Heterogeneous effects of monetary policy surprises on bond fund flows*

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Abstract

We present novel evidence on the global transmission of monetary policy (MP) surprises via bond funds. Using daily MP surprise measures and a multi-country panel of weekly fund flows, we document that bond fund flows respond systematically to MP surprises. The direction, intensity, and persistence of these responses, however, vary across destination countries, fund investment strategies, and fund domiciles. Furthermore, bond fund flows react not only to domestic MP surprises, but also to foreign MP surprises, indicating cross-border spillovers. We explore two mechanisms driving these responses: the relative importance of MP shocks versus information shocks, and the impact of exchange rate movements on portfolio rebalancing. Our findings highlight the role of nonbank financial intermediaries in global MP transmission.

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Keywords: NBFIs, bond funds, monetary policy surprises, cross-border spillovers

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1 Introduction

Nonbank financial intermediaries (NBFIs) account for roughly half of global financial assets, with investment funds[1] representing the fastest-growing segment of the sector. These funds have become increasingly important in international capital markets, characterized by their significant cross-border positions and growing role in portfolio intermediation (Schmidt and Yeşin, 2022; FSB, 2024). However, their role in the transmission of monetary policy (MP) remains incompletely understood.

This paper examines how bond fund flows into four major economies, namely, the Eurozone, Switzerland, the United Kingdom (UK), and the United States (US), respond to MP surprises from 2010–2023. We combine daily MP surprise measures[2] with a weekly panel of fund flows. Using panel local projections, we estimate the cumulative response of fund flows to both domestic and foreign MP surprises, accounting for differences in destination countries, investment strategies, and fund domiciles.

We document that bond fund flows respond systematically but heterogeneously to MP surprises: First, we document that domestic contractionary MP surprises tend to trigger increased inflows into Switzerland and the US, which are widely regarded as safe-haven markets, while leading to a decrease in inflows to the Eurozone and the UK. This result suggests that safe-haven currencies play a critical role in guiding capital flows following contractionary surprises. Second, we find that passively-managed and foreign-domiciled funds react more strongly to domestic MP surprises than actively-managed or domestically-domiciled funds. Passive funds, due to their mechanical rebalancing nature, tend to amplify the effect of policy changes, as they adjust their portfolios in response to shifts in market conditions. Foreign-domiciled funds are likely more sensitive to MP surprises because they are often exposed to currency risks. Third, we show that foreign MP surprises significantly influence fund flows, highlighting the presence of cross-border spillovers and the global interconnectedness of financial markets.

We offer a deeper understanding of these patterns by exploring the mechanisms driving them. First, we decompose MP surprises into pure policy shocks and information shocks (Romer and Romer, 2000; Romer and Romer, 2004; Nakamura and Steinsson, 2018; Jarociński and Karadi, 2020; Bauer and Swanson, 2023a; Bauer and Swanson, 2023b), enabling us to distinguish between the direct effects of a policy change and the more indirect effects stemming from changes in the economic outlook conveyed during central bank announcements. Second, we

[1] Investment funds are also known as mutual funds, investment schemes, or simply as funds.

[2] Following the previous literature (e.g., Kuttner, 2001; Gürkaynak et al., 2005a; Gürkaynak et al., 2005b), we measure MP surprises as the daily change in the prices of three-month interest-rate futures on the date of the central bank's announcement. This measurement enables us to isolate the unexpected component of MP actions, offering an exogenous identification of policy surprises.

examine how exchange rate movements, induced by MP surprises, can influence fund flows. We show that currency appreciation following contractionary shocks increases the attractiveness of local-currency assets, which may lead to portfolio rebalancing by NBFIs.

This paper contributes to three strands of literature. First, we expand the understanding of MP transmission through NBFIs (e.g., Hau and Lai, 2016; Nelson et al., 2018; Xiao, 2020; Giuzio et al., 2021; Ciminelli et al., 2022; Kaufmann, 2023; Tiza Mimun et al., 2025), by offering a multi-country analysis of bond fund responses. We are the first to adopt a unified multi-country framework, ensuring cross-country comparability through a consistent empirical framework. We also provide new insights into the heterogeneous reactions of NBFIs on the basis of their investment strategies and domiciles. Second, we complement existing research on international monetary spillovers, which has traditionally focused on bank-based transmission channels (e.g., Bruno and Shin, 2015a; Bruno and Shin, 2015b; Buch et al., 2019; Hale et al., 2020; Correa et al., 2022). By focusing on NBFIs, we show that monetary policy can also propagate through asset markets. Third, we contribute to the understanding of exchange rate dynamics and their role in shaping the international transmission of monetary policy (e.g., Takáts and Temesvary, 2020; Goldberg and Krogstrup, 2023; IMF, 2025), offering new insights into how currency mismatches and hedging behavior influence the portfolio adjustments of NBFIs.

Our findings have important policy implications. Due to the significant size and cross-border reach of investment funds[3], their reactions to MP surprises may affect international monetary spillovers in ways not captured by traditional bank-centered transmission channels. In addition, the heterogeneous and sometimes pro-cyclical nature of fund responses suggests that certain segments of the NBFI sector may amplify market volatility, as exemplified in the March 2020 turmoil (FSB, 2022). Lastly, spillovers from foreign MP surprises underscore the need to monitor international linkages via NBFIs.

The remainder of the paper is organized as follows: Section 2 discusses related literature, while Section 3 describes our data. The empirical approach is described in Section 4 and our main results are presented in Section 5. Section 6 explores the underlying mechanisms driving our results. Section 7 concludes.

[3]Cross-border claims of hedge funds, money market funds, and other investment funds are substantial, varying between 35 to 80 percent of total assets in aggregate (FSB, 2024).

2 Related Literature

2.1 Monetary policy transmission through NBFIs

NBFIs have expanded significantly in recent years, driven by regulatory shifts, low interest rates, and a global search for yield (e.g., FSB, 2020). This trend is evident internationally, where cross-border market-based intermediation has grown markedly (Avdjiev et al., 2025). Since NBFIs have different balance-sheet structures, funding models, and regulatory constraints compared to banks, their reactions to monetary policy (MP) surprises are expected to differ in important ways.

Similar to banks, NBFIs' responses to MP surprises vary according to the nature of the surprise. During expansionary MP surprises, when central banks lower interest rates or adopt other accommodative measures, both banks and NBFIs may experience growth. Banks, benefiting from improved funding conditions, generally increase lending and risk-taking (Kashyap and Stein, 2000). Similarly, NBFIs may experience growth as investors seek higher yields in a low-rate environment. Several studies have documented this mechanism, including Giuzio et al. (2021) and Tillmann and Tiza Mimun (2023) who find that expansionary surprises lead to growth in the investment fund sector. Similarly, Feroli et al. (2014) and Morris and Shin (2016) caution that prolonged periods of MP easing can lead the fund sector to accumulate positions that may cause broader market disruptions when unwound. Hau and Lai (2016) and Bubeck et al. (2018) document investors' reallocation into riskier assets during loose monetary policies in the euro area. Investigating cross-border spillover, Kaufmann (2023) finds that expansionary US surprises generate inflows into European bond funds.

The response to contractionary MP surprises, however, is more complex. Some argue that tightening should affect NBFIs similarly to banks, as it increases the cost of short-term funding for all intermediaries (Stein, 2013). In line with this view, Holm-Hadulla et al. (2023) and Tiza Mimun et al. (2025) show that tightening in the euro area leads to broad-based contractions in both bank and NBFI assets. However, others argue that while banks reduce their lending during monetary tightening (Bernanke and Gertler, 1995), NBFIs may step in to absorb risky assets that banks offload[4], leading to an expansion of the NBFI sector (Drechsler et al., 2017; Farhi and Tirole, 2021; Elliott et al., 2022). Indeed, Nelson et al. (2018) document that NBFIs in the US experience asset growth following contractionary surprises, while banks experience asset declines. Similarly, Xiao (2020) argues that Fed tightening cycles drive deposits from the

[4]Farhi and Tirole (2021) emphasize that NBFIs have capitalized on their ability to operate outside traditional regulatory frameworks, allowing them to expand their influence alongside banks. NBFI regulation has traditionally focused on microprudential risks. Countries have not had an overall macroprudential framework for NBFIs, as they do for banks.

banking sector to NBFIs.

These asymmetric responses to contractionary surprises can be understood through the lens of currency dynamics and international spillovers. In countries with safe-haven currencies (e.g., the USD), tightening can lead to inflows into NBFIs, as global investors seek to hedge against risk or benefit from currency appreciation (Takáts and Temesvary, 2020; Goldberg and Krogstrup, 2023; IMF, 2025). In contrast, risk-off sentiments appear to dominate bond funds' reaction to a tightening in the euro area, leading investors to redeem, reallocate towards safer assets, or shift to other currencies. This interpretation underscores the importance of cross-border spillovers and the global interconnectedness of financial markets, which have not been fully explored in relation to the role of currency regimes in MP transmission.

Importantly, NBFIs are not a homogeneous group; they differ along several dimensions, and these differences may affect their sensitivity to MP surprises. For example, for emerging market funds, Chari et al. (2022) and Moro and Schiavone (2022) show that passive funds, which track benchmark indices, tend to adjust more quickly and mechanically to shifts in the market, potentially amplifying the effect of a given MP surprise.[5] Similarly, Banegas et al. (2022) show that the effect of MP surprises differs by investment strategy. Additionally, the domicile of a fund may play a crucial role in determining its response. Foreign-domiciled funds may be more exposed to currency risks, particularly if they invest in assets denominated in foreign currencies. Indeed, Ciminelli et al. (2022) and Kaufmann (2023) show differing responses to MP surprises by domestic and non-domestic investors.

Taken together, previous contributions highlight that monetary policy operates through heterogeneous channels, and the way NBFIs respond to MP surprises depends on multiple factors: the nature of the surprise (expansionary or contractionary), the investment strategy of the NBFI (passive vs. active, domestic vs. foreign domicile), and the broader economic environment (safe-haven vs. risk-sensitive currencies). Our paper contributes to this body of literature by providing a multi-country comparative analysis of NBFI responses to MP surprises, allowing us to capture differences in investor behavior, fund types, and regulatory environments. The internationalization of financial markets amplifies the potential for policy spillovers, which can either mitigate or exacerbate systemic risks across borders. Understanding these dynamics is crucial for assessing how MP influences global financial stability.

[5]Passive investment funds have gained significant popularity due to their simplicity, cost-effectiveness, and the challenging nature of achieving consistent outperformance through active management. They offer investors a straightforward way to gain exposure to a broad segment of the market or specific sectors, depending on the index being tracked, thereby facilitating diversification and risk management within an investment portfolio.

2.2 Key mechanisms

Recent contributions have highlighted the importance of distinguishing between pure MP shocks and information shocks when assessing the transmission of monetary policy (e.g., Romer and Romer, 2000; Nakamura and Steinsson, 2018; Jarociński and Karadi, 2020; Bu et al., 2021; Miranda-Agrippino and Ricco, 2021; Bauer and Swanson, 2023a; Bauer and Swanson, 2023b). A pure MP shock refers to an unexpected change in the central bank's policy stance, which is orthogonal to changes in the economic outlook. This shock affects asset prices and exchange rates directly through changes in interest rates, providing immediate and predictable shifts in expected returns. In contrast, an information shock refers to the release of new information about the central bank's view on economic conditions, which can influence investors' expectations about future policy and economic outcomes, even in the absence of an immediate policy change.

The distinction between these two types of shocks is central to understanding their effects on financial markets. Pure MP shocks typically lead to a direct adjustment in interest rates and an immediate response in asset prices and exchange rates. Information shocks, on the other hand, may not immediately affect rates but can influence market expectations and behavior more indirectly. Our paper decomposes MP surprises into these two components to better understand whether fund flow reactions are driven by changes in policy rates themselves or by changes in economic expectations revealed by central banks. This allows us to test whether fund flows are more responsive to immediate policy actions (pure MP shocks) or to the longer-term economic outlook (information shocks).

In addition to understanding the nature of the shock itself, another key mechanism through which MP surprises affect NBFIs is the exchange rate reaction. Exchange rate movements can have a significant impact on the relative returns of foreign-currency assets. These currency movements can lead to balance sheet mismatches, where the value of foreign-denominated assets changes unpredictably, prompting funds to adjust their portfolios. Hedging strategies (or the lack thereof) can further exacerbate these mismatches. Evidence from the banking literature supports the idea that exchange rate movements are an important transmission mechanism for MP surprises. Bruno and Shin (2015a) show that contractionary US MP surprises lead to USD appreciation, which in turn reduces cross-border bank flows. We adapt this framework to test whether similar dynamics are present in NBFIs.

3 Data

This section describes the data used in our empirical analysis, including the sources for bond fund flows, interest rate futures, and monetary policy (MP) announcements. We combine weekly bond fund flow data at the country level with daily prices of interest rate futures on central banks' policy rates, as well as the announcement dates of monetary policy decisions by central banks.

Our dataset includes bond fund flows for 12 countries, comprising nine Eurozone countries[6] (Austria, Belgium, France, Germany, Ireland, Italy, the Netherlands, Portugal, and Spain), along with Switzerland, the UK, and the US. Data on interest rate futures for benchmark policy rates, as well as MP announcements, are collected for four central banks: the European Central Bank (ECB), the Swiss National Bank (SNB), the Bank of England (BoE), and the Federal Reserve (Fed). The sample period covers January 2010 to December 2023.

3.1 Fund flows

Our primary data source for fund flows is EPFR, which covers approximately 90% of the global fund universe both in terms of count and balance sheets as of 2024.[7] We use the *Country Flows* dataset, which provides weekly bond fund flows at the country level. This dataset is constructed from two fund-level datasets, Fund Flows and Country Allocation, which are aggregated at the country level. The Country Flows dataset captures total investment flows and positions into each country, aggregating flows from all investment funds globally.

Due to their high frequency, short release lags, and granular breakdowns, EPFR data are widely used in empirical international macroeconomics and finance studies (see e.g., Fratzscher, 2012; Forbes et al., 2016; Fratzscher et al., 2018; Chari et al., 2022; Chari et al., 2022; Davis and Zlate, 2023). One key feature of the EPFR data is that they include flows from a variety of fund types (money market funds, equity funds, bond funds, mixed funds, hedge funds, and real estate funds) globally. These funds have different mandates, regulations, and investment strategies, providing a comprehensive view of global portfolio movements.[8]

Another important aspect of the EPFR data is that fund flows are reported net of valuation changes, reflecting actual investment decisions rather than price-induced changes. However, the EPFR data have some limitations. First, they have non-constant coverage, meaning that the

[6] Although Luxembourg is an important domicile country for investment funds, it is not a destination for bond investment. Therefore, it is not included in our sample of countries. However, investment flows originating from funds domiciled in Luxembourg and invested in our sample of countries are included.

[7] EPFR sources the fund-level data either from third party administrators or from funds' reporting and accounting departments.

[8] Note that pension funds are only indirectly included in EPFR data when their investments are managed through an investment fund.

sample of reporting funds grows over time. The coverage and quality of EPFR data has improved significantly after the 2007–2008 financial crisis (Koepke and Paetzold, 2024). Second, country-level flows may be less precise for small or emerging market economies. These limitations are not a concern in our study, as our sample period spans from 2010 to 2023 and focuses on advanced economies. Thus, the EPFR data are highly suitable for our purposes, providing high-frequency data, broad coverage, and cross-country comparability.

As of 2023, the Country Flows dataset includes portfolio investment flows from more than 27,000 investment funds, with a total of USD 25.2 trillion in assets under management (AUM) across more than 50 countries. Our analysis covers a sample of 12 countries, which together account for approximately 80% of total AUM in the EPFR database. This includes funds domiciled in the selected countries as well as those invested in these countries from other domiciles, such as Luxembourg and Japan.

The two main variables in our analysis are bond flows and bond stocks. Bond flows refer to net transactions during a given period, defined as the purchases minus redemptions of fund shares, while bond stocks refer to AUM, measured as the net asset value of the fund at the end of each period, marked to market prices.[9] In addition to these variables, we use two breakdowns for our analysis that are available in the EPFR dataset: the fund's investment strategy (active vs. passive) and its domicile (domestic vs. foreign). These breakdowns allow us to examine how fund type and domicile influence reactions to MP surprises. Specifically, actively-managed funds aim to outperform benchmarks through selective trading, while passively-managed funds replicate benchmark indices (e.g., exchange-traded funds). The domicile of the fund refers to the jurisdiction in which the fund is registered, and this factor may influence how funds react to MP surprises due to differences in regulatory constraints and funding conditions.[10]

Table 1 provides descriptive statistics, showing that both fund flows and AUM exhibit significant variation across countries and over time. Weekly fund flows range from negative values (USD 305 billion) to large positive values (USD 2 billion), while AUM vary greatly, from USD 2.8 billion to USD 2.2 trillion. Active funds tend to have larger average AUM compared to passive funds, although passive funds generally experience larger fund flows on average. In contrast, foreign-domiciled funds tend to have smaller AUM and more modest fund flows compared to domestically-domiciled funds.

[9] Following previous studies (Forbes et al., 2015; Chari et al., 2022; Ciminelli et al., 2022), we winsorize the data to mitigate the influence of extreme outliers.

[10] Note that our dataset does not include a currency breakdown. Alternative EPFR datasets indicate that the vast majority of bond flows and stocks are denominated in the currency of the destination country.

Table 1: Summary statistics of weekly bond fund flows and AUM

Type		***Mean***	***SD***	***p5***	***p95***
Total	*Flows*	279	1,650	-309	2,071
	AUM	288,148	805,400	2,963	2,244,969
Active	*Flows*	94	1,212	-353	944
	AUM	222,696	601,857	2,608	1,882,210
Passive	*Flows*	184	954	-80	914
	AUM	65,255	213,164	257	344,240
Domestic	*Flows*	252	1,506	-139	2,324
	AUM	223,487	695,698	22	2,048,311
Foreign	*Flows*	55	487	-278	473
	AUM	92,138	162,287	1,690	353,774

Notes: Flows indicate transactions, while AUM indicates assets under management (AUM). The mean, standard deviation, and the 5th and 95th percentiles are all denoted in USD millions. Total, Active, Passive, Domestic, Foreign have 8,760 observations each, whereas Domestic has 7,680 observations.

Table 2 shows the AUM by destination country at the end of our sample period. As expected, the AUM vary significantly across countries. For example, US funds have the largest AUM, totaling nearly USD 4.5 trillion, while Portugal has the smallest, with just USD 9.5 billion. The investment strategy and domicile of funds also vary significantly across destination countries. For instance, in Switzerland, over half of the AUM are held by passively-managed funds, whereas in Austria, more than three-quarters of the AUM are in active funds. The share of foreign-domiciled funds' AUM also differs markedly across countries. For example, less than 20% of the AUM in Switzerland are from foreign-domiciled funds, whereas in the UK, more than 65% of AUM is from foreign-domiciled funds. Note that the importance of passively-managed funds and foreign-domiciled funds grew significantly over our sample period. Specifically, the share of passive funds increased from 16% in 2010 to almost 35% in 2023, whereas the share of foreign-domiciled funds increased from 14% in 2010 to more than 35% in 2023. These developments reflect broader trends in portfolio investment, with passive funds gaining popularity due to their lower fees and greater transparency, and foreign-domiciled funds offering easier access to diversified global portfolios.

Table 2: Bond funds' AUM by destination country, 2023

Country	*Total (USD millions)*	*Active (%)*	*Passive (%)*	*Domestic (%)*	*Foreign (%)*
AUT	36,730	76.29	23.71	6.41	93.59
BEL	42,963	76.00	24.00	0.72	99.28
DEU	201,212	75.64	24.36	4.53	95.47
ESP	152,669	78.55	21.45	20.90	79.10
FRA	271,636	75.92	24.08	6.75	93.25
IRL	21,137	76.49	23.51	19.09	80.91
ITA	164,830	75.62	24.38	NA	NA
NLD	102,395	82.20	17.80	25.01	74.99
PRT	9,521	75.78	24.22	0.08	99.92
Total EUR	1,003,093	76.88	23.12	9.14	90.86
CHE	134,765	48.58	51.42	82.59	17.41
GBR	272,622	69.10	30.90	33.06	66.94
USA	4,477,292	62.70	37.30	78.17	21.83
TOTAL	5,887,772	65.09	34.91	64.43	35.57

Notes: This table presents the assets under management (AUM) for bond funds across the twelve countries included in the sample, by the end of 2023.

3.2 Interest rate futures and monetary policy announcement dates

To identify MP surprises, we use high-frequency data on market expectations of central bank benchmark rates. Specifically, we collect daily price data on three-month futures contracts tied to benchmark rates, sourced from *TickDataMarket*. We choose the three-month maturity for two reasons. First, these contracts are highly liquid and extensively traded, which means their price changes primarily reflect shifts in market expectations, rather than broader market tensions. Second, these contracts are particularly sensitive to MP decisions, making them ideal for identifying MP surprises.

We use futures contracts for the following central banks in our analysis: For the European Central Bank (ECB), we rely on Euribor futures throughout the entire sample period.[11] For the Swiss National Bank (SNB), we use the CHF LIBOR for the period from January 2010 to December 2021, and the SARON from January 2022 to December 2023, which is consistent with the methodology employed by Gentner (2024) and Borner (2025). For the Bank of England (BoE), we use the GBP LIBOR for January 2010 to December 2021 and the SONIA from January 2022 to December 2023. For the Federal Reserve (Fed), we use the USD LIBOR from January 2010 to June 2023, and the SOFR from June 2023 to December 2023.

All of these futures contracts are continuous, meaning the most actively traded contract is used, ensuring that price changes are not distorted by contract rollovers. We specifically focus on the three-month maturity due to its market liquidity and its sensitivity to MP changes. The three-month futures contracts provide an optimal trade-off between liquidity and responsiveness to shifts in market expectations, making them particularly well-suited for identifying MP

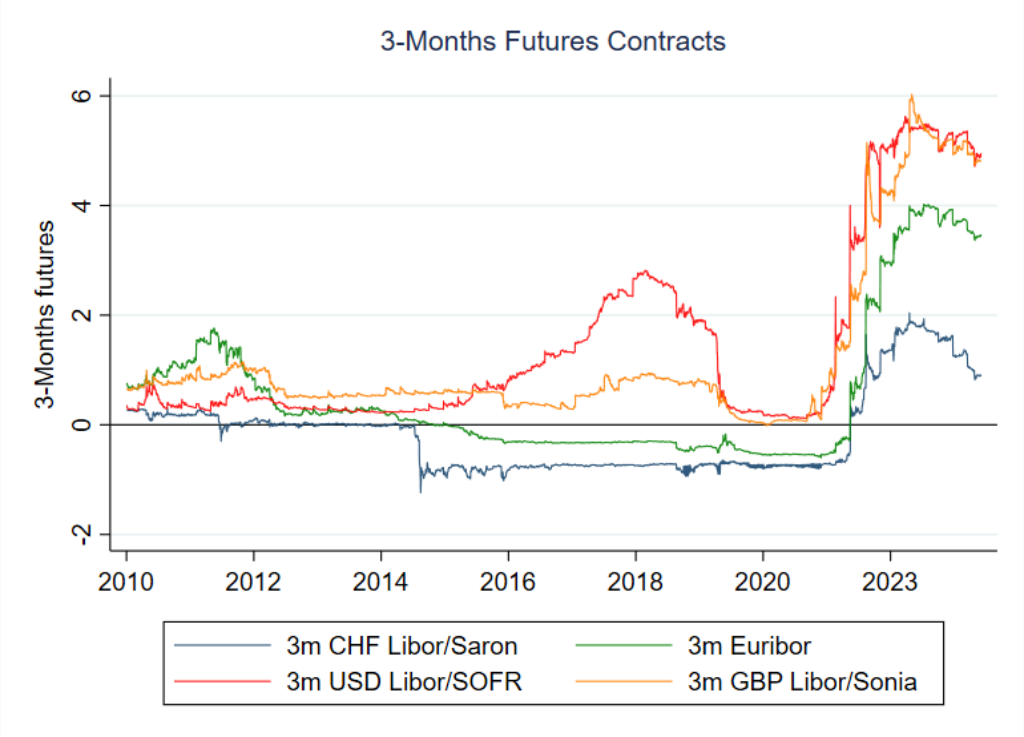
[11] Following Altavilla et al. (2019), we use Euribor because of its comparability with the three-month Libor futures used for the other central banks in our sample.

surprises.

In addition to daily interest rate futures data, we also require the precise dates of central bank policy announcements to identify MP surprises. These include both regular policy meetings and extraordinary announcements. The dates of these announcements are manually collected from the official websites of the ECB, SNB, BoE, and Fed to ensure accuracy in the alignment of the MP surprise data with the actual timing of each central bank's policy decisions.

Figure 1 shows the time-series of prices on three-month future contracts for each of the four central banks in our sample. These time series display significant fluctuations, reflecting the heterogeneous and time-varying monetary policy stances of these central banks over the sample period.

Figure 1: Daily prices on interest rate futures contracts for CHF, EUR, USD and GBP



Notes: This figures shows prices on futures contracts on central bank benchmark rates with three-month maturity from 2010 to 2023. The following data are shown: Euribor (for the entire period); CHF Libor (January 2010-December 2021) and CHF SARON (January 2022-December 2023); GBP Libor (Janaury 2010-December 2021) and GBP SONIA (January 2022-December 2023); and USD Libor (January 2010-May 2022) and SOFR (June 2022-December 2023).

4 Methodology

This section outlines the empirical approach used to analyze the effects of monetary policy (MP) surprises on bond fund flows. Section 4.1 describes the identification of MP surprises, using high-frequency data on financial market expectations to capture unexpected shifts in central bank

policies. Section 4.2 presents the empirical specification for estimating the effects of domestic MP surprises on fund flows, employing local projections to assess the dynamic responses over time. In Section 4.3, the analysis is extended to include foreign MP surprises, exploring the cross-border spillover effects of MP actions by different central banks and their impact on fund flows in other economies. Together, these sections provide a comprehensive framework for understanding the domestic and international transmission of MP shocks in global financial markets.

4.1 Identifying monetary policy surprises

We identify monetary policy (MP) surprises by examining changes in financial market expectations surrounding central bank policy announcements, using the approach established in the literature (e.g., Kuttner, 2001; Romer and Romer, 2004; Nakamura and Steinsson, 2018; Altavilla et al., 2019; Koeniger et al., 2022). Specifically, we measure MP surprises through daily changes in futures prices of interest rates, which reflect adjustments in market expectations in response to the surprise component of policy announcements. We compute the MP surprise for day t as follows:

$$\text{MP surprise}_t = F_t - F_{t-1}, \tag{1}$$

This one-day event window captures the immediate market response to the policy announcement, while minimizing the influence of other macroeconomic news or events. On days when no MP announcement occurs, the MP surprise is set to zero.

Using high-frequency market data offers significant advantages over other identification methods. It addresses endogeneity concerns by isolating the unanticipated component of MP surprises, ensuring that the observed changes in futures prices are driven by surprises, not by factors already priced in by the market. This makes our measure a valid instrument for causal analysis (e.g., Stock and Watson, 2018). Additionally, high-frequency identification minimizes the influence of external events that might distort the data, even in smaller markets (e.g., Ferrari and Ters, 2017). Moreover, this method avoids issues related to model specification or data revisions, providing a more transparent and direct measure of market expectations (e.g., Kuttner, 2001).

Our approach not only captures conventional interest rate changes but also accounts for shifts in expectations related to unconventional monetary policies, such as quantitative easing, foreign exchange interventions, or changes in the remuneration of reserve requirements. Thus, the futures prices reflect a comprehensive view of the central bank's overall monetary stance,

encompassing both traditional and unconventional policy tools. In addition, we can distinguish between positive (contractionary) and negative (expansionary) MP surprises. This distinction is crucial, particularly during periods close to the effective lower bound and during unconventional easing programs. By examining both the direction and magnitude of surprises, we can explore how market reactions differ between tightening and easing phases of the monetary cycle.

To account for the slow absorption of information by the agents (Miranda-Agrippino and Ricco, 2021), we remove the autoregressive component in the MP surprises by regressing the current MP surprise on its lagged values.[12] The residuals from this regression represent the purged MP surprise, which isolates the truly unanticipated monetary policy component:

$$\text{MP surprise}_t = \alpha + \sum_{j=1}^{8} \beta_j \text{MP surprise}_{t-j} + \underbrace{\text{MP surprise}_t^{res}}_{\text{purged MP surprise} = z_t} \tag{2}$$

where $\text{MP surprise}_t^{res}$ represents the residual, reflecting only the exogenous, unpredictable change in MP. The inclusion of up to eight lagged values captures approximately a year of past surprises, ensuring that we account for any autocorrelation in policy reactions. The results are robust to the inclusion of longer lags. We denote this residual as z_t for simplicity in the subsequent analyses.

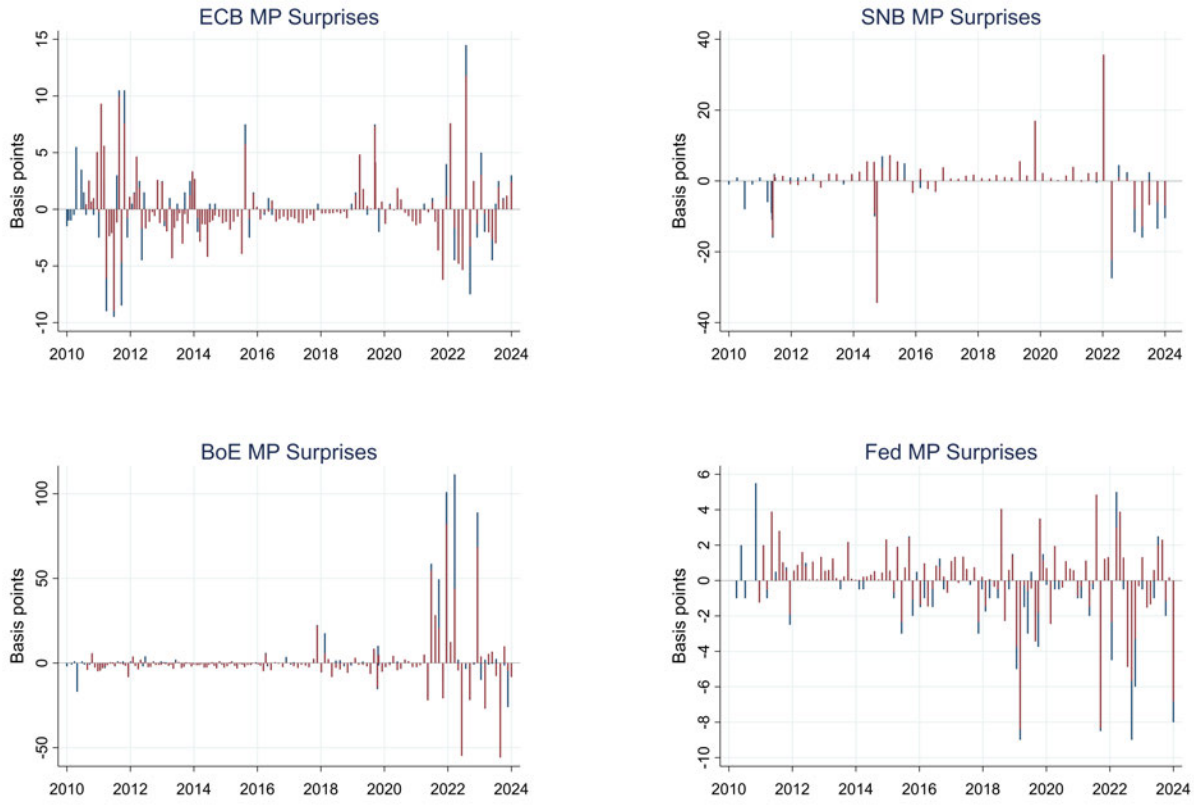
Figure 2 illustrates the identified MP surprises for all four central banks. The figure compares purged MP surprises (red bars) with the portion of the raw MP surprises that get eliminated in the purging process (blue bars). We use the former in the empirical analysis. Overall, the purging process reduces variability in the surprise series and provides a cleaner measure of unexpected policy changes. The differences in surprise magnitudes across central banks underscore the potential for asymmetric cross-border spillovers, emphasizing the importance of accounting for both domestic and foreign MP surprises in our empirical analysis.

Across the central banks in our sample, the variability of MP surprises differs notably. For the ECB, surprises are typically within a ± 15 basis point range, with larger deviations occurring during events such as the European sovereign debt crisis and the COVID-19 pandemic. The SNB shows smaller surprises, typically within ± 10 basis points, reflecting a historically cautious approach, although significant events, such as the discontinuation of the CHF/EUR exchange rate floor and the simultaneous lowering of the policy rate to -0.75% in January 2015, produced

[12] Miranda-Agrippino and Ricco (2021) introduce an instrument for MP shocks that is orthogonal to both the central bank's economic projections and to past market surprises. To control for the central bank's private information, they project MP surprises on Greenbook forecasts and forecast revisions for real output growth, inflation, and the unemployment rate. To account for the slow absorption of information, they remove the autoregressive component in the monthly surprises. In this paper, we replicate this latter step, but cannot replicate the former step. The reason is that no data on central bank forecasts and forecast revisions are available for all the institutions in our sample. Instead, we apply Jarociński and Karadi (2020)'s approach to address the central bank information channel (please see Section 6)

larger-than-usual surprises. The BoE exhibits larger variability, with some surprises exceeding ±50 basis points, driven by political uncertainty such as Brexit and the economic shocks of the pandemic. Fed surprises also show notable fluctuations, frequently exceeding ±25 basis points, particularly during events such as the taper tantrum and the aggressive monetary easing during COVID-19. These cross-country differences underscore the importance of distinguishing between domestic and foreign MP surprises in our empirical analysis.

Figure 2: MP surprises by four central banks



Notes: These figures show MP surprises on policy announcement dates by the SNB, ECB, Fed, and the BoE based on changes in prices of futures contracts. Red bars illustrate the purged MP surprises we use in our empirical analysis. Blue bars indicate the parts of the raw MP surprises that get eliminated in the purging process.

4.2 Empirical specification: Domestic monetary policy surprises

We estimate the cumulative response of fund flows to domestic monetary policy (MP) surprises across four economies: the Eurozone, Switzerland, the UK, and the US. To examine these dynamics, we use panel local projection (LP), which is commonly used to estimate the dynamic effects of shocks (Jordà, 2005). The LP approach avoids the complexity and potential misspecification issues associated with vector autoregression (VAR) models and is well-suited for panel

data analysis. This methodology allows us to estimate cumulative responses over time by iteratively running fixed effects regressions across different projection horizons, $h = 0, 1, 2, ..., H$. We specify the local projection panel estimation as follows:

$$\frac{\sum_{k=0}^{h} Flows_{i,t+k}}{stocks_{i,t-1}} * 100 = \alpha_i + \mu_t + \boldsymbol{\beta}_j^{(h)} \ (D_j * z_{j,t}) + \sum_{n=1}^{N} \boldsymbol{\delta}_n^{(h)} flows_{i,t-n} + \sum_{n=1}^{N} \boldsymbol{\zeta}_n^{(h)} X_{i,t-n} + \varepsilon_{i,t+h} \quad (3)$$

where $\frac{\sum_{k=0}^{h} Flows_{i,t+k}}{Fund\ stocks_{i,t-1}}$ is the cumulative flow-to-lagged-stock ratio of country flow i at time $t+k$, expressed as a percentage. The main explanatory variable, $D_j * z_{j,t}$, is the interaction of the MP surprise $z_{j,t}$ for currency j at time t with the dummy variable D_j that identifies the currency j (i.e., EUR, CHF, GBP, and USD). $z_{j,t}$ is the MP surprise for currency for currency j at time t, aggregated from daily data into weekly values (for details, see Section 4.1). The term $flows_{i,t-n}$ denotes the flow-to-lagged-stock ratio at lag $t-n$, while $X_{i,t-n}$ is a vector of control variables, capturing lagged changes in the nominal effective exchange rate ($\Delta NEER$), 10-year government bond yields ($\Delta 10yr\ yield$), and the VIX (ΔVIX). We also include country fixed effects (α_i) and year-month fixed effects (μ_t).

This regression is estimated for each horizon h, capturing the response of fund flows to MP surprises across various points in time. The inclusion of lagged values of fund flows and macroeconomic controls accounts for pre-existing trends and other economic dynamics that might affect the response.

We set $H = 8$ to capture an eight-week projection horizon, which allows us to observe the short-term dynamics following MP announcements. This horizon is chosen because financial variables, such as bond fund flows, tend to react most acutely in the immediate aftermath of policy announcements. We also include $N = 8$ lags of the flow-to-stock ratio and control variables, reflecting the importance of past dynamics in influencing current outcomes.

4.3 Empirical specification: domestic and foreign monetary policy surprises

Given the high degree of interconnectedness in global financial markets, it is plausible that MP announcements by one central bank influence fund flows in other economies. This is especially relevant given the importance of financial interconnections and the global nature of financial markets. To capture these spillover effects and assess whether shocks originating from different central banks differ in their sign and magnitude, we estimate a separate coefficient for each

foreign central bank surprise. This approach allows us to estimate the differential impacts of each central bank's MP surprise on fund flows in the target economy.

One concern with estimating foreign MP surprises is the potential overlap with domestic MP surprises. This overlap could introduce bias in estimating the coefficients for foreign MP surprises. To mitigate this concern, we include the domestic MP surprise as a control variable in the regression model. This ensures that we capture the independent effects of foreign MP shocks while accounting for the simultaneous impact of domestic shocks on fund flows.

The regression specification to estimate the spillover effects is as follows:

$$\frac{\sum_{k=0}^{h} flows_{i,t+k}}{stocks_{i,t-1}} \cdot 100 = \alpha_i + \mu_t + \sum_{j,m} \boldsymbol{\beta}_{j,m}^{h} \left(D_j \, z_{m,t}\right) + \sum_{n=1}^{N} \boldsymbol{\delta}_n^{(h)} \, flows_{i,t-n} + \sum_{n=1}^{N} \boldsymbol{\zeta}_n^{(h)} \, X_{i,t-n} + \varepsilon_{i,t+h} \tag{4}$$

where the dependent variable remains the cumulative flow-to-lagged-stock ratio of country i at time $t+h$, expressed as a percentage. The main explanatory variables are $z_{m,t}$, the MP surprises of each central bank m = SNB, ECB, BoE, Fed at time t, interacted with the corresponding currency dummy variables D_j. This approach allows us to identify the effect of the MP surprises from each central bank on each currency region while still controlling for the domestic MP surprise.

This specification allows us to estimate the effect of each central bank's MP shock on fund flows for each currency area, while still controlling for the impact of domestic MP surprises. By using separate coefficients for each central bank's surprise, we can assess how the MP actions of different central banks influence fund flows in the domestic economy, thereby capturing cross-border spillovers.

As in the baseline specification, we include country fixed effects α_i and year-month fixed effects μ_t to account for unobserved heterogeneity across countries and over time. The regression also controls for lagged values of fund flows $flows_{i,t-n}$ and other macroeconomic variables, including changes in the nominal effective exchange rate ($\Delta NEER$), 10-year government bond yields ($\Delta yryield$), and market volatility (ΔVIX).

5 Results

This section presents the empirical findings on the impact of domestic and foreign monetary policy (MP) surprises on bond fund flows across four major economies: the Eurozone, Switzerland,

the UK, and the US. Section 5.1 outlines the baseline results, revealing significant cross-country heterogeneity in bond fund flow responses to contractionary domestic MP surprises. Section 5.2 explores the granular perspective by disaggregating fund flows according to investment strategy (active vs. passive) and domicile (domestic vs. foreign). Section 5.3 investigates the impact of foreign MP surprises, demonstrating that Fed surprises drive the most significant spillovers.

5.1 Bond flows and domestic monetary policy surprises

Figure 3 shows the cumulative response of bond fund flows to a 1 percentage point (pp) contractionary domestic MP surprise over an eight-week projection horizon. The results reveal significant heterogeneity in the response of bond flows across countries, both in terms of direction and magnitude. Contractionary MP surprises trigger increased bond fund flows into Switzerland and the US, with Switzerland showing the most pronounced effect. Specifically, cumulative flows into Swiss bond funds increase by approximately 3 pp after eight weeks, while flows into US bond funds increase by 2 pp. In contrast, bond flows into the Eurozone[13] decrease sharply by 3 pp, while the UK experiences a relatively muted decrease of 0.6 pp.

The divergence in responses across countries can largely be explained by the role of safe-haven currencies and the structural characteristics of the countries in question. The US dollar and Swiss franc are both considered global safe-haven currencies, attracting capital flows during periods of economic uncertainty and tightening monetary conditions (Goldberg and Krogstrup, 2023; Graziano and Habib, 2024; IMF, 2025). Contractionary MP surprises increase the attractiveness of US and Swiss bonds as investors seek low-risk assets and anticipate currency appreciation. This safe-haven effect is particularly pronounced in Switzerland, which has a relatively small and less liquid bond market compared to the US (Meier et al., 2012). Furthermore, Switzerland's high share of passive funds (51% of AUM) means that even small fluctuations in yields due to MP shocks can result in amplified rebalancing effects through the mechanical nature of passive fund strategies (Fang, 2025).

In contrast, the decline in bond fund flows to the Eurozone following contractionary MP surprises can be likely attributed to the prevailing "risk-off" sentiment. When global monetary conditions tighten, investors tend to seek safer assets and currencies, which could lead to outflows from riskier markets such as the Eurozone. This interpretation aligns with evidence from the global financial cycle literature Bruno and Shin, 2015a; Hale et al., 2020). In particular, Kaufmann (2023) shows that international investment funds transmit changes in global

[13]We investigate whether our results are sensitive to our treatment of the Eurozone. While we consider each of the nine Eurozone countries individually in the baseline, we run a robustness check by aggregating the Eurozone countries into a single Eurozone entity. We observe similar overall trends to our baseline results. However, the response of bond flows to the US loses its significance.

liquidity to the Eurozone, implying that bond fund flows respond not only to domestic fundamentals but also to shifts in global risk sentiment. Recent evidence also suggests that monetary tightening raises liquidity risk in global bond markets, which can trigger fund outflows even in advanced economies (Chaturvedi, 2025). Our findings are also in line with previous studies focusing on domestic MP surprises in the Eurozone, such as e.g., Holm-Hadulla et al. (2023) and Tiza Mimun et al. (2025). This dynamic may be amplified by concerns over fragmentation risks within the Eurozone (Candelon et al., 2022; Arnold, 2024). The presence of a large share of foreign-domiciled funds in Eurozone markets also compounds the outflows, as these funds are more exposed to currency mismatches, making them more likely to reallocate away from the Eurozone when hedging becomes costly or ineffective (Bruno and Shin, 2015a; Ciminelli et al., 2022: Graziano and Habib, 2024).

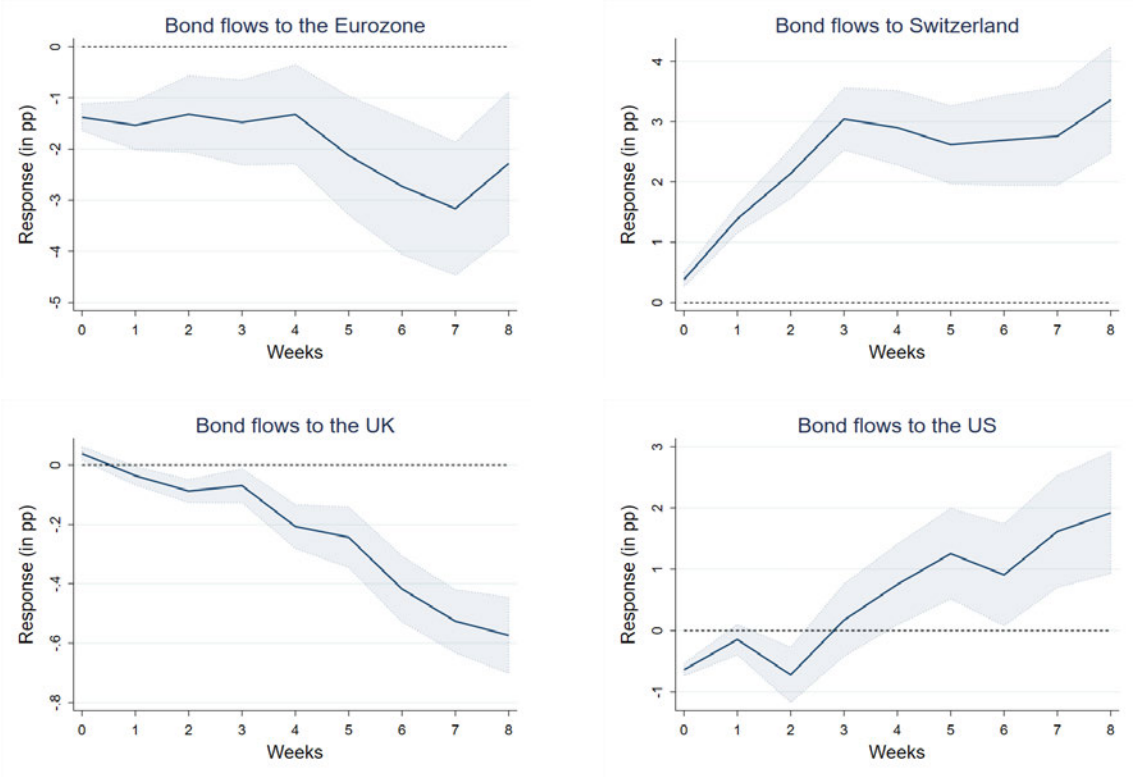
The UK's relatively muted response to contractionary MP surprises could be explained by its more diversified and market-based financial system. The UK is known for its deep and broad capital markets, which span beyond government bonds to include significant equity and corporate bond markets, as well as other alternative investment instruments. This diversification likely provides investors with more portfolio alternatives when monetary conditions change, potentially reducing the reliance on government bonds and dampening the sensitivity of bond fund flows to domestic interest rate changes. Additionally, the UK's higher share of passive bond funds (compared to other economies in our sample) may act as a counterbalance to the more pronounced impact of active fund withdrawals (Fang, 2025).

Lastly, we control for asymmetries of responses to MP surprises by distinguishing between contractionary and expansionary surprises. Overall, we find symmetric response patterns, although magnitudes generally differ. Specifically, we find that expansionary surprises result in moderate decreases in bond fund flows to the US and Switzerland. However, these effects are insignificant for the US and significantly smaller for Switzerland, compared to the bond fund flow responses to contractionary surprises. Conversely, the Eurozone sees relatively large increases in bond flows following expansionary surprises. The UK response is again overall muted.

The patterns for the Eurozone are consistent with previous studies, as expansionary MP surprises typically create a "search-for-yield" effect, where investors seek higher returns for riskier assets (Feroli et al., 2014; Giuzio et al., 2021; Tillmann and Tiza Mimun, 2023). In the case of the US and Switzerland, the muted response appears to be driven by the safe-haven status of the respective currencies. In Switzerland, the effect may be compounded by the fact that the market is relatively small, meaning that the search-for-yield behavior may outweigh the safe-haven demand for Swiss bonds. The UK's muted response is consistent with our baseline

results.

Figure 3: Total bond flows cumulative response to a 1pp MP surprise.



Notes: Blue lines represent the local projection cumulative response (in pp) of bond flows to a 1pp domestic MP surprise. Blue shaded areas are the 90% confidence interval bands

5.2 Granular perspective

Next, we analyze fund flows along two dimensions: investment strategy and fund domicile. Specifically, we first examine the responses of flows for actively managed funds compared to passively managed funds. We subsequently analyze the responses of flows on the basis of whether the funds are domiciled domestically or abroad.

5.2.1 Investment strategy

Figure 4 shows the cumulative response of bond fund flows by investment strategy, distinguishing between passively and actively managed funds. For Switzerland and the US, we find that passive funds exhibit stronger and more persistent responses to contractionary domestic MP surprises. After eight weeks, bond flows to the US from passive funds increase by approximately 12 pp, while flows from active funds decrease by less than 1 pp, a change that is not statistically significant. Similarly, in Switzerland, passive funds see a cumulative increase in bond flows of more than 6 pp, whereas active funds experience a more modest increase of just under 3.5 pp.

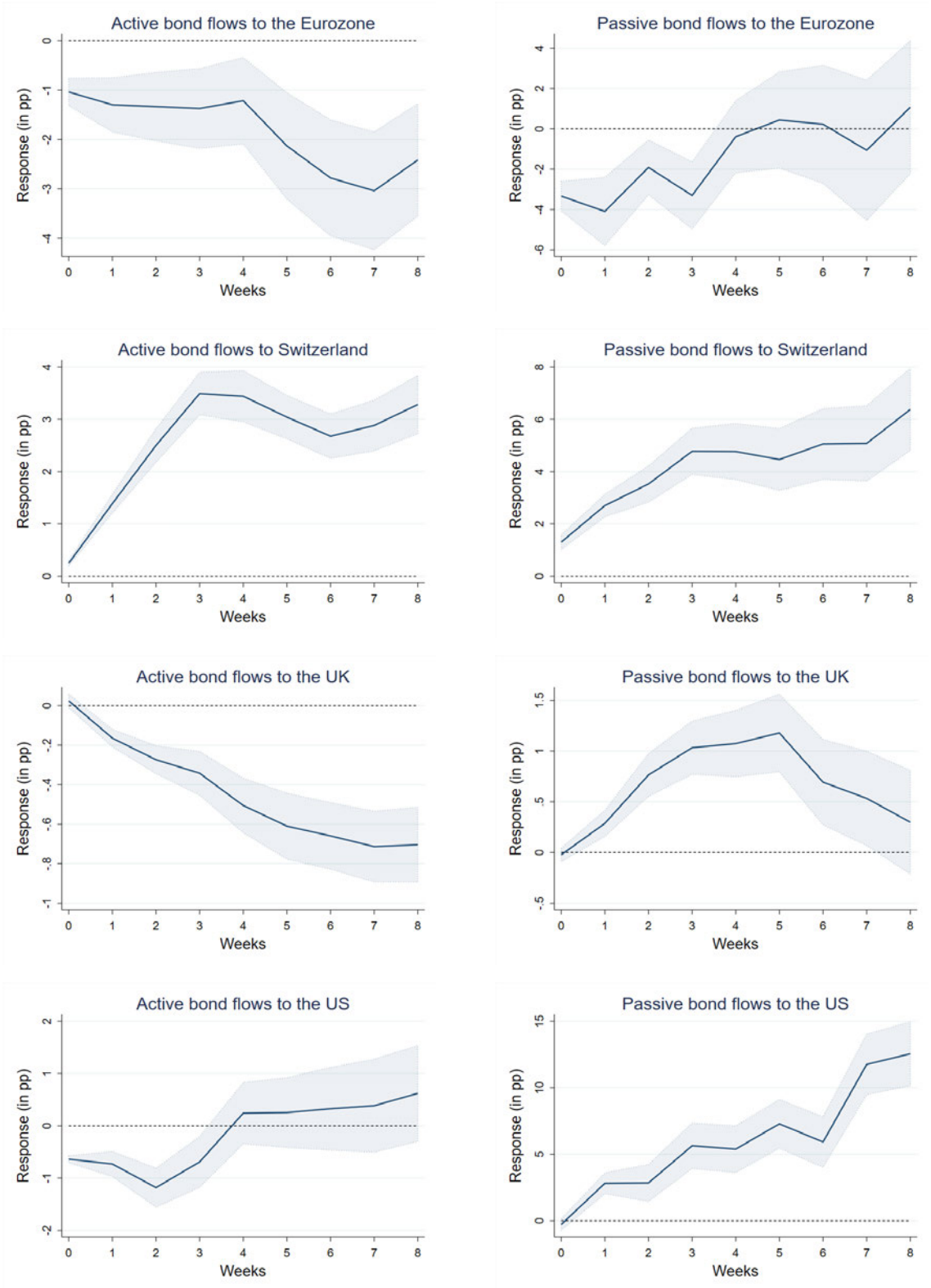
These results indicate that passively managed funds are more sensitive to shifts in monetary policy compared to actively managed funds, likely due to their benchmark-tracking nature, which leads to mechanical adjustments in response to policy signals. Our baseline results for the US and Switzerland thus seem to be driven more strongly by passively managed funds.

The heightened sensitivity of passive funds to MP surprises may pose systemic risks. As passive funds continue to gain market share, their tendency to react strongly to policy changes can amplify market volatility during periods of tightening or easing. This amplification effect is consistent with the findings of Bubeck et al. (2018), Chari et al. (2022) and Moro and Schiavone (2022), who highlight the risk posed by large-scale, rapid reallocations of capital within passive funds.

In contrast, in the Eurozone, bond flows to the region are driven by both active and passive funds, with active fund flows being much more persistent. This divergence likely reflects the higher prevalence of actively managed funds in these regions, as evidenced in Table 2. This dominance of active funds suggests that fund managers' discretion are more influential in shaping flow dynamics, particularly in response to MP surprises. In the UK, both active and passive funds show relatively muted reactions. Passive funds show an increase in bond flows following a contractionary MP surprise. After eight weeks, these bond flows increase by approximately 1 pp. Active funds show a decrease in bond fund flows by approximately 0.8 pp after eight weeks.

The distinction between active and passive funds highlights an important aspect of market structure: passive funds tend to be more responsive to MP surprises due to their mechanical rebalancing, while actively managed funds are more likely to make strategic adjustments on the basis of broader market conditions. As a result, regions with a higher concentration of passive funds are more likely to see amplified responses to MP surprises, while regions with a higher concentration of actively managed funds may exhibit more muted reactions. This structural difference in fund composition is crucial for understanding the varying dynamics of bond fund flows in response to domestic MP actions.

Figure 4: Active and Passive flows cumulative response to a 1pp MP surprise.



Notes: The lines represent the local projection cumulative response (in pp) of active/passive flows to a 1pp domestic MP surprise. Blue shaded areas are the 90% confidence interval bands.

5.2.2 Fund domicile

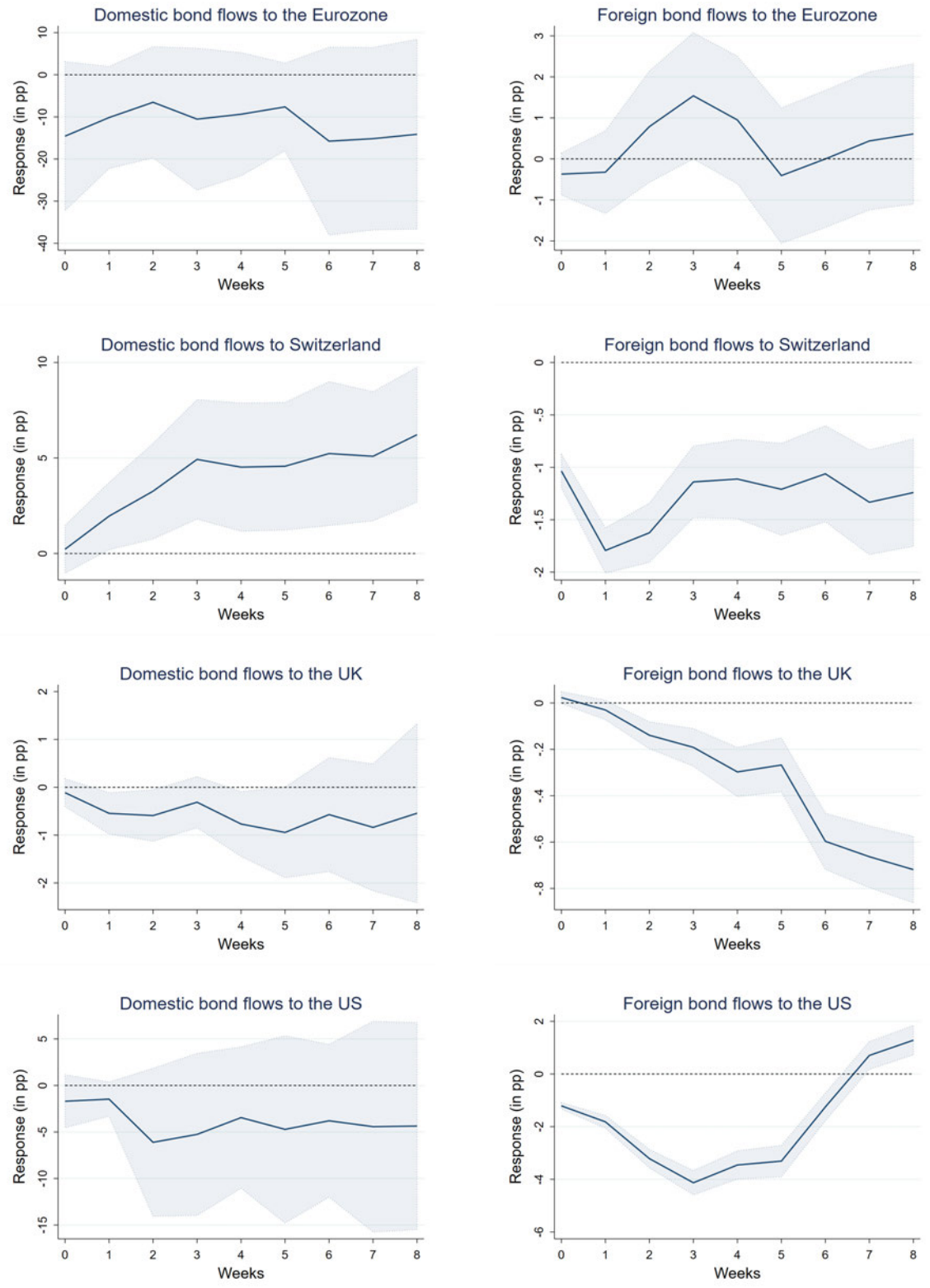
The domicile of a fund may be an important determinant of its response to an MP surprise, as it is indicative of the fund's exposure to potential currency mismatches between its assets and liabilities (Ciminelli et al., 2022; Kaufmann, 2023). Foreign-domiciled funds typically have a more diversified investment mandate, investing in multiple countries and currencies, which exposes them to currency mismatches between their assets and liabilities. This diversification means that they are more likely to engage in portfolio rebalancing when faced with currency mismatches, as they are forced to hedge against currency risks or adjust their holdings in response to changes in exchange rates (Bruno and Shin, 2015a). This amplifies the impact of domestic MP surprises on cross-border fund flows, particularly when funds are domiciled in countries with large or volatile foreign-exchange markets. In contrast, domestically domiciled funds typically focus on a specific market, with more limited exposure to foreign currency risks. Consequently, the impact of an MP surprise on a fund's balance sheet can differ significantly depending on its domicile.

Figure 5 shows the responses of bond fund flows to a 1 pp contractionary domestic MP surprise, disaggregated by fund domicile (domestic vs. foreign). As hypothesized, foreign-domiciled funds generally exhibit stronger and more immediate reactions to MP surprises compared to domestically domiciled funds. Except for Switzerland[14], flows of domestically-domiciled funds do not exhibit a statistically significant response to MP surprises. In contrast, flows of foreign-domiciled funds respond strongly to MP surprises. For example, fund flows to the UK from foreign-domiciled funds decrease by 7 pp after 8 weeks, whereas those to Switzerland decrease by more than 1 pp.

The heightened sensitivity of foreign-domiciled funds to MP surprises underscores the interconnectedness of global financial markets and highlights the potential for MP actions to generate significant cross-border spillovers via the fund sector. The presence of large foreign-domiciled fund sectors means that MP actions can generate more significant and quicker adjustments in global capital markets, particularly during periods of tightening.

[14]Swiss domestically-domiciled funds drive the response, which can be attributed to several structural factors that are unique to Switzerland's financial system. First, Switzerland has a relatively small bond market, which means that even modest inflows or outflows can cause disproportionate changes in bond fund flows. Second, Switzerland's financial sector is highly concentrated with a substantial proportion of institutional investors managing large domestic funds. These investors are more likely to be directly affected by domestic MP decisions.

Figure 5: Domestic and foreign domiciled funds flows cumulative response to a 1pp MP surprise.



Notes: Blue lines represent the local projection cumulative response (in pp) of domestic/foreign flows to a 1pp domestic MP surprise. Blue shaded areas are the 90% confidence interval bands. We only consider the period 2016-2023 due to low data quality before 2015, especially for Eurozone countries.

5.3 Foreign MP spillovers

While previous studies have largely focused on the domestic transmission of monetary policy, cross-border spillovers play a crucial role in shaping capital flows. Therefore, we next examine the impact of foreign MP surprises on bond fund flows in the Eurozone, Switzerland, the UK, and the US. Figure 6 illustrates the cumulative response of bond fund flows to a 1 pp contractionary foreign MP surprise over an eight-week projection horizon. The magnitude and direction of the response vary significantly depending on the origin of the surprise, highlighting the differential impact of foreign MP surprises across countries.

For the Eurozone, contractionary foreign MP surprises lead to a reduction in bond fund flows, with the most significant influence stemming from the Fed. Contractionary Fed surprises appear to reduce the attractiveness of Eurozone bonds, as higher yields erode bond valuations and increase borrowing costs. This is consistent with the broader literature on global financial cycles, where US monetary policy plays a dominant role in shaping investor sentiment and capital flows across borders (Bruno and Shin, 2015a; Hale et al., 2020). It also aligns with the findings reported in Kaufmann (2023). However, the impact of foreign MP surprises on the Eurozone is less pronounced and more short-lived compared to domestic MP surprises.

In Switzerland, foreign MP surprises lead to an increase in bond fund flows, with Fed surprises being the most influential. The response peaks at 5% in week seven, which reflects Switzerland's safe-haven status. Swiss bond flows are likely more sensitive to foreign surprises, particularly those from the US, due to the interplay of Switzerland's small bond market and the global demand for stable, low-risk investments during periods of financial uncertainty. ECB surprises also have a significant impact on Swiss bond flows, though the effect is smaller and less persistent compared to Fed surprises: ECB surprises lead to a significant increase in Swiss bond flows, peaking at 4% in week three, but the effect becomes insignificant on longer horizons. This emphasizes the differential influence of US versus European monetary policy on global financial markets.

The UK exhibits a more complex response to foreign MP surprises, with Fed surprises leading to a substantial increase in bond fund flows, peaking at 5% in week eight. This result suggests that the UK, like Switzerland, is closely integrated into global capital markets and is particularly sensitive to US monetary policy. The significant increase in UK bond flows following Fed surprises aligns with the role of the US dollar as a safe-haven currency and the widespread global exposure to US financial conditions. In contrast, ECB surprises have a negative impact on UK bond flows, though the magnitude is smaller than the effect of Fed surprises. The lack of any significant impact from SNB shocks further emphasizes the differentiated role of

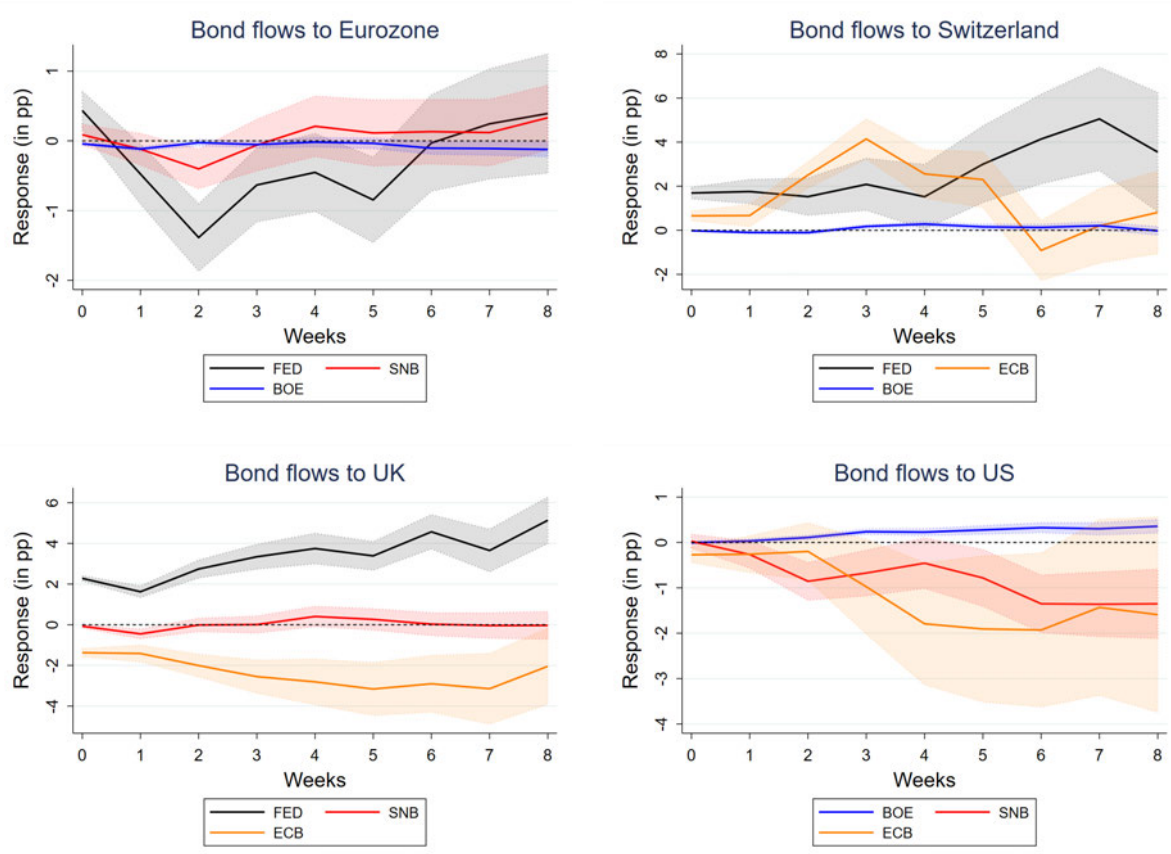
US monetary policy in driving global capital flows. The UK's relatively strong response to Fed surprises can also be attributed to its status as a major financial center, with substantial international capital flows that are highly responsive to changes in US monetary policy.

For the US, foreign MP surprises have a muted impact on bond fund flows compared to domestic MP surprises. This is reflected in the smaller magnitudes and larger confidence intervals associated with the responses to foreign surprises. The US bond market is less sensitive to foreign MP surprises, likely because the US dollar's dominance and the size of the US economy provide a natural buffer against external influences. The US is also less vulnerable to changes in global financial conditions because its domestic financial markets are more insulated, with capital inflows and outflows being driven more by domestic economic conditions and policy actions. However, there is a slight increase in US bond flows following contractionary BoE surprises, which highlights the interconnectedness between the US and UK markets. The impact of SNB and ECB surprises on US bond flows is less pronounced, suggesting that US monetary policy remains the dominant driver of US bond market dynamics.[15]

These results highlight the growing interdependence of global financial systems, with the US playing a central role in driving cross-border spillovers. Such spillovers may exacerbate volatility in local bond markets.

[15]The baseline domestic results are robust to the inclusion of foreign shocks. However, to maintain readability of the graphs, these results are not presented here.

Figure 6: Bond flows cumulative response to a 1pp foreign MP surprise by origin



Notes: Lines represent the local projection cumulative response (in pp) of bond flows to a 1pp foreign MP surprise by origin. Shaded areas are the 90% confidence interval bands.

6 Mechanism

In this section, we explore two mechanisms, the exchange rate dynamics and the distinction between policy shocks and central bank information shocks, that may explain the heterogeneous responses of bond fund flows to MP surprises. Exchange rate movements can affect the relative attractiveness of foreign-currency assets, potentially influencing portfolio rebalancing decisions. Similarly, distinguishing between MP shocks, which reflect unexpected changes in policy, and information shocks, which communicate new economic outlooks, allows us to isolate the direct impact of MP actions from the broader economic signals conveyed by central banks.

However, the significant variation in fund flow responses across different regions can be attributed to multiple channels, beyond the direct effects of MP actions. For example, global risk sentiment can amplify the effects of MP surprises, particularly in risk-sensitive markets. Similarly, liquidity conditions in financial markets can influence how quickly and smoothly fund flows adjust in response to MP surprises.

6.1 Type of surprise: MP shock vs information shock

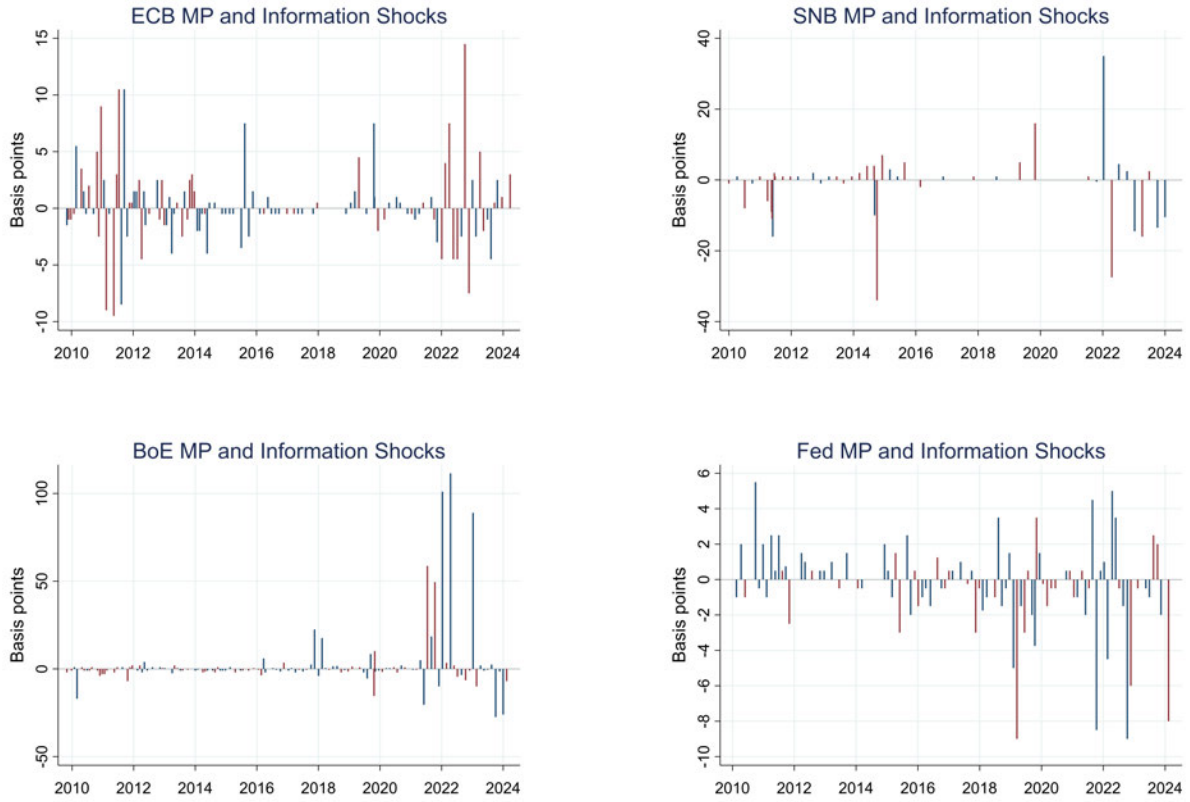
Monetary policy (MP) announcements serve as an important source of information for financial markets, but they often contain two fundamentally different types of content: information about changes in the policy itself (*MP shock*) and information regarding the central bank's assessment of the broader economic outlook (*information shock*) (Jarociński and Karadi, 2020). MP shocks refer to unanticipated policy changes, such as unexpected adjustments in interest rates or the introduction of unconventional monetary policy tools. These shocks are immediately reflected in market reactions because they represent new policy actions that market participants had not anticipated. Information shocks, on the other hand, arise when central bank decisions convey new insights into the economic outlook, such as updated inflation forecasts or growth projections, which were previously unknown by market participants.

To distinguish between these two types of shocks, we follow the approach introduced by Jarociński and Karadi (2020), which relies on the co-movement of stock prices and interest rates around MP announcements. A negative co-movement, where interest rates increase and stock prices decrease, is typically indicative of an MP shock, as investors respond to the direct impact of policy tightening. Conversely, a positive co-movement suggests an information shock, where a favorable assessment of economic conditions drives a more optimistic market response, even in the face of tighter policy.

Applying this classification to our sample, we find that all four central banks in our study (ECB, SNB, BoE, and Fed) exhibited both types of shocks during the sample period, with

varying frequencies and magnitudes. For example, the BoE experienced significant MP shocks during the tightening period after 2022, which were primarily driven by unanticipated policy changes. In contrast, the SNB predominantly exhibited information shocks through 2021, reflecting periods when market participants were reacting more to the central bank's communication about economic conditions than to policy changes themselves. Figure 7 shows the frequency and magnitude of both MP and information shocks for each central bank.

Figure 7: MP shock vs information shocks across central banks



Notes: This figure shows the decomposition of our estimated and purged MP surprises into MP shocks (blue bars) and information shocks (red bars).

Next, we assess how bond fund flows respond to these two types of shocks using the methodology outlined in Section 4. Figure 8 shows the cumulative responses of bond fund flows to both MP shocks and information shocks separately, across the Eurozone, Switzerland, the UK, and the US.

In the Eurozone, the reaction to MP shocks is consistent with our baseline results: bond flows decrease following a contractionary MP shock. However, the response to information shocks is initially muted, intensifying after four weeks. This dynamic underscores the importance of clear and timely communication from the central bank about both the policy stance and the broader

economic outlook, which can significantly affect investor behavior.

In Switzerland, bond fund flows respond positively to both MP and information shocks, with the reaction being more gradual over time. This aligns with Switzerland's role as a safe-haven economy. The safe-haven effect is well-documented in the literature. Both types of shocks appear to drive the baseline results for Switzerland, reinforcing the role of the Swiss economy as a key destination for risk-averse investments during times of uncertainty.

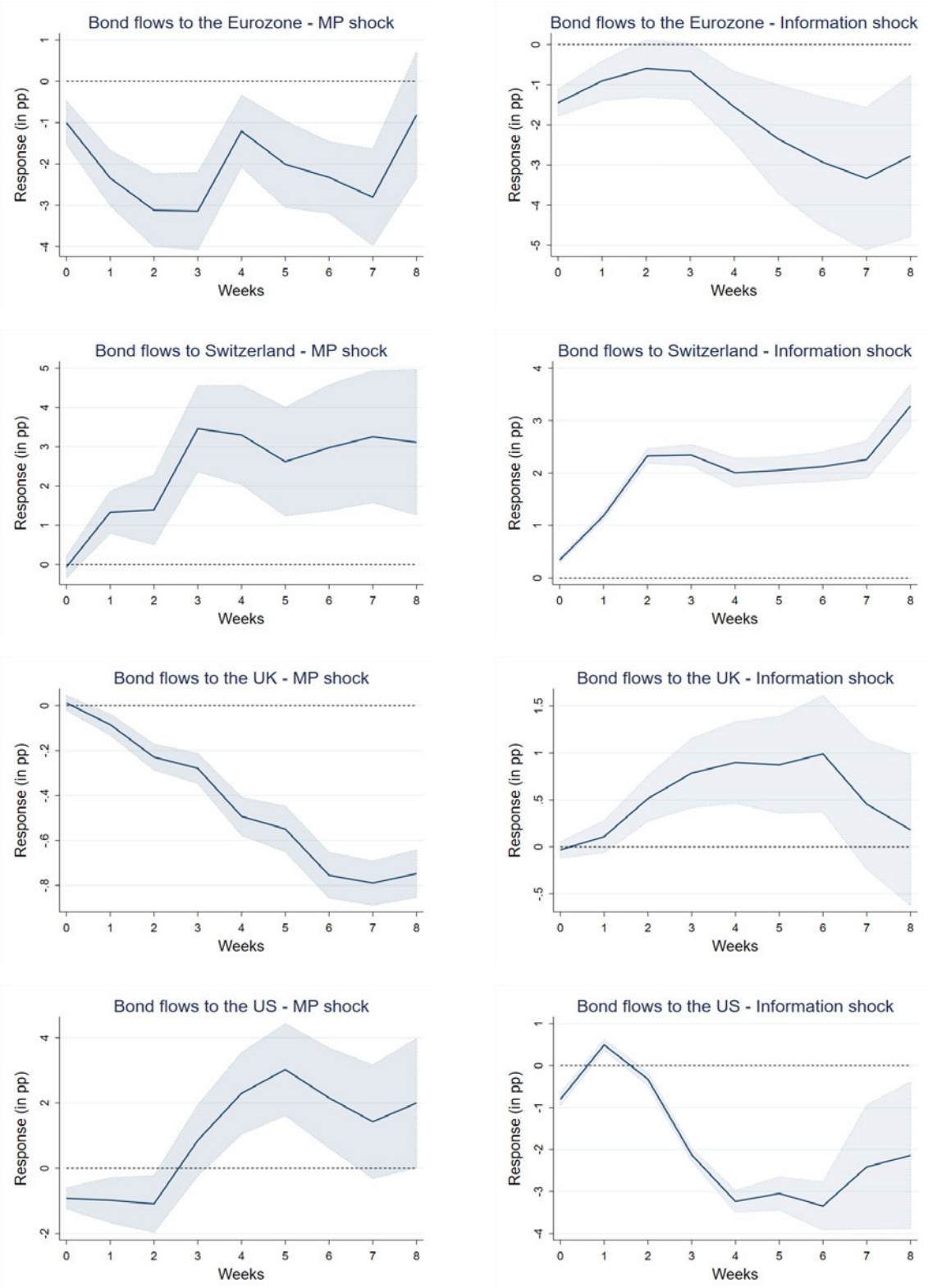
For the UK, the response to information shocks leads to a moderate increase in bond flows, reflecting the positive sentiment generated by favorable economic news or a reassessment of economic conditions. However, contractionary MP shocks result in a significant and persistent decline in bond fund flows. This suggests that investors react strongly to the direct impact of tighter monetary policy, possibly in search of higher-yielding alternatives or due to the diminishing attractiveness of UK bonds. The baseline results for the UK, therefore, seem to be primarily driven by MP shocks, which directly affect investor preferences for UK bond markets.

In the US, bond fund flows show a somewhat erratic response to information shocks. Initially, flows increase, likely driven by an optimistic economic outlook, but then decline as investor sentiment shifts, indicating some uncertainty about the longer-term impact of the central bank's outlook. However, the response to MP shocks is much more straightforward: bond flows steadily increase in response to tightening policy, consistent with higher yields making US bonds more attractive to investors. This finding suggests that, as expected, the US economy's financial markets are more sensitive to direct policy actions than to shifts in the economic outlook.

These findings highlight that bond fund flows are primarily driven by MP shocks rather than information shocks. This highlights the critical role of central bank actions in influencing investor behavior and the importance of clear MP communication in guiding market expectations. Information shocks, while influential, tend to have more delayed and less pronounced effects on bond flows, particularly in the context of economies with large, liquid bond markets such as the US and the Eurozone. In contrast, the Swiss economy, with its smaller bond market and stronger safe-haven appeal, sees more immediate and pronounced responses to both types of shocks.[16]

[16]We also test whether active and passive funds react differently to information shocks and find that active funds react more strongly, similar to the results presented in Section 5.2.1.

Figure 8: Total bond flows cumulative response to a 1pp MP surprise



Notes: Blue lines represent the local projection cumulative response (in pp) of bond flows to a 1pp MP (left) or Central Bank Information (right) shock. Blue shaded areas are the 90% confidence interval bands

6.2 Exchange rate response to MP surprises

We examine the role of exchange rate dynamics in explaining the heterogeneous responses of bond fund flows to MP surprises across different currency areas. Exchange rate movements affect the relative returns on foreign-currency assets and may create significant balance sheet mismatches for investment funds, especially when hedging strategies are incomplete or imperfect. Bauer and Swanson (2023a) argue that exchange rate reactions to unexpected monetary tightening can serve as a key mechanism for global capital reallocation, particularly in economies with high global financial integration.

Evidence from the banking literature supports the importance of exchange rate movements as a transmission mechanism for MP surprises. Bruno and Shin (2015a) show that contractionary Fed surprises lead to a significant appreciation of the US dollar, which in turn reduces cross-border bank lending by increasing the costs of foreign-denominated debt and disrupting portfolio allocations. Similarly, Gertler and Karadi (2015) find that the appreciation of the USD following Fed contractionary surprises reduces international lending, particularly to emerging markets, by increasing the cost of borrowing in USD and shifting capital flows away from riskier assets. These studies suggest that exchange rate responses to MP surprises can directly affect international investment patterns, particularly for bond funds.

To investigate whether similar dynamics hold for fund flows, we estimate the cumulative response of the nominal effective exchange rate (NEER) following a 1 pp contractionary domestic MP surprise over a 30-day window. This window is chosen to capture the initial market reaction to the surprise while avoiding noise from unrelated macroeconomic events. We hypothesize that exchange rate movements following MP surprises are a key driver of fund flows, influencing the relative returns on assets denominated in different currencies and inducing portfolio reallocations by investment funds.

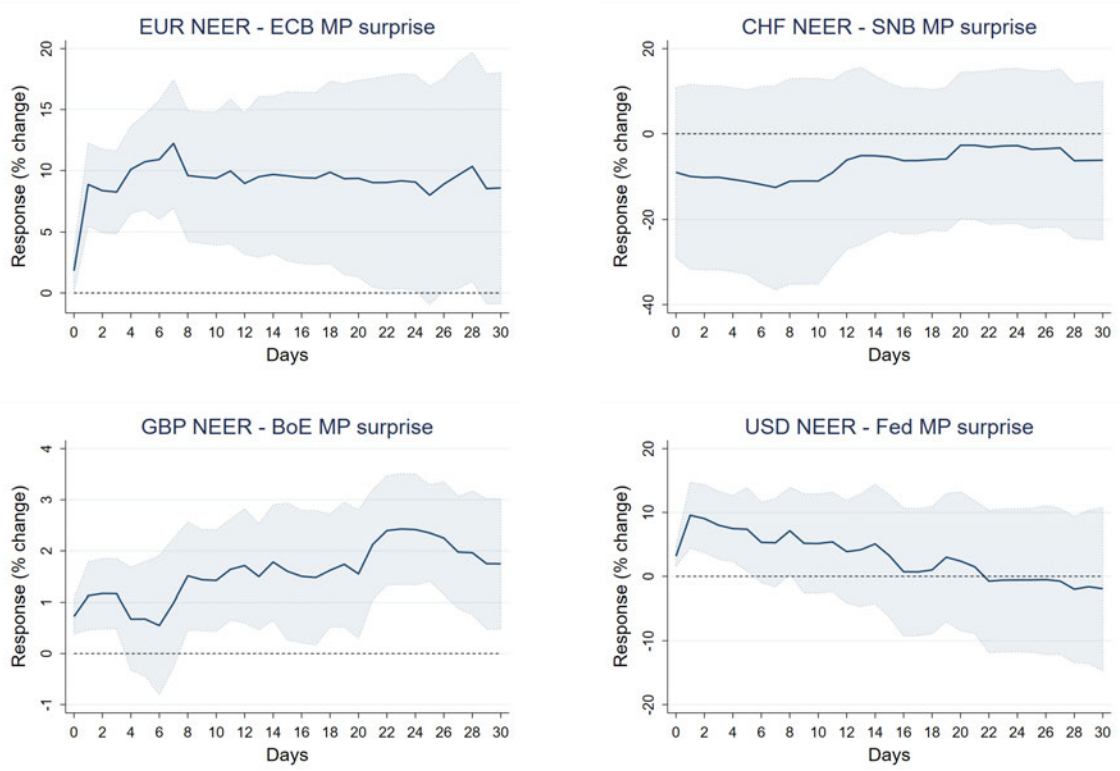
Figure 9 shows that all four currencies in our sample (EUR, USD, GBP, and CHF) appreciate following a contractionary MP surprise, although with different magnitudes and durations. The euro and USD both appreciate by approximately 10 percent on impact, suggesting that these currencies are particularly responsive to changes in monetary policy. The euro's appreciation is persistent, lasting for several weeks. In contrast, the USD shows a more temporary response, reverting to pre-announcement levels within two weeks. This behavior is consistent with the dollar's unique role as a global reserve currency and funding currency. The dollar's immediate reaction is less persistent because its value is influenced by a broader range of global factors, including capital flows into the US financial markets and the dollar's use as a global benchmark for trade and finance.

That the appreciation of the EUR is associated with decreasing bond fund flows appears as an inconsistency, because EUR assets should become more attractive to investors. However, it appears that the risk sentiment channel dominates the exchange rate channel in the case of the Eurozone. Contractionary surprises can increase risk aversion, particularly in markets perceived as vulnerable to external pressures. This interpretation aligns with findings in the broader literature, where tighter monetary policy increases investor caution and triggers capital outflows from economies with more fragmented financial systems (e.g., Candelon et al., 2022; Holm-Hadulla et al., 2023). Thus, distinct structural characteristics between the US and the Eurozone likely play a crucial role in determining the direction and persistence of bond fund flows.

The Swiss franc shows no significant response over the full sample period, which is likely attributable to the SNB's exchange rate floor (2011–2015), that aimed to prevent excessive appreciation of the franc and to prevent deflationary developments. However, in robustness checks restricted to the period after 2016 and reported in Appendix A, after the SNB discontinued the floor, the franc shows a significant response to contractionary MP surprises. This is consistent with the role of the Swiss franc as a traditional safe-haven currency, which appreciates in times of market turbulence as investors seek stable, low-risk assets (Graziano and Habib, 2024).

The British pound appreciates more modestly and gradually, suggesting that while the UK's bond markets are impacted by MP surprises, the currency's reaction is less pronounced compared to that of the euro and dollar. The pound's muted response may reflect the UK's relatively less central role in global risk markets compared to the US and Eurozone, as well as the UK's specific monetary and fiscal policy dynamics post-Brexit.

Figure 9: NEER cumulative responses to a 1pp contractionary MP surprise.



Notes: Blue dashed lines represent the local projection cumulative response (in pp) of EUR, CHF, GBP and USD NEER to a 1pp domestic MP surprise. Shaded areas represent the 95% confidence interval.

7 Conclusion

This paper investigates how domestic and foreign monetary policy (MP) surprises affect bond fund flows to several advanced economies, each with distinct currency roles and financial market structures. By combining daily MP surprise measures with a multi-country panel of weekly fund flow data, we provide evidence that bond fund flows respond systematically to MP surprises, thereby contributing to the understanding of MP transmission channels. Our analysis yields three key findings, each of which expands the existing literature on the role of non-bank financial intermediaries (NBFIs) in the MP transmission process.

First, we document that the direction of bond fund flows following MP surprises aligns with traditional transmission channels. Contractionary domestic MP surprises lead to increased inflows into Switzerland and the United States, which are widely considered safe-haven destinations, while decreased inflows are observed in the Eurozone and the United Kingdom. These patterns are consistent with the balance sheet and the bank lending channels respectively.

Second, we find that the magnitude and persistence of fund responses vary significantly by investment strategy and fund domicile. Passive funds, which follow benchmark indices, exhibit stronger and more persistent reactions to MP surprises compared to active funds. This result aligns with the mechanical nature of passive funds' portfolio adjustments. Similarly, foreign-domiciled funds are more sensitive to MP surprises than domestically domiciled funds, likely due to their greater exposure to currency mismatches and the need for portfolio rebalancing in response to exchange rate fluctuations.

Third, we find that fund flows respond not only to domestic but also to foreign MP surprises, underscoring the presence of cross-border spillovers. While the global role of the Fed in influencing capital flows is well recognized, our findings show that MP actions by the ECB, SNB, and BoE also propagate internationally via fund flows. These results call for a more comprehensive approach to analyzing international MP spillovers

We further explore two mechanisms underlying these results. First, we find that fund flow responses are primarily driven by the policy component of MP surprises rather than the information shock component. This suggests that markets react more strongly to the actual policy actions taken by central banks, rather than the informational content regarding future economic conditions conveyed by central banks during their announcements, which highlights the role of actual MP actions in shaping investor behavior and portfolio rebalancing. Second, we show that exchange rate movements, which follow contractionary MP surprises, play a crucial role in driving portfolio rebalancing. These exchange rate adjustments alter the relative returns on foreign-currency-denominated assets and, when funds do not fully hedge their currency expo-

sure, create balance sheet mismatches. This mechanism underscores the importance of currency dynamics in the broader transmission of MP surprises.

Our findings have several important policy implications. Given the substantial size and cross-border reach of investment funds, their reactions to MP surprises can have significant implications for international monetary spillovers. Traditional models of MP transmission, which focus primarily on the bank-lending channel, may overlook the importance of NBFIs. In addition, the heterogeneous and sometimes pro-cyclical nature of fund responses suggests that certain segments of the NBFI sector may amplify market volatility, as exemplified by the March 2020 turmoil (FSB, 2022). Lastly, the cross-border nature of fund flows highlights the need for policymakers to monitor international linkages in fund flows, as foreign MP surprises can propagate significant spillovers that impact domestic financial markets in ways that are not captured by domestic monetary policy alone.

In conclusion, our study contributes to the growing literature on MP transmission through NBFIs and provides new insights into how domestic and foreign MP surprises shape bond fund flows. We show that these responses are not only driven by traditional MP channels but are also influenced by factors such as the investment strategy, domicile, and exchange rate movements. Understanding these dynamics is critical for assessing the broader impacts of MP on global financial stability, especially as NBFIs continue to play an increasingly important role in international portfolio management.

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Appendix

A Robustness

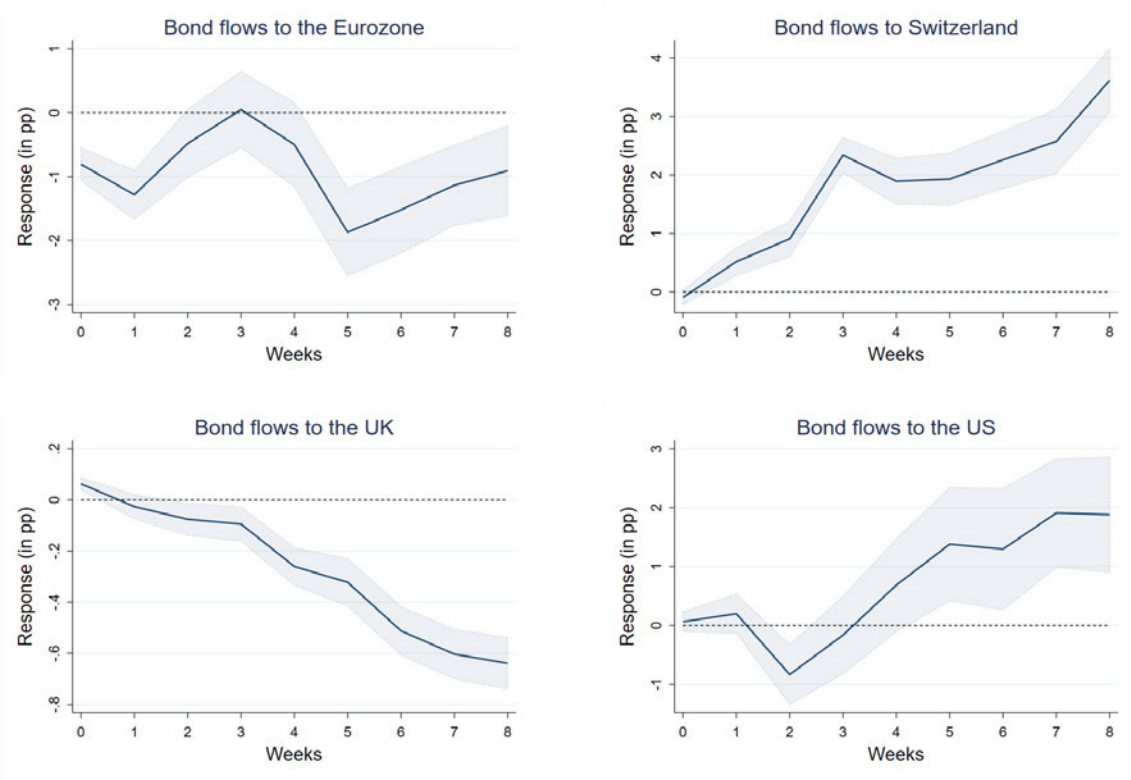
We conduct a robustness check by considering the latter half of our sample period, specifically from January 1, 2016, to December 31, 2023. The period between 2010 and 2015 was marked by the after-effects of the global financial crisis and unique MP environments in our country sample: In the Eurozone, the ECB faced the aftermath of the sovereign debt crisis in the first half of our original sample period. In the US, the Fed had an extended period of near-zero interest rates following the global financial crisis. In Switzerland, the policy rate was cut to zero before a minimum exchange rate of 1.20 CHF/EUR was introduced. The minimum exchange rate was maintained by the SNB until January 2015 to counteract excessive appreciation pressures on the Swiss franc.

The 2016–2023 window reflects a more stable policy environment across central banks, allowing for a cleaner assessment of MP transmission mechanisms. It serves as a robustness check to validate the stability and generalizability of our main results.

A.1 Bond flows and domestic MP surprises

Figure A1 displays the cumulative response of bond fund flows to a 1 percentage point contractionary domestic MP surprise over an eight-week projection horizon for the 2016–2023 sample period. The overall trends are consistent and in line with the results we observe in Section 5.1, but with slightly narrower confidence bands, particularly for Switzerland and the Eurozone. This may suggest that the after-effects of the global financial crisis and unique MP environments somewhat blurred the response of fund flows to MP surprises.

Figure A1: Total bond flows cumulative response to a 1pp MP surprise (2016-2023)



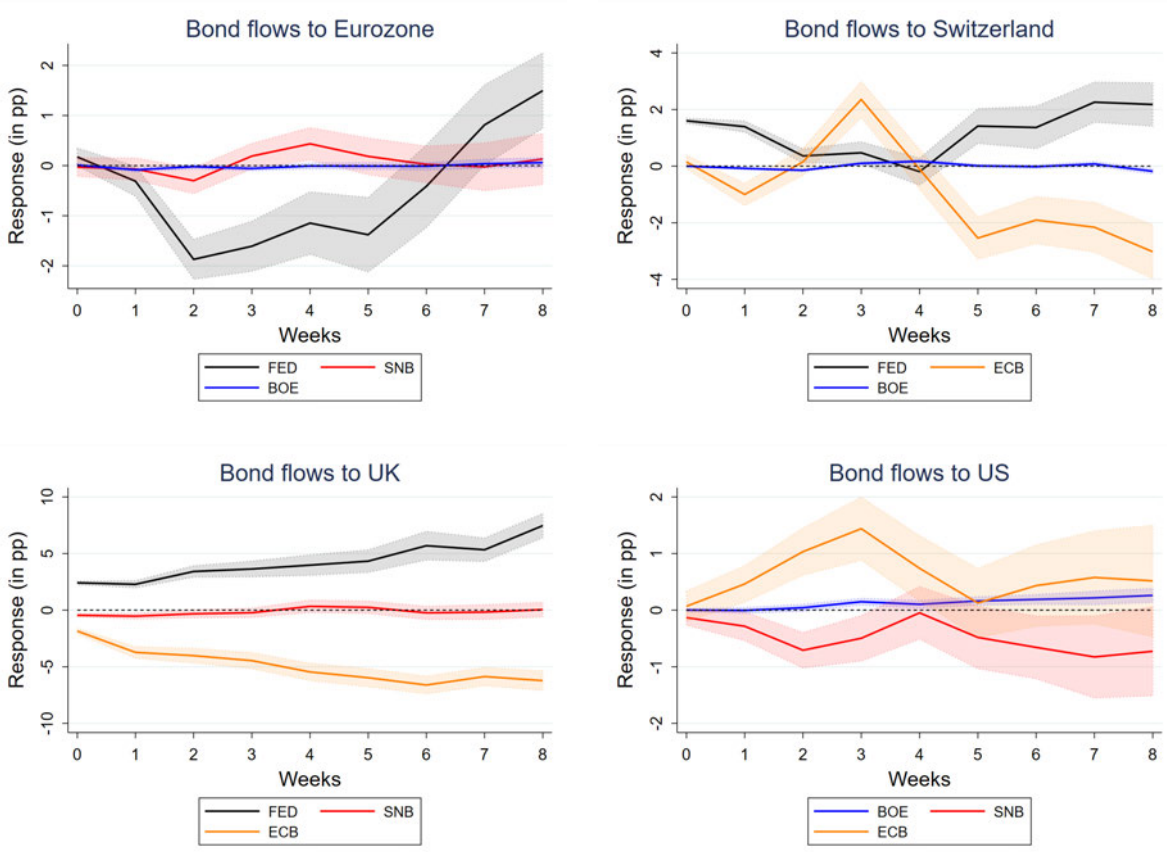
Notes: Blue lines represent the local projection cumulative response (in pp) of bond flows to a 1pp domestic MP surprise. Blue shaded areas are the 90% confidence interval bands.

A.2 Bond flows and foreign MP surprises

Next, we evaluate the impact of foreign MP surprises using our shorter sample period. Figure A2 illustrates the responses of domestic bond fund flows to net foreign MP surprises for the 2016–2023 period. Overall, Fed shocks remain the primary driver of foreign spillovers. However, ECB shocks have a larger influence in the more recent subsample. For the Eurozone and the UK, the responses are almost identical. For Switzerland, Fed shocks are lower in magnitude, and ECB shocks now have a negative impact in certain weeks. For the US, ECB shocks now lead to an increase in bond flows in weeks 1-4.

Overall, those results support the central role of the US in driving foreign spillovers, but also show an increasing sensitivity of bond flows to ECB shocks. Additionally, the results highlight that capital allocation strategies of NBFIs evolve over time. As a result, the time period considered plays a crucial role in estimating the sensitivity of bond flows to foreign MP surprises.

Figure A2: Bond flows cumulative response to a 1pp foreign MP surprise by origin (2016-2023)

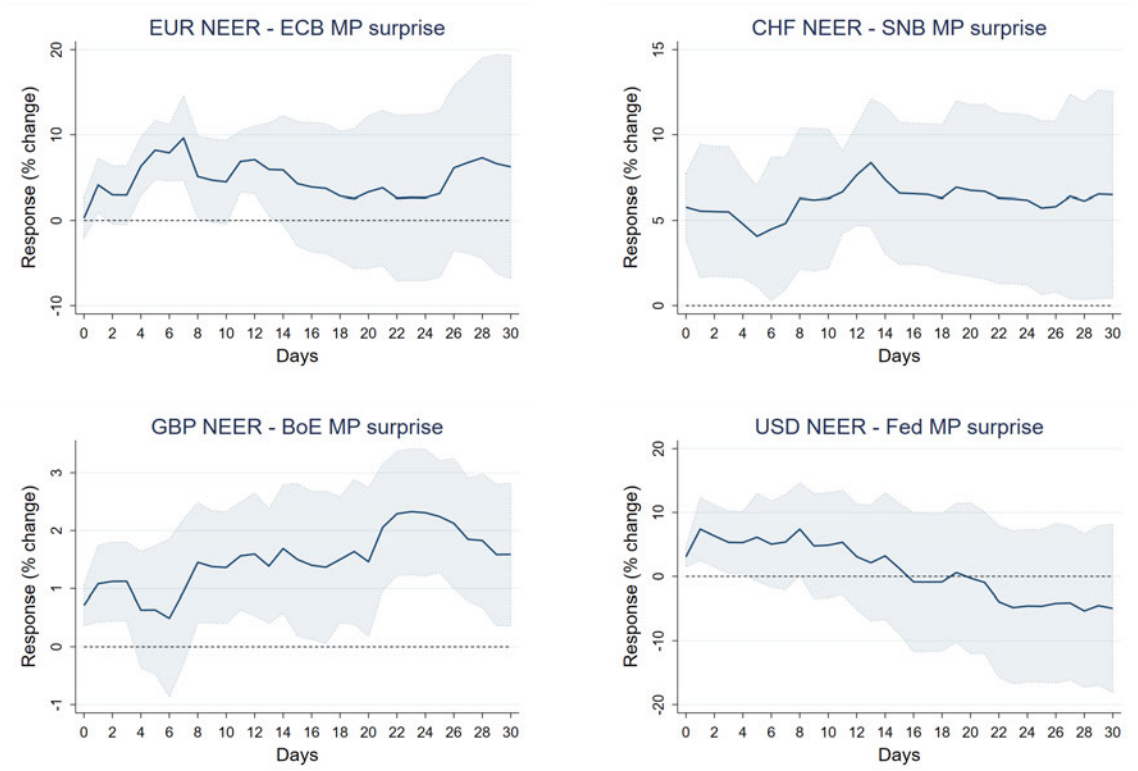


Notes: Lines represent the local projection cumulative response (in pp) of bond flows to a 1pp foreign MP surprise by origin. Shaded areas are the 90% confidence interval bands.

A.3 Exchange rate response

We replicate the results from Figure 9 for the 2016-2023 sample period. Figure A3 shows the different responses. Overall, we observe similar responses to our baseline results, although some differences emerge. On one hand, the NEER responses for the EUR, GBP, and USD become somewhat less significant and persistent after 2016. We still observe an appreciation of those currencies, but the persistence decreases. On the other hand, the CHF NEER, which showed no significant response to MP surprises over the full sample period, now exhibits a strong and significant appreciation. This shift is consistent with the minimum CHF/EUR exchange rate policy implemented by the SNB until January 2015, which probably dampened fluctuations in the CHF NEER response. These results suggest that our main findings are robust to the sample period, with the exception of Switzerland, which represents a special case due to the exchange rate policy that was in place at the time.

Figure A3: NEER cumulative responses to a 1pp MP surprise (2016-2023)



Note: Blue dashed lines represent the local projection cumulative response (in pp) of EUR, CHF, GBP and USD NEER to a 1pp domestic MP surprise. Shaded areas represent the 90% confidence interval.