Foreign demand for safety and macroeconomic instability *

Madalen Castells-Jauregui, Dmitry Kuvshinov,

Björn Richter, and Victoria Vanasco §

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Abstract

Using novel data on sectoral safe asset positions in 21 advanced economies since 1980, we document the central role of the foreign sector in the market for safety and its macroeconomic implications. We show that safe asset holdings have expanded significantly relative to GDP, driven by rising net holdings of the foreign sector and accommodated by increased issuance from the financial and public sectors. Furthermore, fluctuations in safe assets are almost exclusively driven by the foreign and financial sectors, with close links between the two. Finally, increases in foreign demand for safety—or its counterpart, the supply by financials—are associated with domestic credit expansions and weaker medium-term output growth, both in raw data and when using FX reserve accumulation in Asian economies as instrument.

Keywords: safe assets, capital flows, financial accounts, business cycles, financial stability
JEL classification codes: E42, E44, E51, F33, F34, G15

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§Castells-Jauregui: European Central Bank. Kuvshinov: Universitat Pompeu Fabra, Barcelona School of Economics, and CEPR. Richter: NOVA SBE, Universitat Pompeu Fabra, and Barcelona School of Economics. Vanasco: CREI, Universitat Pompeu Fabra, Barcelona School of Economics, and CEPR.

1 Introduction

Safe assets—broadly defined as financial instruments with highly certain payments—are a key building block of modern financial systems. They serve as reliable stores of value, high-quality collateral, price benchmarks, and help fulfil prudential requirements (Gourinchas and Jeanne, 2012). In recent decades, demand for safe assets has surged, particularly from emerging markets (Bernanke, 2005). This demand can be met both by the public sectors in advanced economies (e.g., through government bonds), and by private financial institutions (e.g., through deposits or securitized bonds). A growing concern is whether advanced economies can sustainably supply safe assets—especially when produced privately—without jeopardizing financial stability (Krishnamurthy and Vissing-Jorgensen, 2015; Caballero, Farhi, and Gourinchas, 2017; Maggiori, 2017; Moreira and Savov, 2017; Caballero and Simsek, 2020; Ahnert and Perotti, 2021; Brunnermeier, Merkel, and Sannikov, 2021).

Despite this growing concern, there is no systematic empirical evidence on the role of foreign counterparties in the market for safe assets, the sectors that supply safety across borders, and the broader macroeconomic consequences of these dynamics. This paper addresses these gaps using a new dataset that tracks safe assets and liabilities by sector—public, household, non-financial corporate, financial, and foreign counterparties—for 21 advanced economies since 1980.

We uncover several new facts. First, that over the past few decades in advanced economies, foreign sectors have increased their net holdings of safe assets, while their domestic financial sectors have been increasingly intermediating safety. Second, that the foreign and the financial sectors are responsible for most of the variation in acquisitions and issuances of safe assets. Moreover, their dynamics are closely interlinked: when the foreign sector acquires safe assets, the domestic financial sector issues safe assets almost one-for-one. Finally, in terms of real effects, we find that higher demand for safety by the foreign sector (OLS and instrumented) is associated with increases in domestic risky lending, and lower medium-term real GDP growth.

We construct the dataset on safe assets and liabilities of different economic sectors using financial accounts data extended backwards based on Diebold and Richter (2021). The data cover 21 advanced economies going back to 1960 for the US, and to the 1980s or 1990s for most other countries. We follow Gorton et al. (2012) and categorize as safe the debt instruments with a highly certain stream of payments that are issued by governments, central banks, and financial intermediaries.[1] Consistent

[1]In particular, we define as safe the following financial instruments: government bonds (central and local), currency, reserves, gold, special drawing rights, deposits, money market fund shares, and bonds issued by financial intermediaries.

with other studies (Gorton et al., 2012; Barro et al., 2022), we find that economy-wide safe assets in our sample of countries have increased markedly relative to GDP since 1980, while maintaining a stable safe-asset share to total financial assets.

To understand which sectors are the main players in the market for safety, we analyze gross positions and flows of safe assets and liabilities. We first document a strong positive trend in safe-asset holdings and liabilities of the foreign and the financial sectors, suggesting an increase in intermediation through privately produced safe assets both within and across borders, consistent with Gourinchas and Jeanne (2012). We then quantify the importance of different sectors through a novel variance decomposition methodology rooted in the accounting identity that economy-wide safe-asset acquisitions must equal economy-wide safe-asset issuances. We find that more than 90% of gross safe-asset fluctuations are driven by the financial and foreign sectors. These two sectors are even more important for fluctuations than for averages and trends: for example, the foreign sector holds 23% of safe assets on average, but accounts for 39% of fluctuations, while households and firms hold 36% of safe assets but only account for 4% of fluctuations.

We then turn to analyze net positions, which we define as safe assets minus safe liabilities of each sector. We say that a sector demands (supplies) safety if its net safe-asset holdings are positive (negative). We document a trend increase in net safe asset holdings (demand) driven by the foreign sector within each country, with its counterpart being an increase in issuances by the domestic financial sector (pre-GFC) and the public sector (post-GFC), suggesting a substitution from private to publicly created safety after the 2008-09 crisis. Note that we observe these patterns not only at country level, but also for the aggregate of our advanced economies, suggesting that the increase in foreign demand is mainly driven by economies not in our sample, such as China. Turning to fluctuations, we show that foreign safe-asset acquisitions (changes in demand from abroad) are almost exclusively met by issuances (supply) of the domestic financial sector. For every \$1 of net safe assets acquired by the foreign sector, financial sector net issuance of safe assets increases by 81 cents, with most of this issuance driven by bank deposits (51 cents) and non-bank bonds (19 cents). These findings highlight the importance of studying the foreign demand for safety jointly with the private domestic supply, as, for example, in the theoretical work of Maggiori (2017) and Ahnert and Perotti (2021).

To alleviate the concern that the foreign sector could simply be absorbing shocks to flows of the other sectors, we instrument foreign safe-asset acquisitions with changes in foreign exchange reserves of a group of reserve-accumulating East Asian countries (China, Taiwan, Hong Kong, Singapore, and

Korea).[2] Our instrument follows the methodology in Nakamura and Steinsson (2014) and Guren, McKay, Nakamura, and Steinsson (2020) by estimating country-specific exposures to changes in this demand for safety from East Asia, and combining these country-specific sensitivities with aggregate variation in East Asian countries' reserve holdings to instrument the net safe asset flows of the foreign sector.[3] We find that the response of the financial sector to the foreign sector safe-asset acquisitions is, if anything, stronger than that implied by the OLS estimates. For each $1 of instrumented foreign sector safe asset demand, the domestic financial sector issues close to $1, with around 70 cents coming from domestic banks and the rest from non-banks.

Our final contribution is to provide the first systematic evidence on the negative real effects of the foreign demand, and financial supply of safe assets, as well as the underlying economic mechanisms. We do so by exploiting our cross-country dataset to study the relevance of the sectoral composition of the market for safety for macroeconomic stability and growth. Recent theoretical work has shown that private safe asset creation may generate financial instability, for example by backing these safe assets with risky loans of poor quality (Gennaioli et al., 2013; Gorton and Ordoñez, 2022; Castells-Jauregui, 2023). We find evidence consistent with this view in the data. We first show that foreign demand for safety is strongly associated with domestic credit expansions: for every $1 of net safe assets acquired by the foreign sector, domestic financials increase their risky credit by 61 cents. We then show that higher net safe asset demand by the foreign sector, and its mirror image, higher safe-asset supply by the domestic financial sector, are associated with lower medium-term real GDP growth—both on their own, and after controlling for overall growth in risky credit and net foreign asset position. Differently, higher supply of public safe assets is not associated with lower GDP growth in the future. Again, these results hold both in OLS, and when instrumenting foreign sector demand or financial supply with changes in foreign reserves of Asian economies as described above.

Our findings indicate that over the past four decades, advanced economies have increasingly exported safety to the rest of the world. However, the fact that this safe-asset demand has largely been met by the private sector introduces significant vulnerabilities, as it shifts residual risk onto the domestic real economy (households and firms) and the financial sector (banks and non-banks). Looking forward, policymakers in advanced economies may need to pay close attention to changes in foreign demand

[2]We show that higher reserves in these Asian economies correspond to lower yields on global safe assets such as US Treasuries, in line with an outward shift in the demand curve for safe assets.

[3]Our identifying assumption is that changes in reserve holdings for these Asian countries are driven by local economic conditions, mainly a need to defend their domestic currencies, and not by changes in the demand or supply for safety of the domestic sectors in the advanced economies in our sample.

for safety, and the sectoral composition of the corresponding supply, with potentially more stringent regulations and macroprudential policies to mitigate the corresponding risks. At the same time, emerging markets may need to turn to their domestic economies to meet some of their demand for safety, which carries its own set of opportunities and risks (see, e.g., Clayton, Dos Santos, Maggiori, and Schreger, 2024, 2025; Cuevas, 2023; Ioannidou, Gao, and Gallo, 2024).

Our work is motivated by the literature that has long emphasized that safe asset shortages, i.e. global demand for safe assets increasing faster than supply, have contributed to the decline in real interest rates and to important global imbalances (Bernanke, 2005; Bernanke et al., 2011; Gourinchas and Jeanne, 2012; Caballero et al., 2016, 2017; Caballero and Farhi, 2018; Del Negro et al., 2019; Brunnermeier et al., 2021). Our findings support the view that foreign demand for safety may contribute to financial instability (Maggiori, 2017; Caballero and Simsek, 2020; Ahnert and Perotti, 2021), and that private safe-asset creation can endanger financial stability (Gorton, 2010; Stein, 2012; Gennaioli et al., 2013; Hanson et al., 2015; Dang et al., 2017; Moreira and Savov, 2017; Diamond, 2020; Kacperczyk et al., 2021; Acharya et al., 2021; Gorton and Ordoñez, 2022) and growth (Caballero and Farhi, 2018; Segura and Villacorta, 2023; Castells-Jauregui, 2023; Altinoglu, 2023). Our findings also suggest that the close links between foreign demand and private supply of safety are an important feature of this market and the associated real effects, which should be reflected in both economic theory and policy.

The paper is organized as follows. Section 2 describes the data sources and methodology used to construct the new dataset of safe assets and liabilities. Section 3 studies the trends and fluctuations in gross safe-asset positions, and Section 4—those in net positions. Section 5 analyzes the links between sectoral safe asset positions, risky credit, and GDP growth. Section 6 concludes with a discussion of the implications of our findings for policymakers and future research.

2 A new database of safe assets in advanced economies

Coverage. This project uses annual financial balance sheets data to construct a new cross-country dataset of safe assets and liabilities of different economic sectors. The dataset builds on Diebold and Richter (2021), who extended the OECD financial accounts' time series available online by digitizing data from the printed historical OECD publications. We further extend the data in Diebold and Richter (2021) which cover amounts outstanding (balance sheet positions) with additional data on flows (quantities acquired or issued) of financial assets and liabilities of different economic sectors.

The data cover an unbalanced panel of 33 countries. For our analysis, we focus on a subsample of 21

advanced economies. When analyzing the trends, we further restrict this group to a consistent sample of 16 countries whose data go back to at least 1980 or 1990. This subset includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, UK, and the US. The remaining countries in our 21-economy sample are Iceland, Ireland, Israel, Portugal, and Switzerland.

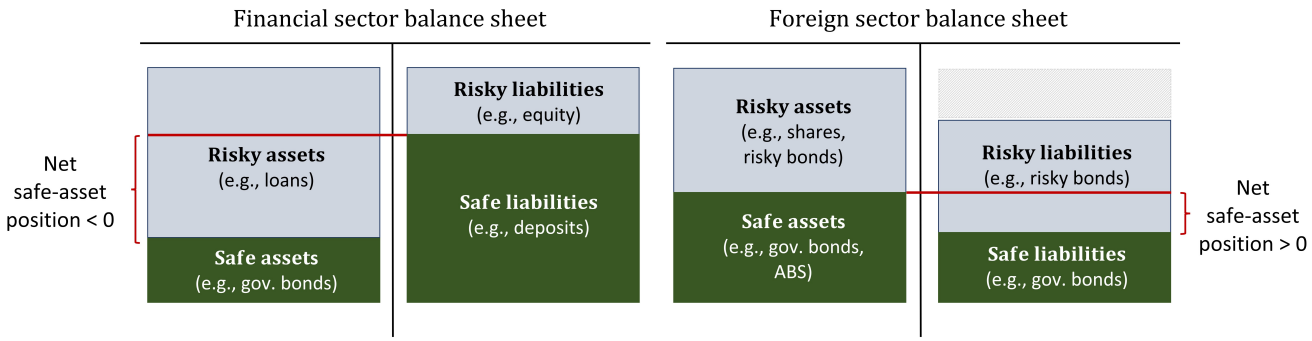
Safe asset definition. We follow the definition of Gorton et al. (2012), and define safe assets as the following financial instruments: special drawing rights, monetary gold, currency, reserves, deposits, money market fund shares, and bonds issued by the government or by financial institutions. In contrast, we classify bonds issued by non-financial corporates, loans, equity and investment fund shares (excluding money market fund shares), as well as insurance and pension claims or entitlements, derivatives, stock options, and other accounts receivable/payable, as risky assets.[4] With our data, this breakdown into safe and risky assets can easily be implemented on the liability side of sectoral balance sheets. The breakdown is more challenging on the asset side, because for bonds the safety classification depends on the sector issuing them. To deal with this, for the US, we obtain the breakdown directly from the flow of funds data (where the issuing counterparty sector can be observed). For the other countries, we proxy the breakdown of bonds on the asset side with the shares of safe and risky bonds in total domestic bonds in the given year.[5]

Sectoral safe-asset positions. We measure the amount of safe assets and liabilities for the following economic sectors within each country, as reported in the non-consolidated financial accounts data: the public sector (government and central bank), the financial sector (banks and non-bank financial companies), the real sector (households and non-financial firms), and the foreign sector (rest of the world). The foreign sector in each country includes both other advanced economies in our sample, and the economies outside our sample (for example, emerging markets). Gross positions represent the total safe assets and total safe liabilities of each sector. We define the net safe asset position of a given sector as its safe assets minus its safe liabilities, and we say that a sector demands

[4]Alternatively, one could characterize an asset as safe by measuring its convenience or safety premium, as in Krishnamurthy and Vissing-Jorgensen (2012); Nagel (2016); Kacperczyk et al. (2021); Mota (2023); Nenova (2023). This, however, requires granular data on prices of all these securities which we do not have for our entire sample.

[5]In our sample, outside of the US, bond markets are dominated by governments and financials, which account for roughly 90% of total bond issuances (consistent with other evidence on the small size of non-financial corporate bond markets outside of the US, e.g., Darmouni and Papoutsi, 2022). Therefore, any measurement imprecisions from splitting the bond holdings based on ratio of sectoral bond liabilities are likely to be small.

Figure 1: Example financial balance sheets of different sectors



(supplies) safety if its net safe asset position is positive (negative).

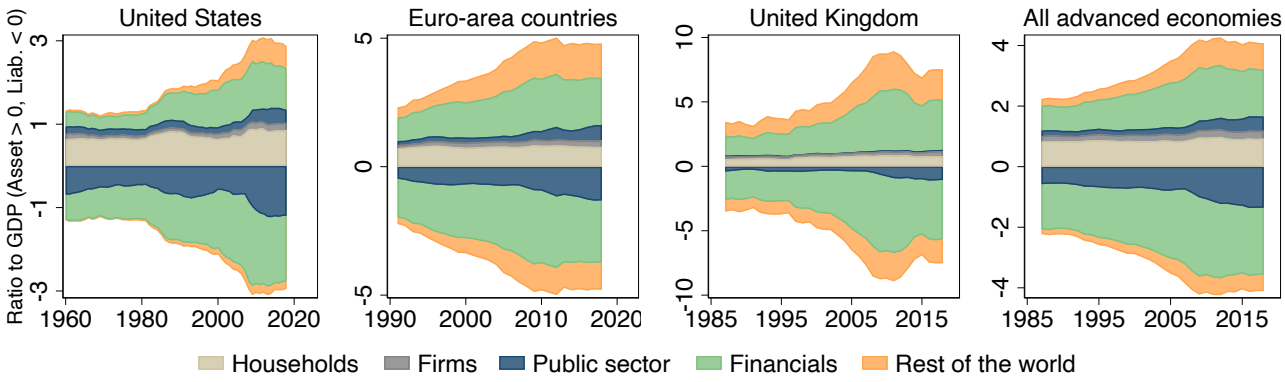
Figure 1 shows an example of sectoral balance sheets to illustrate how we compute both gross and net safe-asset positions in our data. On the left, we depict a typical financial sector balance sheet with a negative net safe-asset position. That is, its safe liabilities are larger than its safe assets. This example reflects how the financial sector tends to supply safety as it finances risky loans with safe deposits. On the right, we depict a typical foreign sector balance sheet with a positive net safe-asset position. That is, the domestic safe assets held by foreigners are larger than the foreign safe assets held by the domestic sectors. This example reflects how the foreign sector in advanced economies tends to demand safety by holding relatively large amounts of safe bonds issued by the domestic sectors. Lastly, the difference between total assets and liabilities of the foreign sector captures the country's net foreign asset position.[6]

One agent's financial asset is necessarily another agent's liability. For example, a bank deposit is an asset for a household and a liability for the bank issuing it. As a result, for the economy as a whole (domestic and foreign sectors) the sum of sectoral safe assets must equal the sum of sectoral safe liabilities and the sum of sectoral net safe assets must equal zero. These identities will be essential for the variance decompositions in our subsequent analysis of safe-asset fluctuations.

Appendix Figure A.1 provides a broad overview of the trends in aggregated financial balance sheets, plotting economy-wide safe and risky asset positions relative to GDP, as well as the ratio of safe to total financial assets, referred to as the safe-asset share. We observe large increases in financial assets since the 1980s in the US, the UK, the euro-area, and for the aggregate of advanced economies in our sample. At the same time, the ratio of safe to total financial assets—the safe-asset share—has

[6]Generally, assets are not equal to liabilities in financial accounts data as the positions only reflect financial assets. An exception tends to be the financial intermediary balance sheet which shows only small deviations between financial assets and liabilities, as this sector's business model relies on activities in financial markets.

Figure 2: Trends in gross sectoral safe-asset positions (assets > 0, liabilities < 0)



Notes: Gross positions are the sum of total safe asset holdings, or safe liabilities of the specific sector. The public sector includes central government, local government, and the central bank. Financials include both banks (deposit taking institutions) and non-banks, shown separately in Figure A.3. The foreign sector includes all foreign (non-resident) counterparties. The series for euro-area countries are the sum of Austria, Belgium, Finland, France, Germany, Italy, Netherlands, and Spain. The advanced-economy total is the sum of 16 advanced economies for which we have long-run data.

remained relatively stable over time. Appendix Figure A.2 shows that these trends are repeated in the majority of the 16 countries with long-run data in our sample.

3 Gross positions and increasing intermediation of safety

3.1 Trends in gross safe assets

To understand which sectors play an important role in the market for safety, we begin by studying the trends in gross sectoral positions. Figure 2 depicts the ratio of the gross safe assets held and issued by each sector relative to GDP, for the US, UK, a euro-area composite (Austria, Belgium, Finland, France, Germany, Italy, Netherlands, and Spain), and an aggregate of 16 advanced economies with long-run data in our sample. Appendix Table A.1 shows the average sectoral positions across 16 advanced economies in 1980, 2005 and 2015, as well as the changes for each sector as share of GDP and proportion of total economy-wide growth.[7]

The sectoral composition of the market for safety has changed substantially during our sample

[7]We chose the periods to capture the start of our sample for most countries (1980), the pre global financial crisis level (2005), and the end of our sample (2015). Note that the numbers in the table are unweighted averages of cross-country data, whereas the right panels of Figure 2 show the sum of country-level positions divided by the sum of their GDP (both converted to US dollars).

period, as documented in Figure 2 and Table A.1. We see that most of the growth in gross safe-asset holdings and liabilities during the last decades (80% and 75% respectively) has been driven by the financial and foreign sectors (see Table A.1). Within financials, banks are responsible for a large fraction of this growth for most countries in our sample. In the US, however, non-banks (insurance, pension funds, mutual funds, and other non-banks) play a central role, reflecting the importance of GSEs and money market mutual funds in the US financial system (Appendix Figure A.3). Finally, the position of the real sector has remained relatively stable during this period, despite its substantial safe-asset holdings.

Appendix Figure A.5 shows that the trends are very similar under two alternative (more stringent) definitions of safe assets—first, classifying all non-bank financial sector debt as risky (with the exception of government-sponsored enterprises in the US), and second, classifying all long-term debt of the financial sector as risky.

3.2 Fluctuations in gross safe assets

We now study which sectors drive the fluctuations in gross safe assets using data on flows (issuances and acquisitions) of safe assets from the financial accounts. In particular, we want to understand which sectors are the marginal buyers of safe assets and which sectors are the marginal issuers.

We follow a similar methodology to Fang et al. (2025) and conduct a variance decomposition exercise that exploits two accounting identities. First, that the economy-wide safe asset acquisitions, ΔSA^{Total}, must equal the economy-wide safe asset issuances, ΔSL^{Total}. And second, that the economy-wide acquisitions (issuances) must equal the sum of the sectoral acquisitions, ΔSA^{j} (issuances, ΔSL^{j}), where sectors are indexed by j. We combine these to obtain the following two identities:

$$\Delta SL_{it}^{Total} = \Delta SA_{it}^{Finan.} + \Delta SA_{it}^{Public} + \Delta SA_{it}^{RoTW} + \Delta SA_{it}^{Real} \tag{1}$$

$$\Delta SA_{it}^{Total} = \Delta SL_{it}^{Finan.} + \Delta SL_{it}^{Public} + \Delta SL_{it}^{RoTW}. \tag{2}$$

Above, ΔSL_{it}^{j} and ΔSA_{it}^{j} denote the 1-year flow in safe liabilities and in safe assets, respectively, of sector j in country i in year t relative to country i's GDP, and where we made use of the fact that the real sector does not issue safe assets, i.e., $\Delta SL_{it}^{Real} = 0$.

We take equation (1), multiply both sides by ΔSL_{it}^{Total}, take expectations, and after some algebra obtain the following decomposition of the variation in the issuance of safe liabilities:

$$
\begin{aligned}
Var\left(\Delta SL_{it}^{Total}\right) &= Cov\left(\Delta SL_{it}^{Total}, \Delta SA_{it}^{Real}\right) + Cov\left(\Delta SL_{it}^{Total}, \Delta SA_{it}^{Public}\right) \\
&+ Cov\left(\Delta SL_{it}^{Total}, \Delta SA_{it}^{Finan.}\right) + Cov\left(\Delta SL_{it}^{Total}, \Delta SA_{it}^{RoTW}\right).
\end{aligned} \tag{3}
$$

Then, dividing both sides by $Var\left(\Delta SL_{it}^{Total}\right)$ we obtain:

$$
1 = \beta^{Real} + \beta^{Finan.} + \beta^{Real} + \beta^{Public} + \beta^{RoTW} \tag{4}
$$

where $\beta^j \equiv \frac{Cov\left(\Delta SA_{it}^j, \Delta SL_{it}^{Total}\right)}{Var\left(\Delta SL_{it}^{Total}\right)}$ for sector $j \in \{Real, Finan., Public, RoTW\}$.

We estimate each β^j by regressing the safe-asset flows of the corresponding sector j, ΔSA^j, on the economy-wide issuance of safe liabilities, ΔSL^{Total}:

$$
\Delta SA_{it}^j = \alpha_i + \alpha_t + \beta^j \Delta SL_{it}^{Total} + \varepsilon_{it}^j, \tag{5}
$$

where we include country (α_i) and year (α_t) fixed effects. Thus, β^j reflects the marginal acquisition of safe assets by sector j for a one unit economy-wide issuance of safe liabilities. We measure the contribution of each sector to fluctuations in safe-assets holdings with these βs, with high-β sectors as more important drivers. We repeat this exercise for identity (2) to estimate the marginal issuance of safe liabilities by sector j for a one unit economy-wide acquisition of safe assets.

Table 1 shows the resulting regression coefficients for safe asset acquisitions (panel A, first row) and issuances (panel B, first row). For comparison, the bottom rows of each panel show, correspondingly, the average share of safe asset holdings and liabilities of each sector. The results are based on an unbalanced panel of 17 advanced economies for which we have safe-asset flows data.[8]

We find that the financial and the foreign sectors are the main drivers of fluctuations in both safe asset holdings and liabilities. For each dollar of safe liabilities issued in the economy, the financial sector acquires 45 cents and the foreign sector acquires 39 cents (top row of Panel A). Even though the real sector holds a substantial amount of safe assets (households and firms together hold 36% of all safe assets, see bottom row of Panel A), they are not important drivers of fluctuations in safe asset holdings. The financial and foreign sectors, on the other hand, account for 84% of the fluctuations in

[8]For the variance decompositions, we exclude Iceland and Ireland from the pooled-sample analysis because these countries have very large safe-asset—in particular financial and foreign sector—positions relative to GDP, so the variance decomposition analysis ends up being driven disproportionately by these two countries. Our results, however, also hold when including these two countries, in fact they become starker in terms of the financial and foreign sectors driving an even larger share of safe-asset fluctuations. We also exclude Australia and Israel because of the lack of financial flows data for these countries.

Table 1: Marginal holders and issuers of safe assets

	(1) Households	(2) Firms	(3) Financials	(4) Public sector	(5) RoTW
	Panel A: Holdings				
Marginal share	0.02**	0.02***	0.45***	0.11***	0.39***
	(0.01)	(0.01)	(0.03)	(0.03)	(0.02)
Average share	0.29	0.07	0.36	0.09	0.23
	Panel B: Issuance				
Marginal share	0.00	0.00	0.57***	0.11***	0.32***
	(.)	(.)	(0.03)	(0.03)	(0.04)
Average share	0.00	0.00	0.58	0.24	0.17
Observations	512	512	512	512	512

Notes: In panel A, we show the marginal sectoral shares for fluctuations in gross safe-asset acquisitions—obtained through the regressions in (5)—and the average shares in total safe asset holdings—calculated as the ratio of each sector's holdings to the economy-wide total in the full sample. In panel B, we show the marginal sectoral shares for fluctuations in gross safe-asset issuances, and the average sector-shares in safe-asset liabilities. The shares in each row add up to 1, subject to a small residual. Standard errors clustered by country and year are in parentheses. *,**, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

safe asset holdings, but hold only 60% of safe assets.

In Panel B we see that for every dollar of safe assets acquired in the economy, the financial sector issues 57 cents and the foreign sector issues 32 cents, with only 11 cents issued by the public sector. This is surprising, as the public sector is important for long-run trends in safe assets (Figure 2) and issues 24% of safe assets on average. Appendix Figure A.6 plots these decompositions for 18 advanced economies separately. The financial and foreign sectors are important marginal holders and issuers of safe assets across the board, while public sector issuance and household acquisitions are important in some larger and less-open economies (Japan, the US, and Canada).

We conclude by conducting a more detailed analysis for more granular economic sectors (e.g., banks vs non-bank financials, government vs the central bank) and financial instruments (e.g., bonds, money market fund shares, deposits). Results are presented in Appendix Tables A.2 and A.3. For both acquisitions and issuance of safe assets, the bulk of the gross fluctuations is driven by domestic bank deposits, with a somewhat smaller part attributable to foreign deposits and bonds issued by domestic governments and financial institutions. Finally, in Appendix Table A.4 we show that our findings are robust to controlling for macro-financial observables (GDP growth, inflation and short-term interest rates), and to using 3-year as opposed to 1-year flows.

Overall, the results in this section suggest that, over the last few decades, the financial sectors in advanced economies have been increasingly intermediating safety both within and across borders.

This is reflected in the increase in gross safe asset holdings and liabilities of both the financial and the foreign sector. Furthermore, almost all the safe asset fluctuations are explained by issuances and acquisitions of these two sectors.

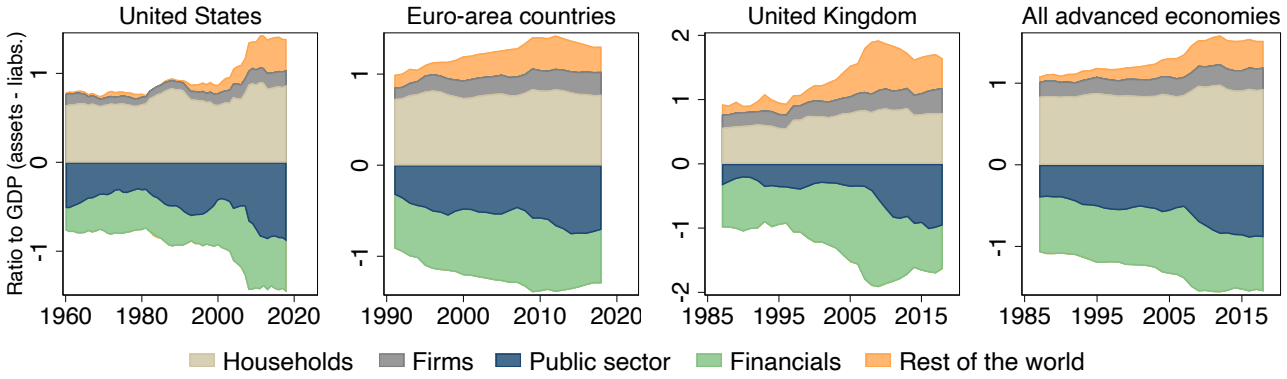
4 Net safe assets and the foreign-financial sector link

4.1 Trends in net safe assets

We now turn to study trends and fluctuations in net safe-asset positions, which allow us to infer which sectors effectively demand (hold) and supply (issue) safety. Figure 3 shows the trends in net safe-asset positions of each sector relative to GDP for the US, UK, euro-area, and the total of advanced economies (unweighted averages of country-level data are shown in Appendix Table A.5).

Starting with the demand side (sectors with positive net safe-asset positions), the foreign sector has been responsible for most of the increase in net safe-asset holdings throughout our sample. On the other hand, real sector (household and firm) holdings, despite being large on average, have remained relatively flat. On the supply side (sectors with negative net positions), we observe increases for both the financial and the public sectors, with the financial sector relatively more important before the 2008-09 global financial crisis, and the public sector more important afterwards. In the Appendix

Figure 3: Trends in net sectoral safe-asset positions (assets minus liabilities)



Notes: The net safe-asset position is the difference between safe assets and safe liabilities of the specific sector. The public sector includes central government, local government, and the central bank. Financials include both banks (deposit taking institutions) and non-banks, shown separately in Figure A.7. The foreign sector includes all foreign (non-resident) counterparties. The series for euro-area countries are the sum of Austria, Belgium, Finland, France, Germany, Italy, Netherlands, and Spain. The advanced-economy total is the sum of 16 advanced economies for which we have long-run data.

Figure A.7, we split the financial sector into banks and non-banks. We find that banks supply safety, while non-banks typically demand it, with the exception of the US, where non-banks became important suppliers of safe assets post-1990s.

Appendix Figure A.8 shows that these trends are generally reflected in the individual countries in our sample, with small, financially open economies such as the UK, Netherlands, Spain, and Sweden, registering especially large increases in the foreign sector safe-asset holdings. Appendix Figure A.9 shows that results hold under alternative safe-asset definitions.

4.2 Fluctuations in net safe assets

We have shown that the foreign sector has been the main driver of the documented increases in safe asset holdings in recent decades. Here, we study which sectors issue the assets acquired by the foreign sector. To do this, we perform a variance decomposition of the counterparts to foreign sector net safe asset flows. As before, this decomposition is based on financial accounting identities—in this case that the sum of total net safe asset flows of all sectors should equal zero. Given this, the net safe asset acquisitions by the foreign sector should equal the sum of net safe asset issuances of the other sectors:

$$\Delta NSA_{it}^{RoTW} = -\Delta NSA_{it}^{Real} - \Delta NSA_{it}^{Finan.} - \Delta NSA_{it}^{Public}. \quad (6)$$

As in equation (5), we estimate the variance share of each sector j by regressing the net acquisitions of this sector on the foreign-sector net safe asset acquisitions:

$$\Delta NSA_{it}^{j} = \alpha_i + \alpha_t - \beta_{RoTW}^{j} \Delta NSA_{it}^{RoTW} + \varepsilon_{it}^{j}, \quad (7)$$

where we include country (α_i) and year (α_t) fixed effects. As before, we use 1-year safe-asset flows as a measure of changes in net safe-asset holdings, and run the regression in the unbalanced panel of 17 advanced economies. Now, β_{RoTW}^{j} reflects the marginal issuance of safe assets by sector j for a one unit net acquisition of safe assets by the foreign sector. As before, we say that a sector contributes to fluctuations if it is a high β sector.

Table 2 shows the results of this decomposition exercise (i.e., the estimated coefficients β_{RoTW}^{j} for each counterpart sector j). We find that net acquisitions by the rest of the world are almost exclusively met by net issuance of the financial sector. In Panel A, we see that for each $1 of safe assets acquired by the foreign sector, the financial sector issues 81 cents (most of it by domestic banks) and the public

Table 2: Counterparts of foreign sector net safe asset acquisitions

	Panel A: OLS					
	Domestic Real Sector		Financial Sector		Public Sector	
	Households	Firms	Banks	Non-banks	Government	CB
$\Delta \text{NSA}^{\text{RoTW}}$	-0.02	0.04	0.66***	0.15	0.15*	0.02*
	(0.03)	(0.03)	(0.09)	(0.09)	(0.08)	(0.01)
Observations	500	500	500	500	500	500
	Panel B: Instrumental variable					
$\Delta \text{NSA}^{\text{RoTW}}$	-0.07	0.03	0.73***	0.33***	-0.00	0.02
	(0.11)	(0.07)	(0.22)	(0.11)	(.)	(0.01)
Observations	500	500	500	500	500	500

Notes: The shares are obtained by regressing the negative of the net safe-asset flows of each domestic sector on the net safe-asset flows of the foreign sector following equation (7). The shares add up to 1, subject to a small residual. In panel B, we instrument foreign sector flows with changes in FX reserve holdings of Asian economies following equation (8). The Kleibergen-Paap weak ID statistic for the first-stage regression is 69.22. Standard errors clustered by country and year are in parentheses. *,**, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

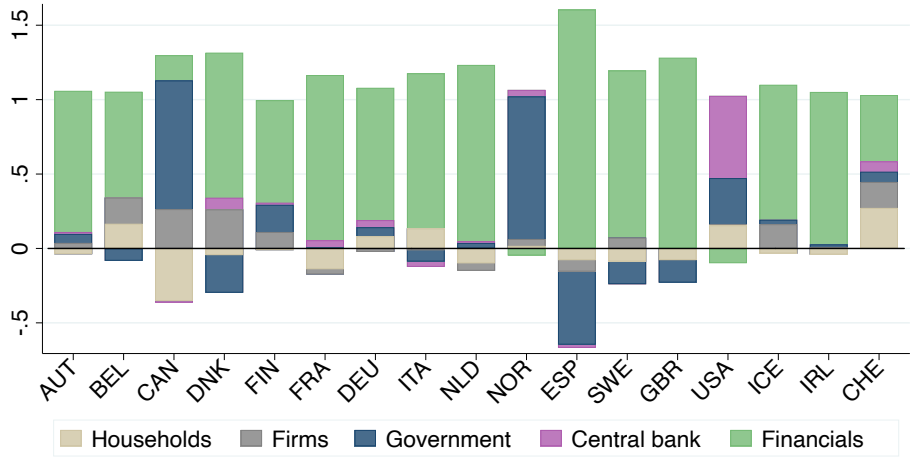
sector issues 17 cents (most of it by the government). Appendix Table A.6 shows that not only is the financial sector a key marginal issuer for the foreign sector acquisitions, but the foreign sector is the key marginal acquirer of financial sector issuances.[9] The financial sector is a key counterpart of foreign acquisitions for most countries in our sample, as shown in Figure 4, with the notable exception of the US, where the public sector plays an important role.[10]

Table 3 provides a more detailed breakdown of these issuances across different economic subsectors and financial instruments. The sectoral shares (rows) sum to 1, while the instrument-specific shares (columns 2–4) sum to the total share of each sector (column 1). The findings highlight the significant role of domestic bank deposits and safe bonds of domestic financial institutions—particularly non-banks—as key counterparts to foreign safe-asset acquisitions. Specifically, for every $1 of net safe assets acquired by the foreign sector, domestic bank deposits increase by 51 cents and financial-sector bonds by 34 cents (19 cents of these coming from non-banks and 15 cents from banks). Note that since we are analyzing *net* safe asset flows, these higher bond flows could signify both lower bond holdings

[9]More precisely, in Table A.6 we regress the net safe-asset acquisitions of each sector on the net issuances of the financial sector to obtain a variance decomposition of the financial sector flows, and show that for each $1 of net safe assets issued by the financial sector the rest of the world sector acquires 61 cents.

[10]The finding for the US is consistent with the central role of the US dollar in the international financial system, and large foreign sector demand for US government debt (e.g., Bernanke, 2005; Bernanke et al., 2011).

Figure 4: Counterparts of foreign sector net safe asset acquisitions, individual countries



Notes: Each shaded bar corresponds to the share of the specific sector in the decomposition of net foreign-sector safe asset flows, within a specific country, obtained through regressions in (7) at country and sector level. For each country, the shares add up to 1, subject to a small residual.

Table 3: Counterparts of foreign sector net safe asset acquisitions, granular sectors and instruments

	(1)	(2)	(3)	(4)
	Total	Depo. and Cur.	MMF shares	Bonds
Domestic Economy	1.00***	0.51***	0.01	0.49***
	(0.01)	(0.07)	(0.01)	(0.08)
1) Real Sector	0.02	-0.02	0.01**	0.03
	(0.06)	(0.04)	(0.00)	(0.03)
→ Households	-0.02	-0.04**	0.01	0.01
	(0.03)	(0.02)	(0.00)	(0.02)
→ Firms	0.04	0.02	0.00***	0.02**
	(0.03)	(0.02)	(0.00)	(0.01)
2) Financial Sector	0.81***	0.47***	-0.00	0.34***
	(0.10)	(0.06)	(0.01)	(0.11)
→ Banks	0.66***	0.51***	0.00	0.15***
	(0.09)	(0.07)	(0.00)	(0.05)
→ Non banks	0.15	-0.04	-0.00	0.19**
	(0.09)	(0.03)	(0.01)	(0.09)
3) Public Sector	0.17*	0.06*	-0.00	0.11
	(0.09)	(0.03)	(0.00)	(0.09)
→ Government	0.15*	0.02	-0.00	0.13*
	(0.09)	(0.02)	(0.00)	(0.08)
→ Central bank	0.02*	0.04	-0.00	-0.02
	(0.01)	(0.03)	(0.00)	(0.03)

Notes: The shares are obtained by regressing the negative of the net safe-asset flows for each domestic sector and financial instrument on the (total) net safe asset flows of the foreign sector. The shares add up to 1 across sectors and instruments, subject to a small residual (which, for instruments, includes gold flows). Depo. and Cur. stands for deposits and currency. Standard errors clustered by country are in parentheses. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

on the asset side (e.g., via the financials selling their government bond holdings to the foreign sector), and higher bond issuances on the liability side.

Next, to provide a causal interpretation of our results, we instrument rest-of-the-world safe asset acquisitions with a proxy for safe asset demand from emerging markets not in our sample. To construct the instrument, we use data from Lane and Milesi-Ferretti (2018) on the foreign exchange reserve holdings of the following reserve-accumulating Asian countries: China, Hong Kong, Taiwan, Korea, and Singapore. We argue that these reserves are held for domestic reasons, mainly to defend the domestic currency, and thus do not respond to the safe asset demand nor supply of the real, public, and financial sectors in our OECD economies.[11] Consistently, Appendix Figure A.10 shows that higher reserve holdings correspond to lower yields on global safe assets (US Treasuries, and the average of the advanced-economy yields), in line with an outward shift in the safe-asset demand curve.[12]

This reasoning allows us to exploit changes in the foreign exchange reserve holdings of these Asian countries as exogenous variation in safe asset demand from the rest of the world to our sample of countries, i.e., a shock to ΔNSA^{RoTW}. We follow Nakamura and Steinsson (2014) and Guren et al. (2020) who use the interaction between local elasticities and aggregate changes as an instrument. In our context, this approach leverages the fact that some of our advanced economies are more likely to supply safety to the reserve-accumulating Asian economies. To compute these elasticities, we estimate the sensitivity of the foreign sector net safe asset flows, ΔNSA_{it}^{RoTW}, to changes in Asian foreign reserves, ΔAR_t, using the following regression:

$$\Delta NSA_{it}^{RoTW} = \alpha_i + \alpha_t + \sum_{i \in I} \gamma_i \Delta AR_t I_i + v_{it}. \tag{8}$$

Importantly, γ_i is a country-specific coefficient, and I_i is a dummy which equals 1 for country i and 0 for all other countries. We then use the predicted values $z_{it} = \hat{\gamma}_i \Delta AR_t$ as an instrument for ΔNSA_{it}^{RoTW} in equation (5). We estimate $\hat{\gamma}_i$ using all years except the year in question, following a similar approach as in Guren et al. (2020) to avoid a mechanical relationship in the first-stage. The left panel in the Appendix Figure A.12 shows a strong relationship between the net safe asset flows of the foreign sector in our set of advanced economies and z, suggesting a strong first stage. The Kleibergen-Paap weak ID statistic for the first stage is 69.22, well above conventional thresholds for the relevance condition.

[11] Minoiu et al. (2023) use a similar identification strategy for the US.

[12] Appendix Figure A.11 shows that the US and advanced-economy aggregate rest-of-the-world sector safe-asset positions are also negatively correlated with yields, which suggests that our OLS estimates in Table 2 also primarily correspond to demand as opposed to supply movements.

Next, we run regression (7) and instrument ΔNSA^{RoTW} with changes in Asian economies' FX reserves as described above. The results are shown in Panel B of Table 3, and support those from OLS shown in panel A. For each $1 increase in (instrumented) foreign demand for safety, the domestic banking sector issues 73 cents of safe assets, and the domestic non-bank financial sector issues 33 cents, while public-sector response is not significant. In Appendix Figure A.12, we show that these findings also hold in reduced form: our instrument z is strongly correlated with safe-asset flows of the financial sector (middle panel), but not those of the public sector (right panel).[13]

In this section, we have shown that most of the increase in safe asset demand (net holdings) has been driven by the foreign sector. That is, the advanced economies in our sample have been increasingly supplying safety to both other advanced economies, and to countries outside of our sample (emerging markets). We then showed that the fluctuations in safe-asset demand of the foreign sector are met almost exclusively by financial sector issuance. These results suggest that the global saving glut (Bernanke, 2005; Bernanke et al., 2011) is an important force driving trends and fluctuations in the market for safety, and that this foreign demand for safety is strongly linked to private safe asset creation, consistent with the theory of Maggiori (2017). We next study whether these developments have implications for macro-financial outcomes.

5 The market for safety and macroeconomic instability

We have shown that the key drivers of fluctuations in the market for safety are the financial sector (main net issuer), and the foreign sector (main net acquirer). Moreover, these sectors are closely interlinked, with almost all foreign sector acquisitions being met by financial sector issuance. These dynamics may have important implications for the economy. In particular, since the 2008-09 Global Financial Crisis there has been substantial theoretical work underpinning the potential downsides of privately created safety (Stein, 2012; Gennaioli et al., 2013; Hanson et al., 2015; Caballero and Farhi, 2018; Segura and Villacorta, 2023; Castells-Jauregui, 2023; Altinoglu, 2023), and of safety-seeking capital inflows from abroad (Caballero and Simsek, 2020; Ahnert and Perotti, 2021). A mechanism highlighted in this literature relates to private safe asset creation being associated with increases in risky credit and the proliferation of low-quality loans, which back insured deposits and asset-backed securities. Motivated by these theories, we now study how foreign demand for safety (met by a private

[13]Since higher instrumented foreign sector safe asset demand (i.e., higher net *acquisitions*) is associated with higher financial sector net *issuances*, the correlation in the middle panel of Figure A.12 is negative.

supply of safety) impacts domestic risky credit and GDP growth.

To do so, we first study how different components of the financial sector balance sheet—in particular, domestic risky credit—respond to changes in (instrumented) foreign safe asset demand. Second, we build on the methodology used to study the real outcomes of domestic risky credit expansions (Mian and Sufi, 2009; Mian et al., 2017; Müller and Verner, 2023) and relate changes in foreign demand for safety to medium-term real GDP growth.

5.1 Safe assets and risky lending

We now study how the different components of the financial sector balance sheet change with foreign safe-asset acquisitions using a variance decomposition approach as in Section 4.2. Due to the nature of their business, financial intermediaries typically maintain a close balance between their financial assets and liabilities. As a result, any increase in net safe liabilities is typically matched by an increase in net risky assets. Given this, we can express the change in net safe-asset holdings by the foreign sector as follows:

$$\begin{aligned}
\Delta NSA_{it}^{RoTW} &= -\Delta NSA_{it}^{Public} - \Delta NSA_{it}^{Real} - \Delta NSA_{it}^{FI} \\
&\approx -\Delta NSA_{it}^{Public} - \Delta NSA_{it}^{Real} + \Delta NRA_{it}^{FI} \\
&\approx -\Delta NSA_{it}^{Public} - \Delta NSA_{it}^{Real} + \Delta N_{it}^{FI,Loans} + \Delta N_{it}^{FI,Shares} \\
&+\Delta N_{it}^{FI,Ins.} + \Delta N_{it}^{FI,Risky\ bonds} + \Delta N_{it}^{FI,Deriv.} + \Delta N_{it}^{FI,Oth.},
\end{aligned} \tag{9}$$

where we first replace $-NSA_{it}^{FI}$ (net safe asset issuance of the financial sector) with NRA_{it}^{FI} (net risky asset acquisitions of the financial sector), and then decompose the changes in net risky asset flows by risky financial instrument (loans, shares, insurance and pension claims, risky bonds, derivatives, and other accounts) which add up to the total ΔNRA^{FI} flows. As in (4) and (5), the share for each risky instrument is estimated by (pairwise) OLS regressions of the financial sector's net acquisition of each risky financial instrument on the (total) net safe-asset acquisitions of the foreign sector.

The results are presented in Table 4 and can be interpreted as the marginal acquisition of each risky asset by the financial sector in response to a $1 increase in foreign sector safe asset acquisitions. Panel A shows the OLS coefficients, and panel B—the IV coefficients, using changes in Asian economies' FX reserves and heterogeneous elasticities, following equation (8). For comparison, column (1) displays the coefficient for $NSA^{Finan.}$ from equation (6) (the sum of banks' and non-banks' coefficients in Table 2). In column (2) we replace $NSA_{it}^{Finan.}$ with $NRA_{it}^{Finan.}$, the net risky asset supply of the

Table 4: Foreign sector safe asset acquisitions and domestic risky assets

	Panel A: OLS							
	Financials Total		Decomposition of risky financial instruments					
	Net Safe	Net Risky	Loans	Equity	Insur.	R. Bonds	Deriv.	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta \text{NSA}_{it}^{\text{RoTW}}$	-0.81***	0.74***	0.61***	0.11*	-0.03	-0.00	0.01	0.04**
	(0.10)	(0.11)	(0.11)	(0.07)	(0.02)	(0.01)	(0.01)	(0.02)
Observations	500	500	500	500	500	500	500	500
	Panel B: Instrumental variable							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta \text{NSA}_{it}^{\text{RoTW}}$	-1.06***	0.95***	0.47*	0.43**	-0.03	0.01	-0.03*	0.10**
	(0.27)	(0.27)	(0.27)	(0.21)	(0.05)	(0.02)	(0.02)	(0.04)
Observations	500	500	500	500	500	500	500	500

Notes: The number in column (1) corresponds to the financial-sector net safe asset flows for each $1 of foreign-sector net safe asset acquisitions (sum of banks and non-banks in Table 2, with a negative sign indicating higher financial sector net issuances). The shares in columns (2)–(8) are obtained by regressing the net risky asset acquisitions (in total and by instrument) of the financial sector on the total net safe asset acquisitions of the foreign sector. The shares of individual instruments in columns (3)–(8) add up to the total net risky asset share in column (2) subject to a small residual. In panel B, we instrument the foreign sector safe asset flows with changes in FX reserve holdings of Asian economies following equation (8). The Kleibergen-Paap weak ID statistic for the first-stage regression is 69.22. Standard errors clustered by country and year are in parentheses. *,**, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

intermediary sector. The coefficient estimate is very similar, but with a reversed sign: changes in safe asset acquisitions by the foreign sector are not only reflected in net safe-asset issuance, but also in net risky-asset acquisitions of the financial sector.

The results of the decomposition by risky instrument are shown in Table 4 columns (3) to (8). We find that an increase in the demand for safety by the rest of the world is highly correlated with an increase in the supply of risky loans by the financial sector. If the rest of the world acquires $1 of safe assets, net risky assets of the domestic financial sector go up by 74 cents, with additional exposure to risky loans accounting for most of this increase (61 cents). Panel B shows that for each $1 of instrumented safe-asset demand from the foreign sector, domestic risky lending increases by 47 cents. In the IV specification, we also find a sizable increase in the position in equity, indicating either increased purchases of risky equity (on the asset side) or lower equity and hence higher leverage on the liability side. Overall, these results directly link the export of safe assets to domestic risky credit expansions and other forms of financial sector risk-taking.

5.2 Safe assets and medium-term real activity

To analyze the link between sectoral safe asset flows and real activity, we follow the literature on credit booms (Mian et al., 2017), and study the medium-term relationship between sectoral safe asset flows and subsequent output dynamics by estimating

$$\Delta_3 y_{it+3} = \alpha_i + \beta^j \Delta_3 NSA^j_{it-1} + \Gamma X_{it-1} + u_{it+3}, \tag{10}$$

where $\Delta_3 y_{it+3}$ are three-year changes in real GDP between t and $t+3$, α_i are country fixed effects. X_{it-1} is a control vector that includes three lags of GDP growth, inflation, policy rate changes, and a financial crisis indicator in the baseline specification and, in more saturated specifications, it additionally includes three-year changes in net foreign assets, household and business credit relative to GDP. The coefficient of interest will be β^j for each sector $j \in \{RoTW,\ Finan.,\ Public\}$ which links subsequent output dynamics to changes in net safe asset positions of the foreign, financial, and the public sector, respectively.

The results are shown in Table 5. From column (1) we see that an increase in the net safe asset position of the foreign sector is associated with significantly lower subsequent GDP growth, even after controlling for business-cycle, inflation, and interest rate dynamics. In column (2) we additionally control for changes in net foreign assets, household credit, and firm credit relative to GDP between $t-1$ and $t-4$. The relationship between $\Delta_3 NSA^{RoTW}$ and GDP remains unchanged, indicating that our findings go beyond the dynamics associated with capital flows (and the corresponding trade balance) and domestic credit.

Table 5 columns (3) and (4) repeat these specifications replacing changes in net safe asset positions of the foreign sector with the changes in the net safe asset position of the financial sector. The results show that an increase in safe asset issuance (a decreasing net safe-asset position) by the financial sector is associated with lower subsequent GDP growth. Differently, higher issuance of safe assets by the public sector does not predict lower medium-term GDP growth (columns 5 and 6, with statistically insignificant and negative rather than positive coefficients). This relationship between changes in sector-level net safe asset positions and subsequent output dynamics is a robust pattern of the data. Appendix Table A.7 shows that results hold using 3-year cumulative net safe asset flows as opposed to changes in levels. Appendix Figure A.13 shows results from local projection (Jordà, 2005) exercises, using 1-year flows at the sector level and both country and year fixed effects as well as a rich set of controls, that confirm the dynamics described above at horizons of up to eight years.

Table 5: Sectoral safe-asset positions and subsequent output dynamics

	Dependent variable: real GDP growth$_{t \text{ to } t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Δ_3NSA RoTW$_{i,t-1}$	-0.09***	-0.06**				
	(0.02)	(0.03)				
Δ_3NSA Financials$_{i,t-1}$			0.10***	0.08***		
			(0.01)	(0.01)		
Δ_3NSA Public$_{i,t-1}$					-0.06	-0.06
					(0.04)	(0.04)
R^2	0.204	0.232	0.238	0.256	0.188	0.228
Country FE	✓	✓	✓	✓	✓	✓
Base controls	✓	✓	✓	✓	✓	✓
Additional controls		✓		✓		✓
Observations	528	528	528	528	528	528

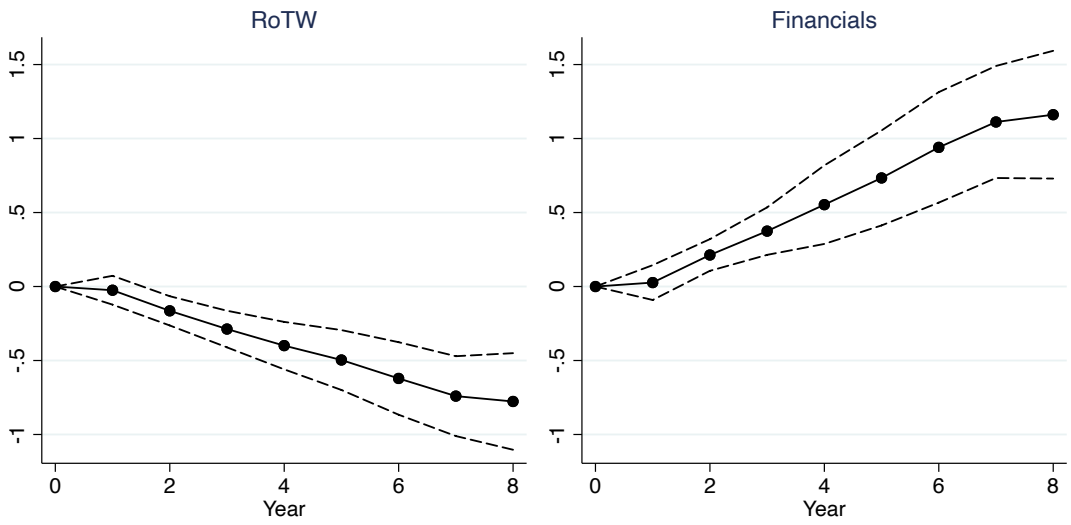
Notes: The dependent variable is the change in log real GDP between t and $t+3$. Explanatory variables (in rows) are changes in the ratio of the respective variable and GDP between $t-4$ and $t-1$. Base controls include three lags of GDP growth, inflation, short-term interest rates, and the financial crisis dummy. Additional controls include the three-year changes in net foreign assets to GDP, household credit to GDP, and business credit to GDP. Country fixed effects included. Driscoll-Kraay standard errors (5 lags) in parentheses. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

One concern in these regressions is that the results may be driven by reverse causality or omitted variables. That is, foreigners may increase their demand for safe assets when financials have increased risky credit for other domestic reasons we are omitting in the specification. To get around these issues, as before, we instrument the net safe-asset flows of the foreign sector (and here, additionally the financial sector) in our sample of advanced economies with the changes in foreign exchange reserves of Asian economies, allowing for heterogeneous elasticities in responses across countries following equation (8). We estimate the dynamic response using local projections with a rich set of controls, and leave out the observation used in the local projection (year t) when estimating the country-specific elasticity:

$$\Delta_h y_{i,t+h} = \alpha_{i,h} + \alpha_{t,h} + \sum_{s=0}^{4} \beta^j_{h,s} \Delta NSA^j_{i,t-s} + \sum_{s=0}^{4} \beta^y_{h,s} \, \Delta y_{i,t-s} + \iota_h X_{i,t} + \epsilon_{i,t}, \quad h \in \{1,..,8\}. \tag{11}$$

Above, $\Delta_h y$ is the h-year cumulative change in real GDP between t and $t+h$, α_i are country fixed effects, α_t are year fixed effects, X_{it} is the control vector including contemporaneous values and 4 lags of baseline and additional (credit and net foreign asset position) controls. $\beta^j_{h,0}$ are the coefficients of interest, that we estimate for the foreign (j=RoTW) and financial-sector (j=Finan.) safe-asset flows, both instrumented using the predicted values z_{it} from (8).

Figure 5: Net safe asset positions and future GDP growth: LP-IV



Notes: The dependent variable is the change in log real GDP between year t and $t+h$. Local projection estimates for 1-year changes in the net safe-asset rest of the world (left panel) and financial (right panel) sector position. Changes in (rest of the world, or financial sector) safe-asset positions are instrumented using changes in FX reserve holdings of Asian economies following equation (8), excluding the year for which the regression is run when estimating the country-specific elasticity. Controls include contemporaneous values and four lags of GDP growth, inflation, short-term interest rates, financial crisis dummy, changes in net foreign assets to GDP, household credit to GDP, and business credit to GDP. Country and year fixed effects included. Dashed lines are 95% confidence intervals using Driscoll-Kraay standard errors with $1.5 \times h$ lags.

Figure 5 shows the estimated instrumented regression coefficients for the foreign and the financial sector. Consistent with the OLS results in Table 5, high instrumented net safe-asset purchases by the foreign sector ($\Delta NSA^{RoTW} > 0$), and high net safe-asset issuance by the domestic financial sector ($\Delta NSA^{Finan.} < 0$) reduce medium-term real GDP growth. The effects are large and persistent, with an instrumented 1% of GDP rest of the world purchases, or financial sector issuance, associated with cumulatively 0.5–1 percentage point lower real GDP growth over the following 5–8 years.

Appendix Figure A.14 shows that these relationships continue to hold under alternative specifications. Figure A.14a shows that they hold when using the baseline set of controls (i.e., without controlling for credit growth and the net foreign asset position). Figure A.14b shows that the effects are not driven by differential exposures to macroeconomic dynamics in Asian countries (as opposed to exposures to safe asset demand): the estimates remain virtually unchanged when we control for country-specific elasticities interacted with GDP growth of the Asian economies (constructed analogously to the safe-asset demand elasticities that we use in our instrument).

Together with the results in the previous sections, our findings suggest that higher demand for safety from the rest of the world is largely met by privately produced domestic safe assets, increases

domestic risky lending, and lowers future medium-term real GDP growth. To our knowledge, these results provide the first systematic empirical evidence of the adverse macro-financial consequences of increased rest-of-the-world demand—and private sector supply—of safety.

6 Conclusions

This paper provides key insights into the role of safe assets in modern economies by studying the sectoral composition of the market for safety in an extensive cross-country sample. Analyzing harmonized financial accounts data across countries and over time points to a pivotal role of the foreign sector in driving safe asset demand, and of the financial sector in supplying privately produced safe assets. We relate our findings to macro outcomes and show that expansions in safety demand from the rest of the world, or equivalently in supply by financials, are associated with lower subsequent GDP growth and expansions in risky credit to households and firms.

Our results point to some important issues. After 2008, there has been some substitution from private to public safety through expansions in central bank balance sheets and government debt and a retrenchment in private debt issuance, which has created concerns among policymakers and academics. Our findings suggest that these public balance sheet expansions may have a positive side-effect through reducing the need for the private provision of safety, and thus ameliorate the associated negative effects on macro-financial stability. Our findings highlight important trade-offs to be considered in the design of macro-prudential regulation in advanced economies.

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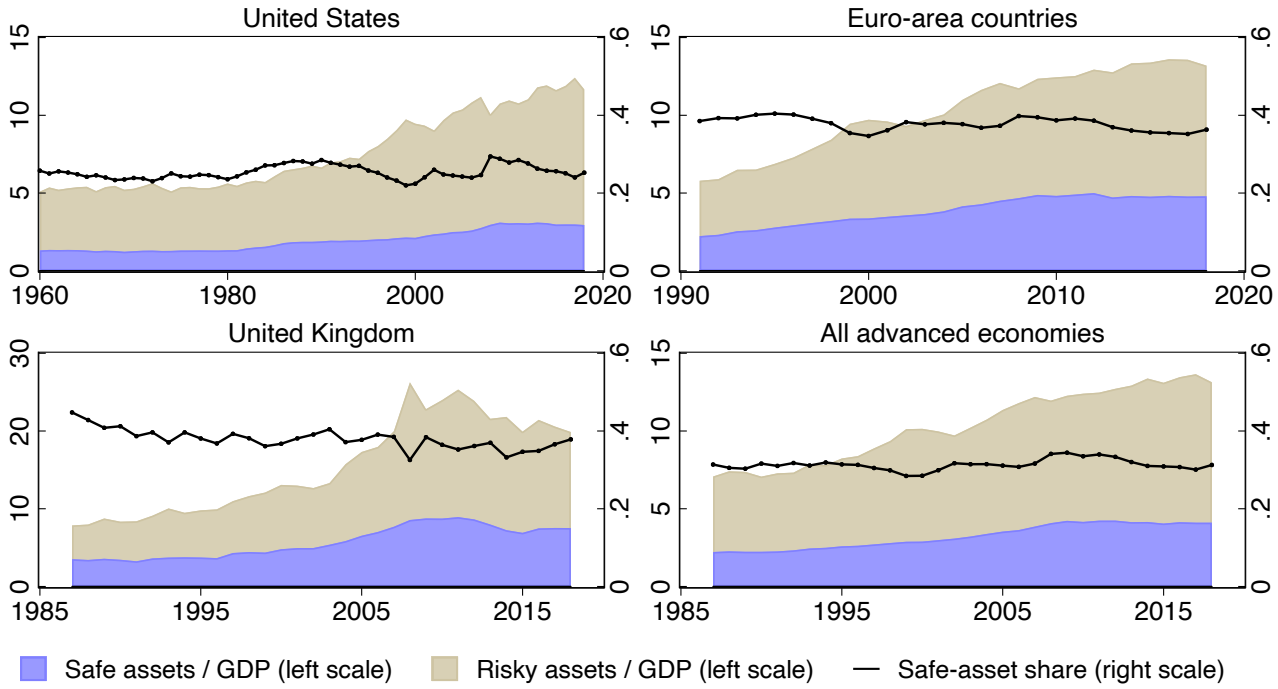
Online Appendix

A Gross positions: additional results

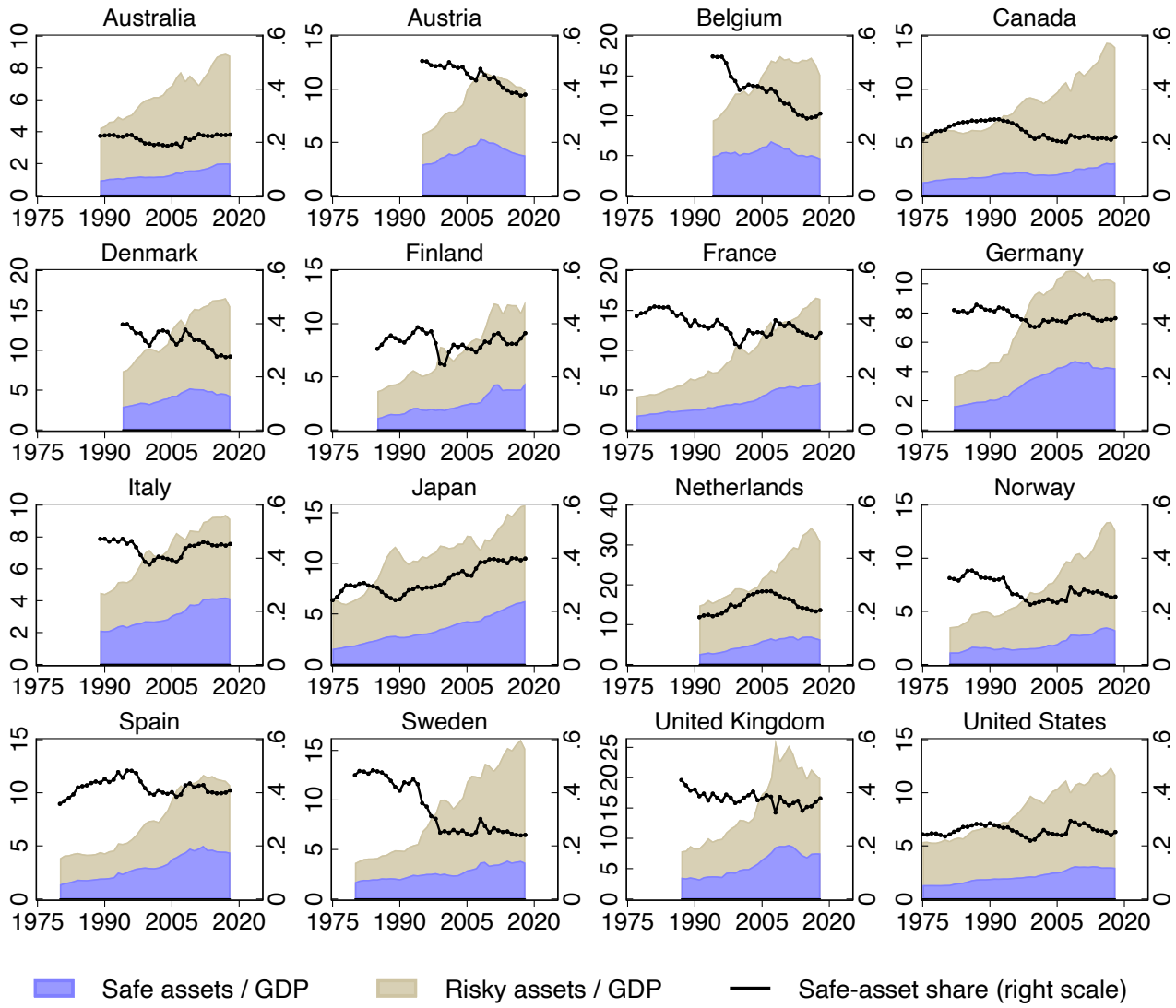
A.1 Gross safe-asset trends: additional results

Figure A.1: Safe and risky asset holdings, and the safe-asset share



Notes: Safe assets include currency, reserves, deposits, gold, special drawing rights, money market mutual fund shares, and bonds issued by governments and financial intermediaries. Risky assets are all other financial assets (equities, non-financial corporate bonds, loans, insurance & pension assets, derivatives, and other accounts). The safe-asset share is the ratio of safe to total (safe + risky) financial assets. The series for euro-area countries are the sum of Austria, Belgium, Finland, France, Germany, Italy, Netherlands, and Spain. The advanced-economy total is the sum of 16 advanced economies for which we have long-run data. The series include financial assets issued by domestic sectors and those issued abroad but held by domestic sectors.

Figure A.2: Safe and risky asset holdings in individual countries



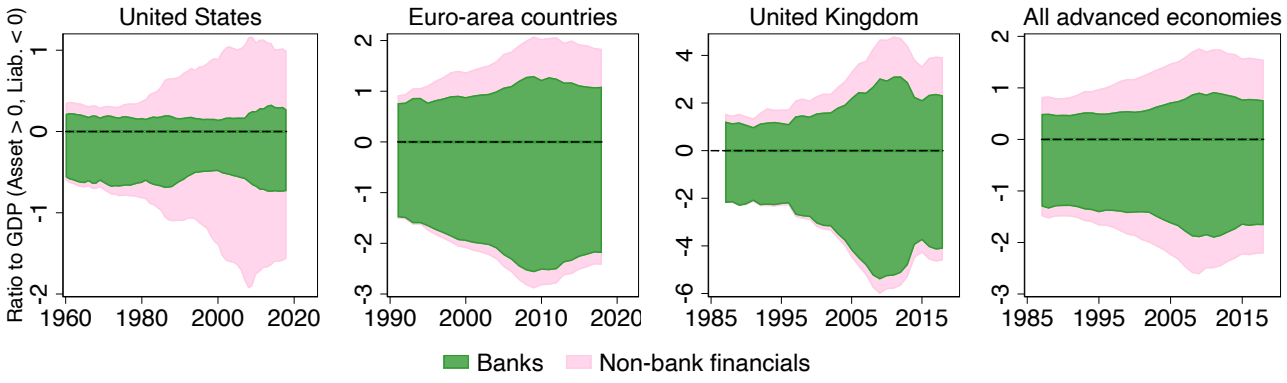
Notes: Safe assets include currency, reserves, deposits, gold, special drawing rights, money market mutual fund shares, and bonds issued by governments and financial intermediaries. Risky assets are all other financial assets (equities, non-financial corporate bonds, loans, insurance & pension assets, derivatives, and other accounts). The safe-asset share is the ratio of safe to total financial assets.

Table A.1: Gross sectoral safe-asset positions in selected years, average of 16 advanced economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Level / GDP			Change 1980–2005		Change 1980–2015	
	1980	2005	2015	Absolute	% Total	Absolute	% Total
Safe asset holdings:							
Households	0.66	0.71	0.77	0.05	2%	0.11	4%
Firms	0.14	0.22	0.28	0.08	4%	0.14	5%
Public sector	0.17	0.25	0.43	0.08	4%	0.26	9%
Financials	0.51	1.50	1.68	1.00	47%	1.17	42%
Rest of the World	0.13	1.06	1.25	0.93	43%	1.12	40%
Total	1.61	3.76	4.41	2.14	100%	2.80	100%
Safe liabilities:							
Public sector	0.38	0.68	1.05	0.30	14%	0.67	24%
Financials	1.16	2.29	2.47	1.13	53%	1.32	48%
Rest of the World	0.11	0.80	0.89	0.68	32%	0.78	28%
Total	1.65	3.77	4.41	2.12	100%	2.77	100%

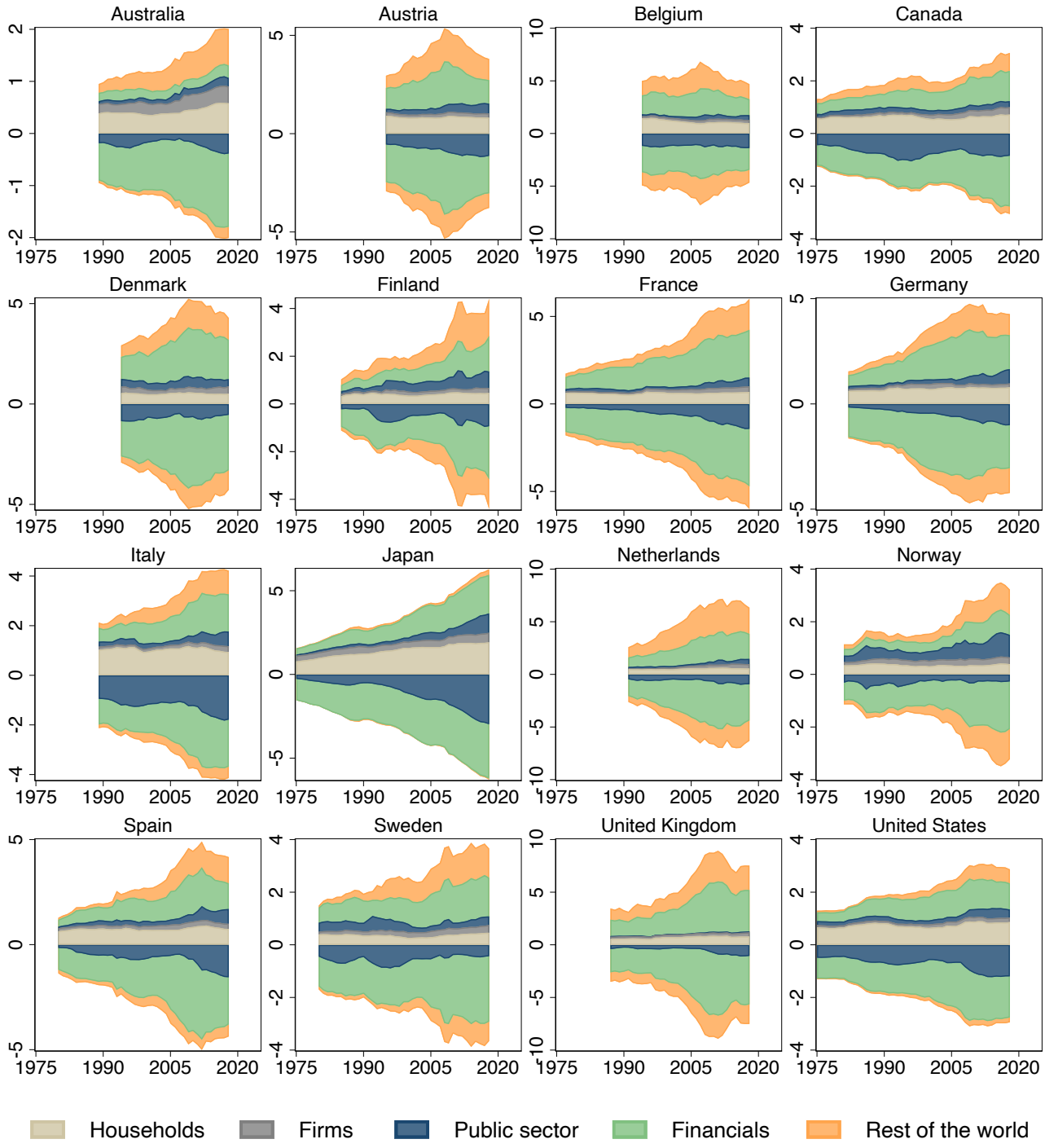
Notes: Unweighted averages of gross safe-asset positions relative to GDP in 16 advanced economies (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, UK, and the US). Absolute change is the change in the sectoral safe asset position relative to GDP. % Total change is the share of the total safe-asset position change attributable to this sector.

Figure A.3: Gross safe-asset positions of banks and non-bank financials



Notes: Gross positions are the sum of total safe asset holdings, or safe liabilities of the specific sector. Banks are deposit taking institutions, and non-bank financials are all other financial institutions (insurance & pension funds, money market funds, broker-dealers etc). Euro-area countries are the sum of Austria, Belgium, Finland, France, Germany, Italy, Netherlands, and Spain; all advanced economies are sum of 16 advanced economies.

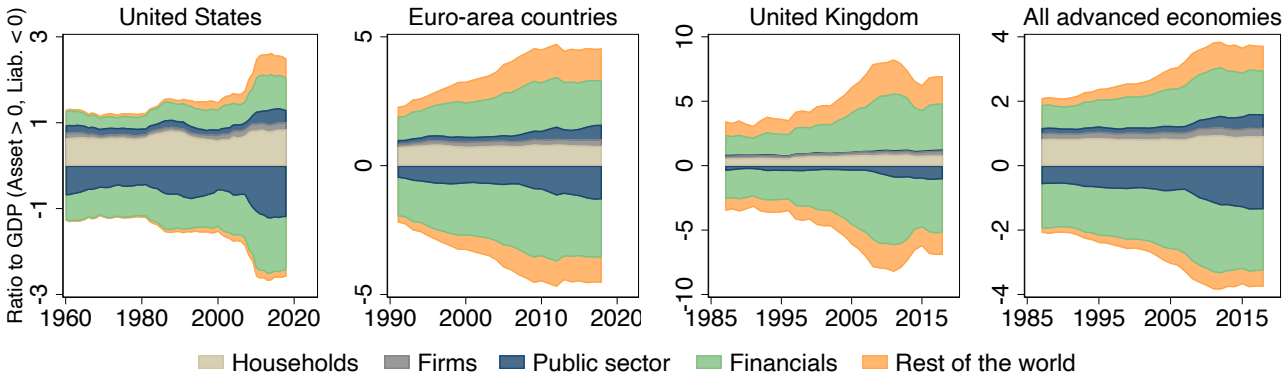
Figure A.4: Gross sectoral safe-asset positions in individual countries



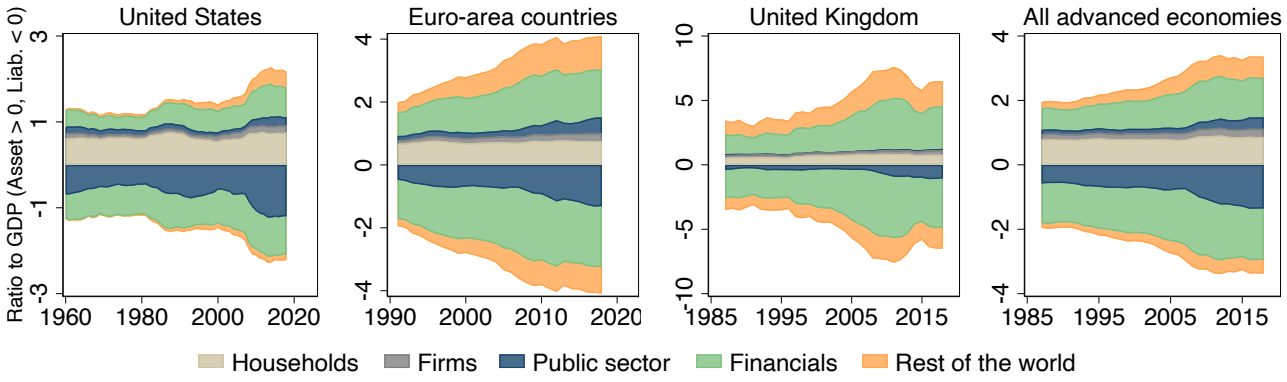
Notes: Gross positions are the sum of total safe asset holdings, or safe liabilities of the specific sector. Public sector includes central government, local government, and the central bank. Financials include both banks (deposit taking institutions) and non-bank financials.

Figure A.5: Trends in gross safe assets, alternative safe-asset definitions

(a) Classifying bonds issued by non-bank financials as risky:



(b) Classifying long-term financial sector bonds as risky:



Notes: Under the definition in panel (a), safe assets include currency, reserves, deposits, gold, special drawing rights, money market mutual fund shares, and bonds issued by governments and banks (as well as GSEs in the US). Under the definition in panel (b), safe assets include currency, reserves, deposits, gold, special drawing rights, money market mutual fund shares, government bonds, and short-term (less than 1 year initial maturity) financial sector bonds.

A.2 Gross safe-asset fluctuations: additional results

Figure A.6: Marginal holders and issuers of safe assets, individual countries

Notes: In the left panel, the shaded bars correspond to the marginal sectoral shares for fluctuations in gross safe-asset acquisitions, obtained through the regressions in (5) for each specific country and sector. In the right panel, the shaded bars correspond to the marginal sectoral shares for fluctuations in gross safe-asset issuances. The shares in each country add up to 1, subject to a small residual.

Table A.2: Marginal holders of safe assets, granular sectors and instruments

	Total	Depo.and Cur.	MMF shares	Bonds
Total Economy	1.00***	0.82***	-0.00	0.18***
	(0.00)	(0.03)	(0.00)	(0.03)
1) Real Sector	0.04***	0.05***	-0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.00)
→ Households	0.02**	0.02***	-0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.00)
→ Firms	0.02***	0.02***	-0.00*	0.00
	(0.01)	(0.00)	(0.00)	(0.00)
2) Financial Sector	0.45***	0.37***	-0.00	0.08***
	(0.03)	(0.03)	(0.00)	(0.02)
→ Banks	0.39***	0.33***	-0.00**	0.06***
	(0.02)	(0.03)	(0.00)	(0.02)
→ Non banks	0.07***	0.04***	-0.00	0.03***
	(0.02)	(0.02)	(0.00)	(0.01)
3) Public Sector	0.11***	0.09***	0.00	0.03**
	(0.03)	(0.02)	(0.00)	(0.01)
→ Government	0.02**	0.02**	0.00	0.00
	(0.01)	(0.01)	(0.00)	(0.01)
→ Central bank	0.09***	0.07***	0.00	0.02**
	(0.02)	(0.02)	(0.00)	(0.01)
4) RoTW Sector	0.39***	0.32***	0.00	0.07***
	(0.02)	(0.03)	(0.00)	(0.02)

Notes: The numbers correspond to the marginal sector and instrument shares for fluctuations in gross safe-asset acquisitions, obtained through the regressions in (5) by both sector and instrument. The shares add up to 1 across sectors and instruments, subject to a small residual (which, for instruments, includes the shares accounted for by gold flows). Standard errors clustered by country are in parentheses. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table A.3: Marginal issuers of safe assets, granular sectors and instruments

	Total	Depo.and Cur.	MMF shares	Bonds
Total Economy	1.00***	0.83***	-0.00	0.17***
	(0.00)	(0.03)	(0.00)	(0.03)
1) Real Sector	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)
→ Households	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)
→ Firms	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)
2) Financial Sector	0.57***	0.48***	-0.00	0.09***
	(0.03)	(0.02)	(0.00)	(0.03)
→ Banks	0.54***	0.47***	-0.00	0.07***
	(0.03)	(0.02)	(0.00)	(0.02)
→ Non banks	0.03	0.01	-0.00	0.02
	(0.02)	(0.01)	(0.00)	(0.02)
3) Public Sector	0.11***	0.10***	0.00	0.00
	(0.02)	(0.02)	(.)	(0.01)
→ Government	0.01	-0.00	0.00	0.01
	(0.01)	(0.00)	(.)	(0.01)
→ Central bank	0.10***	0.10***	0.00	-0.00
	(0.02)	(0.02)	(.)	(0.00)
4) RoTW Sector	0.32***	0.25***	0.00	0.08***
	(0.04)	(0.04)	(0.00)	(0.01)

Notes: The numbers correspond to the marginal sectoral and instrument shares for fluctuations in gross safe-asset issuances, obtained by regressing the issuances of the corresponding sector and instrument on economy-wide safe-asset acquisitions. The shares add up to 1 across sectors and instruments, subject to a small residual (which, for instruments, includes the shares accounted for by gold flows). Standard errors clustered by country are in parentheses. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table A.4: Marginal holders and issuers of safe assets, alternative specifications

	(1) Households	(2) Firms	(3) Financials	(4) Public sector	(5) RoTW
Marginal buyers:					
Baseline	0.02**	0.02***	0.45***	0.11***	0.39***
	(0.01)	(0.01)	(0.03)	(0.03)	(0.02)
Controls	0.02	0.02**	0.44***	0.13***	0.39***
	(0.01)	(0.01)	(0.03)	(0.04)	(0.03)
3-year flows	0.04**	0.02**	0.43***	0.10***	0.41***
	(0.02)	(0.01)	(0.02)	(0.03)	(0.04)
Marginal issuers:					
Baseline	0.00	0.00	0.57***	0.11***	0.32***
	(.)	(.)	(0.03)	(0.03)	(0.04)
Controls	0.00	0.00	0.57***	0.13***	0.31***
	(.)	(.)	(0.04)	(0.03)	(0.03)
3-year flows	0.00	0.00	0.65***	0.09***	0.26***
	(.)	(.)	(0.05)	(0.03)	(0.04)

Notes: The numbers correspond to the marginal sectoral shares for fluctuations in gross safe-asset acquisitions (marginal holders)—obtained through the regressions in (5)—and the marginal sectoral shares for fluctuations in gross safe-asset issuances (marginal issuers) The shares in each row add up to 1, subject to a small residual. "Controls" specification controls for contemporaneous values and two lags of real GDP growth, inflation, and the short-term interest rate. 3-year flow specification uses 3-year instead of 1-year safe-asset flows. Standard errors clustered by country and year are in parentheses. *, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

B Net positions: additional results

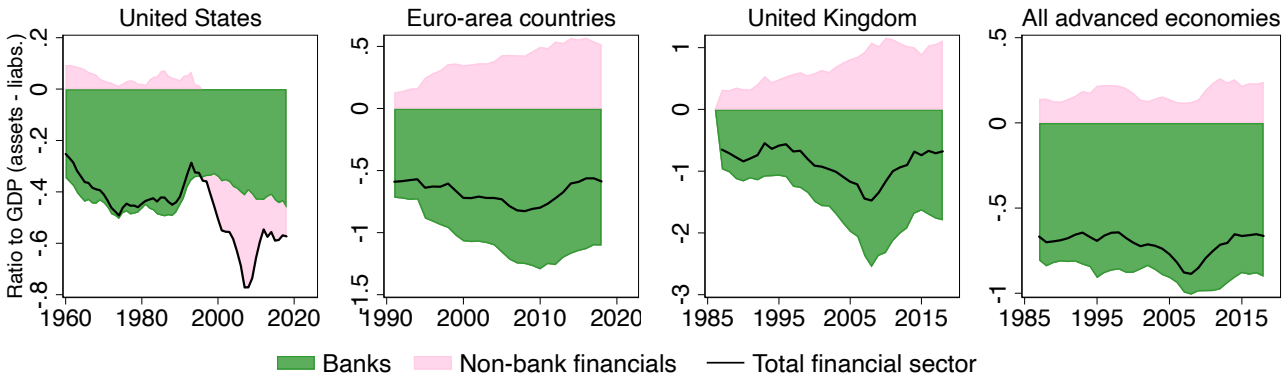
B.1 Net safe-asset trends: additional results

Table A.5: Net sectoral safe-asset positions in selected years, average of 16 advanced economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Level / GDP			Change 1980–2005		Change 1980–2015	
	1980	2005	2015	Absolute	% Total	Absolute	% Total
Positive net safe-asset position (demand):							
Households	0.66	0.71	0.77	0.05	13%	0.11	18%
Firms	0.14	0.22	0.28	0.08	22%	0.14	24%
Rest of the World	0.02	0.26	0.36	0.25	65%	0.35	58%
Total	0.82	1.20	1.41	0.38	100%	0.59	100%
Negative net safe-asset position (supply):							
Public sector	0.20	0.42	0.62	0.22	62%	0.42	75%
Financials	0.65	0.78	0.79	0.13	38%	0.14	25%
Total	0.85	1.21	1.41	0.36	100%	0.56	100%

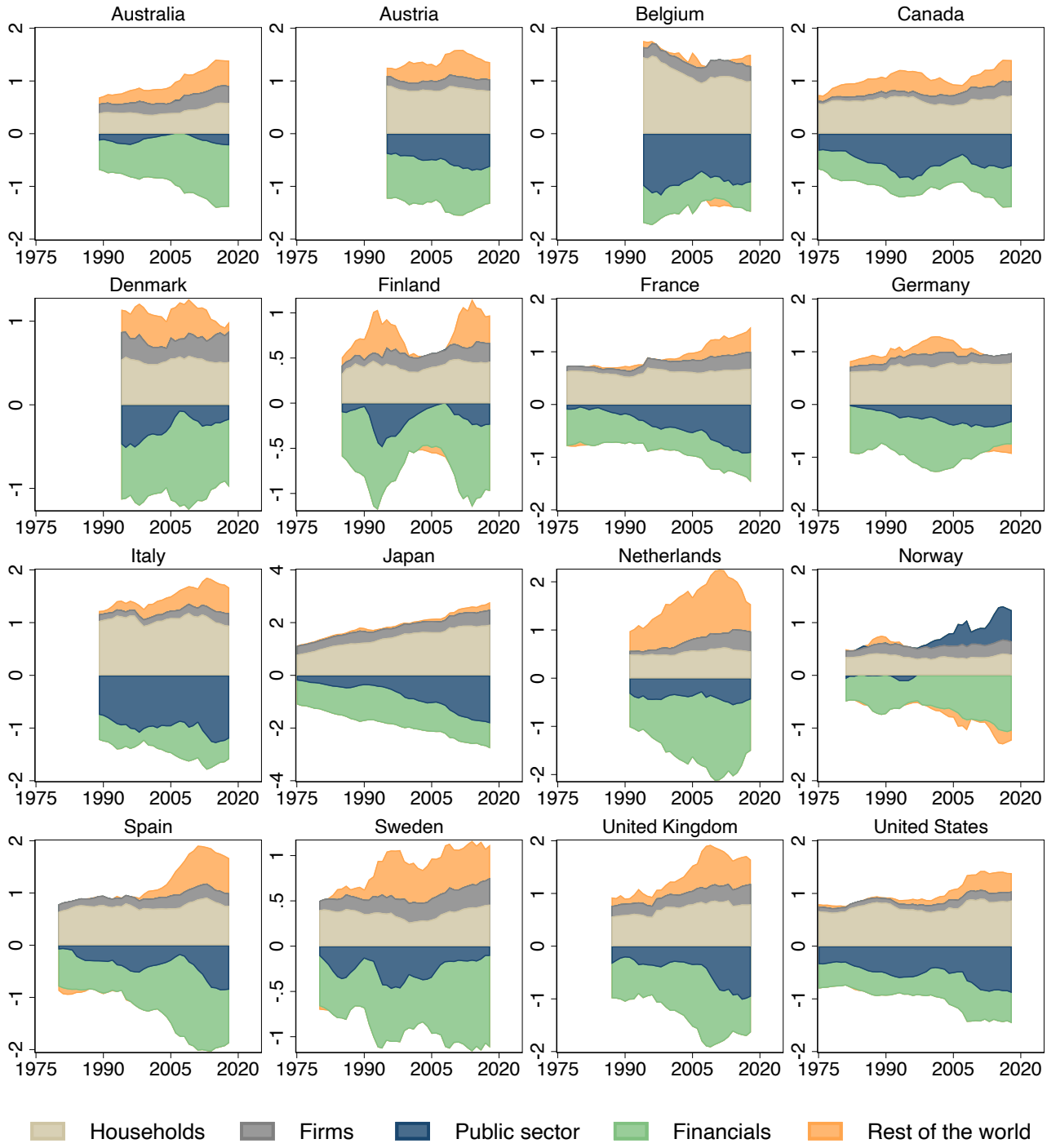
Notes: Unweighted averages of net safe-asset positions relative to GDP in 16 advanced economies (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, UK, and the US). Positive positions are shown as safe assets minus liabilities, and negative positions as safe liabilities minus assets. Absolute change is the change in the net sectoral safe asset position relative to GDP. % Total change is the share of the total change (aggregated for positive or negative net position sectors) attributable to this sector.

Figure A.7: Net safe-asset positions of banks and non-bank financials



Notes: The net safe-asset position is the difference between safe assets and safe liabilities of the specific sector. Banks are deposit taking institutions, and non-bank financials are all other financial institutions (insurance & pension funds, money market funds, broker-dealers etc). Euro-area countries are the sum of Austria, Belgium, Finland, France, Germany, Italy, Netherlands, and Spain; all advanced economies are sum of 16 advanced economies.

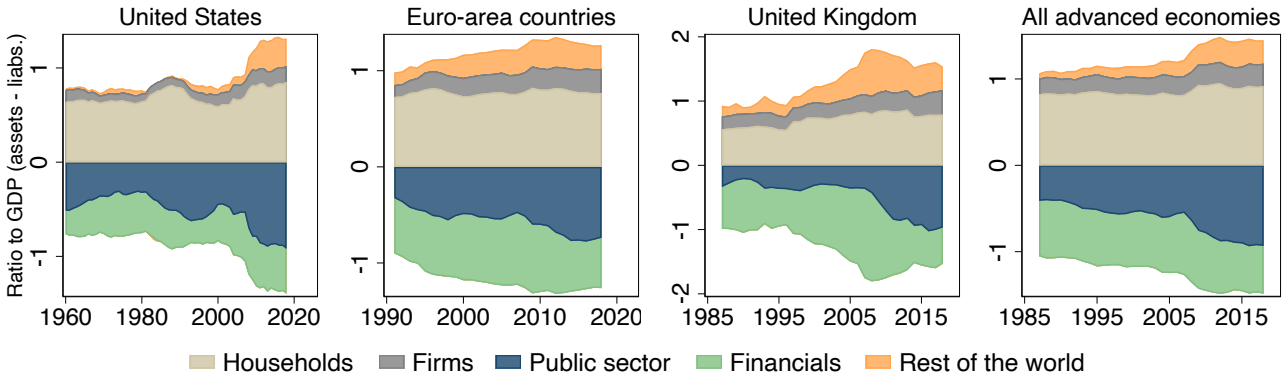
Figure A.8: Net sectoral safe-asset positions in individual countries



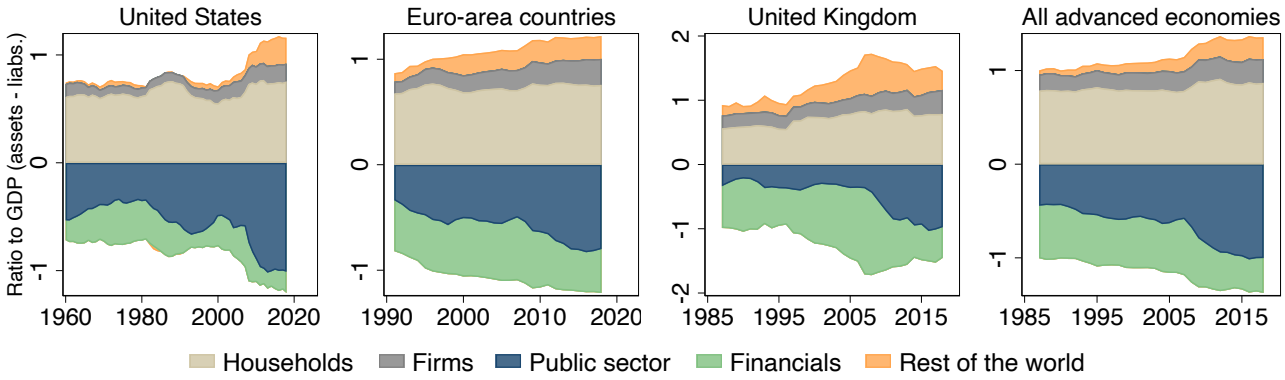
Notes: Net position is the difference between safe assets and safe liabilities of the specific sector. Public sector includes central government, local government, and the central bank. Financials include both banks (deposit taking institutions) and non-bank financials.

Figure A.9: Trends in net safe assets, alternative safe-asset definitions

(a) Classifying bonds issued by non-bank financials as risky:



(b) Classifying long-term financial sector bonds as risky:



Notes: Under the definition in panel (a), safe assets include currency, reserves, deposits, gold, special drawing rights, money market mutual fund shares, and bonds issued by governments and banks (as well as GSEs in the US). Under the definition in panel (b), safe assets include currency, reserves, deposits, gold, special drawing rights, money market mutual fund shares, government bonds, and short-term (less than 1 year initial maturity) financial sector bonds.

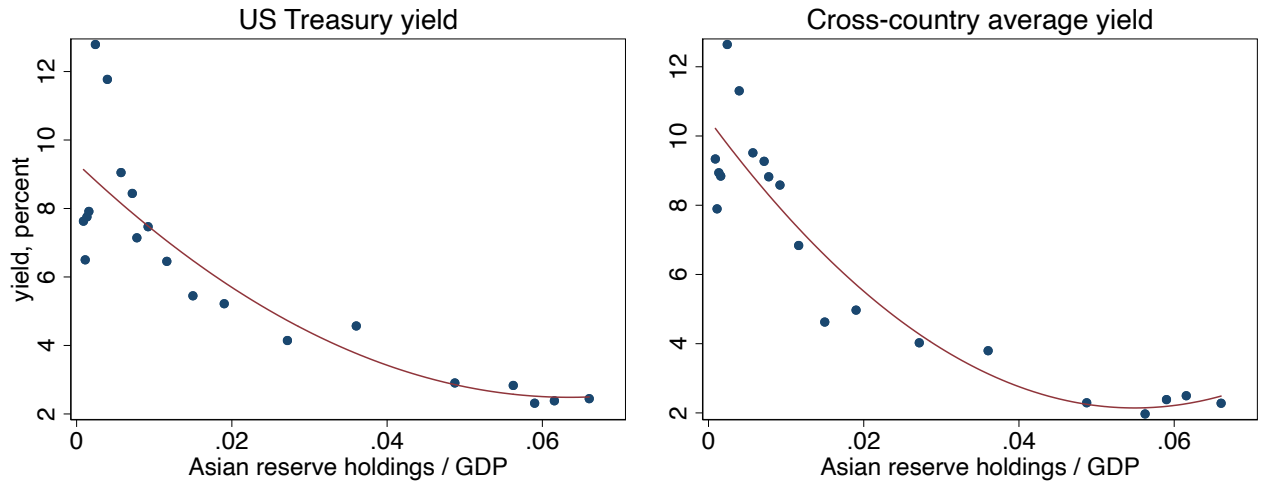
Table A.6: Counterparts of financial sector net safe-asset issuance

	(1) Households	(2) Firms	(3) Public sector	(4) RoTW
$-\Delta \text{NSA}^{\text{Financials}}$	0.15***	0.06***	0.17***	0.61***
	(0.03)	(0.02)	(0.05)	(0.07)
Observations	512	512	512	512

Notes: The shares are obtained by regressing the net safe-asset flows of the corresponding sector on the negative of the net safe-asset flows of the financial sector. The shares add up to 1, subject to a small residual. Standard errors clustered by country and year are in parentheses. *,**, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

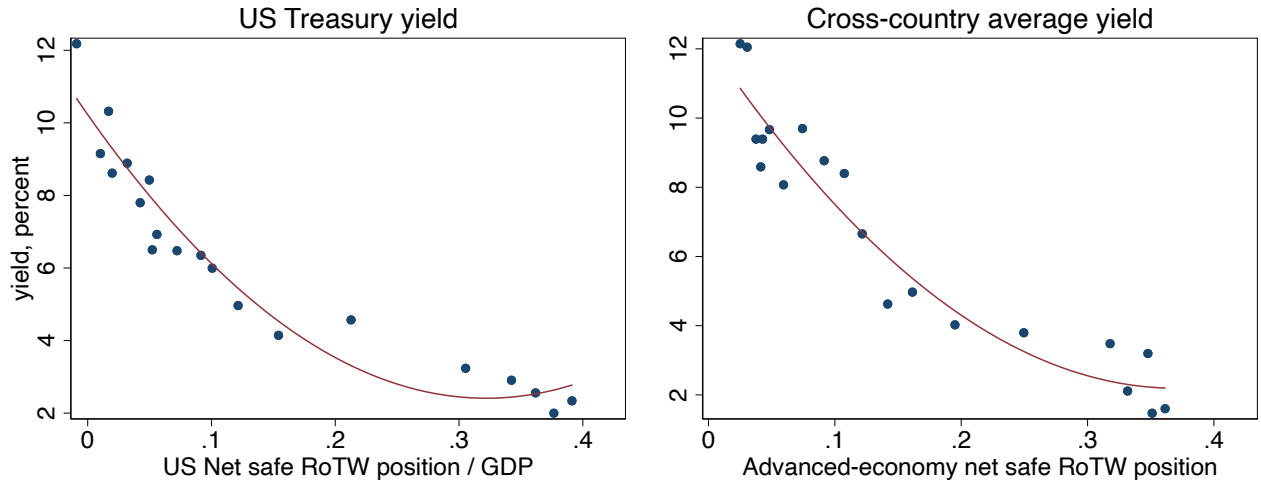
B.2 Net safe-asset fluctuations: additional results

Figure A.10: Asian reserve holdings and global safe asset yields



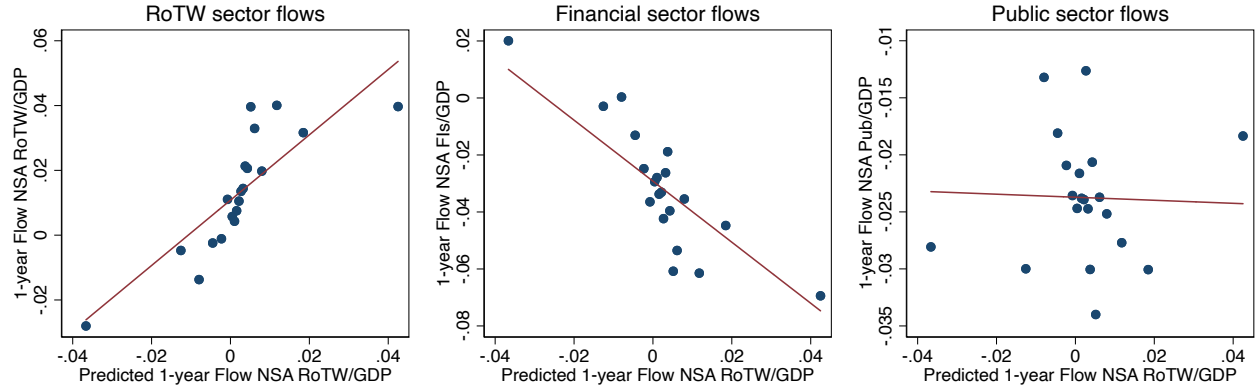
Notes: Binned scatter plots. The figure shows the relationship between foreign exchange reserves of China, Taiwan, Hong Kong, Singapore and Korea relative to world GDP (x axis), and the yields on safe government securities—the US Treasury yield in the left panel, and the yearly average of advanced-economy government bond yields in the right panel (y axes).

Figure A.11: Rest-of-the-world sector net safe assets and global safe asset yields



Notes: Binned scatter plots. The figure shows the relationship between the foreign sector net safe-asset position (x axis), and the yields on safe government securities, for the US (left panel) and the aggregate of our advanced economies (right panel).

Figure A.12: Predicted RoTW safe asset demand and sectoral safe asset flows

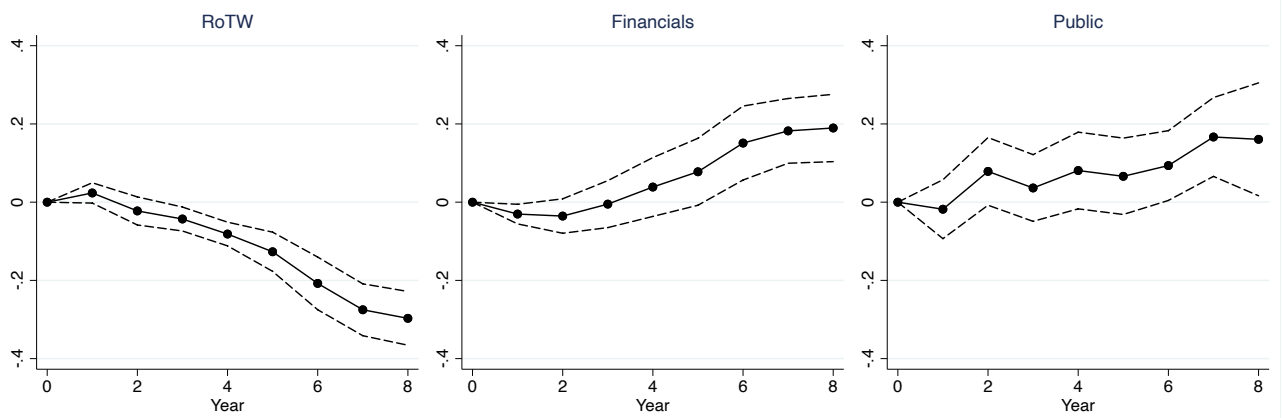


Notes: Binned scatter plots. The figures show the relationship between the predicted foreign-sector safe asset flows, calculated as changes in foreign exchange reserves of China, Taiwan, Hong Kong, Singapore and Korea relative to world GDP multiplied with the country-specific elasticity following (8) (x axis), and the net safe asset flows of different sectors (y axis). All graphs show the residual relationship controlling for country and time fixed effects.

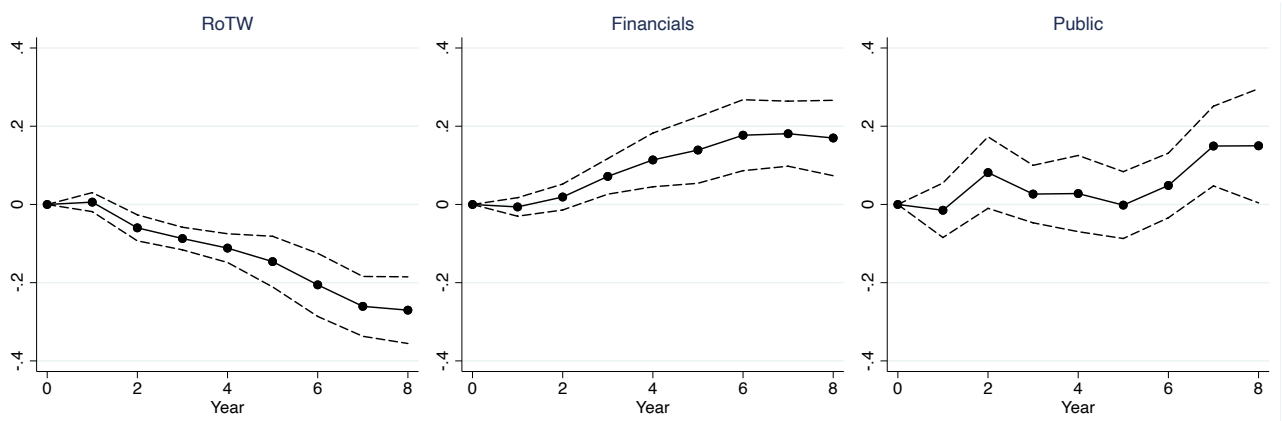
C The market for safety and macroeconomic instability: additional results

Figure A.13: Net sectoral safe-asset flows and future GDP growth: local projections

(a) Baseline controls:



(b) Additional controls:



Notes: Local projections for real GDP growth (in percentage points) at horizons $h = 1, ..., 8$ years ahead, following a 1% GDP change in net safe asset flows of a given sector. Top panel controls for current levels and four lags of GDP growth, inflation, policy rate changes and the financial crisis dummy, as well as country and year fixed effects. Bottom panel additionally includes contemporaneous values and four lags of changes in net foreign assets, household credit, and firm credit relative to GDP. 95% confidence intervals are computed based on Dricoll-Kraay standard errors (ceiling (1.5×h) lags).

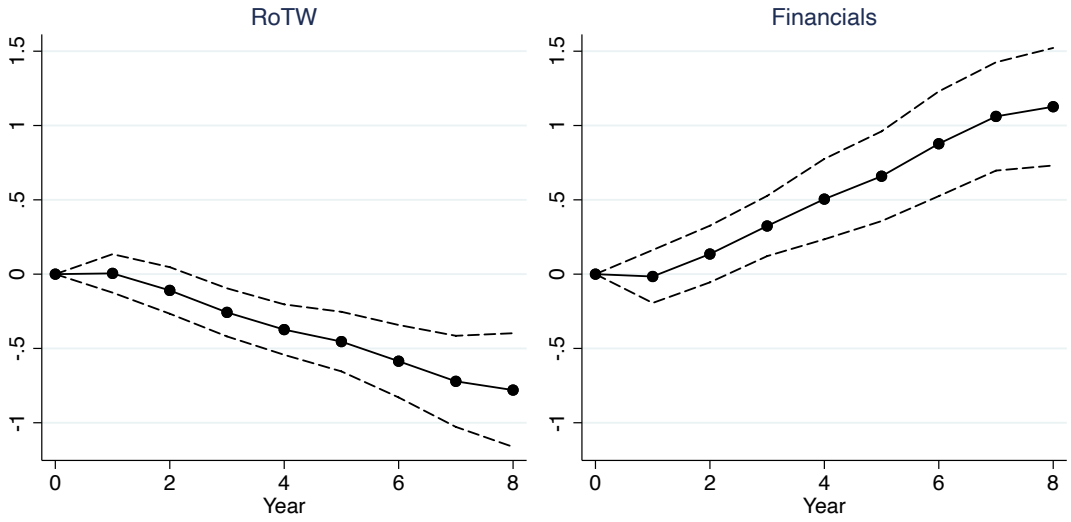
Table A.7: Net safe asset flows at sector-level and subsequent output dynamics

	Dependent variable: real GDP growth$_{t \text{ to } t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\sum_3$ NSA RoTW$_{i,t-1}$	-0.13***	-0.10***				
	(0.03)	(0.03)				
$\sum_3$ NSA Financials$_{i,t-1}$			0.13***	0.10***		
			(0.03)	(0.03)		
$\sum_3$ NSA Public$_{i,t-1}$					0.03	0.05
					(0.05)	(0.04)
R^2	0.328	0.357	0.354	0.364	0.254	0.326
Country FE	✓	✓	✓	✓	✓	✓
Base controls	✓	✓	✓	✓	✓	✓
Additional controls		✓		✓		✓
Observations	388	388	388	388	388	388

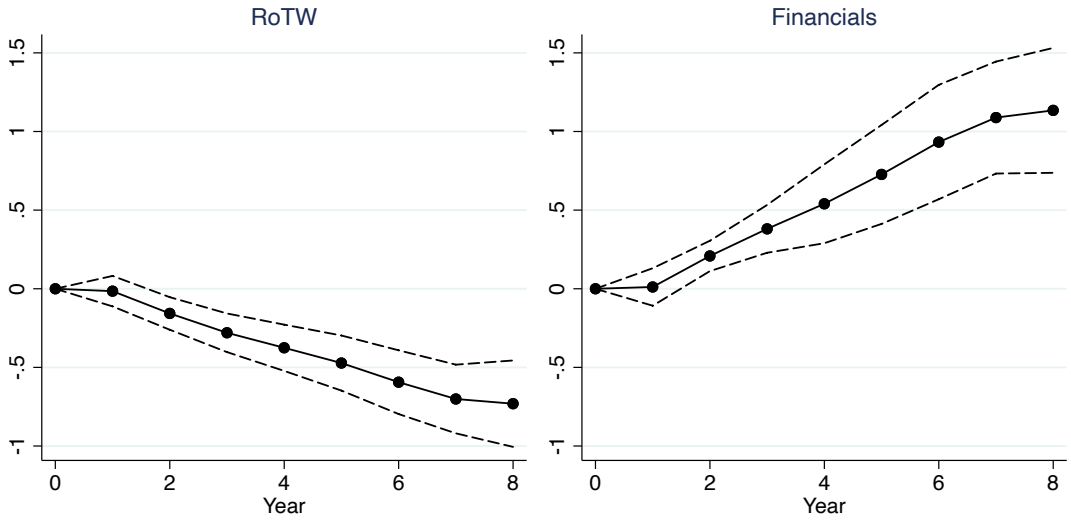
Notes: The dependent variable is the change in log real GDP between t and $t+3$. Explanatory variables are the three-year sum of sectoral net safe asset flows between $t-4$ and $t-1$ relative to GDP. Base controls include three lags of GDP growth, inflation, short-term interest rates as well as three lags of the financial crisis dummy. Additional controls include the three-year change in net foreign assets to GDP, household credit to GDP and business credit to GDP. Country fixed effects included. Driscoll-Kraay standard errors (5 lags) in parentheses. *,**,*** indicates significance at the 0.1, 0.05, 0.01 level, respectively.

Figure A.14: Net safe asset positions and future GDP growth, LP-IV: alternative specifications

(a) Baseline controls:



(b) Heterogeneous Asian GDP growth elasticities:



Notes: The dependent variable is the change in log real GDP between year t and $t+h$. Local projection estimates for 1-year changes in the net safe-asset rest of the world (left panel) and financial (right panel) sector position. Changes in (rest of the world, or financial sector) safe-asset positions are instrumented using changes in FX reserve holdings of Asian economies following equation (8), excluding the year for which the regression is run when estimating the country-specific elasticity. The controls in panel (a) include contemporaneous values and four lags of GDP growth, inflation, short-term interest rates, and the financial crisis dummy. The controls in panel (b) additionally include contemporaneous values and four lags of changes in net foreign assets to GDP, household credit to GDP, and business credit to GDP, as well as the interaction of the country dummies with the GDP growth rate of the Asian economies. Country and year fixed effects included. Dashed lines are 95% confidence intervals using Driscoll-Kraay standard errors with $1.5 \times h$ lags.