# Do Investor Differences Impact Monetary Policy Spillovers to Emerging Markets?*

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**Abstract**

We revisit the nature of the monetary spillovers on external positions by studying the differential impact of heterogeneous investors, with an emphasis on Emerging Market Economies (EME). For this purpose, we use monthly securities data of Euro Area investors to implement local projection specifications. In response to high frequency identified monetary policy shocks, heterogeneity in investor requirements such as mandates induce different rebalancing behaviour across institutional investor groups. The outsized holdings of EME debt by large institutional investors implies that portfolio reallocations following global monetary changes may appear to be a capital flow shock to these economies. Indeed, in our results so far, we find stark heterogeneity in rebalancing behaviour and a tendency toward a flight to safety. That is, in response to monetary tightening institutional investors reduce their shares of privately issued securities, disproportionately so for EME, and increase their holdings of sovereign debt. These spillovers are stronger in response to short term rates than to forward guidance and when monetary tightening is synchronized between the U.S. Federal Reserve and the European Central Bank. Insurance and pension funds and banks tend to reduce more strongly their exposure to privately issued bonds, perhaps due to the need to comply with stricter prudential regulations.

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The rise in interest rates worldwide has reignited the debate over the potential danger of monetary spillovers to Emerging Market Economies (EME). The Taper Tantrum episode in 2013, namely investor reaction to the news that the Fed would halt quantitative easing, induced EME borrowing costs to soar with spreads up to 200 basis point. Although at lower levels, a similar rise in the spread has occurred with the recent tightening of monetary policy in Advanced Economies (AE).

The traditional arguments for the spillovers center around the idea of the impossible trinity. Specifically, as EME fix their exchange rates to the Advanced Economies, particularly the US, interest parity makes them vulnerable to the changes in foreign monetary policy. As the monetary policy rate represents the baseline of any rate on debt, its rise triggers an increase in the cost of both sovereign and private debt. Based on this narrative, only EME operating under fixed exchange rate regimes should experience spillovers. However, recent trends have shown that the effects of the Taper Tantrum are spread across all EMEs. Indeed the spillovers in this case appear linked to various types of investors rebalancing their portfolios away from EMEs securities. Those investors in turn may selectively reduce their exposure toward riskier countries, such as EME. This reallocation behaviour may thus effectively act as capital flow shocks for some EME.

The traditional narrative for EME typically treats creditors who hold their debt as homogeneous investors. Therefore, it does not allow any scope to consider the impact of transmission effects that may materialize across different type of securities, issuers or investors. These transmission effects may be important to the extent that certain EME have debt issuances that are skewed toward particular combinations of investor group. For example, an EME sovereign that issues internationally is prone to experience volatile capital flows if the investors holding its bonds have a more elastic demand in the face of interest rate shocks (see Fang, Hardy and Lewis (2022)).

There may be several reasons for investors to rebalance away from EME securities. Moreover investor incentives to rebalance may differ due to the mandates of their clientele, which maybe more or less risk-averse, or investor specific regulations. For instance an interest rate hike increases the cost of funding for banks, thereby reducing their investment capacity. Banks may then selectively reduce the exposure to risky countries by more.

Other reasons relate to currency risk. In the Original Sin Hypothesis (see Eichengreen and Hausmann (1999)) harmful spillovers emerge when EME issue debt in foreign currency, while experiencing revenues (private or public) in the domestic currency. This hypothesis presumes that spillovers are more likely to materialize or harm the economy when the largest part of the foreign debt is in foreign currency. However, recent improvements in the monetary credibility of EMEs, many of which have moved toward inflation targeting regimes, have led them to issue debt in local currency, effectively neutralizing the pains connected to the original sin. In Section 2 on stylized facts below, we confirm that this pattern of foreign currency denomination bears out for Euro Area holdings. In this case, however, currency risk is borne by the investors: exchange rate fluctuations affect the intermediary balance sheet values and may impair its ability to fulfill the regulatory constraints. This balance-sheet effect reduces the investor risk-bearing capacity and increases its incentive to rebalance away from the riskier securities. Incentives to rebalance would be stronger for investors facing stricter regulation, such as banks or insurance funds.[1]

Against this background and given the recent sustained rise of interest rates by central banks in Advanced Economies, it is important to assess the role of investor heterogeneity in determining the spillovers to Emerging Markets. These spillovers have also been documented to be larger than those to AE (see Milesi-Ferretti et al. (2022)) for a number of reasons including fear of floating and the extent of financial frictions in EME.[2] The concerns related to the harm of the spillovers are exacerbated also by the increasing number of EME that are on the brink of default. As such, the pandemic and other shocks have added strains to the secular rise in government indebtedness and have endangered EME fiscal capacity. The consequences are materializing gradually. There have indeed been 15 separate default events since 2020, across nine sovereigns, compared with 19 defaults across 13 countries between 2000 and 2019.[3] If a rise in interest rates increases the cost of borrowing for EME, the default cascades may persist. Moreover, in policy-making circles,

1 See Solvency II regulation for insurance and pensions funds in the euro area.

2 The authors address also the spillovers materializing through the trade channels. While those maybe large in extent and importance, our paper, whose advantage lies also in the use of granular securities data, focuses on the financial spillovers.

3 See https://www.fitchratings.com/research/sovereigns.

there are increasing concerns that the rise in interest rates are most often contemporaneous across central banks. Thus, the spillovers transmitted contemporaneously from the large currency areas may be larger in extent and strength (see Obstfeld (2022)). If so, again the implications of this contemporaneous monetary policy change may impact EME investor groups differently.

Given the importance of investor behavior to EME issuers, in this paper we ask: do investor differences impact monetary policy spillovers to these countries? For this purpose, we propose a unique look into disaggregated investor holdings of EME securities. Specifically, we decompose these EME securities into categories of sovereigns, private corporations, and funds. As such, our analysis is the first to study a decomposition of heterogeneous investor group holdings of a cross-section of EME-issued securities. Overall, we are interested in measuring and qualifying the extent of the monetary spillovers on both the portfolio shares of different investors. As such, the potential heterogeneity in investor elasticities is a key part of our analysis. For example, capital flow reversals to EME are more likely to materialize if their debt is held in the hands of flighty investors. Hence, in our empirical hypothesis the elasticity of investor demand is the main trigger of the capital flow reversals.

We address these issues by using monthly securities data available at the Bundesbank disaggregated across investors, issuers types and also issuer countries. Below, we describe preliminary analysis based on these data. In our next version, we will employ a panel local projection specification (see Jordà (2005) or more recently Montiel Olea and Plagborg-Møller (2021) among others). Our specification regresses the portfolio shares for each investor type on high frequency identified monetary policy shocks, our measure of exogenous changes in monetary policy (see Altavilla et al. (2019)). As noted above, we consider three main classes of investors: banks, insurance and pensions funds (ICPF) and other financial institutions (OFI). This latter group includes investment, mutual and ETF funds. In the baseline specification we consider the portfolio holdings by these heterogeneous investor groups of securities issued by a similarly diverse group of issuers. That is, we study the different investor group holdings of three types of foreign securities: private financial "funds", private non-financial corporations, and government. This decomposition

allows us to examine how investors who differ in terms of their underlying characteristics and demand elasticity may transmit shocks through their portfolio reallocation behaviour.

Next we cut the portfolio shares into two main country groups: AE versus EME. This breakdown allows us to quantify the spillovers to EME. Furthermore, to qualify the monetary transmission mechanism, we estimate specifications featuring different investor-security and monetary shock combinations in two steps. First, we test the impact of different components of the Euro Area shocks, namely the part due to short run movements in the rates versus that due to forward guidance (see Altavilla et al. (2019)). This analysis allows us to discuss the transmission mechanism along the term structure. Second, we consider Euro Area and U.S. monetary shocks in combinations, finding that synchronized increases of the rates are likely to produce more pronounced spillover effects, disproportionately so to the EME.

Although our analysis is preliminary, several results stand out so far. First, the rebalancing behaviour in response to a monetary tightening varies significantly across investors. This variation appears to be largely due to characteristic differences implied by the underlying investor base group. For example, Insurance and Pension behaviour may be impacted by their mandates, banks by prudential regulation, and investment funds by their clientele portfolio preferences. As suggestive of this behavior, in the baseline specification banks and insurance funds tend to reallocate funds more heavily than other financial institutions: a contractionary monetary policy shock may increase funding and default risk and intermediaries with stricter regulation need to adjust their portfolio to meet the regulatory criteria. Moreover their rebalancing is characterized by a flight away from securities issued by private entities and toward those issued by governments. Seen through the lenses of the issuing countries, the portfolio reallocation is akin to a credit shock to resident firms or private entities issuing abroad. This flight to safety is more pronounced for banks and ICPF, consistent with the view that those investors face stricter prudential regulation and must maintain long term investment goals. The monetary tightening increases funding risk, thereby escalating the impact of regulatory constraints faced by those investors. As a result, these investors may be forced to rebalance toward

safer assets. Moreover the increase in interest rates reduces the asset values. Thus, long term investors, such as ICPF, are more likely to experience long term losses.

Second, the spillovers, albeit of similar nature, are stronger under synchronized policy actions. In this case, the investment funds and others in the OFI group may exhibit a flight to safety as well. However, the nature of their portfolio reallocation behavior however may be different. These intermediaries are more likely to fund themselves through dollars, so that a tightening from the Fed increases their funding costs. The effect of the synchronized policy thereby increases their incentives to hold fixed income assets through this channel.

Finally, when we break down the portfolio shares by issuing country, spillovers to EME securities appear stronger. In this case the heterogeneity in rebalancing behaviour is even starker. While ICPF and OFI investor groups continue to increase their positions in sovereign debt securities, banks do the opposite. As noted earlier, EME sovereign are increasingly issued in local currency. By contrast, bank funding is largely in euros, or dollars. The stark currency mis-match, coupled with the relative currency fluctuations induced by the monetary tightening at home, produces balance sheet losses that tighten the regulatory constraints. Overall, then, these results suggest that the risk bearing capacity of banks is smaller than that of other intermediaries and that banks' exposure to EME is more likely to be conducive to capital reversal in the event of a monetary policy tightening. However, it should be noted that banks are not the largest holders of EME sovereign in the euro area (as shown in Section 2). Hence it may be the case that the elasticity of the largest holder, OFI, has a more significant impact on the overall economy.

**Relation to Literature.** A core tenet of modern macroeconomic theory is that countries should allow exchange rates to float so that the implied relative prices may absorb variations in financial conditions abroad. Thus, floating rates allow nominal and real exchange rates to absorb the brunt of the required adjustment. The premises of the trilemma are even starker for EME as several financial and trade shocks, stemming from vulnerabilities, may require greater monetary policy flexibility at home. Recently Rey (2015) has pushed forward the view that flexible exchange rates cannot insulate economies from the global financial cycle. In her arguments the depreciation that follows a monetary

tightening at the center weakens domestic balance sheets, forces deleveraging and limits credit growth, thus weakening economic activity in the periphery. Beyond the arguments related to the best exchange rate arrangement needed to shed foreign shocks, there is also a large literature studying financial spillovers in emerging-market economies, the global financial cycle and the Mundellian trilemma/dilemma. See for instance Farhi and Werning (2014), Blanchard (2016), Rey (2013), and Taylor and Obstfeld (2017), just to name a few. None of these papers have studied spillovers using disaggregated data to examine the role of large differentiated investors.

The idea that flickle investors may pose a threat to fiscal sustainability in EME has been advanced using more aggregated data by Fang, Hardy and Lewis (2022). The role of investor heterogeneity for arbitrage deviations, also with EME, has been studied in Faia, Salomao and Veghazy (2022). However, none of these studies focus on monetary policy spillovers.

A recent study on the monetary spillovers to EME financial and trade conditions is Obstfeld and Zhou (2023). Also, steps forward in the direction of examining monetary spillovers to EME using U.S. data include Chari, Dilts Stedman and Lundblad (2020) and Ciminelli, Rogers and Wu (2022). These papers thus consider the importance of monetary spillovers, but do not look at the impact of heterogeneous investors.

In this paper, by contrast, we quantify more exactly the role of investor characteristics for this spillover. For instance, we find that some investors reallocate portfolio positions differently than one would expect based upon conventional wisdom implied by macro channels.

**Overview** The paper proposal is set-up as follows. Section 1 describes the data. Section 2 provides some basic stylized facts about disaggregated holdings by institutional investor groups and securities types. The basic econometric specification is detailed in Section 3. Section 4 reports some preliminary results using monthly aggregated external positions by investor group and issuer type. To be included in the next version are results on the effects of the Taper Tantrum in Section 5, more analysis, and well as a conclusion.

# 1 Securities data

Our study is based on two main data sources, both referring to securities held in the Euro Area. The underlying common source of both are the securities holdings statistics (SHS hence forth), which is a harmonized collection of security-by-security portfolio holdings by all Euro area investors and for all security asset classes. These data are collected at the country level by the corresponding country central bank. These data are then merged at lower frequencies by the ECB into consolidated Euro Area series. In our project, we employ the data collected by the Bundesbank, which includes all holdings from German residents and has the distinct advantage for our purposes of being available at monthly frequencies. The higher frequencies are important given our interest in studying the monetary transmission mechanism. Note that German financial institutions are also the largest holders within the Euro area for most asset classes. For the purpose of our analysis, we will use both the portion of the data disaggregated at the investor and issuer level, but alternatively, aggregated at the issuer country level, and then dissaggregated at country level. In some cases we complement the information in this dataset with the securities data in the ECB-SHS statistics which are dis-aggregated at the level of country issuer, but are provided at a quarterly frequency.

The primary micro-level dataset comes from the Securities Holdings Statistics Base plus (SHS-Base plus) database compiled by Deutsche Bundesbank.[4] The database is a security-level, full census of all financial institutions domiciled in Germany. Domestic banks report all assets held on their own balance sheets. Institutions also report securities held in safe custody on behalf of their customers, regardless of the ultimate investors' countries of origin. For convenience, we refer to investors recorded in the SHS-Base plus data as "Germany-based" investors. For each security identified by the International Securities Identification Number (ISIN), information is available for the face value (nominal amount) held, market value as of the reporting date, and the sector classification of the investors.

Compared to other datasets often used in international finance research, SHS-Base plus is the ideal dataset for this study for at least three reasons, . First and foremost, this

4 DOI: 10.12757/SHSBaseplus.05122212.

data set is a census and thus has a wide coverage of securities, reporting institutions, and sectors of security holders. Securities issued worldwide, including emerging market sovereign bonds, are reported. The data covers all investors types in the ESA1995 and ESA2010 sector classification, including but not limited to domestic and foreign banks, insurance companies and pension funds, governments, households, and investment funds. The custodian-based dataset also covers parts of non-German investors' security holding, given the significant role of German banks and clearing houses as asset custodians and depositories in Europe.

Second, SHS-Base plus provides data spanning an earlier start date and at a higher frequency than the aggregate Euro Area data. In particular, SHS-Base plus provides quarterly holdings statistics as early as 2005, and then becomes a monthly dataset starting from 2013. This feature helps us track high-frequency dynamics of asset holdings in response to fast-moving, volatile shocks such as changes in center-country monetary policy.

Finally, the SHS-Base plus data set reports face values of bond holdings of each investor group. As such, it provides an accurate picture of portfolio allocation at the sector level and makes our analysis immune to the usual concern of valuation effects.

Our analysis will use the portfolio shares of debt holdings from various types of investors and issued by different sectors. We consider debt issued by private entities such as financial and non-financial corporations, as well as sovereign. In terms of investors, the breakdown provides portfolio shares for over 22 categories of institutional investors (although households are included as well). We focus on the largest categories for the issuers, which are namely, banks and money market funds (MFI), insurance and pensions funds (ICPF), other financial institutions (OFI) which include mutual funds, exchange-traded funds and other non-bank financial intermediaries that are not ICPFs. These investor groups tend to have very different characteristics and rebalancing behaviour, mostly due to their mandates. One objective of our analysis is to exploit the differences in investor elasticity to identify the extent of the spillover. If rates in the euro area increase, this change may induce several investors to rebalance their portfolio since borrowing rates have increased. Investors will rebalance differentially according to their regulatory

constraints or other characteristics of their mandates. Investors with larger demand elasticities are likely to rebalance more and to sell first the securities issued by EME economies.

# 2 Stylized Facts

In this section we present a few statistics and data cuts that turn helpful in interpreting some of the impulse responses to monetary shocks shown below.

First, since EME currencies are typically more volatile than their AE counterparts, it is important to understand who bears the currency risk, investors or issuers. In the original sin hypothesis EME issue debt in foreign currency, so that any appreciation of the dollar or the euro would increase the probability of their default. If EME instead issue in local currency the exchange rate risk is borne by investors: any fluctuation of the exchange rate would affect the value of their balance sheet and in presence of regulatory constraints this may bring the investor on the brink of default, unless a portfolio rebalancing takes place.

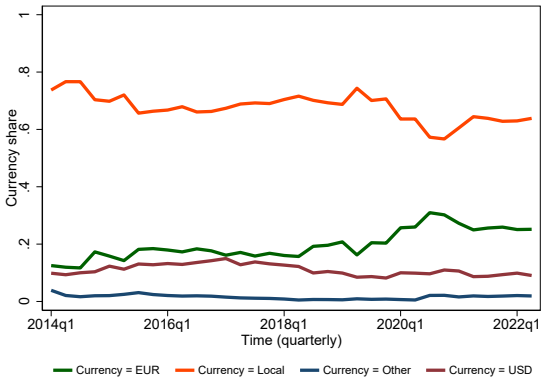
Figure 1 shows indeed that in our sample most of the EME bonds held by euro area investors are in local currency. This figure plots sovereign bond holdings in particular, as this security sector comprises the largest part of EME holdings in the Euro Area.

It is also important to understand which of the investors hold the largest shares of EME securities. Below we show that different investors rebalance their portfolios of EME securities in significantly different directions. That is, in response to the same shock some investor groups may reduce their holdings of sovereign debt, while others may increase them. Which of those responses matters the most for the macro economy depends on which of those investors has the largest exposure to these securities. In Figures 2 and 3, we show the holdings shares of different types of investors both in the SHS-ECB data set, which contain the holdings of all euro area investors, as well as the shares of German residents. These are the two datasets we use in our impulse response analysis below.

Despite variations in these impulse responses, some common patterns emerge. In particular, the holders of the largest shares for corporate bonds are OFI. The holdings of

**Figure 1**

**Portfolio shares of currency for EME sovereign securities** The portfolio shares are computed from medium term (with maturity between around one and five years) debt holdings by denomination currency, namely euros, U.S. dollars, local currency or others. Holding amounts are nominal and not affected by price movements such that the holding shares can be compared across time. Time sample: 2014Q1-2022Q2.




**(a)**
Issuer: EME GOV

sovereign are large also for German banks. This pattern suggests that the elasticities of these two investor groups may matter the most for the macro trends.

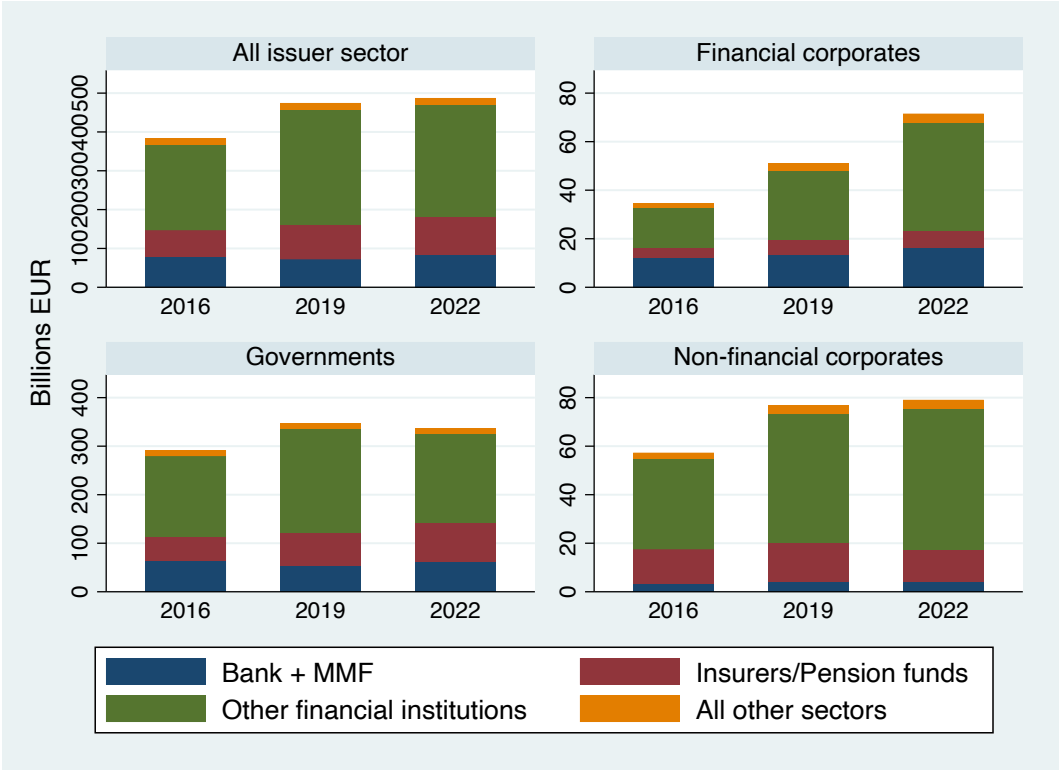
# 3 Econometric specification

At the most disaggregated level of the data, in order to measure elasticities of portfolio shares across investors in response to monetary policy shocks, we estimate the following local projection relationship (see Jordà (2005) or more recently Montiel Olea and Plagborg-Møller (2021)):

$$\omega^{c,s}_{i,t+h} - \omega^{c,s}_{i,t-1} = \alpha^{s}_{i,h} + \beta^{c}_{i,h} + \Gamma^{s}_{i,h} m_t + \Theta^{h} Z^{c,s}_{i,t} + \epsilon^{c,s}_{i,t+h} \tag{1}$$

**Figure 2**
**Euro area investor composition of emerging market debt securities, by issuer sector**

Figure 2 plots the aggregate market value of debt securities issued by emerging market economies and held by Euro area investors recorded in ECB's securities holdings data. All observations are beginning-of-year and is in billions EUR. For holders, "all other sectors" include non-financial companies, households and NPISHs, and governments.




where $\omega_{i,t+j}^{c,s}$ is investor $i$'s portfolio share on a debt security issued by a specific sector $s$ (government or private entity) in country $c$. More specifically, the portfolio share is defined as

$$\omega_{i,t}^{c,s} = \frac{\sum_n B_{i,t}^{c,s}(n)}{\sum_{n,c,s} B_{i,t}^{c,s}(n)}$$

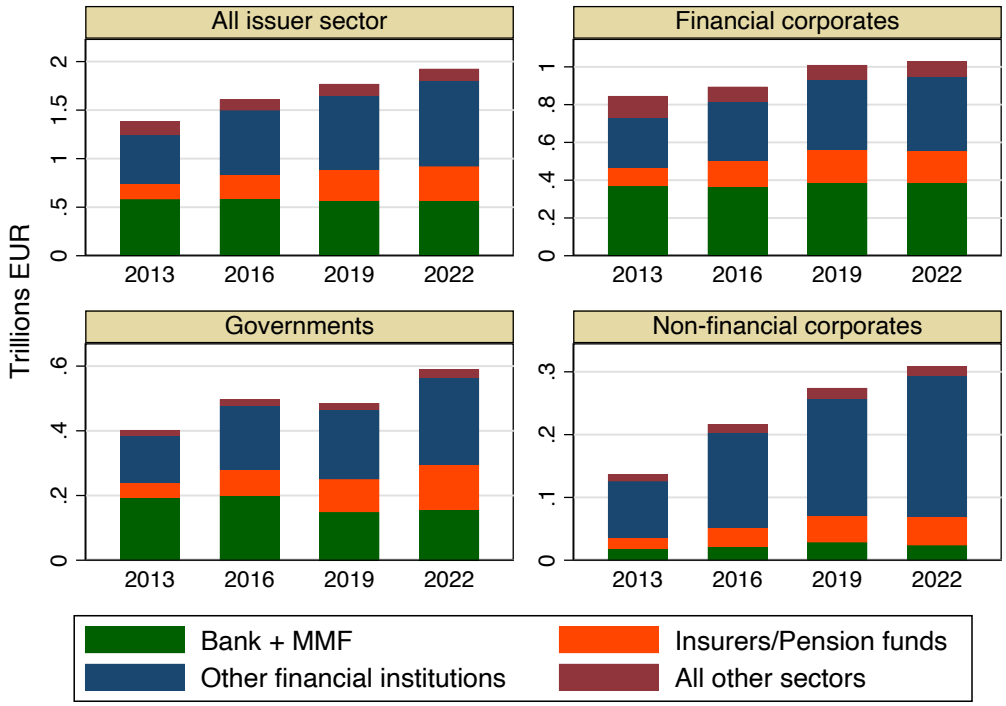
where $B_{i,t}^{c,s}(n)$ is the face value of $i$'s holding of bond $n$ issued by sector $s$ of country $c$. The use of face values prevent valuation effects from contaminating the estimates related to investors' portfolio shift.

The variable $m_t$ in (1) are the monetary policy shocks identified using high-frequency asset price responses to monetary policy events, which we discuss further below; $\{\alpha_{i,h}^{c,s}\}$ are a set of investor-sector-specific intercepts. $\beta_{i,h}^{c}$ denotes country fixed effect.[5] $Z_{i,t}^{c,s}$ are a

5 We would also be able to estimate (1) at the investor level with fixed effects on issuer sector and country to gauge the average response $\{\Gamma_{i,h}\}$.

**Figure 3**
**Germany-based investor composition of external debt holding, by issuer sector**

Figure 3 plots the aggregate face value of debt securities issued by non-German entities and held by Germany-based investors recorded in Deutsche Bundesbank's securities holdings data. All observations are beginning-of-year and is in trillions EUR. For holders, "all other sectors" include non-financial companies, households and NPISHs, and governments.




set of control variables, including external controls and lags of $m$ and $\omega$. For investors, we focus on portfolio responses of three main categories: insurance companies and pension funds (ICPF), other financial institutions (OFI, mostly comprised of investment funds), and banks (MFI). For the breakdown on asset types, we look at sovereign bonds, corporate bonds, and debt securities issued by financial firms. The coefficients of interest is $\{\Gamma_{i,h}s\}_{h=0}^{H}$, the impulse response to the monetary policy shock $m_t$ from time 0 to $H$.

**High-frequency identified monetary policy shocks.** Exogenous monetary policy shocks are obtained through high-frequency identification of monetary policy surprises: see Romer and Romer (2000), Gürkaynak, Sack and Swanson (2005), Bernanke and Kuttner (2005), Hanson and Stein (2015) among early contributors. Monetary policy surprises are constructed from high frequency movements in interest rates of near risk-free market instruments, such as Overnight Indexed Swaps (OIS), in a narrow window around interest rate announcements by the ECB. As such, they plausibly rule out reverse causality and

other endogeneity concern. The identification assumption is as follows. As interest rate decisions are completed an hour or two before the decision is announced, the ECB could not have been reacting to changes in financial markets in a sufficiently narrow window of time around the announcement. Therefore any asset price change is caused by the announcements themselves, rather than vice versa. More formally, the monetary policy shock is given, in each month $t$, by the variable $\Delta m_t = \tau(t)\Delta_w i$, where $\Delta_w i$ is the change in the interest rate within a small time window around the announcement.[6] The variable $\tau(t)$ controls for the time of the announcement during the month. Those shocks are readily available from the Euro Area as constructed by Altavilla et al. (2019).

We distinguish between two types of monetary policy shocks based on horizon by selecting the interest rate $i$ that enters in the construction of $m_t$. While the literature focuses on short-term rates, long-term rates may be more influential on the rebalancing behavior of institutions such as insurers and pension funds. We use the high-frequency movements of 3-month OIS rate as the stand-in for short-rate shocks and use the difference between 10-year and 3-month German Bund yield as the stand-in for long-rate shocks. In subsequent analysis, we also intend to break down high-frequency interest rate movements into those driven by pure monetary shocks and those driven by information effect (Jarociński and Karadi, 2020). We will also use identified factors representing monetary shocks that can be interpreted as surprises to the short-rate target, forward guidance and quantitative easing as in, for example, Altavilla et al. (2019) and Swanson (2021).

**The Impact of Synchronized Spillovers.** In recent times the worldwide surge in inflation has induced several central banks around the world to raise the interest rates in a concerted way. Our Figure 1 shows that foreign denomination of the securities held in the euro area is equally shared between the euro and the dollar. Hence, any spillover channelled through currency denomination would equally pass through for euro or dollar securities. Similarly, joint moves of the ECB and the Fed may have a stronger impact on the financial market uncertainty (see Caldara et al. (2023)). We test this hypothesis by

6 Monetary policy events typically occur fewer than once per month. When there is no monetary policy action within a month, we set $m_t$ to zero.

including and interacting both the Fed and the ECB monetary policy shocks.[7] We extend our baseline econometric specification to the following:

$$\begin{aligned}\omega_{i,t+h}^{c,s} - \omega_{i,t-1}^{c,s} =& \alpha_{i,h}^{s} + \beta_{i,h}^{c} + \Gamma_{i,h}^{s,\text{Tighten}}(m_t \times m_t^{\star}) \cdot \mathbb{1}\{m_t, m_t^{*} > 0\} \\ &+ \Gamma_{i,h}^{s,\text{Loosen}}(m_t \times m_t^{\star}) \cdot \mathbb{1}\{m_t, m_t^{*} < 0\} \\ &+ \Gamma_{i,h}^{c,s,\text{Divergent}}(m_t \times m_t^{\star}) \cdot \mathbb{1}\{m_t \times m_t^{*} < 0\} + \Theta^{h} Z_{i,t}^{c,s} + \epsilon_{i,t+h}^{c,s}\end{aligned} \tag{2}$$

where $m_t^{\star}$ corresponds to the identified monetary policy shocks around the Fed announcements. The indicator function $\mathbb{1}\{\cdot\}$ partitions monetary shocks based on the synchronicity of the actions, so that we can estimate three sets of impulse responses that corresponds to synchronized or asynchronized monetary policy actions by the major central banks.[8]

In our preliminary analysis involving aggregate data reported below, we estimate an alternative specification in an event-study fashion:

$$\omega_{i,t+h}^{c,s} - \omega_{i,t-1}^{c,s} = \alpha_{i,h}^{c,s} + \Gamma_{i,h}^{c,s} \cdot \mathbb{1}\{m_t, m_t^{*} > 0\} + \Theta^{h} Z_{i,t}^{c,s} + \epsilon_{i,t+h}^{c,s}. \tag{3}$$

**Identifying the Channels and Testing the Taper Tantrum.** Our paper focuses on financial channels and a prominent one among them relates to the rebalancing and deleveraging of global intermediaries induced by uncertainty in the global financial cycle (see Miranda-Agrippino and Rey (2020)). We test which part of the spillovers are channelled by these effects by interacting the monetary policy shocks with either the VIX, as our proxy for global risk, or the volatility risk premium (VRP), our proxy for global uncertainty.[9] The two variables differ to the extent that the first indicates a rise in the volatility of stock values, while the second signals the inability to forecast future stock prices.

7 For U.S. monetary policy shocks, we use the updated shock series constructed by Miguel Acosta, based on Gürkaynak, Sack and Swanson (2005) and Nakamura and Steinsson (2018).

8 See Aastveit and Anundsen (2022) for an example that examines the asymmetric effect of monetary policy (expansion vs. contraction) using a similar specification.

9 The volatility risk premium is defined as the difference between implied volatility and realized volatility of the S&P 500 index. Bollerslev, Tauchen and Zhou (2009) show that fluctuations of this measure capture time-varying economic uncertainty faced by investors.

Defining $x_t$ is either the VIX or the VRP, the new specification reads as follows:

$$\omega_{i,t+h}^{c,s} - \omega_{i,t-1}^{c,s} = \alpha_{i,h}^{c,s} + \Gamma_{i,h}^{c,s} m_t + \Lambda_{i,h}^{c,s}(m_t \times x_t) + \Theta^h Z_{i,t}^{c,s} + \epsilon_{i,t+h}^{c,s} \tag{4}$$

This approach should then allow us to consider the impact of global risk and uncertainty on portfolio allocation changes, and then ultimately on the external positions of countries. In the next section, we provide preliminary evidence on some of the relationships described above.

# 4 Aggregate External Positions by Investor and Issuer

Our focus is to uncover the role of the heterogeneous investor base and their respective elasticities on capital flow fluctuations and reversals. Therefore, we start our analysis by examining the impact of monetary policy shocks on the aggregate monthly external positions by investor sector, using publicly available time series available on the website of Deutsche Bundesbank. These data allow us to distinguish the response per investor type and issuer type, but without any distinction on the issuer countries. In the next version of the paper, we intend to drill down across both dimensions. This first step allows us to uncover how German investors, who come from the largest Euro Area country and comprising the largest holders of external positions, reallocate their portfolio in response to a monetary tightening in the aggregate. A reduction in the external positions may then also come with changes in the relative weights across countries countries, a question which we will examine next.

The investor types that we consider in this analysis are banks (and money market funds, labelled MFI), insurers/pensions (labelled ICPF), and other financial institutions (labelled OFI), mostly comprised of mutual funds, ETFs, and other types of investment funds. These are the largest holders of the external positions and cover a set of institutions with a wide spectrum in terms of base and elasticities. As noted above, and elsewhere in the literature, insurance and pension funds have to serve highly risk-averse clientele and have

tight prudential regulation than other types of investors such as investment funds. Hence in response to a contractionary shock that, by increasing risk premia and the probability of default, increases the overall risk of their portfolio they may rebalance more actively than other financial institutions.

In terms of issuers side we consider all sectors in aggregate, the financial and non-financial sector and the government. Hence, to fix ideas the portfolio shares that we use as dependent variables of our local projections are for instance the shares that insurance funds or banks hold of debt issued by non-financial corporations or by the government.

## 4.1 Foreign debt holding and monetary policy shocks

Figure 3 plots the investor composition of Germany-based investors' aggregate holding of debt issued by foreign entities. At this broad aggregated level, banks (and MMFs), insurance companies and pension funds, and investment funds account for the bulk of the external positions. While the German investor composition of foreign financial corporations and governments are similar, investment funds hold the most foreign corporate bonds compared to all other investor sectors.

Formally, our preliminary analysis requires estimating a simplified version of the baseline specification of Equation (1) specified here:

$$\omega_{i,t+h}^{s,F} - \omega_{i,t-1}^{s,F} = \alpha_{i,h}^{s,F} + \Gamma_{i,h}^{s,F} m_t^{\text{Short (Long)}} + \Theta^h Z_{i,t} + \epsilon_{i,t+h}^{s,F}. \tag{5}$$

In Equation (5), the dependent variable is investor $i$'s holding of sector $s$'s issuance, as a share of total debt holding of the investor. $\omega_{i,t}^{s,F}$ for each issuer sector $s$, formally defined as

$$\omega_{i,t}^{s,F} = \frac{B_{i,t}^{s,\text{Foreign}}}{\sum_s B_{i,t}^{s,\text{Foreign}} + \sum_s B_{i,t}^{s,\text{Domestic}}}$$

where $B_{i,t}^{s,\text{Foreign}}$ and $B_{i,t}^{s,\text{Domestic}}$ denote investor $i$'s aggregate face value of holding of foreign and domestic sector-$s$'s debt, respectively. The monetary shock $m_t$ is given by either the

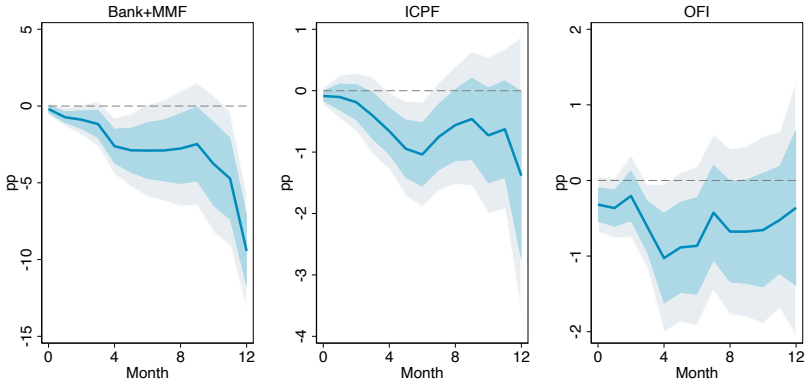
short-rate shock or the long-rate shock. The control variables $Z_{i,t}$ include lagged (up to 3 months) monetary shock $m$ and lagged changes in $\omega$.

We will present results progressively in three steps. First, we consider the impact of a monetary shock on all external positions by investor and issuer type. Second, we present the responses to a joint monetary tightening by the ECB and the Fed. Third, we examine the impact of the tightening only on securities issued by EME using an alternative dataset from ECB. The progression will allows us to uncover the nature of the spillovers.

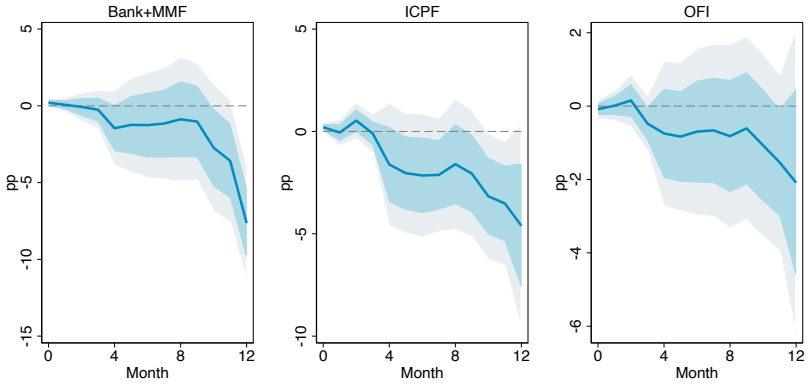
**Baseline Specification.** Figure 4 reports the impulse responses of Germany-based investors' portfolio weights of foreign debt holding in response to a 25 bps tightening of ECB monetary policy ("short-rate shocks"). In all impulse responses reported below, we also plot 68% and 90% confidence bands. Note that external positions includes issuance from advanced economies (AE) as well as emerging markets (EME). Several considerations stand out. First, there is large heteroegeneity in the responses to the shock and most importantly the shock is transmitted through some investors more than through others. The responses of OFI are less likely to be significant, even on sub-samples, than the responses of the ICPF and banks. The absence of rebalance for OFI may also result from a composition effect: the external positions include securities issued by both AE and EME. If the response of those portfolio shares move in opposite direction, the combined response would show no rebalance. ICPF and Banks instead seem to rebalance significantly by reducing their overall external positions for all securities issued by financial and non-financial corporations, but not for securities issued by the government. In sum there appear to be a substitution between asset classes akin to a flight to safety. The rise in interest rate rises the costs of holding riskier securities and induce a shift toward safe ones. This is a plausible explanations to the extent that the external portfolio shares include sovereign bonds issued by the U.S. and other advanced economies, which are perceived as safer.

## Figure 4
## Impulse response of holding of foreign debt (as share of total debt holding) to 25 bps short-rate tightening

Figure 4 plots impulse responses of Germany-based investors' foreign debt holding as share of total debt holding to 25 bps monetary policy surprise reflected in the short-term interest rate. The monetary policy surprise is identified via high-frequency movements in the asset prices around ECB monetary policy event windows (Altavilla et al., 2019). Impulse responses are estimated using the local projection (5) by investor sector (bank+MMF, ICPF, and other financial institutions), and by issuer sector (all sectors, financial corporations, non-financial corporations and government). The control variables include 3 lags of monetary policy shock and lagged changes (for 3 months) of the dependent variables. Foreign debt holding refers to aggregate holding of all debt securities issued by non-German entities. The unit of the $y$-axis is percentage point. 68% and 90% confidence interval with robust standard error are reported.



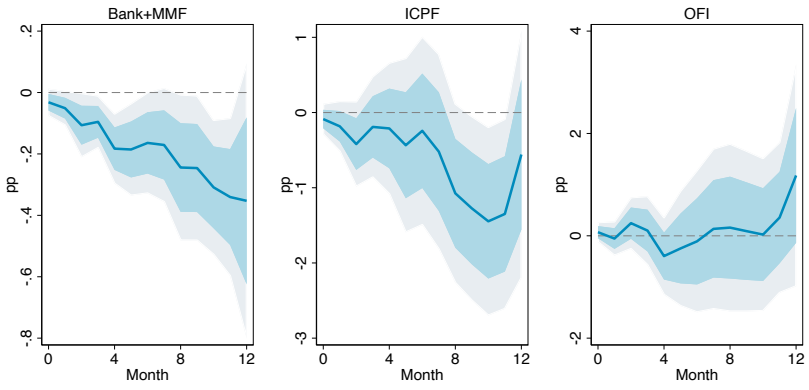

**(a)**
Debt issued by all sectors




**(b)**
(b) Debt issued by financial corporations

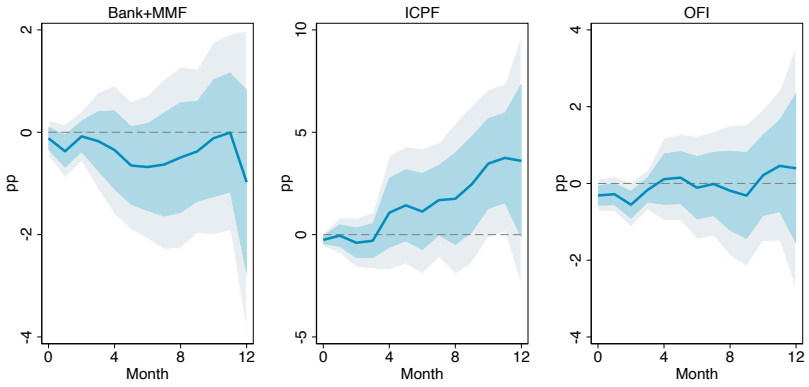
**Figure 4**
**Impulse response of holding of foreign debt (as share of total debt holding) to 25 bps short-rate tightening** (continued)

See the first part of the figure for detailed notes.




**(c)**

(c) Debt issued by non-financial corporations




**(d)**

(d) Debt issued by governments

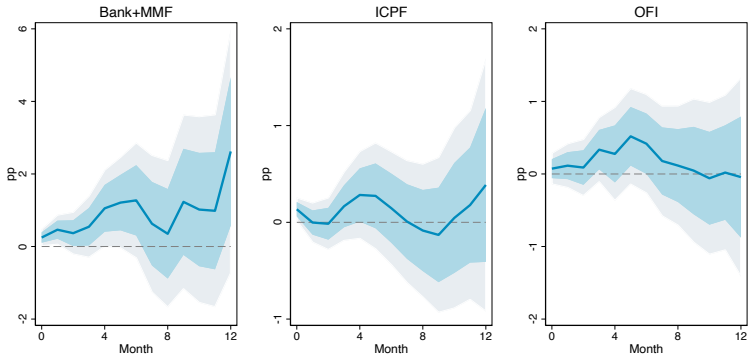
The differential behaviour of ICPF and banks relatively to OFI also provides a first indication of the role of regulation, which is tighter for those institutional investors. As shown in our motivating evidence presented in the introduction EME bonds are largely in local currency. This means that any fluctuations in exchange rates, driven for instance by tighter monetary conditions are home, would affect the value of those intermediaries balance and tighten the regulatory constraint. If this would be the case those investors may have higher incentives to rebalance toward safer asset classes, such as sovereign, and issued by safer countries. We will explore the role of the country of issuance in the sub-section further below.

**Heterogeneous effects of shocks to short- and long-term rates** Spillovers may differ depending on the time horizon of the interest rate. The monetary policy shocks that we employ (see Altavilla et al. (2019)) allow to distinguish components related to short term rates versus those related to forward guidance. We would generally expect the second to have a larger impact. The main arguments in favour of forward guidance was that it could have larger impact by affecting expectations and the whole yield curve. Hence we now explore this hypothesis and plot the impulse responses to component of the monetary policy shock that refers to forward guidance.

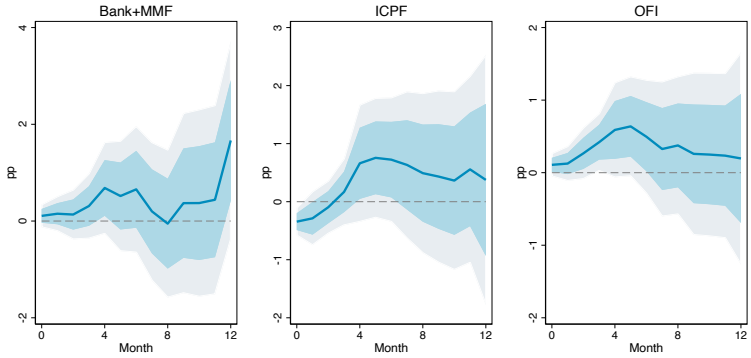
Figure 5 reports the impulse responses to a 25 bps "long-rate tightening". Qualitatively the responses turn now positive in most cases, something which may suggest a substitution between domestic securities and foreign ones. The rebalance toward external assets may be linked to the fluctuations in the exchange rate: as domestic currency appreciate, following the tightening, it becomes less costly to invest in foreign assets. However, the responses are now much more nuanced and less significant. This finding may have two explanations. First the spillovers from uncoventional policies in the euro area may not very strong. Second, the results may reflect the composition effect described above: if the spillovers to AE and EME run in opposite directions their combination will show no changes.

## Figure 5
## Impulse response of holding of foreign debt (as share of total debt holding) to 25 bps long-term rate tightening relative to short rate

Figure 5 plots impulse responses of Germany-based investors' foreign debt holding as share of total debt holding to 25 bps monetary policy surprise reflected in the relative tightening of long-term interest rate (10-year Bund yield) relative to short-term interest rate (3-month Bund yield). The monetary policy surprise is identified via high-frequency movements in the asset prices around ECB monetary policy event windows (Altavilla et al., 2019). Impulse responses are estimated using the local projection (5) by investor sector (bank+MMF, ICPF, and other financial institutions), and by issuer sector (all sectors, financial corporations, non-financial corporations and government). The control variables include 3 lags of monetary policy shock and lagged changes (for 3 months) of the dependent variables. Foreign debt holding refers to aggregate holding of all debt securities issued by non-German entities. The unit of the $y$-axis is percentage point. 68% and 90% confidence interval with robust standard error are reported.



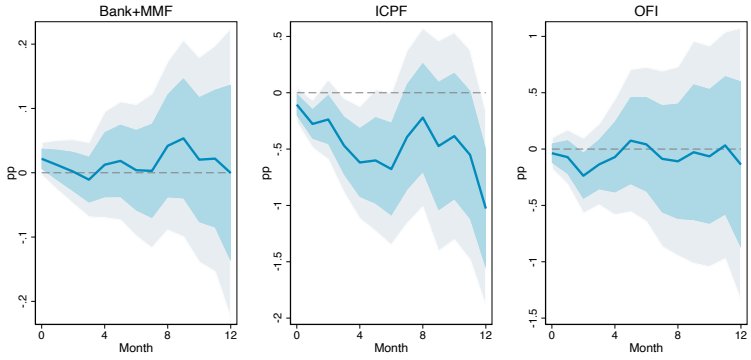

**(a)**
Debt issued by all sectors




**(b)**
(b) Debt issued by financial corporations

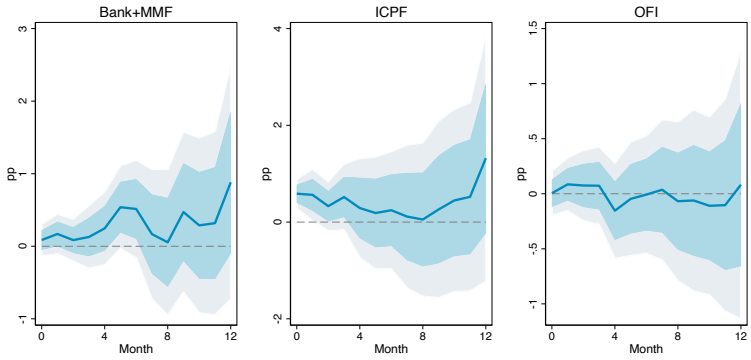
**Figure 5**
**Impulse response of holding of foreign debt (as share of total debt holding) to 25 bps long-term rate tightening relative to short rate** (continued)

See the first part of the figure for detailed notes.




**(c)**

(c) Debt issued by non-financial corporations




**(d)**

(d) Debt issued by governments

With the next experiments we qualify further the nature of the spillovers.

**Synchronized Policy Shocks and Spillovers.** The results so produce mixed results on the strength of the spillovers from the euro area to the capital flows toward the rest of the world and across different sectors. This maybe due to the fact that euro area spillovers are smaller than that of the U.S. or to the fact that spillovers are larger under synchronous policy stance across currency areas. Moreover, spillovers maybe directed toward specific countries.

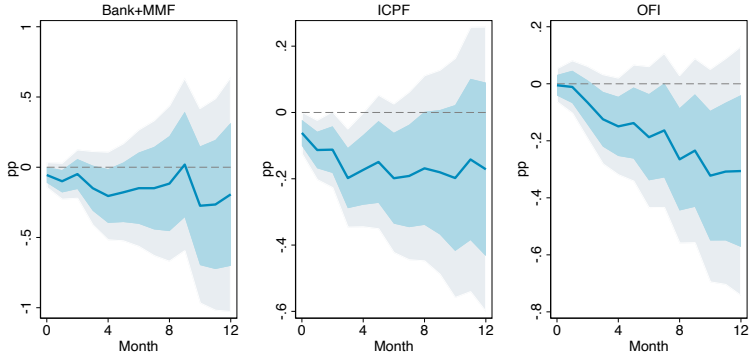
The presumptions has generally be that spillovers from the U.S. to the rest of the world are larger due to the dominance of the dollars and several trade and financial channels have been indicated for that. On the other side, several studies indicate that large fractions of dollars are intermediated by European banks and other intermediaries and for this reason shocks originated in the euro area may have larger effects (see Ivashina, Scharfstein and Stein (2015) or Rey (2015)). Results on this front have so far been mixed. Recent studies examining the impact of unconventional monetary policy to the on global asset prices and capital flows through both the signaling and portfolio re- balancing channels (see for instance Fratzscher, Lo Duca and Straub (2016)) have found generally larger spillovers from the Fed policy, but not from the ECB policy.[10] Our evidence above, using more granular securities data, delivers mixed results on the strength of euro area spillovers.

A new perspective that is gaining ground is that spillovers may be stronger when central banks take coordinated actions. The worldwide increase in inflation by triggering synchronized rise in interest rate across central banks around the world may heighten the adverse spillovers (see Obstfeld (2022)). Hence in what follows we examine this hypothesis.

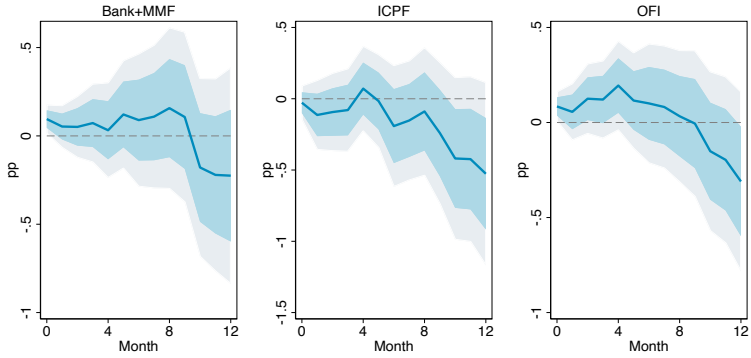
10 Only a few studies have investigated spillovers from the unconventional policies of the the euro area (see Fratzscher, Lo Duca and Straub (2018)) finding that the ECB's Securities Markets Program (SMP) and the Outright Monetary Transactions (OMT) policies boosted global equity markets, and lowered credit risk among G20 banks and sovereigns.

## Figure 6
## Response of foreign debt holding (as share of total debt holding) in episodes of synchronized monetary tightening of ECB and Fed

Figure 6 plots impulse responses of Germany-based investors' foreign debt holding as share of total debt holding, when both the Fed and the ECB surprisingly tighten monetary policy. The monetary policy surprise is identified via high-frequency movements in the asset prices around ECB and Fed's monetary policy event windows (Altavilla et al., 2019; Nakamura and Steinsson, 2018). Impulse responses are estimated using the local projection (5) by investor sector (bank+MMF, ICPF, and other financial institutions), and by issuer sector (all sectors, financial corporations, non-financial corporations and government), replacing the monetary shock $m_t$ with an indicator function $\mathbb{1}\{m_t^{\text{ECB}} > 0, m_t^{\text{Fed}} > 0\}$, where $m$ refers to high-frequency short-term rate responses. The control variables include 3 lags of monetary policy shock and lagged changes (for 3 months) of the dependent variables. Foreign debt holding refers to aggregate holding of all debt securities issued by non-German entities. The unit of the $y$-axis is percentage point. 68% and 90% confidence interval with robust standard error are reported.



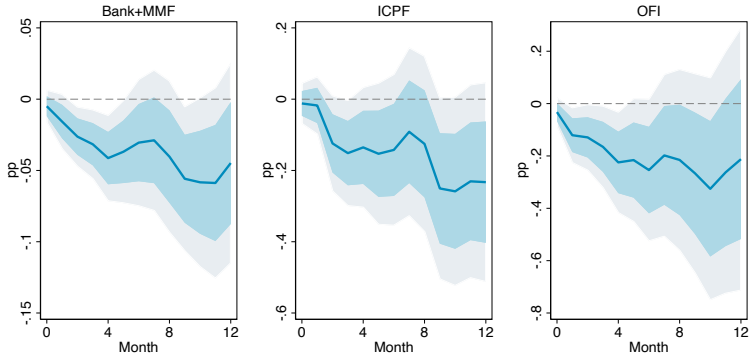

**(a)**
Debt issued by all sectors




**(b)**
(b) Debt issued by financial corporations

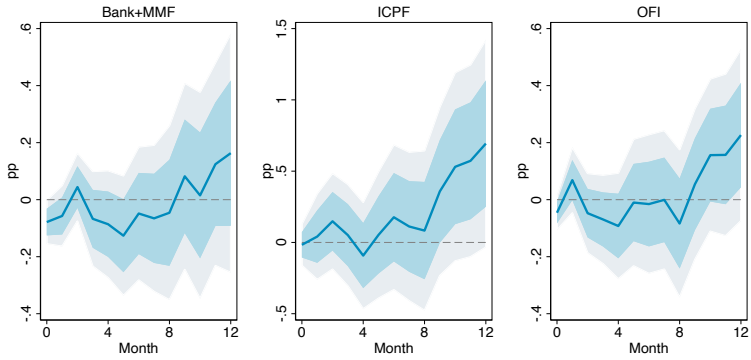
**Figure 6**
**Response of foreign debt holding (as share of total debt holding) in episodes of synchronized monetary tightening of ECB and Fed** (continued)

See the first part of the figure for detailed notes.




**(c)**

(c) Debt issued by non-financial corporations




**(d)**

(d) Debt issued by governments

Figure 6 above reports responses of holdings to *synchronized* tightening of ECB and Fed, where the shock variable in the local projection (5) is replaced by an indicator variable that takes value one only if the short rate shock for both ECB and Fed in the same period is positive (also see (3)). First and foremost, the spillovers now are stronger and in some cases significant also for the OFI. Second, the heterogeneity across investors remains. Third, again we observe a a flight from privately issued securities and toward government issued securities. Seen from the lenses of the issuing countries the rebalance is akin to a credit shock to resident firms or private entities issuing abroad. At last, the move out of privately issued securities and toward sovereign is now observable also for OFI. The nature of their rebalance however maybe different. Those intermediaries are more likely to fund themselves through dollars, hence a tightening from the Fed is increasing their finding costs, something which increases their incentives to hold fixed income assets.

## 4.2 The Role of the Issuing Countries: Preliminary analysis

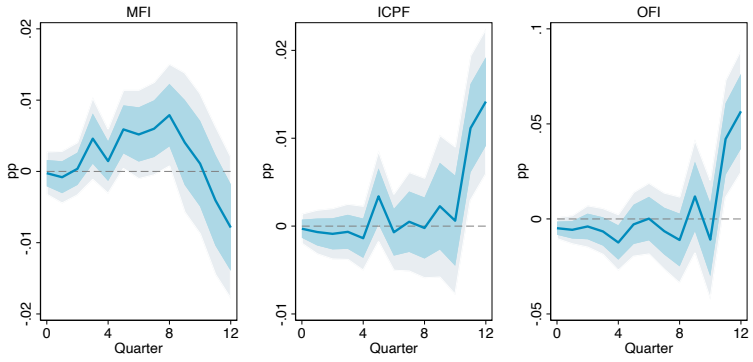
Our results so far indicate marked substitutions from privately issued to government issued securities and a marked heterogeneity across investors. These results may be due to a combination of their mandates and their regulation, which may become tighter when local currency bonds depreciate relatively to domestic ones.

A substitution across securities may also materialize in terms of country shares of the holdings. This reallocation too may speak on the role that different types of investors have on capital flows reversals. A flight to safety may for instance induce intermediaries to move away from EME securities. This effect may be larger if EME sovereign are issued in local currency: larger fluctuations in the relative value of the currencies may tighten the regulatory constraints. The rebalancing would then be more pronounced for intermediaries with tighter regulatory constraints.

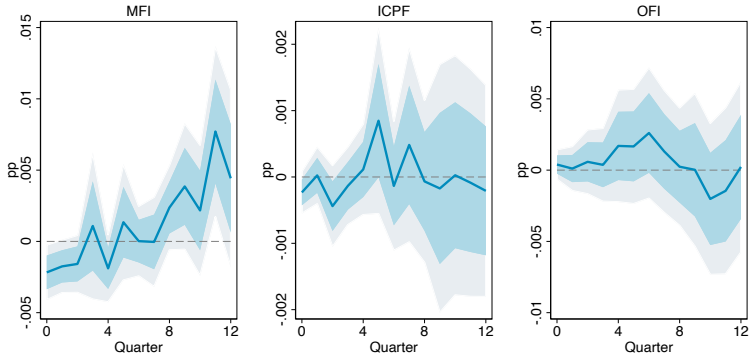
To consider these issues, we now include into our analysis another securities dataset that contains information on the issuing country. Specifically we now employ the ECB Securities Holding Statistics which provides security breakdown by country. In this case however, the portfolio holdings are available at a lower frequency (quarter), and only at market values, hence their responses may also be driven by a valuation effect.

## Figure 7
## Impulse response of holding of emerging market debt (as share of total debt holding) to 25 bps short-rate tightening

Figure 7 plots quarterly impulse responses of Euro area investors' emerging market debt holding as share of total debt holding to 25 bps monetary policy surprise reflected in the short-term interest rate (3-month OIS). The monetary policy surprise is identified via high-frequency movements in the asset prices around ECB monetary policy event windows (Altavilla et al., 2019). Impulse responses are estimated using the local projection (1) by investor sector (bank+MMF, ICPF, and other financial institutions), and by issuer sector (all sectors, financial corporations, non-financial corporations and government). The control variables include 4 lags of monetary policy shock and lagged changes (for 4 quarters) of the dependent variables. Emerging market debt holding refers to aggregate holding of all debt securities issued by emerging market entities. The unit of the $y$-axis is percentage point. 68% and 90% confidence interval with robust standard error are reported.



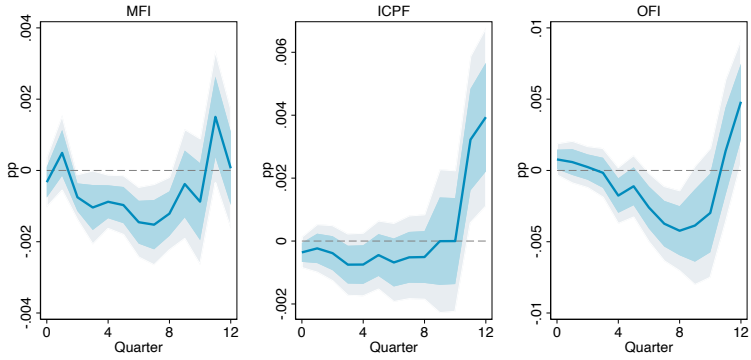

**(a)**
Debt issued by all sectors




**(b)**
(b) Debt issued by financial corporations

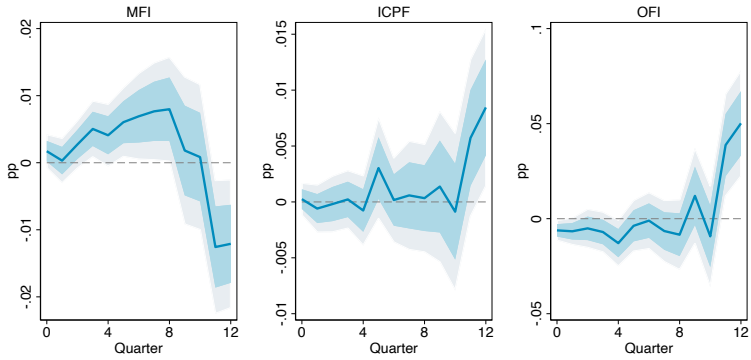
**Figure 7**
**Impulse response of holding of emerging market debt (as share of total debt holding) to 25 bps short-rate tightening** (continued)

See the first part of the figure for detailed notes.




**(c)**

(c) Debt issued by non-financial corporations




**(d)**

(d) Debt issued by governments

To highlight this data, we return to two figures described earlier in Section 2. Specifically, Figure 2 reports the emerging market counterpart of Figure 3, but in this case for Euro area debt holders. Euro area investors tend to hold government bonds compared to debt securities issued by private entities. While investment funds dominate the holding for all issuer sectors, insurance companies and pension funds account for a considerable share of government and corporate bond holding.

Thus, we now report Figures 7 and 8 presenting the impulse responses of the baseline local projection specification in Equation (1) for EME only.[11] Rebalancing is now stronger than in either of the previous cases. More remarkably all intermediaries rebalance toward EME securities in response to a monetary tightening except banks. The reason for this is twofold. First, banks mainly fund themselves in dollar or euro repo markets. The tightening of the funding conditions coupled with the currency mis-matched, induced by the holdings in local (EME) currencies, tighten up banks' regulatory constraints more severely than for all other investors. In sum, only banks' exposure to EME is conducive to capital reversal in the event of a monetary policy tightening.

However, it should be noted that in Section 2 we had shown that banks were not the largest holders of EME sovereign in the euro area. Hence it is likely to be the case that the elasticity of the largest holder, OFI, will have a more significant impact on the overall economy.

# 5 Identifying the effects of Taper Tantrum

To be completed

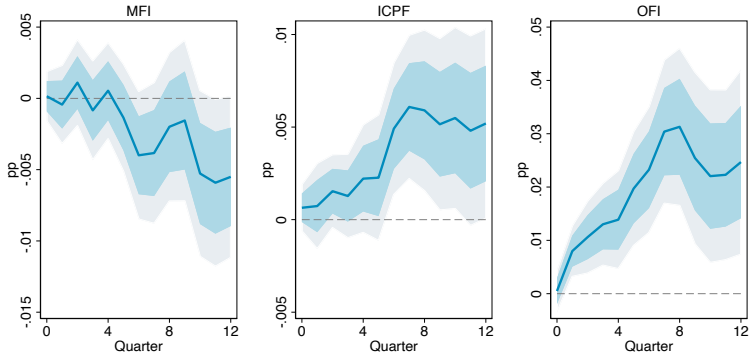
# 6 Concluding Remarks

To be written

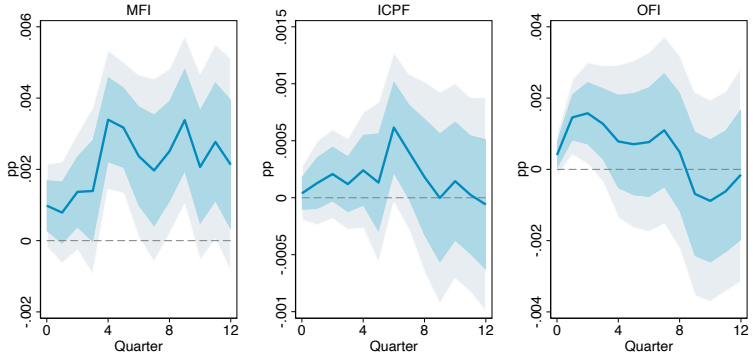
11 The emerging market economies covered in the public dataset include Argentina, Bulgaria, Brazil, Chile, China, Czech Republic, Croatia, Hungary, Indonesia, India, Latvia, Lithuania, Mexico, Poland, Romania, Russia, Slovenia, Slovakia, Turkey, South Africa.

## Figure 8
## Impulse response of holding of emerging market debt (as share of total debt holding) to 25 bps long-term rate tightening relative to short rate

Figure 8 plots quarterly impulse responses of Euro area investors' emerging market debt holding as share of total debt holding to 25 bps monetary policy surprise reflected in the change of long-term interest rate (10-year Bund yield) relative to short-term interest rate (3-month Bund yield). The monetary policy surprise is identified via high-frequency movements in the asset prices around ECB monetary policy event windows (Altavilla et al., 2019). Impulse responses are estimated using the local projection (1) by investor sector (bank+MMF, ICPF, and other financial institutions), and by issuer sector (all sectors, financial corporations, non-financial corporations and government). The control variables include 4 lags of monetary policy shock and lagged changes (for 4 quarters) of the dependent variables. Emerging market debt holding refers to aggregate holding of all debt securities issued by emerging market entities. The unit of the $y$-axis is percentage point. 68% and 90% confidence interval with robust standard error are reported.




**(a)**
Debt issued by all sectors

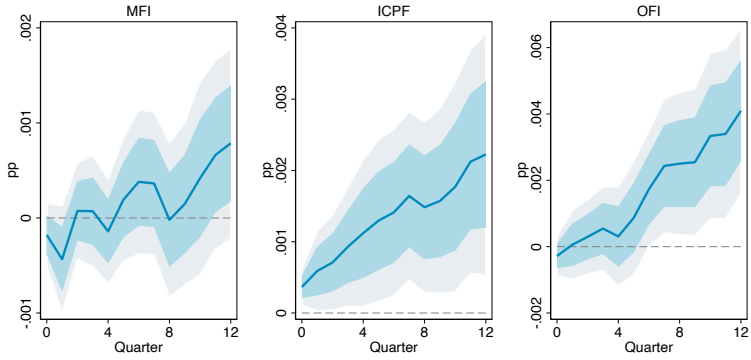



**(b)**
(b) Debt issued by financial corporations

**Figure 8**

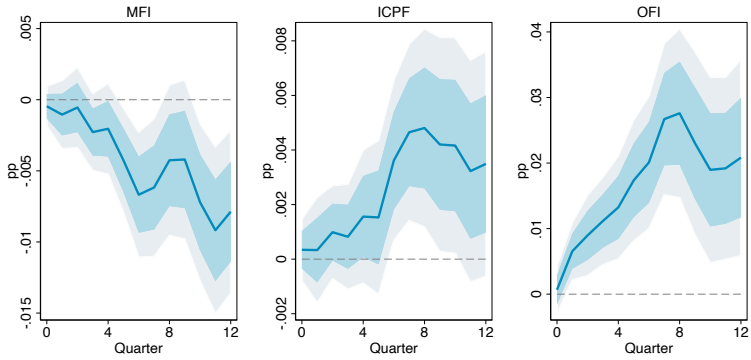
**Impulse response of holding of emerging market debt (as share of total debt holding) to 25 bps long-term rate tightening relative to short rate** (continued)

See the first part of the figure for detailed notes.




**(c)**

(c) Debt issued by non-financial corporations




**(d)**

(d) Debt issued by governments

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