

[13]The bond-flow results rely solely on Treasury securities with maturities longer than one year, since bilateral data for short-term Treasuries are available only from 2011 onward. Aggregate data for short-term Treasuries are available from 2003. Results based on these series, reported in the Appendix B.1, point to Treasury inflows, albeit weakly significant, suggesting an increase in foreign purchases of short-term Treasuries in response to the shock.

Figure 3: Effects of MP shocks on net capital flows



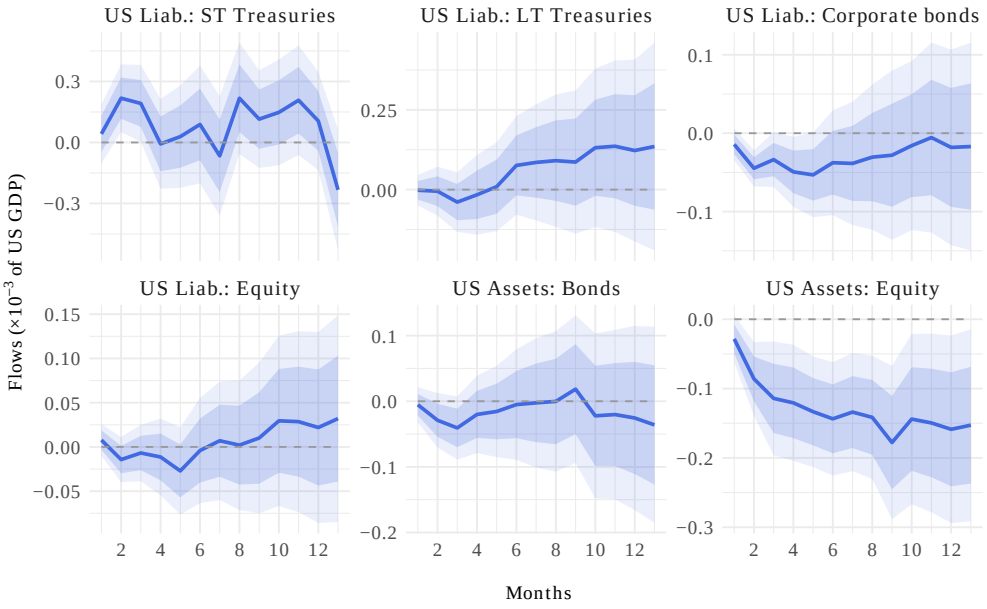
Note: All flows are scaled by lagged US GDP.

At this aggregate level, the figure cannot isolate the source of the adjustment. The decline in net equity flows, for example, could arise from US investors selling foreign equities (repatriating funds), foreign investors increasing their holdings of US equities, or a combination of the two.[14] Likewise, the non-significant response of net bond flows could reflect a null impact on both US and foreign investors, or opposite significant impacts that effectively cancel out in the net calculation. To disentangle these effects, we next analyze capital flows by distinguishing between the asset and liability sides.

[14]Because US stock market may be affected by the tightening, we now expect a stronger reaction coming from US investors selling their foreign equities, but still need some additional tests to verify this.

5.2 Detailed effects of MP shocks on capital flows

Figure 4: Effects of MP shocks on capital flows



Note: All flows scaled by lagged US GDP.

Figure 4 provides more detailed results on which securities really flow and in which direction.[15] The first four plots, labeled as US liabilities, show how foreign investors adjust their holdings of US securities. As mentioned earlier, the data for US securities is available in greater detail, which allows for a more granular analysis on that side.[16]

Looking at the liability side first, we see that foreign investors increase their holdings of short-term US Treasury securities in the short run in response to interest rate hikes, as previously expected. This shift suggests that higher yields on safe assets under tighter monetary conditions

[15] In Appendix B.2, we also show the effect of US monetary policy shocks on prices. Consistent with theory, a contractionary MP shock results in negative price changes across assets, reflecting both higher discount rates and elevated risk premia (Bernanke and Kuttner, 2005; Gilchrist and Zakrajšek, 2012; Chari et al., 2021).

[16] The TIC data also report foreign holdings of US agency securities. We exclude them from our baseline analysis because their stocks and flow responses are much smaller than those of Treasuries or corporate bonds, and their estimated responses are never significant. For completeness, Figure 21 in the Appendix reports their impulse responses.

prompt a reallocation toward short-term Treasuries. The simultaneous decline in foreign purchases of corporate bonds further supports this narrative, indicating a move away from riskier assets in favor of safer alternatives.

Then, turning to the response of US investors (asset side), the impact is particularly noteworthy. The bottom panel of Figure 4 shows a significant reduction in US purchases of foreign equities following contractionary monetary policy shocks. This effect is not only large in magnitude, but also the only significant response that is persistent over time. Using back-of-the-envelope calculations, a 100 bps monetary policy shock triggers a cumulative repatriation of foreign equities of about 2,4 billion of dollars over 9 months (i.e. roughly 5% of the average US foreign equity position). Then, a relative decline in US purchases of foreign bonds is also observed, although this response is smaller in magnitude and less statistically robust.

It is well known that asset prices typically contract in response to US monetary tightening: bond yields rise and stock prices contract across the globe. These movements generate important wealth effects that rebalance portfolios even in the absence of active investor adjustment. The latter, captured through the responses of actual flows, are the focus of this paper rather than the response of asset prices, but can be compared to the wealth effects generated by US monetary policy shocks. While repricing reflects the common shift in investors' perceptions or constraints that move their demand in the same direction, flow adjustments capture differences in beliefs and constraints across investors.

The TIC data allow us to quantify these valuation effects, thereby putting into perspective the magnitude of active flow adjustments relative to the portfolio rebalancing that results from market-price movements. In Appendix B.2, we show the responses of estimated valuation changes. Most strikingly, the contraction of equity prices generates wealth effects that are one order of magnitude higher than the actual flow adjustments. We therefore conclude that common shifts in investors' beliefs and constraints are quantitatively more important for rebalancing equity holdings than investors' respective differences.

In Appendix B.2, we also show the effect of US monetary policy shocks on prices. In contrast to valuation changes, these responses are independent of the size of the underlying holdings and therefore reveal the direct impact on market prices, unaffected by composition effects. Consistent with theory, a contractionary MP shock results in negative valuation changes across assets, reflecting both higher discount rates and elevated risk premia (Bernanke and Kuttner, 2005; Gilchrist and Zakrajšek, 2012; Chari et al., 2021). Importantly, these reactions are once again more pronounced for equity prices, followed by corporate bonds and Treasuries, thus revealing a clear pecking order where the magnitude of price reactions rises with the riskiness of the underlying asset.

In line with Faia et al. (2024)'s findings, we show that the reaction of bond inflows is relatively insignificant and add relative to this paper a fruitful analysis on equities. Our results are also consistent with Eren et al. (2023) or Tabova and Warnock (2022) who show that the foreign official sector has a price-inelastic demand for US Treasuries. These results tend to confirm that active rebalancing by foreigner is way less pronounced than the rebalancing efforts by US investors.

Overall, our results suggest that the conventional view of contractionary US monetary policy strongly attracting capital flows to the US is above all driven by US investors repatriating funds by disinvesting from foreign equity markets. This reaction is protracted and economically sizable.

5.3 Discussion: Investor heterogeneity

In this paper, we show that restrictive monetary policy shocks induce a retrenchment in cross-border equity flows while sovereign bonds, and to a lesser extent, corporate bonds are largely less affected. In a frictionless world with homogeneous investors—i.e., identical beliefs, preferences, and risk tolerance—monetary policy shocks would be absorbed via price adjustments alone, with little to no underlying trading. The presence of capital flows therefore implies meaningful heterogeneity among investors in their willingness or capacity to bear risk and adjust portfolios.

Such heterogeneity has become a key feature in recent research showing that monetary policy

affects risk premia through its interaction with market segmentation and investors' risk-bearing capacities (Kekre and Lenel, 2022b; Drechsler et al., 2018). Differences in regulation, liability structures, investment mandates, or access to funding can create diverging incentives to hold certain assets, even when facing the same macroeconomic shock.

Building on the framework of Drechsler et al. (2018), and applying it to an international context, we can interpret our findings through the lens of constrained, leveraged investors operating alongside risk-averse savers. These investors—often US-based institutions—borrow from households and must maintain liquidity buffers, typically in the form of central bank reserves. When the Fed tightens monetary policy, the cost of liquidity rises. This compresses the balance sheet capacity of leveraged investors, forcing them to reduce exposure to risky assets such as equities and long-term bonds. Since these investors are primarily US-based, this mechanism helps explain the retrenchment from foreign equity markets that we observe in the data. In contrast, foreign investors may not face immediate funding constraints from US monetary policy. However, they are indirectly affected as US investors withdraw from foreign markets, tightening local liquidity conditions and risk-bearing capacity abroad. This leads to second-round effects that may later affect foreign investors' own balance sheet constraints and their ability to absorb US risky assets.[17]

Investor heterogeneity may also manifest in how different sectors manage foreign exchange risk. For example, foreign equities are often held by institutional investors such as mutual funds or hedge funds, which are more exposed to FX fluctuations and may not fully hedge their positions. In contrast, foreign bonds are mainly held by long-term investors such as pension funds and insurance companies, who tend to hedge FX risk more systematically—both as part of their asset-liability management strategies and in response to regulatory requirements. (Campbell et al. (2010), Du et al. (2024), Nenova et al. (2025)).[18] In this context, monetary tightening—by raising

[17] As a second-round effect, leverage constraints in foreign markets may bind, which further influences foreign investors' preferences for US risky assets.

[18] Other reasons for heavier hedging of bonds include the relatively greater impact of currency fluctuations on bond returns, given their lower volatility compared to equities. In addition, while equity returns tend to be negatively correlated with FX returns—providing a natural hedge in downturns—bond returns exhibit a positive covariance with

hedging costs or increasing currency volatility—is likely to prompt stronger adjustments in equity portfolios, while bond holdings remain more stable due to their higher hedge ratios and inelastic demand.

While further data would be needed to directly test these mechanisms—particularly the role of leverage and hedging strategies—our results clearly point to meaningful heterogeneity across investor types. US and foreign investors respond differently to monetary policy shocks, and these asymmetries in behavior drive the observed capital flow adjustments across asset classes.

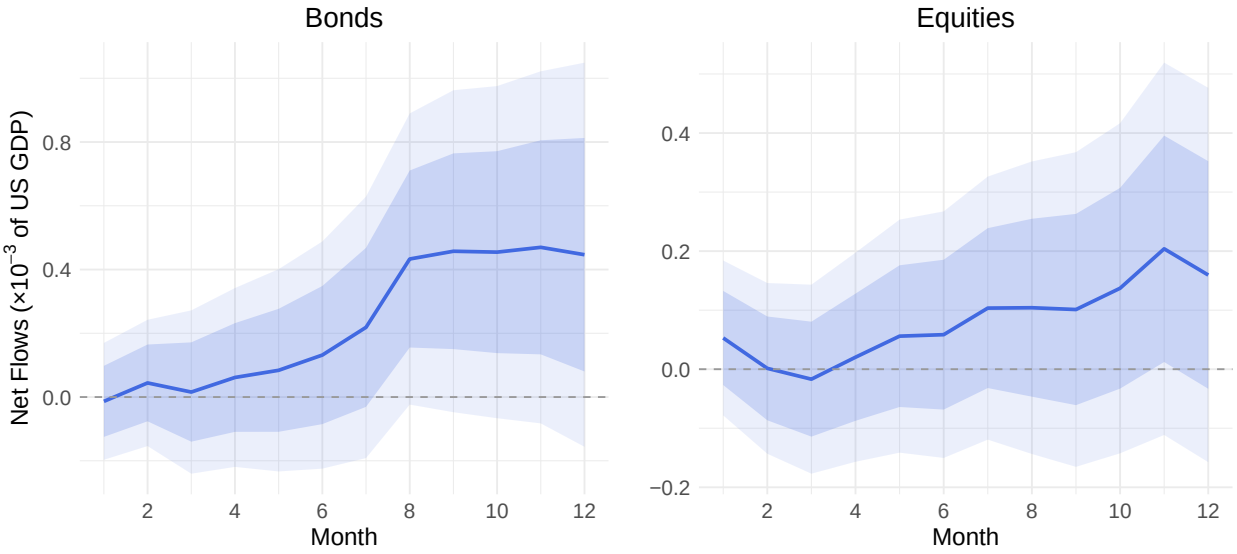
6 Beyond 'Pure' Monetary Policy: the effects of Central Bank Information Shocks

We now turn to scenarios where the conventional triptych—stronger growth, monetary tightening, and dollar appreciation—does not hold. For example, during the 2008 financial crisis, the Fed sharply cut rates while the dollar strengthened, driven not by higher returns but by its safe-haven status. As much as monetary policy reflects the economic outlook, monetary policy surprises also convey information from the central bank about the state of the economy. This motivates our focus on Central Bank Information (CBI) shocks, which capture market reactions to information revealed by the Fed beyond the policy rate surprise itself. Whether this reflects the Fed's private economic assessment (Jarociński and Karadi, 2020) or its unexpected response to public data (Bauer and Swanson, 2023) remains debated. Regardless, CBI shocks should affect markets quite differently from 'pure' monetary policy shocks. To provide a fuller picture of how monetary policy impacts capital flows, we therefore extend our analysis to include these CBI shocks.

currency movements. As a result, unhedged currency exposure can increase the risk of bond portfolios, further incentivizing full hedging for fixed income assets (Campbell et al. (2010)). Du et al. (2024) confirm empirically this larger hedging for bonds.

6.1 Net-net flows

Figure 5: Effects of CBI shocks on net capital flows



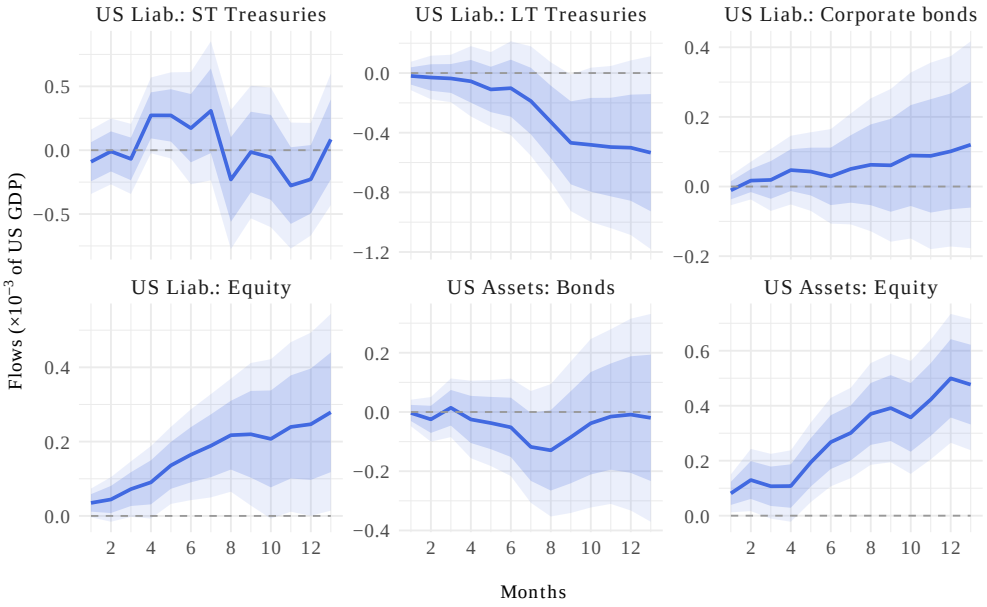
Note: All flows are scaled by lagged US GDP.

We begin by examining net capital flows in response to CBI shocks. As shown in Figure 5, these shocks are associated with positive net outflows in both equity and bond markets, although the responses are only barely significant—especially in the case of equities. [19] However, as mentioned before, net flows alone can be misleading. For instance, a positive net bond flow could reflect increased US purchases of foreign bonds (on the asset side), foreign sales of US bonds (on the liability side), or a combination of the two. To accurately interpret these dynamics, we need to disaggregate flows by investor type.

[19] As for monetary policy shocks, these results are based exclusively on Treasury securities with maturities above one year. Results incorporating Treasury bills, using aggregate data available from 2003 onward, are reported in the Appendix and show broadly consistent patterns.

6.2 Detailed effects of CBI shocks on capital flows

Figure 6: Effects of CBI shocks on capital flows



Note: All flows scaled by lagged US GDP.

Figure 6 provides this decomposition.[20] A striking result emerges for equities: while the net-net view suggested only a muted response, the breakdown reveals that both US and foreign investors increase their equity transactions substantially. In other words, the near-zero net effect masks a sizable portfolio reshuffling. By contrast, the bond responses appear more muted and less conclusive.[21]

Figure 6 also reveals that foreign investors increase their holdings of US equities while simultaneously reducing their exposure to long-term US Treasuries (even if barely significant). This rebalancing suggests that Fed communication signals an improved economic outlook and reduced

[20]The responses of asset valuation components to the CBI shock (see Figure 27 in Appendix C.2) show that positive information shocks reduce risk premia, raising the value of riskier assets like equities and foreign bonds, while lowering demand and prices for US Treasuries (Georgiadis and Jarociński, 2023; Pinchetti and Szczepaniak, 2021).

[21]Figure 29 in the Appendix also reports the impulse response for US agency securities. Their dynamics following the CBI shocks are very similar to those of long-term Treasuries, and thus do not alter the main conclusions.

global risk aversion, aligning with evidence that CBI shocks correlate with equity booms and heightened economic activity (Georgiadis and Jarociński, 2023; Pinchetti and Szczepaniak, 2021). Notably, the demand for short-term Treasuries remains largely unchanged. This distinction reinforces the idea that CBI shocks—unlike traditional monetary policy shocks—primarily influence risk sentiment and long-term expectations rather than the immediate demand for very short-term safe assets.

At the same time, US investors increase their holdings of foreign equities. Thus, this global reallocation suggests a coordinated portfolio shift: foreign investors rotate out of their own equity markets to purchase US equities, while US investors acquire riskier foreign equities. Together, these findings support the view that CBI shocks are perceived as global rather than domestic signals: they induce synchronized cross-border portfolio rebalancing, consistent with a decline in perceived financial risk and a more optimistic global economic outlook. These results are aligned with recent evidence from Pinchetti and Szczepaniak (2021) and Faia et al. (2024), who show notably that CBI shocks drive capital towards higher-yielding markets.

7 Robustness checks

In this section, we assess the robustness of our baseline results by considering alternative specifications and methodological choices. Since our primary focus is on the effects of 'pure' monetary policy shocks, we present robustness checks related to these shocks here. Robustness analyses concerning CBI shocks are provided in the Appendix.

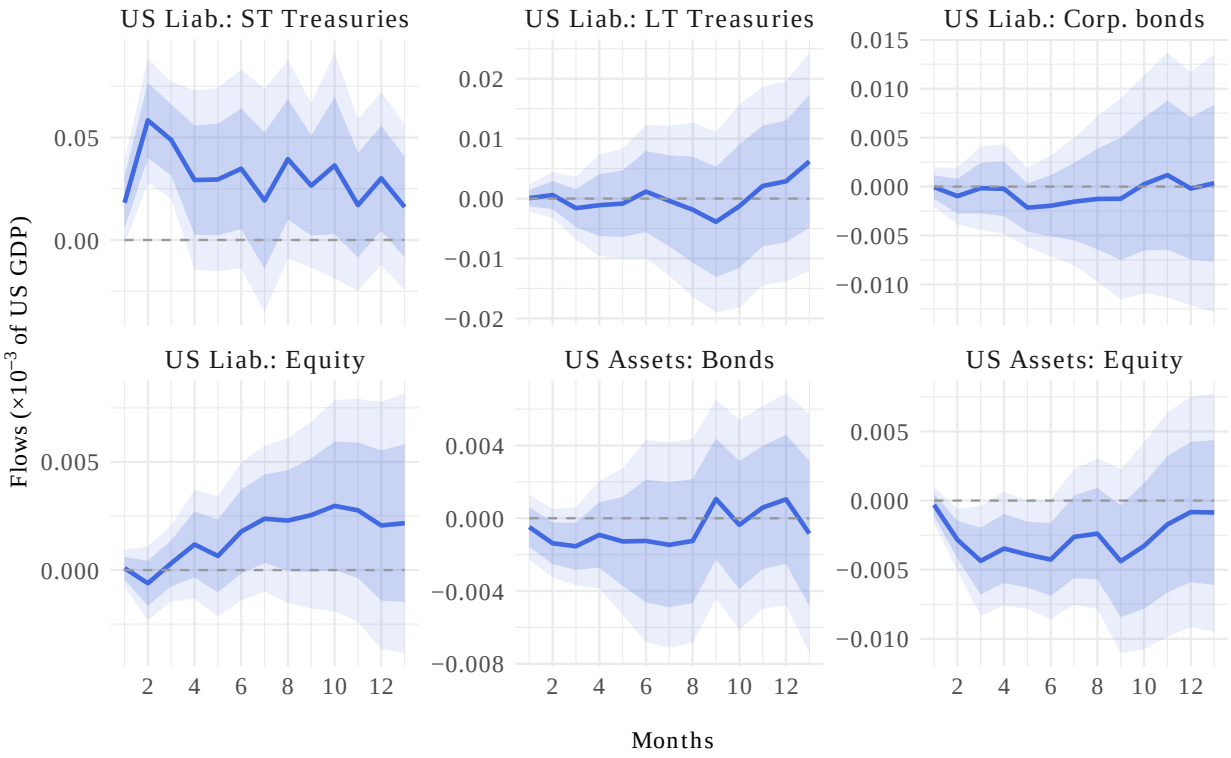
7.1 Alternative monetary policy shocks

First, we replicate our baseline regressions using alternative 'pure' monetary policy shock measures proposed by Jarocinski (2021), Cieslak and Pang (2021) and Bauer and Swanson (2023).

Following Jarocinski (2021), we examine the effects of u_1 (standard monetary policy shocks)

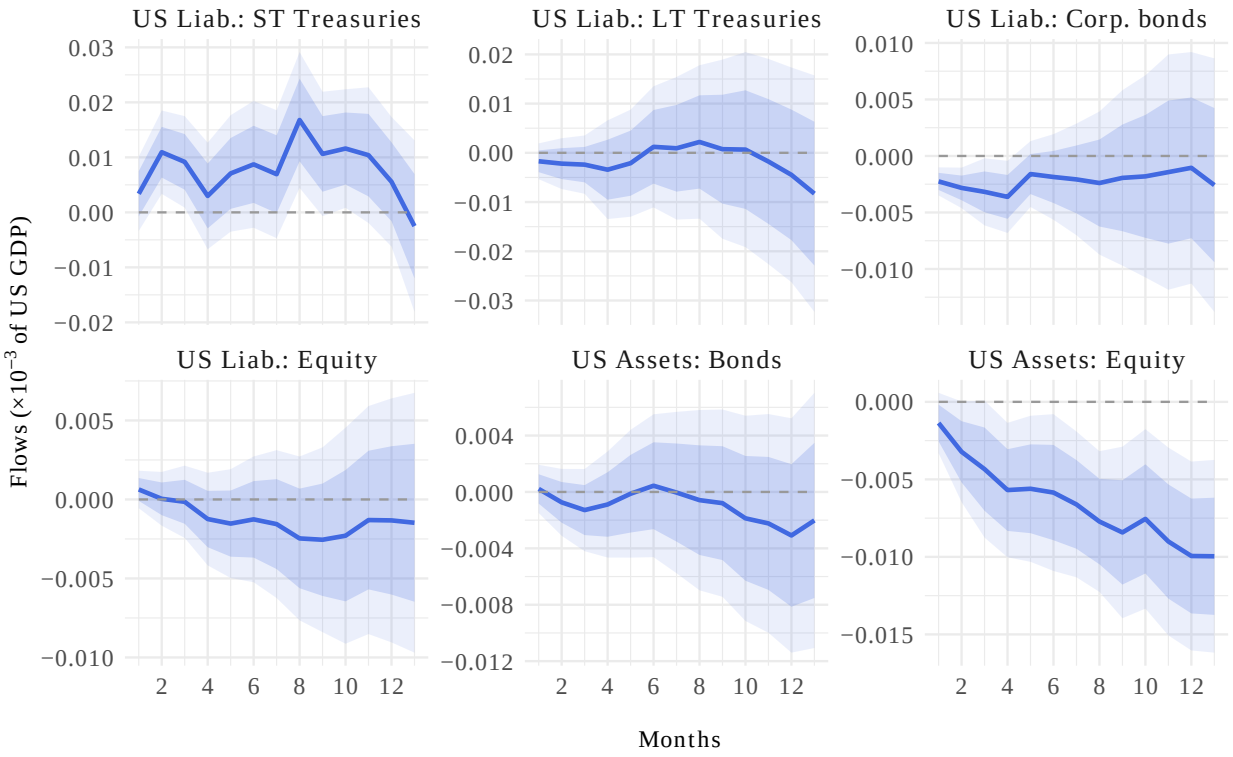
and u_2 (Odyssean forward guidance) in place of our baseline 'pure' monetary policy shocks. The corresponding results are presented in Figures 7 and 8.

Figure 7: Effects of MP (u_1) shocks on capital flows (Jarocinski)



Note: All flows are scaled by lagged US GDP.

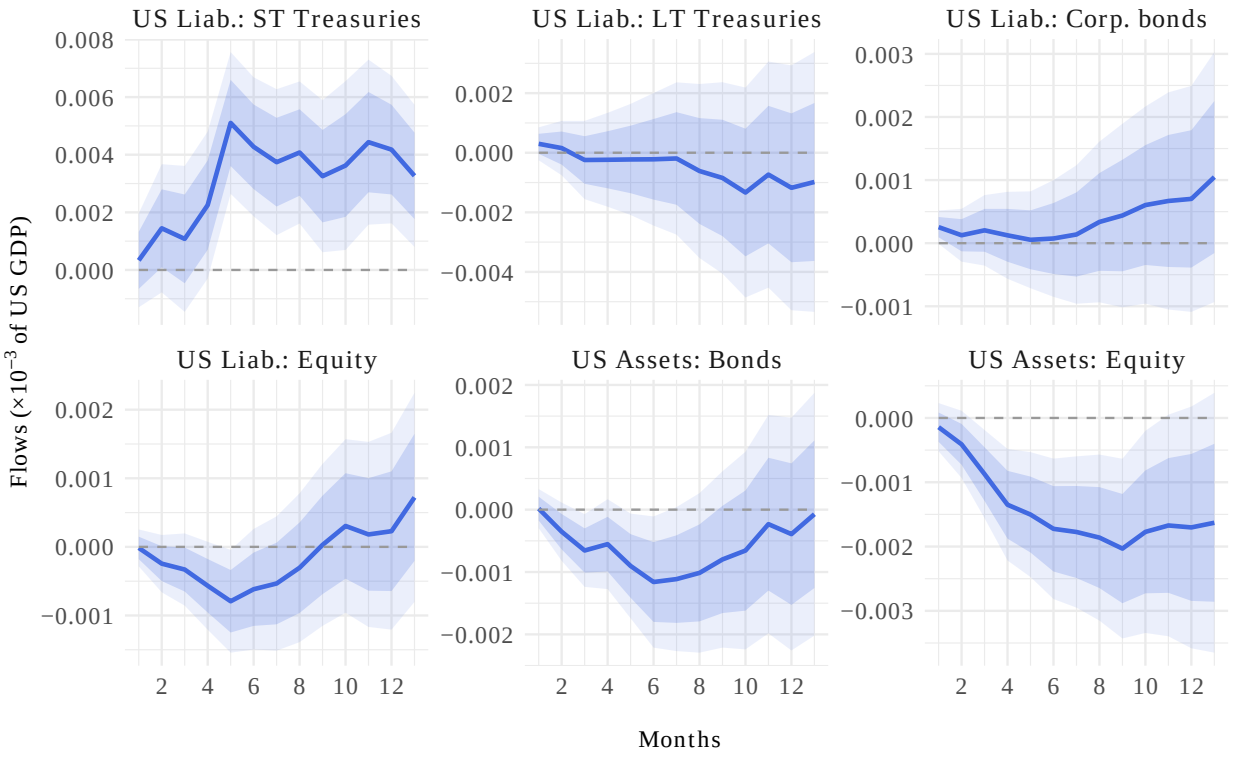
Figure 8: Effects of MP shocks (FG) on capital flows (Jarocinski)



Note: All flows are scaled by lagged US GDP.

Then, we consider the monetary policy shocks as estimated by Cieslak and Pang (2021). Responses are reported in Figure 9.

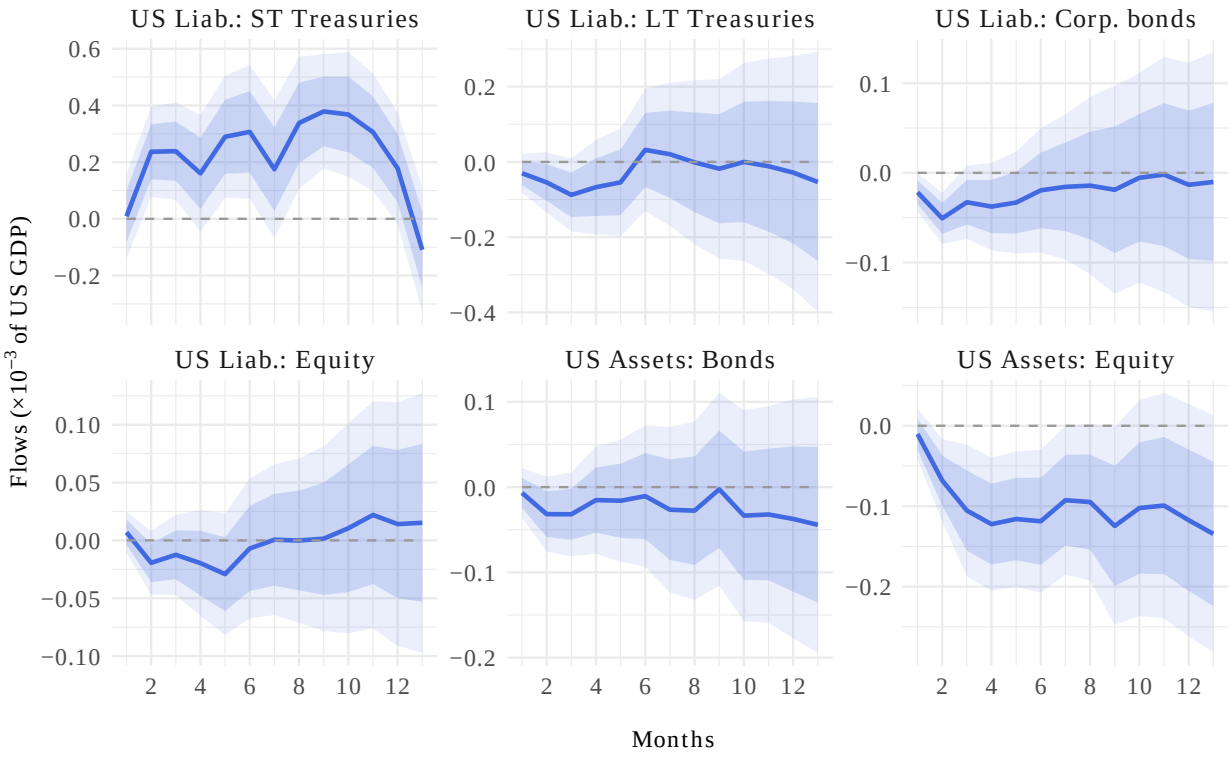
Figure 9: Effects of MP shocks on capital flows (Cieslak & Pang)



Note: All flows are scaled by lagged US GDP.

Finally, we use Bauer and Swanson (2023)'s monetary policy orthogonalized shock as another way to estimate 'pure' monetary policy shocks. Results are reported in Figure 10.

Figure 10: Effects of MP shocks on capital flows (Bauer & Swanson)



Note: All flows scaled by lagged US GDP.

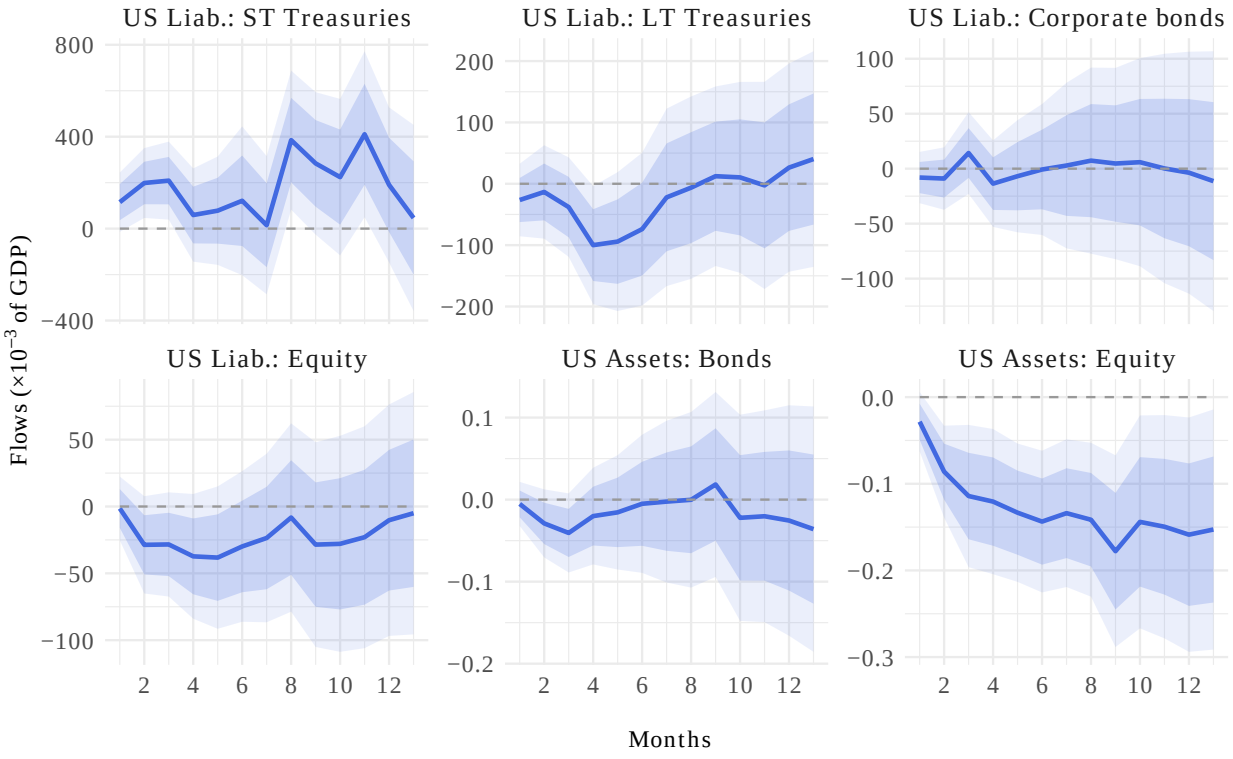
Across all specifications, our conclusions remain robust. We consistently observe a strong and persistent decline in US investors' holdings of foreign equities following a US monetary policy tightening, accompanied by increased purchases of short-term Treasuries.

7.2 Scaling by investing country lagged GDP

We next explore an alternative scaling of capital flows. While our baseline uses lagged US GDP—a natural choice given our focus on the perspective of a US investor and the aim to capture the absolute magnitude of flows—we also scale flows by the lagged GDP of the investing country. This adjustment gives relatively more weight to flows from smaller economies, where even modest

amounts represent a larger share of domestic output. Under this alternative, flows on the asset side remain scaled by US GDP, while flows on the liability side are scaled by the GDP of the respective counterpart country. The resulting estimates are presented in Figures 11 and 33.

Figure 11: Effects of MP shocks on capital flows



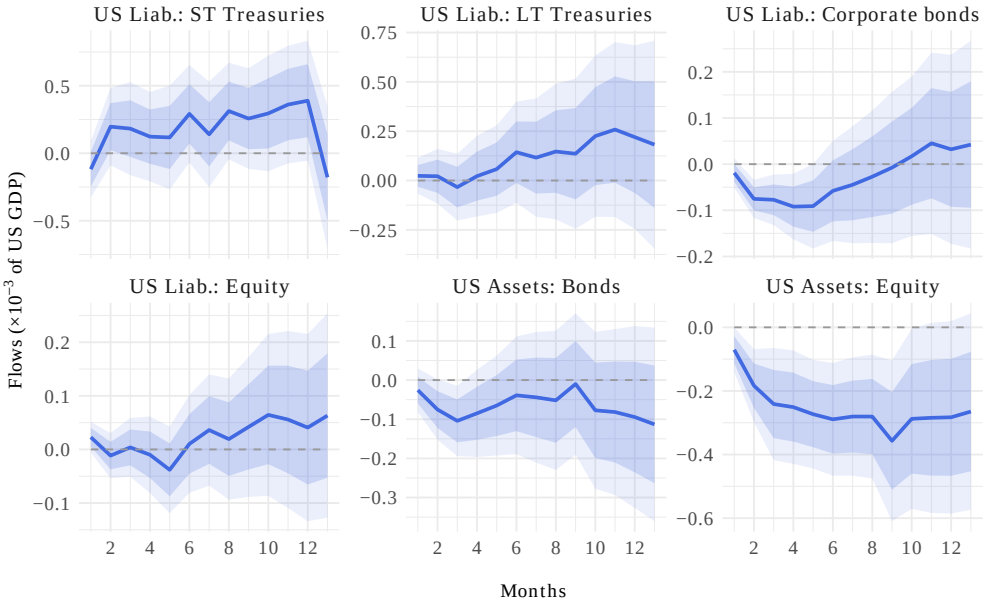
Note: All flows are scaled by investor's country lagged GDP.

Changing the scaling approach affects some results on the liabilities side, notably for corporate bonds: a short-run negative and significant response under US GDP scaling becomes slightly positive and insignificant when using the investing country's GDP. Short-term Treasuries also show a more persistent effect under the alternative scaling, while other responses remain broadly unchanged, keeping our main message unchanged.

7.3 Accounting for local 'pull' factors

In addition to some global control variables, we supplement our baseline with country-specific 'pull factors' that may influence domestic response to US shocks. These controls include the national Consumer Price Index (CPI), the industrial production index (IPI), and a dummy for systemic banking crises, following Laeven and Valencia (2020)'s classification. Note that due to data availability constraints, these variables are included as a robustness check rather than in the baseline specification, as their inclusion reduces the overall sample size. As shown in Figure 12, our results are qualitatively robust to these additions. Crucially, the magnitude and significance of the impact on US equities remain consistent.

Figure 12: Effects of MP shocks on flows - adding pull factors



7.4 Additional results

7.4.1 By sub-samples

We decide to perform additional robustness checks by estimating our baseline model separately for two sub-samples: advanced economies and emerging markets.[22]

The results, presented in Figures 13 and 14, indicate that our main findings largely reflect the responses of advanced economies, which is expected given their relatively larger bilateral capital flows with the United States. Nevertheless, we also observe significant repatriation effects in emerging market equities. In terms of foreign purchases of US Treasuries, emerging markets appear to favor short-term securities, whereas advanced economies predominantly increase their holdings of long-term Treasuries.[23] This pattern likely reflects differing risk preferences and liquidity needs: emerging markets favor short-term Treasuries for their lower duration and flexibility, partly due to greater reliance on short-term external funding. In contrast, advanced economies, with deeper financial markets and longer-term investment horizons, are more likely to increase their exposure to long-term Treasuries.

[22] The full list of countries in each group is provided in the Appendix.

[23] Additional results in the Appendix show that purchases of short-term Treasuries temporarily rise among advanced economies excluding financial hubs. However, the impact on long-term Treasuries is again more persistent.

Figure 13: Effects of MP shocks on flows - AE counterpart countries

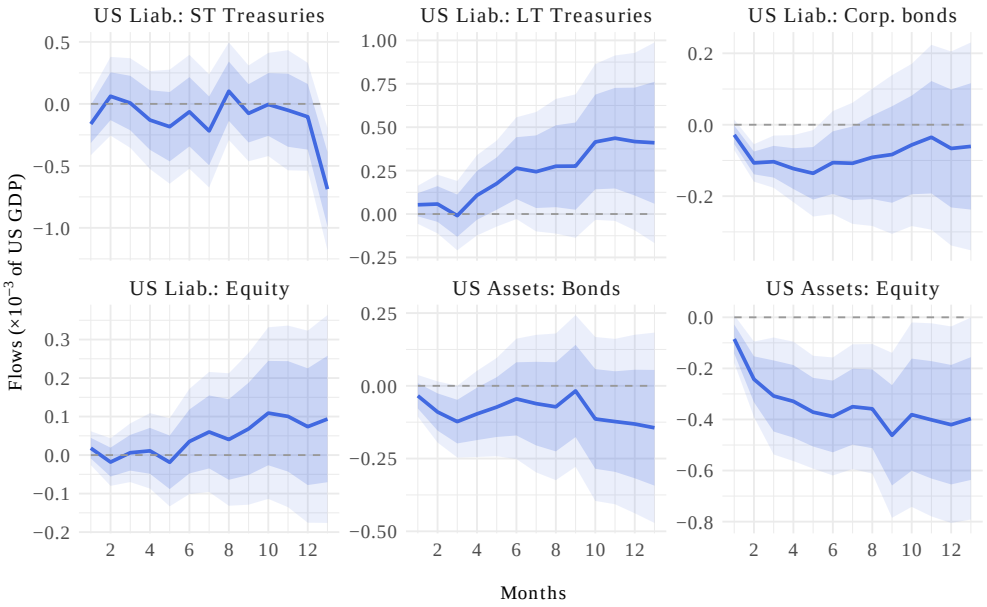
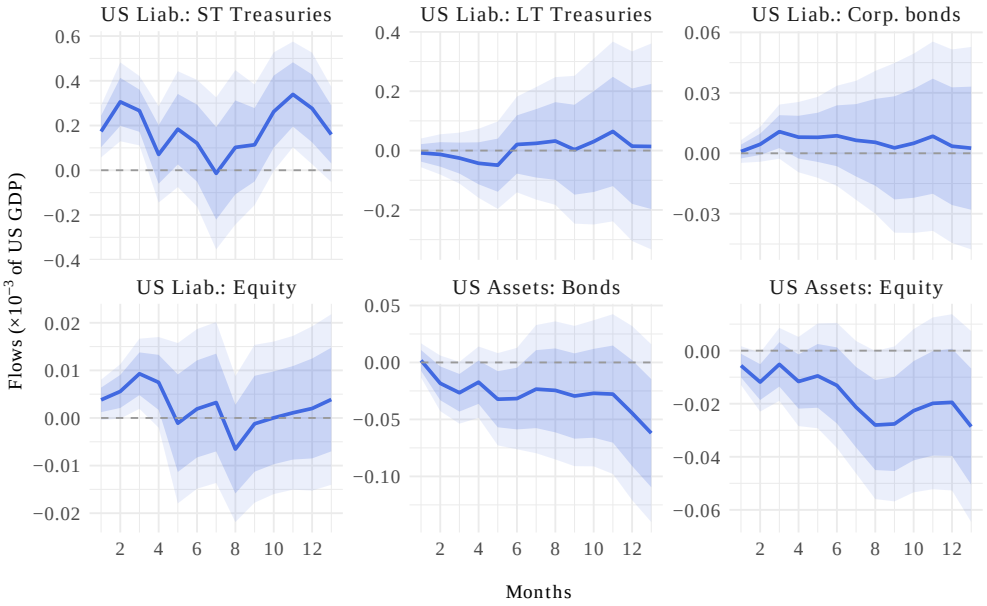


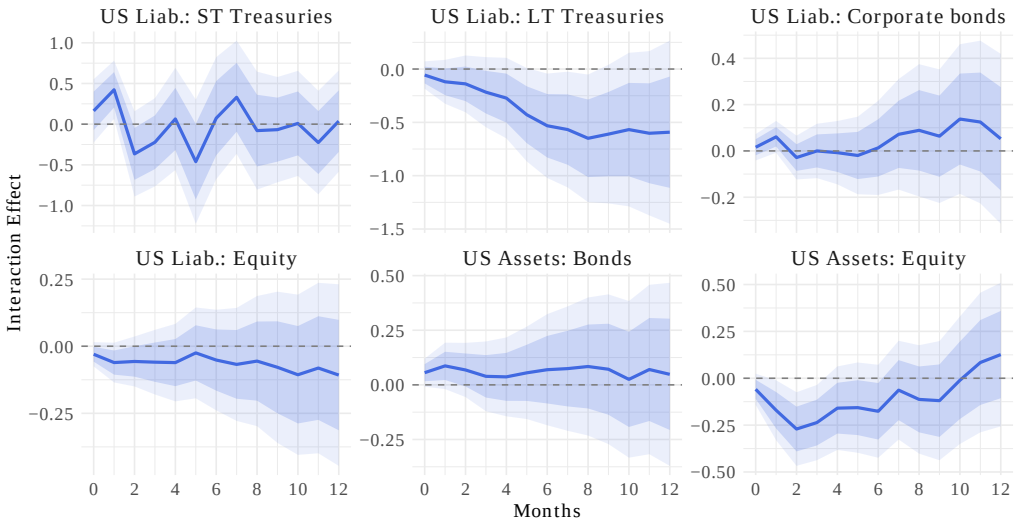
Figure 14: Effects of MP shocks on flows - EME



7.4.2 Looking for asymmetries

We conclude by testing for potential asymmetries in the response of capital flows, interacting our monetary policy shock in the baseline specification (Equation 1) with a dummy variable indicating the shock's sign. Specifically, we report the additional effect associated with negative surprises (i.e., monetary policy easing). The results indicate a stronger negative response of US net purchases of foreign equities following such easing shocks, suggesting that the negative relationship we documented earlier is even more pronounced in the case of monetary policy loosening (US investors tend to purchase even more strongly foreign equities when there in case of Fed easing). For other asset classes, we find no significant evidence of asymmetry in the response.

Figure 15: Additional effect of negative MP shocks.



Note: All flows are scaled by lagged US GDP and multiplied by 1,000 (i.e., units are $\times 10^{-3}$ of lagged US GDP).

8 Conclusion

This paper sheds new light on the way US monetary policy tightening influences cross-border capital flows. Our analysis highlights that the conventional wisdom—monetary tightening attracting capital flows into the United States—masks important heterogeneity in investor behavior. We show that these flows are not solely driven by increased foreign demand for US safe assets but also, and importantly, by a significant retrenchment of US investors from foreign equity markets. This distinction underscores the role of investor heterogeneity in shaping international portfolio adjustments. Moreover, by extending the analysis to incorporate Central Bank Information shocks, we capture the broader economic signals embedded in Fed communications, revealing more nuanced portfolio rebalancing responses that go beyond traditional interest rate channels. Thus, a positive signal on the state of the economy leads to global portfolio adjustments with increased investments in both US and foreign equities.

These insights deepen our understanding of the global transmission of US monetary policy and offer important implications for policymakers concerned with the international spillovers of monetary tightening and the stability of capital flows. Future research should aim to better identify the specific sources of investor heterogeneity that drive these flow dynamics, with particular attention to the roles of leverage and hedging strategies in shaping portfolio responses.

References

Bauer, M. D., B. S. Bernanke, and E. Milstein (2023). Risk appetite and the risk-taking channel of monetary policy. *Journal of Economic Perspectives 37*(1), 77–100.

Bauer, M. D. and E. T. Swanson (2023). A reassessment of monetary policy surprises and high-frequency identification. *NBER Macroeconomics Annual 37*(1), 87–155.

Bernanke, B. S. and K. N. Kuttner (2005). What explains the stock market's reaction to federal reserve policy? *The Journal of Finance 60*(3), 1221–1257.

Bertaut, C. C. and R. Judson (2014). Estimating us cross-border securities positions: New data and new methods. *Available at SSRN 2483922*.

Bertaut, C. C. and R. Judson (2022, February). Estimating U.S. Cross-Border Securities Flows: Ten Years of the TIC SLT. FEDS Notes 2022-02-18-2, Board of Governors of the Federal Reserve System (U.S.).

Bertaut, C. C. and R. W. Tryon (2007). Monthly estimates of us cross-border securities positions. *FRB International Finance Discussion Paper* (910).

Borio, C. and H. Zhu (2012). Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism? *Journal of Financial stability 8*(4), 236–251.

Bubeck, J., M. M. Habib, and S. Manganelli (2018). The portfolio of euro area fund investors and ecb monetary policy announcements. *Journal of International Money and Finance 89*, 103–126.

Campbell, J. Y., K. Serfaty-De Medeiros, and L. M. Viceira (2010). Global currency hedging. *The Journal of Finance 65*(1), 87–121.

Cenedese, G. and I. Elard (2021). Unconventional monetary policy and the portfolio choice of international mutual funds. *Journal of International Money and Finance 115*, 102357.

Chaboud, A. P., S. V. Chernenko, E. Howorka, R. S. Krishnasami Iyer, D. Liu, and J. H. Wright (2004). The high-frequency effects of u.s. macroeconomic data releases on prices and trading activity in the global interdealer foreign exchange market. International Finance Discussion Papers 823, Board of Governors of the Federal Reserve System.

Chari, A., K. Dilts Stedman, and C. Lundblad (2021). Taper tantrums: Quantitative easing, its aftermath, and emerging market capital flows. *The Review of Financial Studies 34*(3), 1445–1508.

Cieslak, A. and H. Pang (2021). Common shocks in stocks and bonds. *Journal of Financial Economics 142*(2), 880–904.

Ciminelli, G., J. Rogers, and W. Wu (2022). The effects of us monetary policy on international mutual fund investment. *Journal of International Money and Finance 127*, 102676.

Davis, J. S., G. Valente, and E. Van Wincoop (2021). Global drivers of gross and net capital flows. *Journal of International Economics 128*, 103397.

Drechsler, I., A. Savov, and P. Schnabl (2018). A model of monetary policy and risk premia. *The Journal of Finance 73*(1), 317–373.

Du, W., A. W. Huber, et al. (2024). Dollar asset holdings and hedging around the globe. Technical report, National Bureau of Economic Research.

Eren, E., A. Schrimpf, and F. D. Xia (2023). The demand for government debt. *Available at SSRN 4466154*.

Faia, E., K. K. Lewis, and H. Zhou (2024). Do investor differences impact monetary policy spillovers to emerging markets? Technical report, National Bureau of Economic Research.

Fratzscher, M., M. Lo Duca, and R. Straub (2018). On the international spillovers of us quantitative easing. *The Economic Journal 128*(608), 330–377.

French, K. R. and R. Roll (1986). Stock return variances: The arrival of information and the reaction of traders. *Journal of Financial Economics 17*(1), 5–26.

Georgiadis, G. and M. Jarocinski (2022). Global implications of multi-dimensional us monetary policy normalization. *Journal of International Money and Finance*.

Georgiadis, G. and M. Jarociński (2023, December). Global spillovers from multi-dimensional US monetary policy. Working Paper Series 2881, European Central Bank.

Gertler, M. and P. Karadi (2015). Monetary policy surprises, credit costs, and economic activity. *American Economic Journal: Macroeconomics 7*(1), 44–76.

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

Gourinchas, P.-O. and H. Rey (2014). External adjustment, global imbalances, valuation effects. In G. Gopinath, E. Helpman, and K. Rogoff (Eds.), *Handbook of International Economics*, Volume 4, Chapter 0, pp. 585–645. Elsevier.

Gourinchas, P.-O., H. Rey, and M. Sauzet (2019). The international monetary and financial system. *Annual Review of Economics 11*, 859–893.

Griever, W. L., G. A. Lee, and F. E. Warnock (2001). The us system for measuring cross-border investment in securities: a primer with a discussion of recent developments. *Fed. Res. Bull. 87*, 633.

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

Jarocinski, M. (2021). Estimating fed's unconventional policy shocks.

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

Kekre, R. and M. Lenel (2022a). Monetary policy, redistribution, and risk premia. *Econometrica 90*(5), 2249–2282.

Kekre, R. and M. Lenel (2022b). Monetary policy, redistribution, and risk premia. *Econometrica 90*(5), 2249–2282.

Kroencke, T. A., M. Schmeling, and A. Schrimpf (2015). Global asset allocation shifts.

Laeven, L. and F. Valencia (2020). Systemic banking crises database ii. *IMF Economic Review 68*(2), 307–361.

Miranda-Agrippino, S. and H. Rey (2020a). The global financial cycle after lehman. *AEA Papers and Proceedings 110*, 523–528.

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

Miranda-Agrippino, S. and H. Rey (2021, October). The global financial cycle. Working Paper 29327, National Bureau of Economic Research.

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

Nenova, T., A. Schrimpf, and H. S. Shin (2025). Global portfolio investments and fx derivatives. Technical report, Bank for International Settlements.

Pinchetti, M. and A. Szczepaniak (2021). Global spillovers of the fed information effect.

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

Tabova, A. M. and F. E. Warnock (2021, September). Foreign investors and us treasuries. Working Paper 29313, National Bureau of Economic Research.

Tabova, A. M. and F. E. Warnock (2022). Preferred habitats and timing in the world's safe asset. Technical report, National Bureau of Economic Research.

Warnock, F. E. and C. Cleaver (2003). Financial centres and the geography of capital flows. *International Finance 6*(1), 27–59.

Warnock, F. E. and M. Mason (2001). The geography of capital flows: What we can learn from benchmark surveys of foreign equity holdings. *Available at SSRN 255463*.

APPENDIX

Table 1: Survey of empirical evidence

Study	Data	Identification	Main findings
Banegas et al. (2016)	ICI fund flows, US-based funds, monthly (2000-14)	Deviation of Fed fund rate from Taylor rule based on survey data	Unexpected Fed tightening (shock to the path of monetary policy) associated with outflows from bond and inflows to equity mutual funds
Bua and Dunne (2017)	Portfolio holdings, Ireland-based funds, quarterly (2014-2016)	QE dummy variables for different time periods	QE leads to rebalancing by fund managers from EU government bonds (targeted by CB operations) towards corporate bonds or closer substitutes, such as foreign government bonds
Cenedese et al. (2015)	EPFR country flows, global funds, monthly (2008-14)	Intraday change in US long-term yields and actual US Fed operations	US unconventional monetary policies prompt rebalancing of fund managers to non-US securities, in particular DM equity, and away from US securities
Curcuru et al. (2015)	EPFR fund flows, global funds, daily (2007-14)	Intraday change in long-term yields (US/UK/JP) or spreads (EA)	Active reallocation of underlying investors to DM equity and out of DM bonds following Fed and ECB easing
Fratzscher et al. (2016b)	EPFR fund and country flows, global and US-based funds, daily (2007-10)	Event dummy and actual US Fed operations	US Fed QE1 in 2008 triggered a portfolio rebalancing by underlying investors into US equity and bond funds and out of EM funds. US Fed QE2 since 2010 had the opposite effect
Fratzscher et al. (2016a)	EPFR fund and country flows, global and EA-based funds, daily (2007-12)	Event dummy and actual ECB operations	Some evidence of stronger inflows by underlying investors into EA periphery equity and, in some cases, bond markets, partly rebalancing from highly-rated EA countries. Positive impact on flows to EM equity and bond funds and DM bond funds
Hau and Lai (2016)	LIPPER fund flows, EA-based funds, quarterly (2003-10)	Change in real interest rates across EA countries	Loose monetary policy associated with an increase in inflows by underlying investors into equity and outflows from money market funds
Kroencke et al. (2015)	EPFR fund flows, US-based funds, weekly (2006-2014)	Weekly changes in US 2-year and 10-year Treasury yields	Fed easing associated with reallocation by underlying investors to non-US assets. Yield curve flattening associated with a shift out of equities and into US bonds
Joyce et al. (2014)	Micro dataset of UK-based institutional investors, quarterly (1985-2012)	Actual BoE operations	Reallocation of fund managers from UK gilts to corporate bonds following BoE quantitative easing

Figure 16: Effects of MP shocks on flows from international mutual funds
Source: Bubeck et al. (2018)

A Descriptive Statistics

A.1 List of country type

Here we display some additional statistics. First, we precise the list of countries entering each country group.

Table 2: Country Classification by Group

Advanced Eco. (AE)	**Emerging Eco. (EME)**	**Financial Hubs**	**Tax Havens**
Australia (AUS)	Argentina (ARG)	Luxembourg (LUX)	Bahamas (BHS)
Austria (AUT)	Brazil (BRA)	Singapore (SGP)	Barbados (BRB)
Belgium (BEL)	Chile (CHL)	United Kingdom (GBR)	Bermuda (BMU)
Canada (CAN)	China (CHN)	Hong Kong (HKG)	Cayman Islands (CYM)
Denmark (DNK)	Colombia (COL)		Curaçao (CUW)
Finland (FIN)	Egypt (EGY)		Guernsey (GGY)
France (FRA)	Hungary (HUN)		Isle of Man (IMN)
Germany (DEU)	India (IND)		Jersey (JEY)
Greece (GRC)	Indonesia (IDN)		Liberia (LBR)
Hong Kong (HKG)	Malaysia (MYS)		Luxembourg (LUX)
Ireland (IRL)	Mexico (MEX)		Monaco (MCO)
Italy (ITA)	Morocco (MAR)		Panama (PAN)
Japan (JPN)	Pakistan (PAK)		Trinidad and Tobago (TTO)
Korea, Rep. (KOR)	Peru (PER)		
Luxembourg (LUX)	Philippines (PHL)		
Netherlands (NLD)	Poland (POL)		
New Zealand (NZL)	Romania (ROU)		
Norway (NOR)	Russia (RUS)		
Portugal (PRT)	South Africa (ZAF)		
Singapore (SGP)	Thailand (THA)		
Spain (ESP)	Turkey (TUR)		
Sweden (SWE)	Venezuela (VEN)		
Switzerland (CHE)			
United Kingdom (GBR)			

A.2 Descriptive Statistics on US TIC data

Table 3: Descriptive Statistics of Aggregated Bilateral Flows (Total, millions of dollars)

Variable	Q25	Q50	Mean	Q75	SD
US Liab.: LT Treasuries	-656.00	9853.00	12828.60	24745.00	26407.00
US Liab.: Corporate Bonds	879.00	5454.00	7600.20	14418.00	12866.40
US Liab.: Equities	-499.00	3447.00	4269.20	9723.00	10920.80
US Assets: Foreign Bonds	-4356.00	36.00	-529.80	6229.00	13579.20
US Assets: Foreign Equities	0.00	3834.00	5978.80	10658.00	12955.10

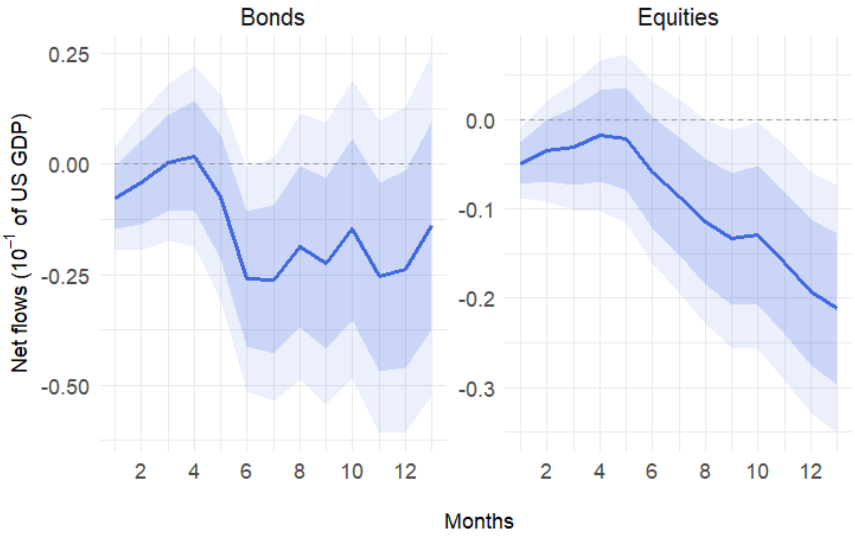
B Additional results for MP shocks

B.1 Effects on net-net flows adding ST Treasuries

Since our main dataset of bilateral capital flows covers only long-term US Treasuries (with maturity above one year), we complement the analysis with aggregate data that also include short-term Treasury securities (Treasury bills) available since 2003. Short-term Treasury flows are proxied by first differences in outstanding positions, as valuation adjustments are not separately available for this instrument, in contrast to other asset classes in the original source. The results are presented in Figure 17. A comparison with Figure 3, which reports responses based solely on long-term Treasuries, indicates that foreign investors increase their holdings of short-term Treasuries following monetary policy shocks, whereas holdings of long-term Treasuries exhibit little response.[24]

[24]The sample period also differs, starting in 2003 rather than 1994 as in the baseline analysis, which may additionally account for some of the differences in results.

Figure 17: Effects of MP shocks on net net flows, integrating ST Treasuries

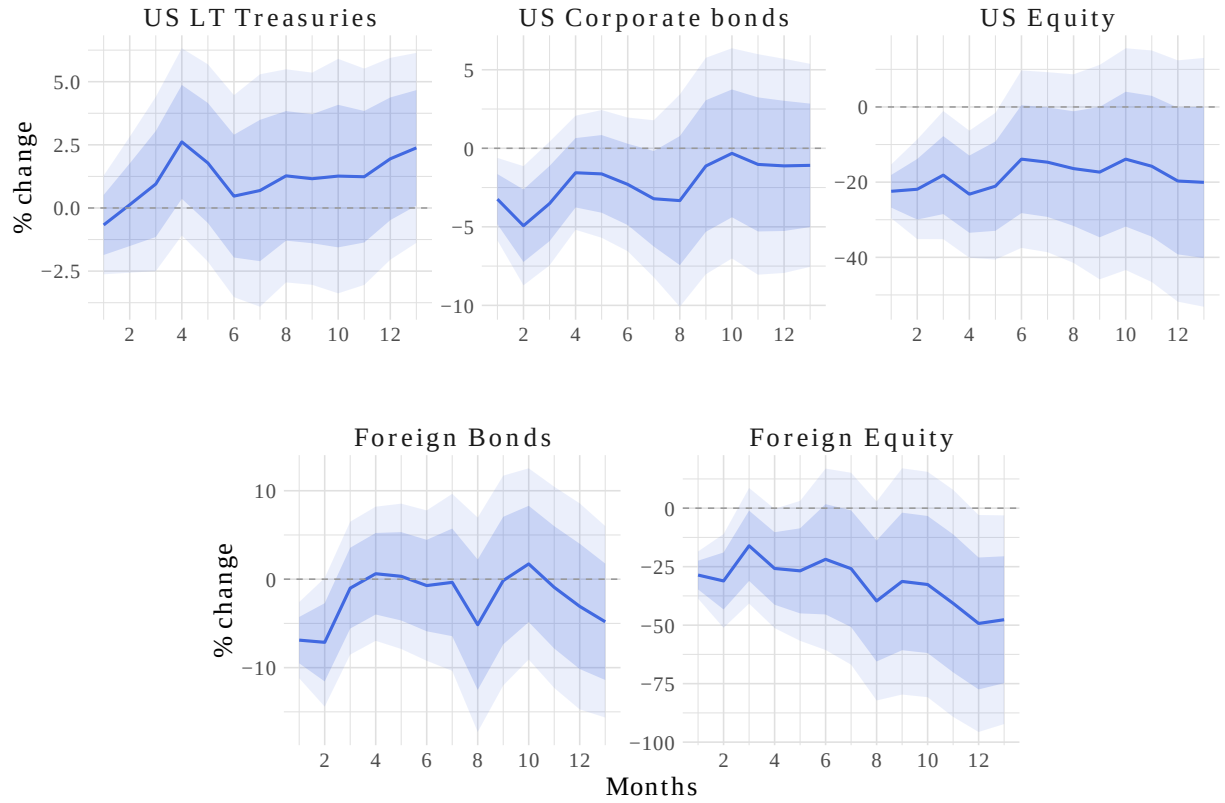


B.2 Effects on price indices

We complement our analysis by studying the effects of MP shocks on asset prices and valuation changes.[25] We also measure the impact of monetary policy shocks on global risk aversion and uncertainty.

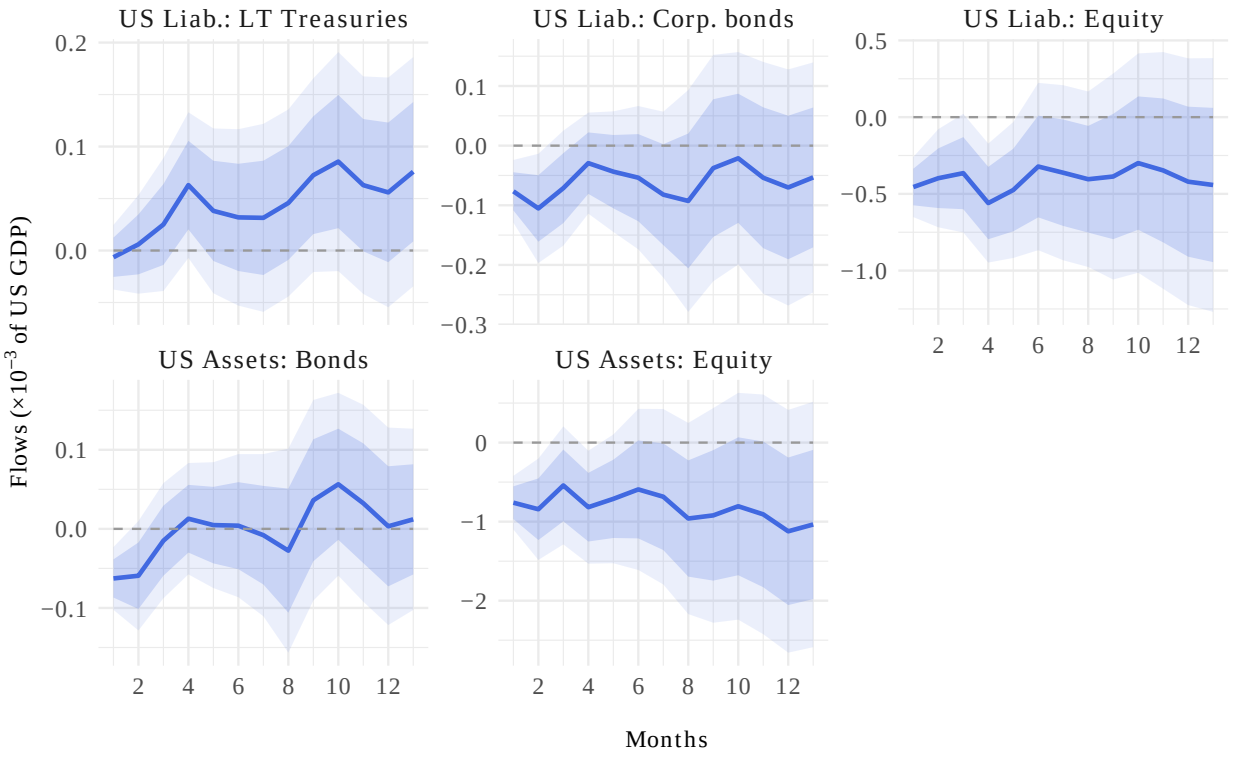
[25] Bertaut and Judson (2014) use aggregate price indices to compute valuation effects from TIC data. To obtain time series series for asset prices, we simply reverse-engineer their procedure to obtain the price indices across all countries and asset classes in their dataset. Unlike capital flows or valuation changes, our dependent variable in this case does not require scaling.

Figure 18: Effects of MP shocks on price indexes



Note: IRFs of US and foreign price indexes constructed from valuation changes following Bertaut and Judson (2014). IRFs are not cumulated across horizons.

Figure 19: Effects of MP shocks on estimated valuation changes

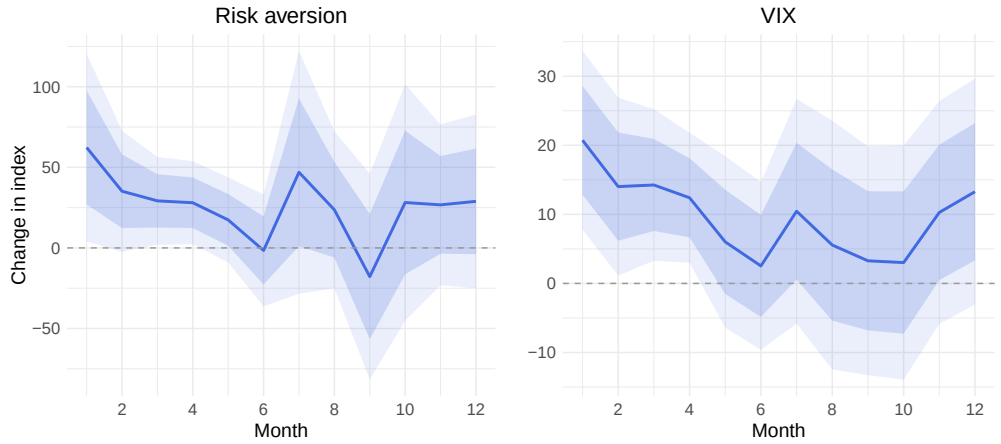


Note: These estimates of valuation changes rely on the methodology developed by Bertaut and Judson (2014). IRFs are cumulated across horizons.

Figure 18 shows that US equity prices – and to a lesser extent corporate bond prices – fall after a monetary tightening, while long-term Treasury prices remain largely unchanged, in line with policy shocks primarily affecting short-term rates. Likewise, US tightening reduces foreign equity and bond prices, reflecting a Global Financial Cycle and the role of both foreign asset price movements and exchange-rate effects.[26] Across markets, equities decline more than corporate bonds, indicating a broad reduction in global risk appetite and higher required risk premia. Figure 19 shows similar responses for estimated valuation changes, but allows to express the responses in terms of actual USD amounts (scaled by US GDP) that can be directly compared to the flow responses in the body of the paper.

[26]Unlike US securities, these valuation measures incorporate both foreign asset price movements and exchange-rate effects.

Figure 20: Effects of MP shocks on Risk aversion and the VIX



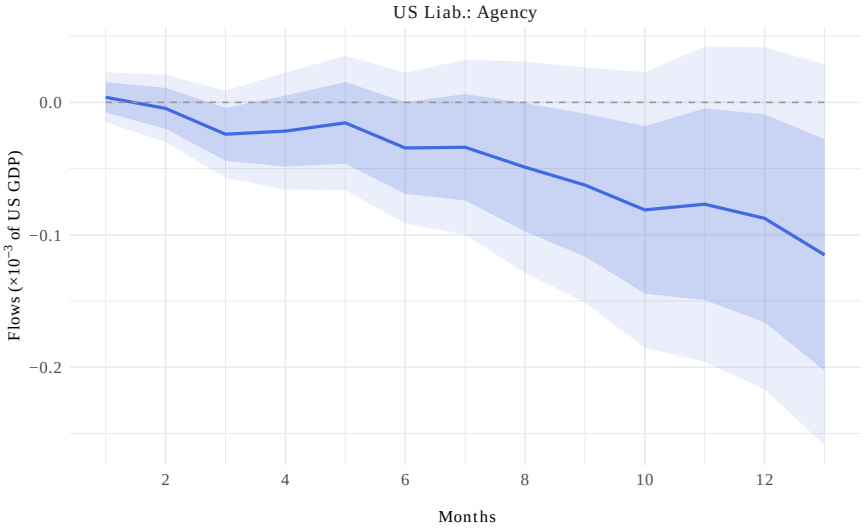
Note: Risk aversion is measured using the series from Bauer et al. (2023). The VIX corresponds to the CBOE Volatility Index, sourced from the Federal Reserve Bank of St. Louis FRED database.

Figure 20 shows that contractionary monetary policy shocks lead to an increase in global risk aversion and uncertainty, as proxied by the VIX.

B.3 Effects on additional instruments

Here, we add the impact on US agency securities. The figure shows a small decline which is not significant.

Figure 21: Effects of MP shocks on flows of US Agency securities

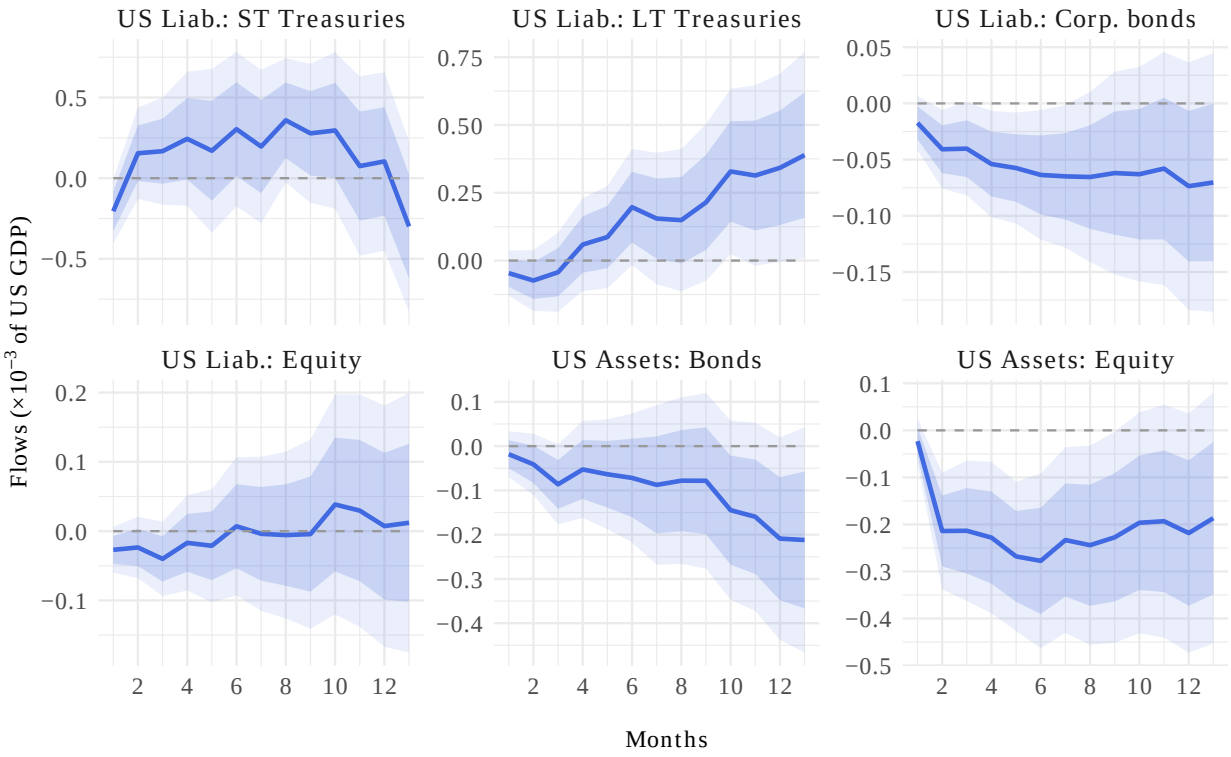


Note: All flows scaled by lagged US GDP.

B.4 Effects on other subsamples

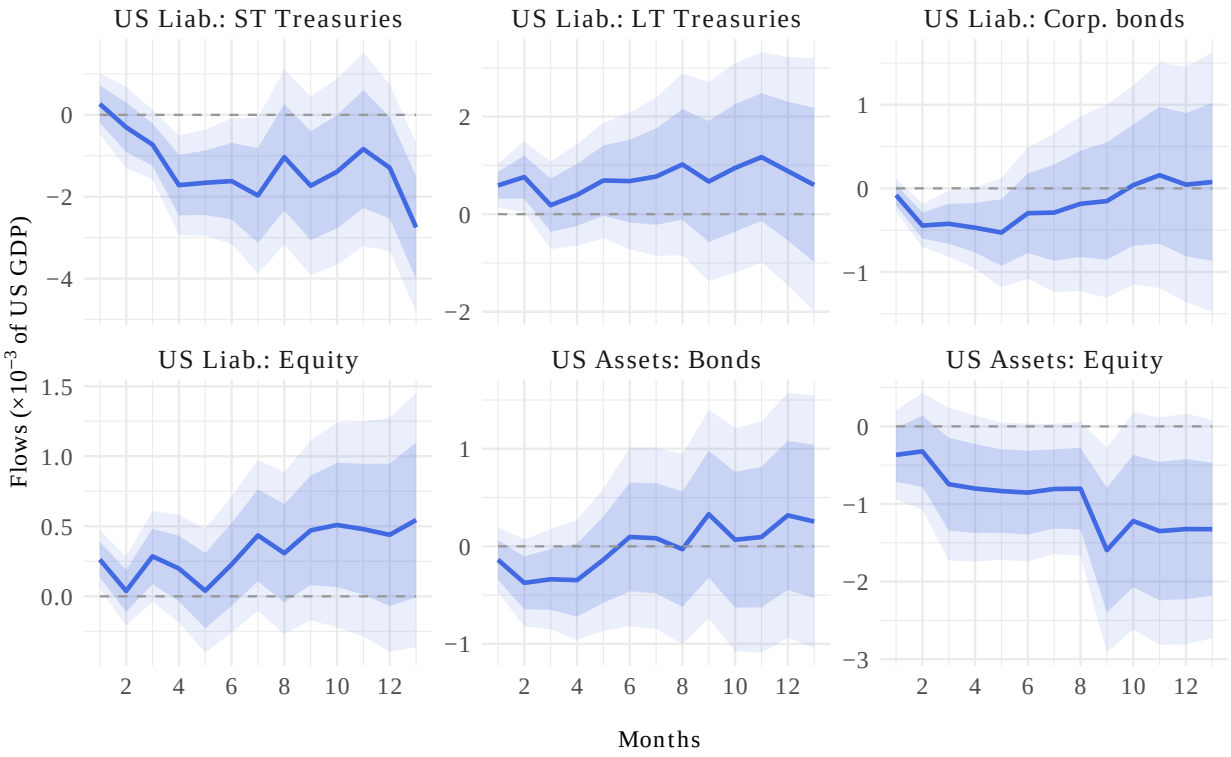
Then, we do the estimates on other sub-samples. Given the role of financial centers, we also compute the IRFs for advanced economies excluding financial hubs, as well as for financial hubs alone. We finally do the same for tax havens, as classified in Table 3. Results are presented in Figures 22, 23 and 24.

Figure 22: Effects of MP shocks on AE economies - excluding financial hubs



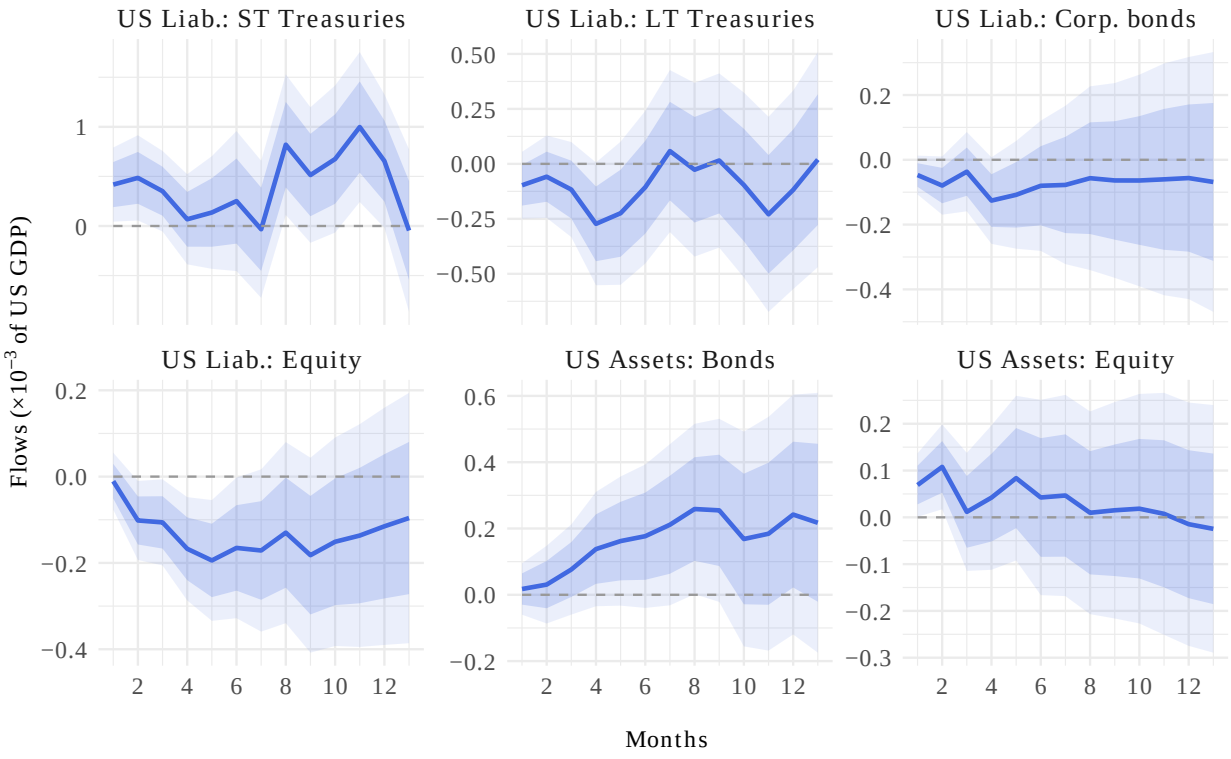
Note: All flows are scaled by lagged US GDP.

Figure 23: Effects of MP shocks on financial hubs



Note: All flows are scaled by lagged US GDP.

Figure 24: Effects of MP shocks on tax havens

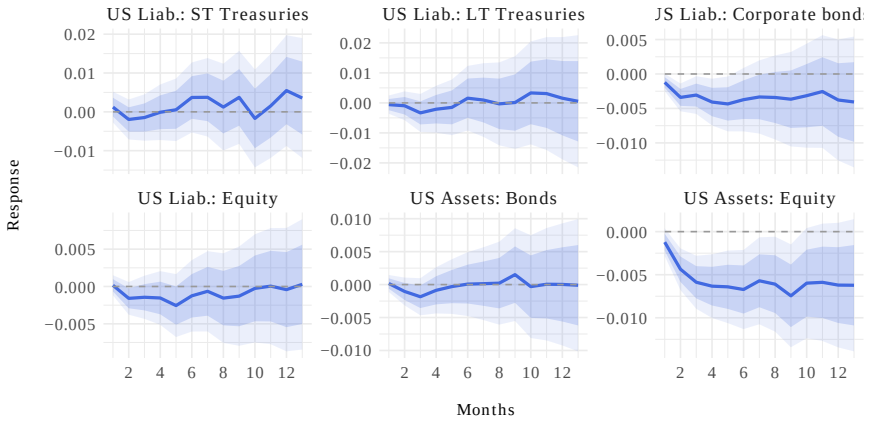


Note: All flows are scaled by lagged US GDP.

B.5 Effect on aggregated data

Finally, we verify that our findings hold when using aggregated rather than panel data. This check is particularly relevant for short-term Treasuries, which are available in aggregate form beginning in 2003 rather than 2011.

Figure 25: Effects of MP shocks on capital flows, using aggregated data



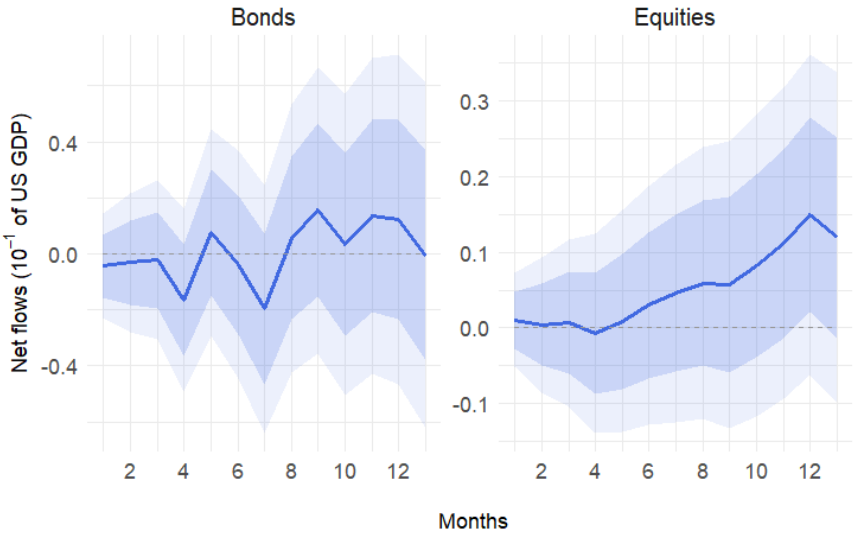
Note: All flows scaled by lagged US GDP.

C Additional results for CBI shocks

C.1 Effects on net-net flows adding ST Treasuries

As for monetary policy shocks, we complement the analysis with aggregate data that also include short-term Treasury securities available since 2003. The results are presented in Figure 26. We observe no reaction from bonds.

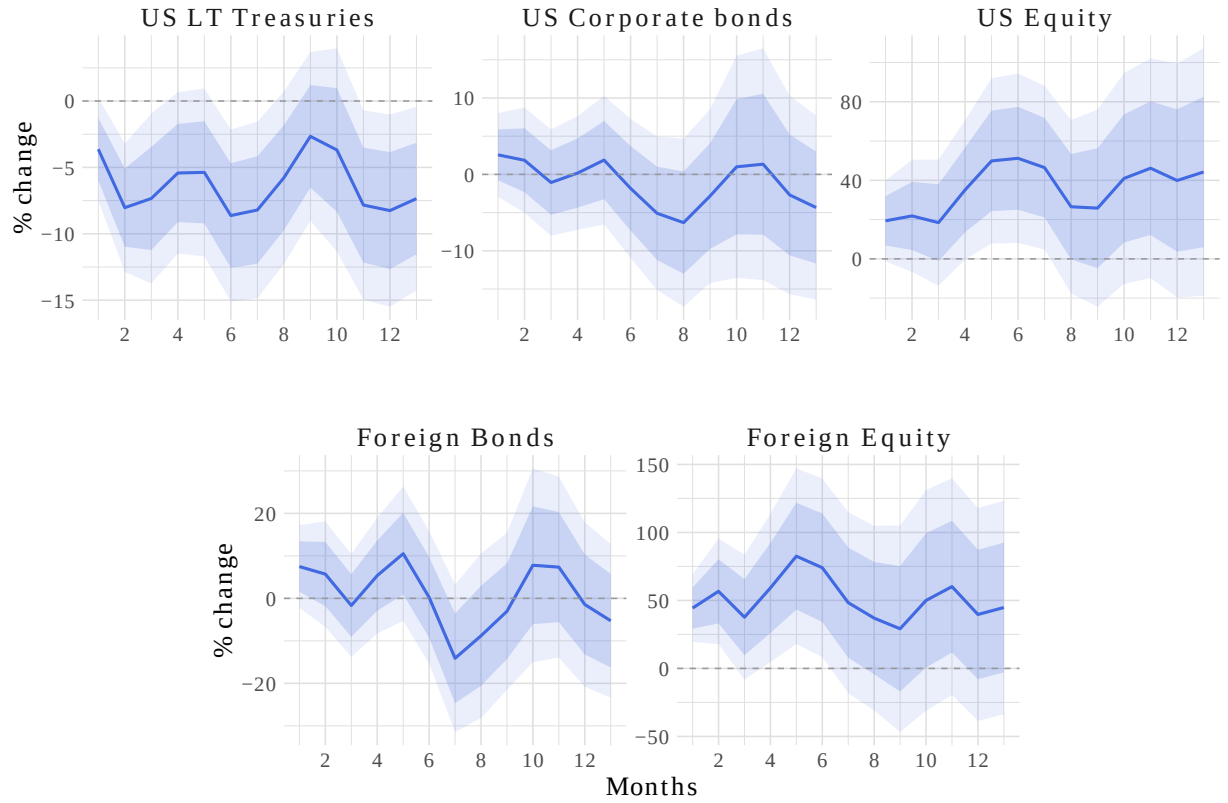
Figure 26: Effects of CBI shocks on net net flows, integrating ST Treasuries



C.2 Effects on price indexes

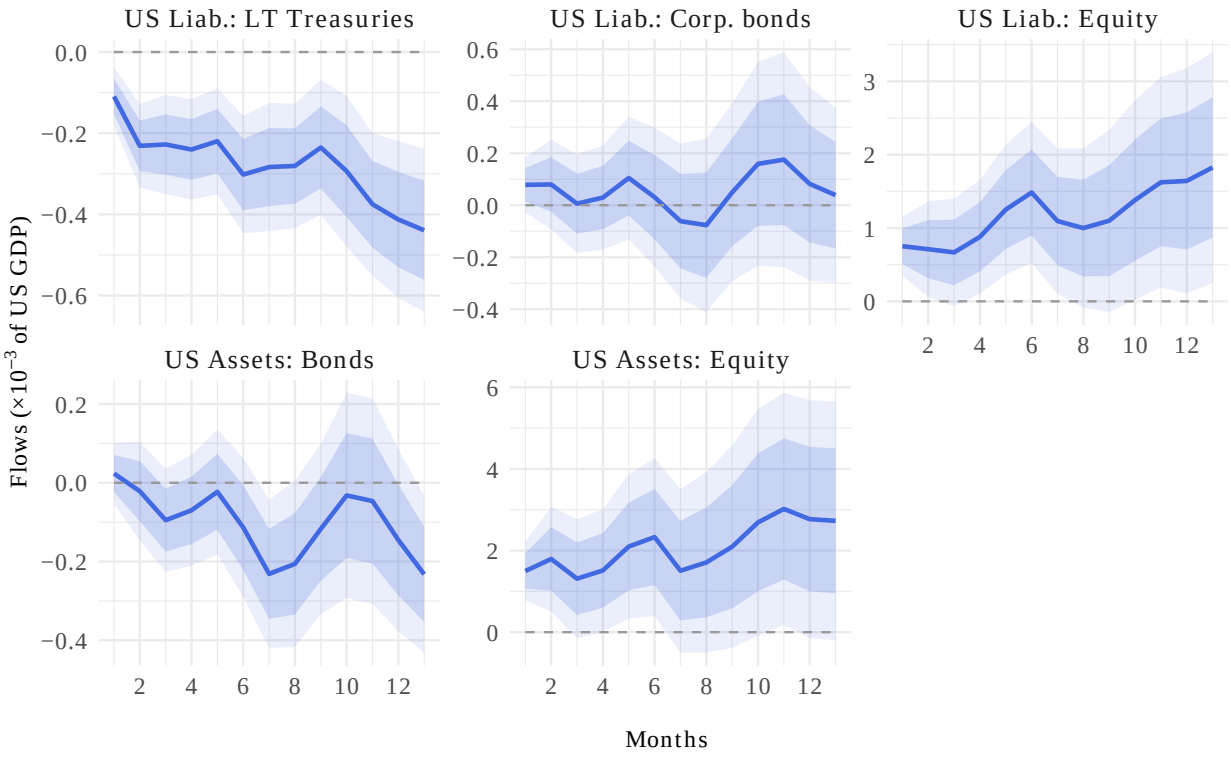
To further contrast the effects of US monetary policy and CBI shocks, we also examine asset price responses, similar to the exercise in Appendix B.2. Unlike MP shocks, positive CBI shocks significantly lower long-term Treasury valuations (Figure 27) and more strongly raise risky asset prices, consistent with their association with favorable economic news. Foreign asset valuations likewise rise following positive CBI shocks.

Figure 27: Effects of CBI shocks on price indices



Note: IRFs of US and foreign price indexes constructed from valuation changes following Bertaut and Judson (2014). IRFs are not cumulated across horizons.

Figure 28: Effects of CBI shocks on estimated valuation changes

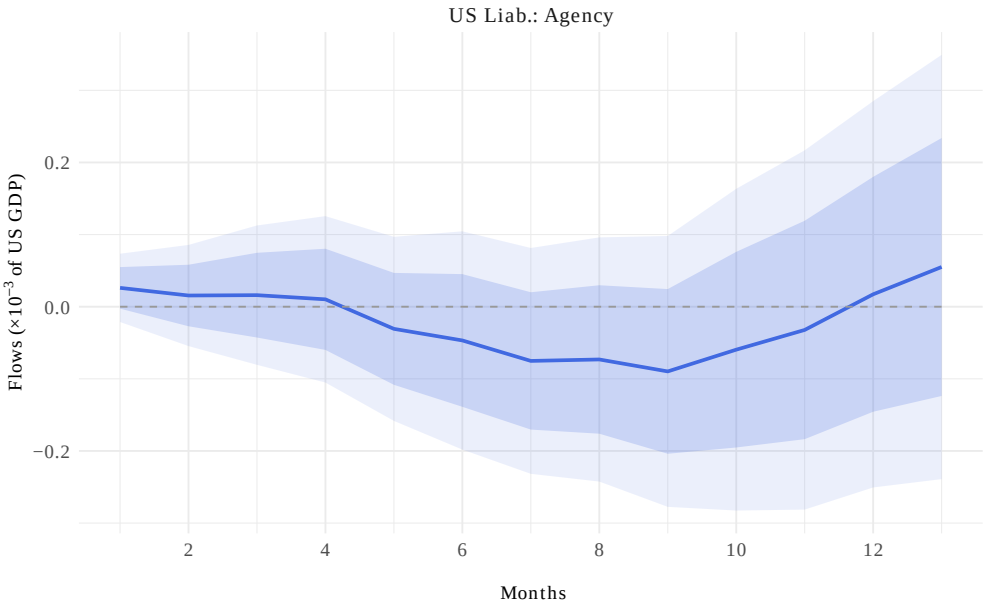


Note: These estimates of valuation changes rely on the methodology developed by Bertaut and Judson (2014). IRFs are cumulated across horizons.

C.3 Effect on additional instruments

We add the impact on US agency securities and show that the effect closely mirrors the one from US LT Treasuries.

Figure 29: Effects of CBI shocks on flows of US Agency securities



Note: All flows scaled by lagged US GDP.

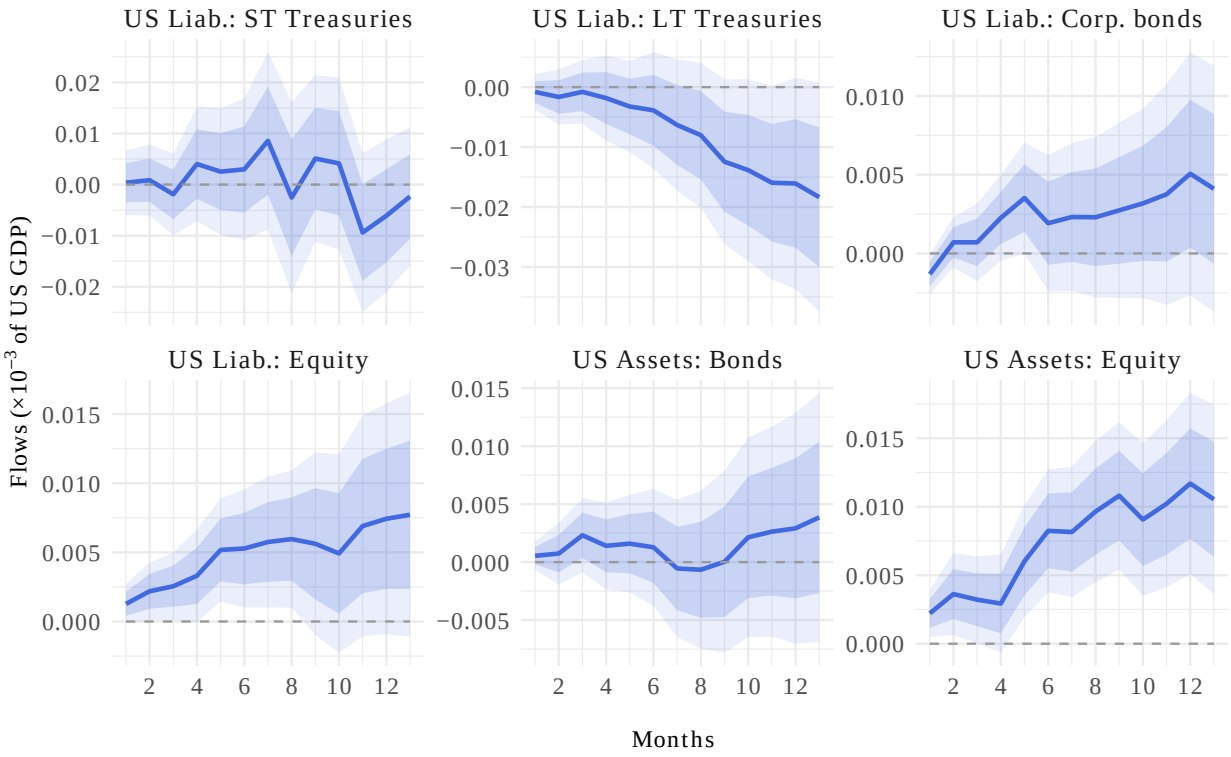
C.4 Robustness checks for CBI shocks

C.4.1 Alternative CBI shocks

Following Jarocinski (2021), we examine the effects of u_4 (Delphic forward guidance) as a proxy for CBI shocks.[27] The corresponding results are presented in Figure 30.

[27] The author himself notes that this shock likely reflects the Fed's information effect.

Figure 30: Effects of CBI (u_4) shocks on capital flows (Jarocinski)



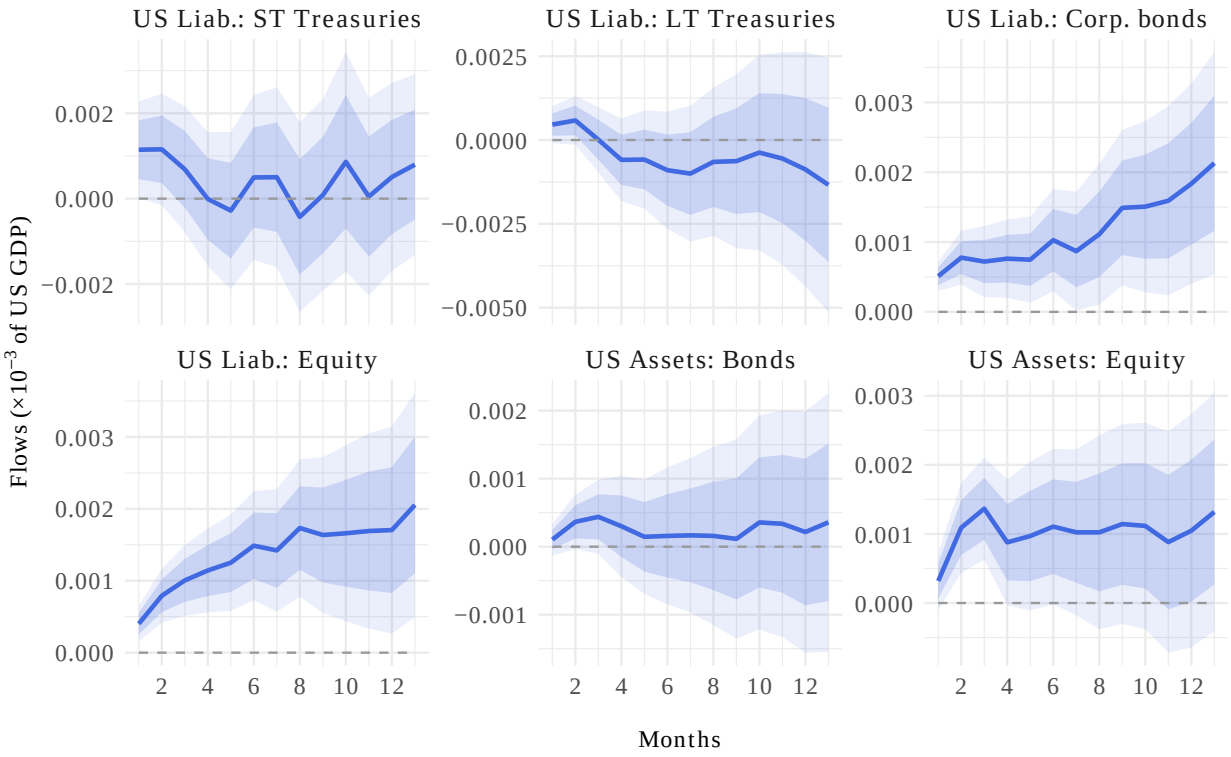
Note: All flows are scaled by lagged US GDP.

Then, we consider growth[28] and flight-to-safety shocks as estimated by Cieslak and Pang (2021).[29] Responses are reported in Figures 31 and 32.

[28] According to the authors, a positive shock to growth expectations raises stock prices and bond yields, and impacts yields at short-to-intermediate maturities more than at long maturities.

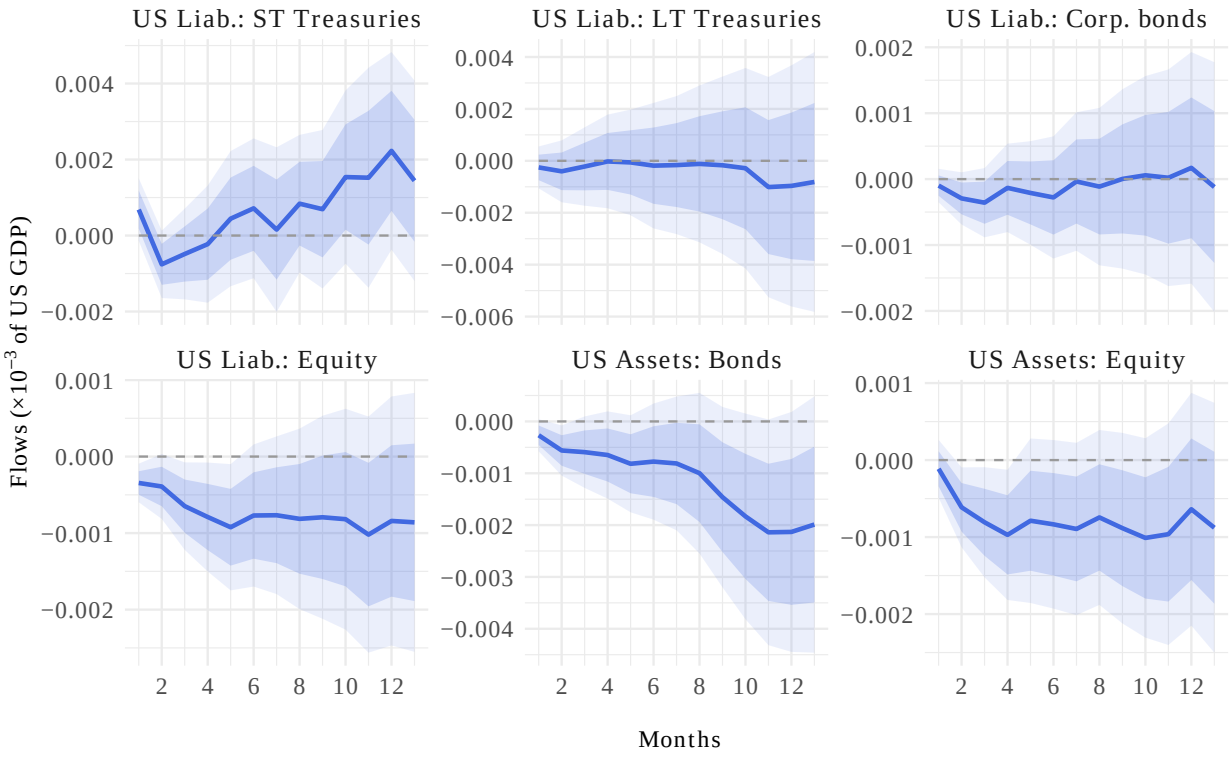
[29] The authors also label the FTS shocks 'hedging premium shocks'. These shocks are characterized by a larger impact on the longer end of the yield curve than on the short end and a positive comovement between yield changes and stock returns.

Figure 31: Effects of growth shocks on capital flows (Cieslak & Pang)



Note: All flows are scaled by lagged US GDP.

Figure 32: Effects of FTS shocks on capital flows (Cieslak & Pang)

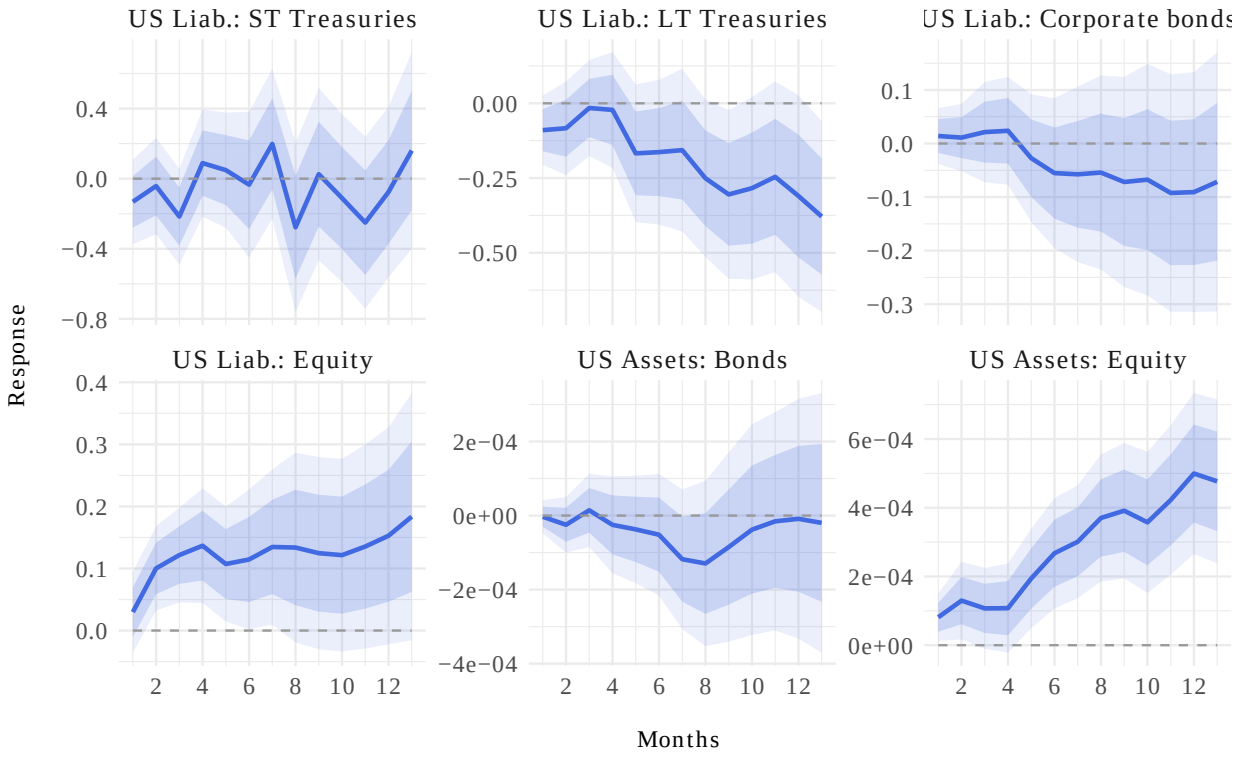


Note: All flows are scaled by lagged US GDP.

Across all specifications, our conclusions remain robust. We consistently find evidence of substantial portfolio rebalancing—marked by a sharp rise in both US and foreign equity holdings, and a decline in long-term Treasuries, though the significance of the latter varies depending on the specific shock.

C.5 Alternative scaling

Figure 33: Effects of CBI shocks on capital flows



Note: All flows scaled by lagged country GDP.

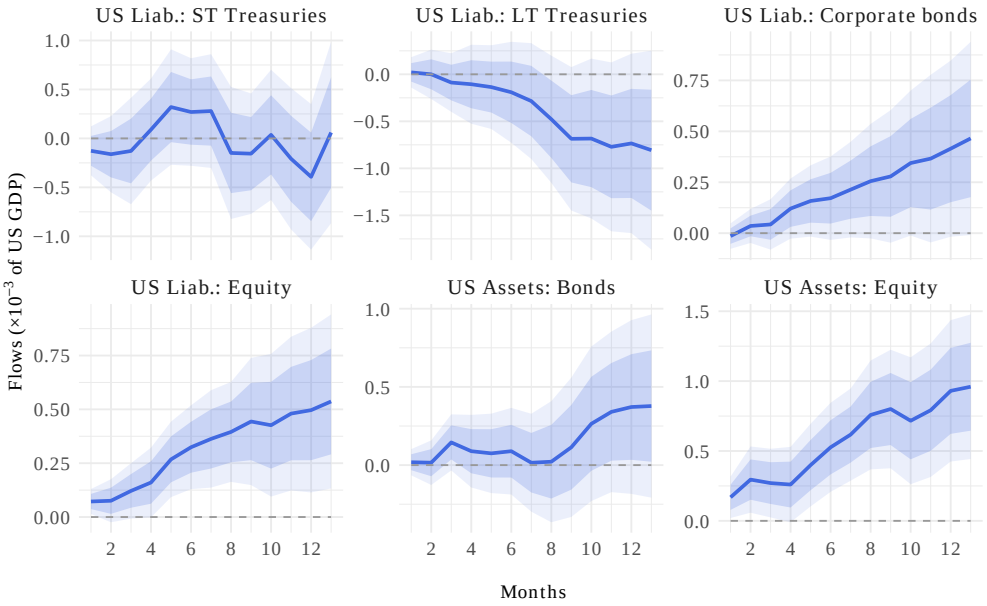
For CBI shocks, results are largely consistent across both scalings. Long-term Treasuries still decline significantly, and US equities rise, while other asset classes remain insignificant. Corporate bonds display a mixed but still insignificant pattern. As the scaling change does not affect liabilities, the strong and persistent response in foreign equities is robust.

C.5.1 Accounting for local factors

Finally, adding CPI, IP and systematic banking crisis as 'pull' factors gives the following results, reported in Figure 34. Effects are still highly significant and even strongly larger in terms of

magnitude, especially for US assets of foreign equities.

Figure 34: Effects of CBI shocks on capital flows - adding 'pull' factors



Note: All flows scaled by lagged US GDP.

D Supply effects

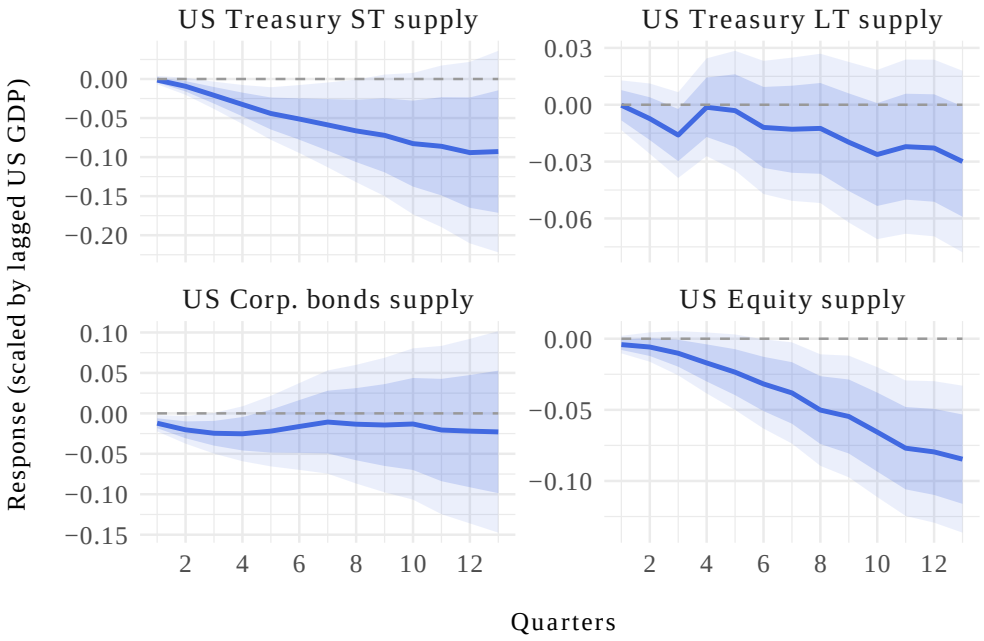
In this paper, we study the adjustment of investor flows to monetary policy shocks. The interpretation of our results is based on the hypothesis that the net supply of assets remains unchanged following a MP shock. Yet, macroeconomic adjustments — even if they often come with a lag — are precisely what monetary policy is designed to achieve. Thus, as much as GDP and inflation react to monetary policy, so should the supply of assets (through issuance of bonds and equity) as well as the demand for those assets. Flow adjustments may therefore also reflect changes on the supply side. In this section, we want to take a look at this issue by plotting the response of the net issuance of US assets to MP shocks. We make use of the US Financial Accounts (Fed release Z.1) that allow to construct quarterly aggregates of newly issued Treasuries, corporate bonds and

equity.

Figure 35 displays the results of this exercise. As is to be expected, there is a negative response of both corporate bond issuance and equity issuance. Contrary to the figures in the remainder of this paper, the x-axis is in quarters and response therefore are displayed for three years instead of just one. Corporate bond issuance is reacting immediately whereas the reaction of equities is more delayed, possibly representing the fact that corporate bond issuance is sensitive to funding costs (that are affected by MP shocks) whereas equity issuance only reacts after one year, possibly in response to the delayed macroeconomic effects of monetary policy. US long-term Treasuries do not react in comparison to short-term Treasuries – in line with the regular and predictable issuance by the Treasury.

In light of the analysis above, these results imply that the contraction of foreign inflows into US corporate bonds could very well stem from supply effects. In the case of equities, the insignificant inflow response alongside negative supply effects might suggest that inflow forces are being underestimated. Yet this impression is misleading, because equity supply adjusts with a delay. Once this timing is taken into account, the results do not overturn our conclusion that foreign equity inflows are not the main driver of the overall negative response of net-net flows.

Figure 35: Effects of MP shocks on US asset supply



Note: All flows are scaled by lagged US GDP. Contrary to the figures in the remainder of this paper, the x-axis is in quarters.