# Interpreting Turbulent Episodes in International Finance*

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**Abstract**

We study the anatomy of the international portfolio finance network. As global financial linkages have become denser over time, cross-border portfolio equity positions have grown in importance relative to debt for Emerging markets and Advanced economies. Using the framework developed by Rey and Stavrakeva (2024), we construct a novel proxy of daily foreign investor holdings in both equity and long-term sovereign debt markets across 32 currency areas. Leveraging an instrumental variable strategy, we identify a causal effect of foreign equity ETF inflows on exchange rates and local stock market prices. Our high-frequency proxy enables us to interpret episodes of turbulence in international finance. It should prove useful to assess how persistent the current shocks to the international financial system are likely to be.

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# 1 Introduction

Movements in exchange rates and asset prices are first-order issues for policy makers around the world. They affect the conduct of monetary, fiscal and macroprudential policies. Despite decades of empirical and theoretical research, the mechanisms through which financial-market-driven exogenous demand shocks or rebalancing in response to news affect exchange rates, equity prices and long-term yields are still far from settled. This question has gained renewed relevance in the wake of recent global events, such as the sizeable tariff announcements by the Trump administration, which triggered abrupt shifts in global capital flows and currency valuations.

Addressing this issue is empirically and conceptually challenging. First, there is considerable debate regarding the appropriate theoretical framework: whether to adopt a financial markets-centered perspective of FX markets or rely on more traditional macroeconomic models. Each approach typically relies on strong and often untestable assumptions[1]. Second, the literature has thus far used only the holdings of subsets of investors (especially when studying non-US investors) to measure the growth rate of investor holdings, a key variable of interest as it reflects changes in investor demand.[2] Finally, identifying exogenous demand shocks in FX markets —or isolating shifts in financial asset demand in response to news— is notoriously difficult, as these movements are often intertwined with other endogenous dynamics and expectations.

This paper tackles these challenges by building on the framework introduced in Rey and Stavrakeva (2024), which links exchange rates to asset price movements via accounting identities—specifically, market-clearing conditions. This approach builds on the spirit of the

[1]For an early contribution blending the two approaches by incorporating bond market noise traders in a macroeconomic model see Jeanne and Rose (2002). See also Itskhoki and Mukhin (2021), Kekre and Lenel (2024) and Valchev (2020)

[2]In Rey and Stavrakeva (2024), while we also use a subset of investor holdings based on the Morningstar data, we also argue that this subset of investors is representative. Koijen and Yogo (2020) uses the CPIS data like us but focuses on yearly changes and assumes a strongly parameterized demand system. Gourinchas et al. (2022), Greenwood, Hanson, Stein, and Sunderam (2023), Jiang et al. (Forthcoming) and Nenova (2023) focus on bond markets.

literature on portfolio balance models (Kouri (1976) and Branson and Henderson (1985)) that jointly studied the behaviour of asset prices and exchange rates, assuming imperfect substitutability across domestic and foreign assets. But unlike this early literature [3], it is notably free of structural assumptions, making it particularly well-suited to empirical implementation.

The first part of the paper shows that the subcomponents of this decomposition can be reliably measured using the IMF's Portfolio Investment Positions by Counterpart Economy (CPIS)[4] dataset on cross-border asset holdings. The CPIS data captures the universe of cross border bi-lateral holdings and is the most complete existing dataset. Having established the usefulness of the CPIS data in terms of constructing the sub-components of this accounting identity, in the second part, we utilize the cross-border holdings matrix derived from CPIS, together with the same accounting identity, to develop a novel, *market prices-based* proxy for the *daily* growth in foreign investor holdings for each national stock market and long-term debt market.

We show that this high-frequency, market prices-based proxy co-moves strongly with the final investor flows of the equity ETFs, as measured by changes in shares outstanding. Using this relationship, we construct an exogenous instrument based on equity ETFs flows, which captures both exogenous demand shocks, possibly due to differences in opinions or liquidity shocks, and country-specific news. We then estimate the causal response of exchange rates and local equity market prices to a one percent increase in foreign equity investor holdings, instrumented using foreign ETF demand, cleaned from past fund performance and movements of the VIX.

[3] See also Hau and Rey (2004; 2006) and Camanho et al. (2022) who jointly model the dynamics of international equity prices and the exchange rate and Goldberg and Krogstrup (2023) who construct an Exchange Market Pressure index for a large cross-section of countries.

[4] Formerly Coordinated Portfolio Investment Survey or CPIS.

## 1.1 Summary of Results

We start by documenting the growing importance of financial linkages and, in particular, of cross-border equity financing over time. By 2023 it has overtaken fixed income as the primary channel for international borrowing and lending across the majority of countries.

Regardless of whether we use CPIS-based measures of foreign holdings or our daily market price-based proxies, we find that increases in foreign investor holdings are associated with a strong and statistically significant response in both exchange rates and local asset prices.

For exchange rates, higher foreign holdings —whether in equities or long-term debt— tend to appreciate the domestic currency, with the effect generally more pronounced in the case of fixed income markets across most countries and specifications. However, in the context of equity markets, several countries emerge as consistent outliers, notably Japan (JPY), Hong Kong (HKD), the United States (USD), Switzerland (CHF), and other currencies pegged to the USD. For these economies, an increase in foreign equity holdings is paradoxically associated with a depreciation of the domestic currency, in contrast to the general pattern. This effect, however, does not extend to their long-term debt markets, where increased foreign holdings continue to correlate with currency appreciation.[5]

When examining the effect of foreign portfolio flows on domestic asset prices —both equities and long-term government debt— we again observe a positive relationship: greater foreign holdings are associated with higher asset prices. This finding holds across both specifications, although the results are somewhat weaker when using CPIS-based measures of foreign holdings in long-term debt.[6] Importantly, for equity markets, the estimated coefficients suggest that local stock prices rise more than the domestic currency appreciates in response to increased foreign holdings. In the case of long-term government debt, higher foreign holdings lead to roughly proportional increases in both bond prices and exchange

[5]These findings for equity markets are also supported by our earlier results in Rey, Rousset-Planat, Stavrakeva, and Tang (2024) and Rey and Stavrakeva (2024).

[6]This attenuation likely reflects the limitations of CPIS data, which does not isolate sovereign debt holdings and fails to account for new issuance—an important factor in fixed income markets but less so in equities.

rate appreciation, particularly when using our market-price-based holding proxy. There are interesting exceptions due to the management of exchange rates done by some jurisdictions.

The findings for equity markets are reinforced by our instrumental variable regressions, which lend themselves to a causal interpretation. The estimated coefficients in the IV and non-IV regressions have a very similar pattern, similar sign and roughly similar magnitude for most countries.

Finally, based on our novel daily decomposition we provide an interpretation of the striking disconnect between the USD and the standard global financial cycle that we have observed since the announcement of Trump's tariffs. More specifically, the response to the Trump tariff announcement on April 2, 2025, marked a notable shift in global investment behavior, as the U.S. dollar depreciated sharply and foreign investors disproportionately reduced their holdings in U.S. equities and long-term government debt in favour of non-U.S. markets. This stands in stark contrast to prior crises like Covid-19 and the global financial crisis (GFC), where foreign investors typically sought safety in U.S. assets, increasing their demand for U.S. long-term government debt and decreasing demand for foreign equities in relative terms. The tariff shock represents a rare instance where global investors fled U.S. assets more than those of other countries, challenging the traditional "flight-to-safety" pattern.

# 2 Global Map of Equity and Debt Ownership

## 2.1 The Global Network of Equity and Debt Positions

We use the IMF CPIS dataset to map the global network of foreign ownership positions of equity and debt. Since 2001, the CPIS data have been systematically collected and are seen as the most comprehensive measure of aggregate cross-country asset holdings (see Lane and Milesi-Ferretti (2007)). We restrict the sample to 32 currencies[7] to construct a network

[7]These are AUD, BRL, CAD, CHF, CLP, CNH, COP, CZK, EGP, EUR, GBP, HKD, HUF, IDR, ILS, INR, JPY, KRW, MXN, MYR, NOK, NZD, PHP, PLN, RUB, SEK, SGD, THB, TRY, TWD, USD and ZAR, where for the TWD and RUB just the liability side exists. We added famous U.S. tax havens (CYM,

graph of global cross-border asset and liability positions for the years 2008 and 2023 (end of year).

The global networks of equity and debt ownership positions are shown in Figure 2 and Figure 3, respectively. The node sizes are proportional to the total liabilities of each borrower with respect to the rest of the world (ROW), normalised by U.S. GDP in the corresponding year. When we plot equity markets, the size reflects the equity liabilities and, similarly, for the debt positions' plots. The arrows point from the lender country to the borrower country, where the width of the arrows reflects the size of the asset position, normalised by U.S. GDP in the corresponding year.[8]

Notice that we denote countries using their currency for consistency. These networks, which focus exclusively on portfolio investments -and therefore exclude FDI, banking and trade credit-, illustrate four important stylised facts:

1. **Growing Multipolarity** In 2008, the USD, EUR and GBP were by far the biggest gross borrowers and the three most central countries/currencies in the network of equity and debt borrowing. JPY and CHF were also important gross borrowers with respect to equity markets in particular. Moving to 2023, while the USD, EUR and GBP still dominate as central borrower currencies, the three-polar world in equity borrowing has started to appear more multipolar with the growing importance of other currencies such as AUD, CAD, KRW, CNH, HKD, TWD and INR.

2. **Deeper cross-border capital markets** The size of total equity and debt liabilities relative to the US GDP has increased significantly across all countries between 2008 and 2023, with the growth in equity liabilities across all countries being particularly striking. In terms of equity borrowing, the US has significantly surpassed all other

BHS, BMU) to the USD and pegged currencies/EMU-tax havens to the EUR (DNK and AWB).

[8]To ensure comparability, the four networks shown in Figures 2 and 3 are size-invariant; that is, one dollar in positions per U.S.-GDP in the respective year is depicted using the same visual scale across all plots.

countries with the US equity liabilities relative to its own GDP increasing from 13% in 2008 to 43% in 2023.

3. **Growing importance of equity financing.** To enable comparison between Figures 2 and 3 regarding the relative importance of equity versus debt in financing, we compute the ratio of equity liabilities to total liabilities for each currency area. We then assign node colours along a green-to-red gradient: greener nodes indicate greater reliance on equity financing, while redder nodes indicate greater reliance on debt.

   One can observe a very striking change between 2008 and 2023. While in 2008 the vast majority of countries in the world borrowed primarily using debt contracts (the circles used to be more red than green), in 2023, almost all countries, including the central countries, borrowed much more using equity rather than debt contracts. This change seems to be driven by the importance of equity financing for the largest advanced countries (USD, EUR, GBP, JPY, CAD, SEK, AUD). Equity was already the dominant source of financing in most EM economies in 2008, and, if anything, its importance increased.

4. **The US and the Eurozone: from net equity creditors to net equity borrowers**. The US and the Eurozone shifted from being a net equity creditor to most countries to a more mixed position; acting as a net creditor with some and a net debtor to others. Specifically, in 2008, the U.S. and the Euro Area had positive bilateral net equity positions with 20 countries (out of 29) each (i.e. they were net equity creditors with respect to these 20 countries). In 2023, this number went down for the U.S. and more substantially for the Euro Area to 15 and 12 countries, respectively. One can see this stylized fact from the color of the network arrows and the intensity of the color, where the latter captures the magnitude of the net exposure.[9]

[9]E.g. for the U.S. net position with country $j$, we calculate $\frac{Assets^{US,j} - Liab.^{US,j}}{Assets^{US,j}}$ to construct the colour

The shift of the U.S. towards being a net equity borrower seems to be driven by advanced economies (EUR, JPY, GBP, KRW) while emerging market economies kept their status as being net equity borrowers vis-a-vis the U.S., with two exceptions (MYR, CZK). In contrast, the Euro Area transitioned from being a net equity creditor to being a net equity debtor with respect to a number of emerging countries (MYR, PLN, THB, ZAR). Last but not least, the Eurozone went from being a net equity borrower from the US to a net equity lender to the US.

## 2.2 Assets and Liabilities over Time by Region

In this sub-section, we show that the increasing importance of equity in cross border positions is a consistent trend rather than an artefact of selecting specific snapshots in time. In the Appendix, Section 7.1, we plot the time series of the total portfolio assets and liabilities, broken down by equity and debt, for each region or major investor country vis-à-vis the rest of the world, scaled by the country's GDPs.

For the U.S., this trend is illustrated in Figure 1, which shows the steady rise of U.S. cross-border portfolio assets and liabilities vis-à-vis the rest of the world. Total US assets and liabilities increased from approximately 25% and 30% of U.S. GDP in 2003 to 40% and 60%, respectively, by the end of 2023, reflecting the deepening of cross border capital markets. The rise in gross assets and liabilities is overwhelmingly due to equity. Interestingly, in EMU, ASEAN, developed Asian nations and South & Central America (Figure 14, 15, 17 and Figure 20) the gross assets increased by more than the liabilities, and it was equity that drove this trend.

gradient.

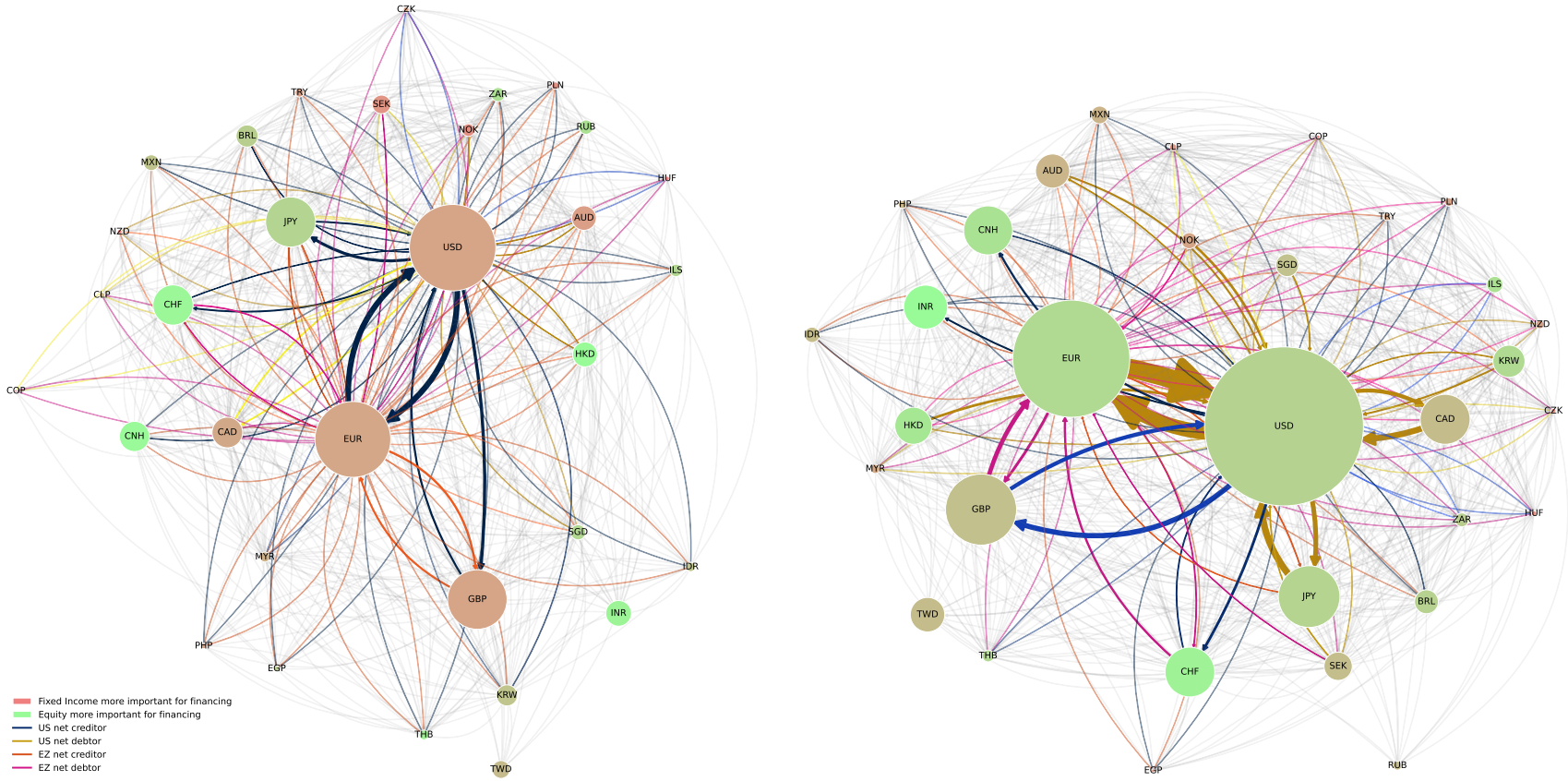



Figure 2: International Equity Positions: left = 2008, right = 2023

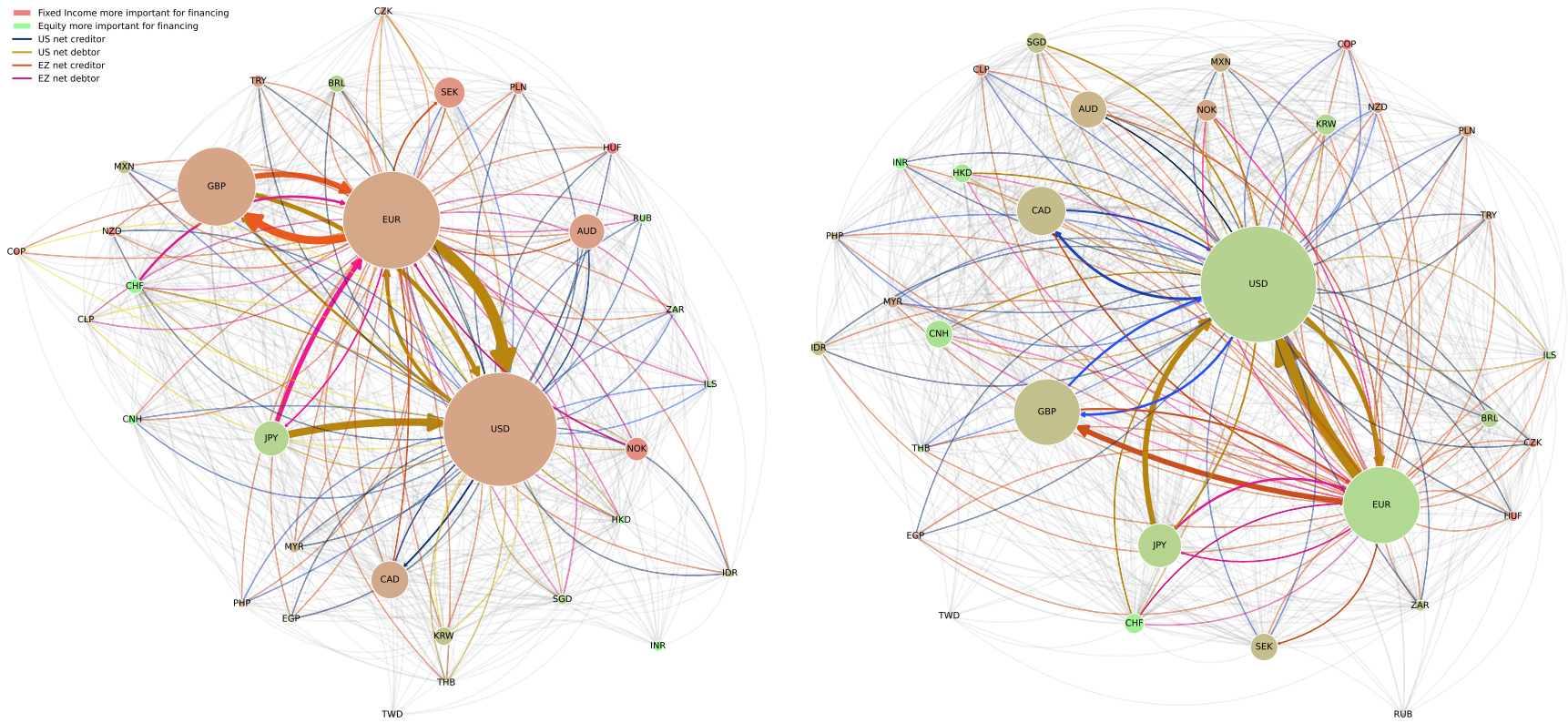
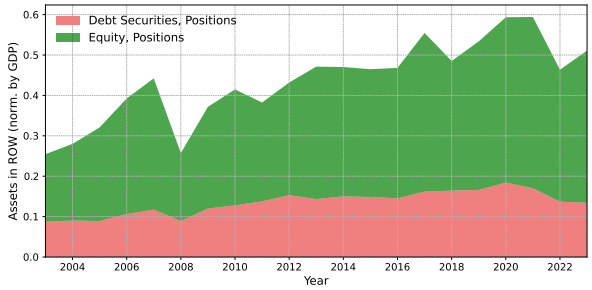
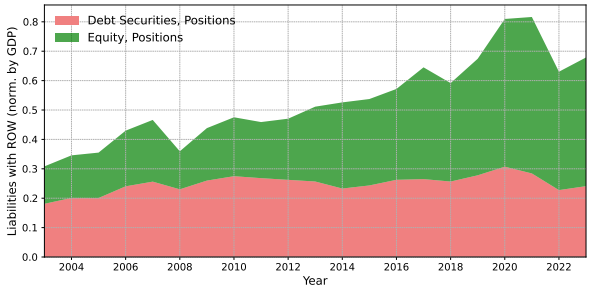



Figure 3: International Debt Positions: left = 2008, right = 2023




Assets in ROW, USD norm. by GDP




Liabilities from ROW, USD norm. by GDP

Figure 1: United States (incl. CYM, BHS, BMU)

## 2.3 The view of the recipient country

To dig deeper into the different types of portfolio financing by country, we present Figures 27 and 28 in the Appendix where we plot the importance of equity for financing against a measure for a country's total liabilities with the ROW. Specifically, for the y-axis, we calculate for each country the fraction of liabilities that are equity. For the x-axis, we take the log of total liabilities divided by the corresponding GDP and scale it to be between 0 and 1 by using observations from both years 2008 and 2023. The two panels split the sample into emerging markets and advanced economies. One can see that, especially for the emerging market groups, there appears to be a positive correlation between the total amount of portfolio liabilities of the country and the fraction of equity borrowing out of total portfolio borrowing.

Each country is plotted as a pie chart which illustrates the importance of different foreign lender countries for both equity and debt financing.[10] We can see that six countries, as denoted by their currencies, USD, EUR, GBP, JPY, HKD, SGD, make up the vast majority of financing for all countries (except INR in 2008 and HKD, where China is important). Three of them (USD, EUR, GBP) are the major sources of financing for almost all countries

[10]Specifically, a half circle is 100% total liabilities in the respective asset class.

in both asset classes. For advanced economies, the share of liabilities financed through equity tends to be lower than for EMs, but it has increased, in some cases markedly, between 2008 and 2023.

# 3 FX and Cross-Country Equity and Debt Ownership

In this section we apply the novel decomposition of equity price growth rates developed in Rey, Rousset-Planat, Stavrakeva, and Tang (2024) (RRST) and later applied to exchange rates by Rey and Stavrakeva (2024). Consider the market-clearing condition for stock market $l$ given by the following equation:

$$P_t^{l,E} Q_t^{l,E} = \sum_j S_t^{l/j} D_t^{l,j,E} \tag{1}$$

The left hand side is nominal holdings of stock market $l$, where $P_t^{l,E}$ is the price of stock market $l$ in the local currency and $Q_t^{l,E}$ is the number of shares issued in stock market $l$. The right hand side is total nominal holdings of stock market $l$ by all investors, where $D_t^{l,j,E}$ are the holdings of stock market $l$ by investors located in country $j$, denominated in the currency of country $j$. $S_t^{l/j}$ is the exchange rate defined as how many units of the currency of country $l$ are needed to buy one unit of the currency of country $j$. The exchange rate translates the holdings, which are in the investors' currency, to the local stock market currency.

We will use market cap size-weighted measures of the stock market. After linearizing equation 1 we obtain the following expression:

$$p_t^{l,E} + q_t^{l,E} = \sum_j \left( \nu^{l,j,E} \left( s_t^{l/j} + d_t^{l,j,E} \right) \right) \tag{2}$$

$$\nu^{l,j,E} = \frac{\overline{S^{l/j} D^{l,j,E}}}{\overline{P^{l,E} Q^{l,E}}}, \tag{3}$$

where small caps denote the natural logarithms of the variables. Expressing equation 2 in

changes we obtain:

$$\triangle p_t^{l,E} - \sum_{j \neq l} \nu^{l,j,E} \triangle s_t^{l/j} = \sum_j \nu^{l,j,E} \triangle d_t^{l,j,E} - \triangle q_t^{l,E}. \tag{4}$$

More specifically, the market-clearing condition determines the role exchange rates play in equilibrating equity markets (or fixed income markets, where a similar decomposition applies). For example, higher holdings of the stock market $l$ by investors in country $j$ due to an exogenous demand shock, for example, will either lead to a stronger currency of country $l$ against a basket of investor currencies or to an increase in the price of the local stock market or both, holding new stock issuance constant. In equity markets, new stock issuance or buy backs account for a small fraction of equity price volatility as shown in RRST, which is why we will assume it is second order in this paper.

A similar decomposition applies for fixed income. We will focus on long-term debt (indicated by superscript LD), and we will proxy the price of long-term debt using 10-year government debt prices. Notice that in the CPIS data long-term debt captures all debt above one year and would include both corporate and government debt. As a result, the measurement error will be larger for this asset class than for equities. Moreover, new issuance is a more important driver of fixed income asset prices, relative to equity, which will further increase the measurement error.[11] While we include the long-term fixed income market for completeness, the focus of this paper is on equity, given the growing importance of equity markets as documented in Section 2.

In RRST and Rey and Stavrakeva (2024), we construct the subcomponents of equation 4 at the monthly frequency by aggregating ISIN-level stocks to the local stock market level and use data on asset managers from Morningstar Direct, combined with a representativeness assumption. In this paper, we test the equation 4 using the CPIS data on cross-border holdings, described in Section 2, which represents the universe of cross-border holdings.

[11] Another source of measurement error is due to the fact that the 10-year government debt yields are associated with bonds with non-zero coupons, where in the conversion to long-term debt prices, we assume coupons are zero because of missing data on the coupon payments.

However, limitations with this approach include the fact that the data are only annual, and we do not observe local investor holdings. We further assume that foreign investors' funds are denominated in the local currency of the investor, which can potentially be a strong assumption for some investor countries, given the prevalence of USD funds outside of the US. This is an assumption we do not need to make in Rey and Stavrakeva (2024), since we observe the currency of issuance of the fund.

To test equation 4 with the CPIS data, we re-write it as follows:

$$\triangle q_t^{l,E} + \triangle p_t^{l,E} = \sum_{j \in \Omega^l} \nu^{l,j,E} \triangle s_t^{l/j} + \sum_{j \in \Omega^l} \nu^{l,j,E} \triangle d_t^{l,j,E} + \left( \nu^{l,l,E} \triangle d_t^{l,l,E} + \sum_{j \neq l, \Omega^l} \nu^{l,j,E} \left( \triangle d_t^{l,j,E} + \triangle s_t^{l/j} \right) \right) \tag{5}$$

where we consider only a subset of the investor countries (indexed by their currencies). Those are the key investor countries (we use the term of countries but of course the euro area contains a set of countries) as can be seen in Figure 2 in Section 2.

$$\Omega^l = \{All\ Reporting\ Countries\ in\ CPIS\} \setminus l$$

which implies:

$$\underbrace{\triangle p_t^{l,E} - \sum_{j \in \Omega^l} \frac{\nu^{l,j,E}}{1 - \sum_{j \neq \Omega^l} \nu^{l,j,E}} \triangle s_t^{l/j}}_{\triangle \widetilde{H}_t^{l,E}} = \underbrace{\sum_{j \in \Omega^l} \frac{\nu^{l,j,E}}{1 - \sum_{j \neq \Omega^l} \nu^{l,j,E}} \triangle d_t^{l,j,E}}_{\triangle H_t^{l,E}} + resid_t^{l,E} \tag{6}$$

$$\text{where } resid_t^{l,E} = \sum_{j \neq \Omega^l} \frac{\nu^{l,j,E}}{1 - \sum_{j \neq \Omega^l} \nu^{l,j,E}} \left( \triangle d_t^{l,j,E} + \triangle s_t^{l/j} - \triangle p_t^{l,E} - \triangle q_t^{l,E} \right) - \triangle q_t^{l,E}. \tag{7}$$

Since we do not observe domestic holdings as part of the CPIS data the growth rate of the domestic holdings $\triangle d_t^{l,l,E}$ minus the growth rate of the local stock market cap, $\triangle p_t^{l,E} + \triangle q_t^{l,E}$, will be a part of the residual. Given that valuation effects will be an important driver of holdings, we would expect the growth rate of domestic holdings to co-move very strongly with the local stock market price growth. As a result, this term is expected to be second order even for countries with larger home bias. The residual also includes the holdings of the

non-reporting investing countries, which we also expect to be second order. As we discussed, for equity markets new issuance would play a secondary role too. Finally, we construct the $\nu$'s based on averages over our sample period (2003-2023).

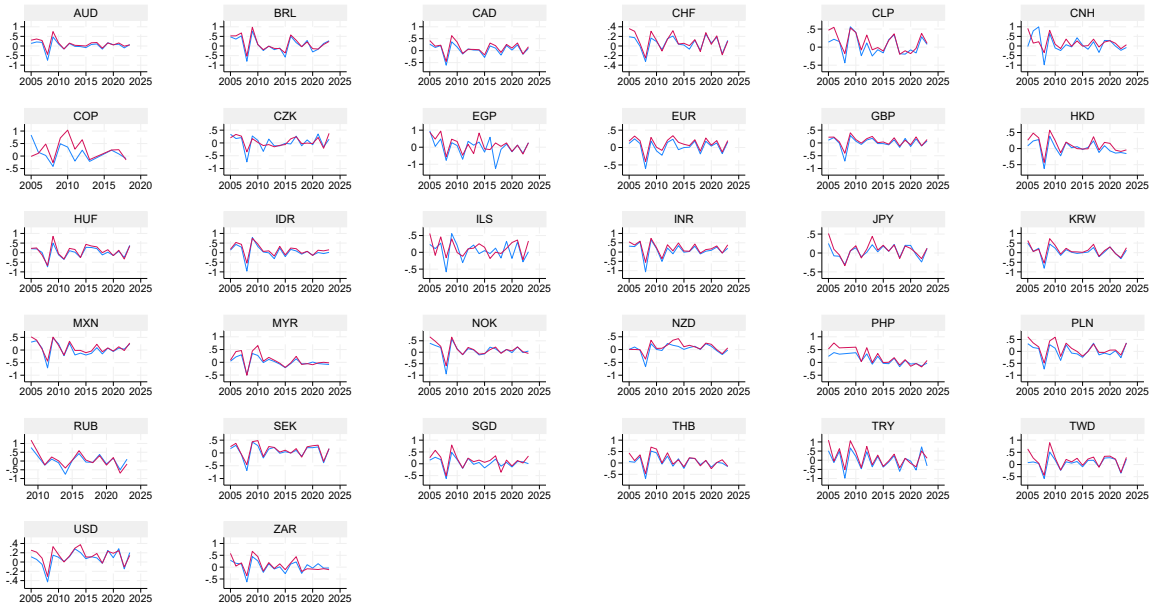
We will refer to $\triangle H_t^{l,E}$ as the growth rate of CPIS holdings, which will be based on the annual growth rate of the stock of cross country equity positions. $\triangle \widetilde{H}_t^{l,E}$ will stand for the implicit foreign equity holdings backed from prices (local stock market price growth and exchange rate growth rates), assuming the residual term, $resid_t^{l,E}$ is approximately zero. A similar decomposition exists for long-term debt, where instead of $E$ we will use $LD$ to denote the variables linked to that market.

The top panel of Figure 4 plots $\triangle H_t^{l,E}$ (red line) against $\triangle \widetilde{H}_t^{l,E}$ (blue line) while the bottom panel presents $\triangle H_t^{l,LD}$ (red line) against $\triangle \widetilde{H}_t^{l,LD}$. It's very clear that $\triangle H_t^{l,E}$ and $\triangle \widetilde{H}_t^{l,E}$ are almost on top of each other, while the relationship is somewhat weaker for long-term debt. This implies that the residual term in equation 7 is fairly small for equity markets while it is larger for long-term debt markets for a number of reasons, including a larger measurement error. In the Appendix, in Figure 4, we also provide the same graph for the case where the only investor country is the US. One can see that the fit is close to perfect for equity markets, highlighting the importance of the US as a global equity investor. However, the fit for long-term debt deteriorates significantly when we consider only the US as an investor currency.

To formally evaluate the fit, in Figure 5 we report the regression coefficients from regressing $\triangle \widetilde{H}_t^{l,E}$ on $\triangle H_t^{l,E}$, and the statistical significance from that regression. The estimated average regression coefficient is close to one for the equity case (0.92) and is always statistically significant, where the numbers range from 0.39 to 1.56. This implies that, on average 92% of the movement of the implicit foreign equity holdings backed from prices can be accounted for by the growth rate of CPIS holdings measure. With respect to the long-term debt decomposition, the average estimated coefficient is 0.33, with a minimum of -0.13 and a maximum of 1, where the estimated scaled covariances are statistically significant in all cases

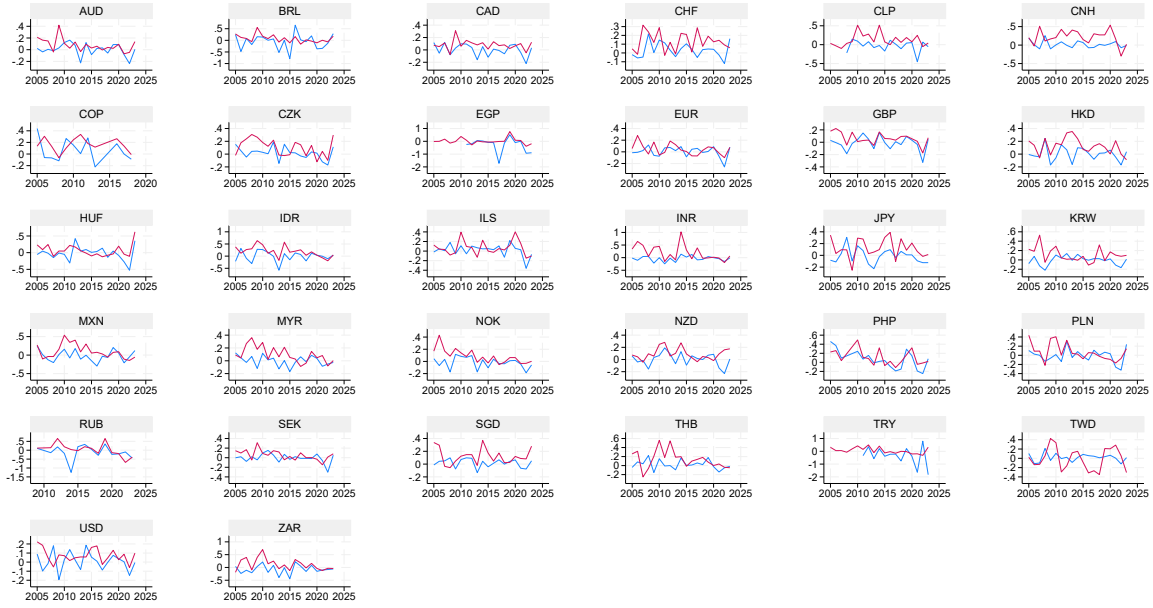
Figure 4: Broad Set of Investor Countries

Equity Holdings




Blue -- Implicit Equity Holdings Backed out From Equity Prices and Exch Rates
Red -- CPIS-Implied Equity Holdings

long-term Debt Holdings

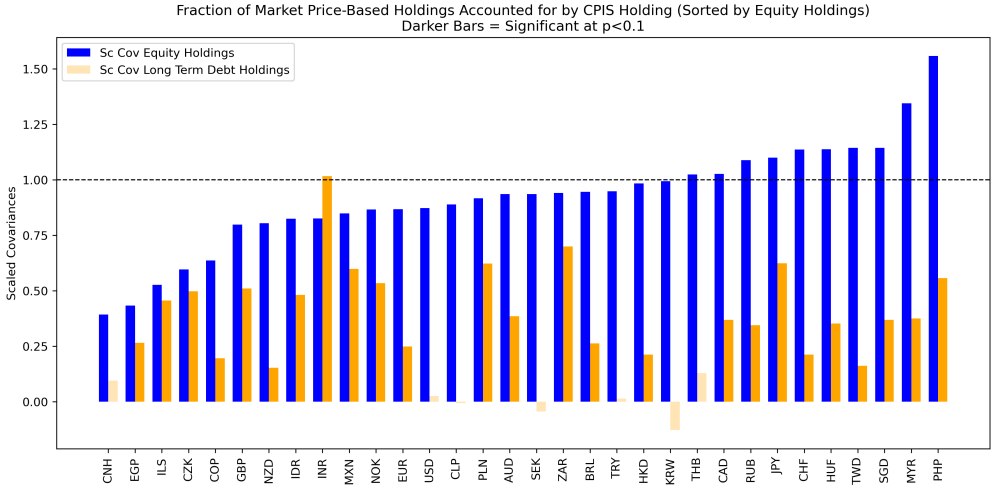



Blue -- Implicit Long Term Debt Holdings Backed out From Debt Prices and Exch Rates
Red -- CPIS-Implied Long Term Debt Holdings

but 7. Notice that in the case of the US the estimated overall scaled covariance for long-term debt is zero, but as can be seen from Figure 4, the fit has improved since mid-2015.[12]

One can potentially attribute the difference between long-term debt and equity markets to valuation effects being a much more important driver of the change in holdings in equity markets. More specifically, coupon payments are also an important driver of returns and hence, an increase in holdings. That's in addition to new issuance playing a more important role for fixed income assets and us having an imperfect measure of fixed income prices due to the reasons discussed above.

Figure 5: Scaled Covariances; Broad Set of Investor Countries



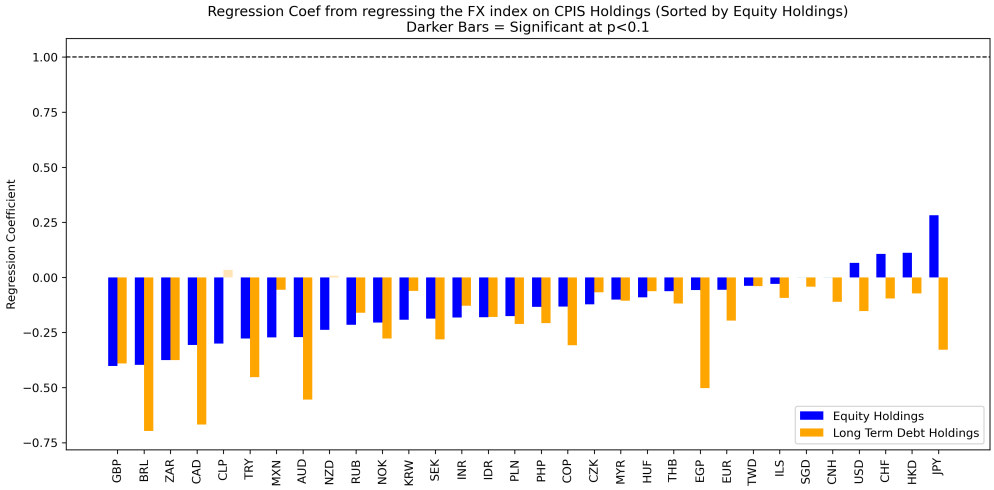

The top panel of Figure 6 reports the regression coefficient from regressing the equity-liability weighted exchange rate index, $\sum_{j \neq l} \nu^{l,j,E} \triangle s_t^{l/j}$, on the CPIS-based equity holdings measure, $\triangle H_t^{l,E}$, for the given country. It also provides the same regression coefficient for the long-term debt equivalent. Starting with equity markets, we find that an increase in holdings of the local stock market by foreigners, denominated in investors' currencies, is associated with a decrease in the equity-liability weighted exchange rate index (i.e. local currency appreciation) for all currencies but USD, JPY, CHF and the HKD, which is pegged

[12]Figure 5 reports the same results for the case where the only investor is the US.

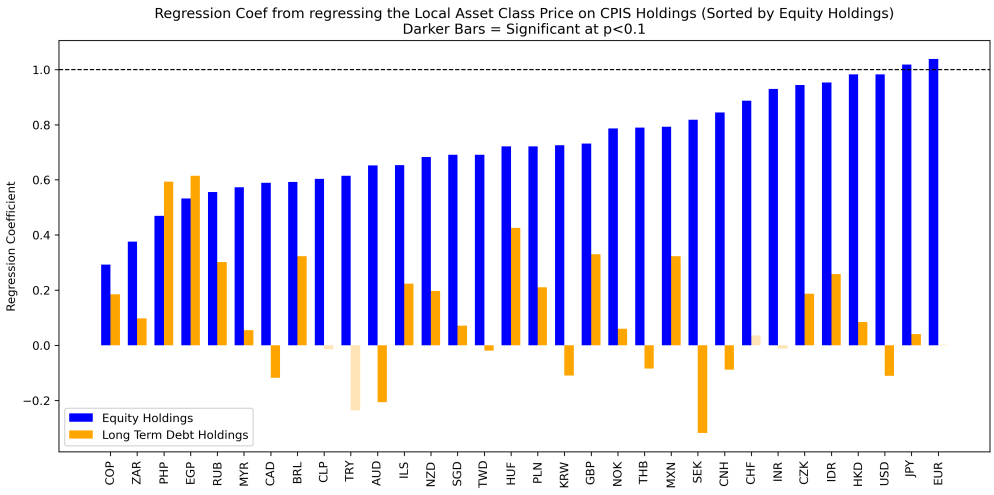
to the USD. These results confirm the findings in our previous work – RRST and Rey and Stavrakeva (2024)–, which is based on a subsample of holdings from Morningstar Direct and not the CPIS data. The estimated coefficients are always statistically significant besides for the Chinese Remnibi and the Singaporean Dollar.

Turning to long-term debt, we find that a higher holdings of long-term debt by foreigners, denominated in investors' currencies, is always associated with a stronger local exchange rate in all cases but one (CLP). The estimated correlations tend to be less negative (but statistically significant in all cases but one, CLP).

The bottom panel of Figure 6 reports the regression coefficient from regressing the growth rate of the local stock market price in local currency, $\triangle p_t^{l,E}$, on our CPIS-based equity holdings measure, $\triangle H_t^{l,E}$. It also provides the same regression coefficients for the long-term debt equivalent. One can see that the estimated coefficient from regressing the local stock market price growth on the change in foreign holdings, denominated in the investor currency, is very high for equity markets, ranging from 0.29 to 1.03, with a mean of 0.73. The estimated coefficients are also always statistically significant. Results are much more heterogeneous and less significant for long-term debt markets, where the estimated coefficients are often negative, which is in contrast to the one-directional and statistically significant relationship between the change in long-term debt holdings and the exchange rate.




FX




Asset Price

Figure 6: Broad Set of Investor Countries

Annual Changes. Heteroscedasticity-adjusted standard errors.

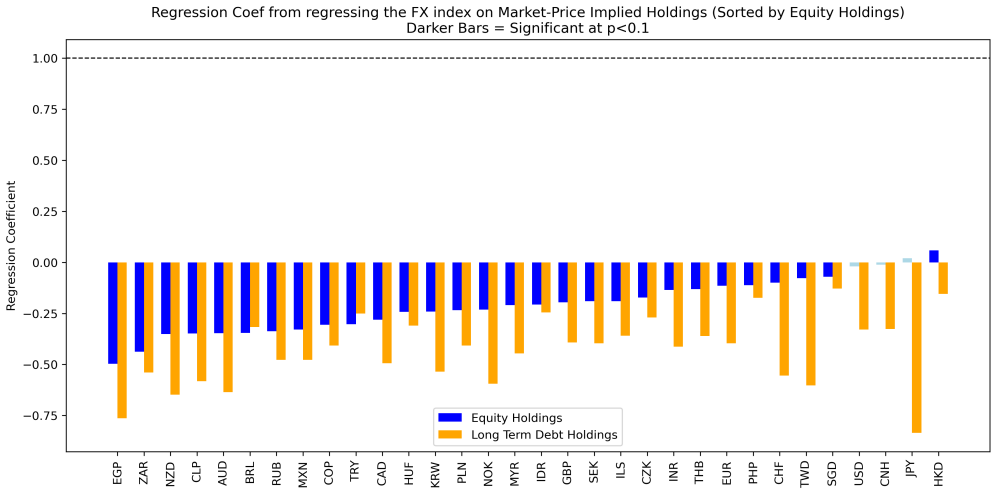
# 4 Proxies for Daily Equity and Fixed Income Foreign Holdings

In the previous section we documented a very close fit between $\triangle H_t^{l,E}$ and $\triangle \widetilde{H}_t^{l,E}$ and, to a lesser degree, between $\triangle H_t^{l,LD}$ and $\triangle \widetilde{H}_t^{l,LD}$. Therefore, in this section we proceed to construct $\triangle \widetilde{H}_t^{l,E}$ and $\triangle \widetilde{H}_t^{l,LD}$ using high frequency market price data and the same values for the network of equity and long-term debt holdings, $\nu's$, we used in the previous section and interpret this market price based measure as being a proxy for the growth rate of holdings of foreign investors, denominated in their own currency.

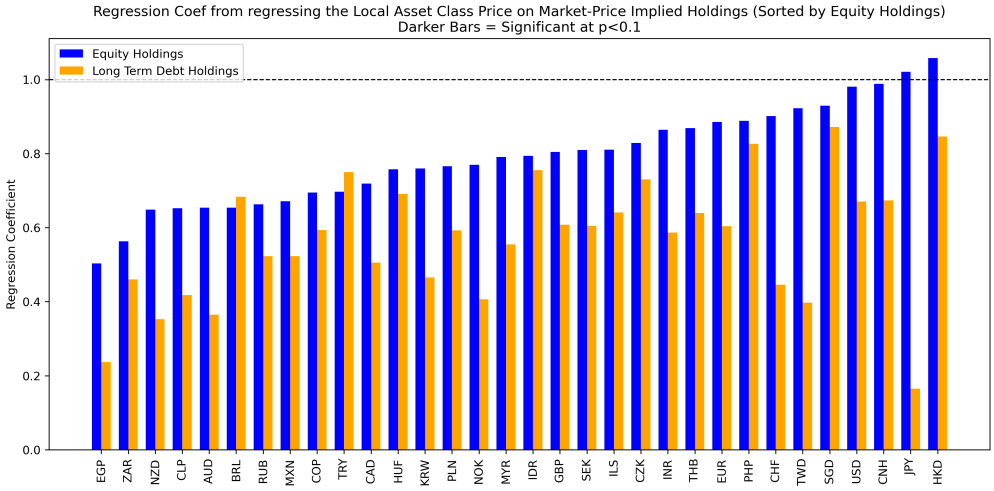
Based on this daily measure, we will first revisit the correlation between equity (or long-term debt) foreign holdings and the exchange rate indices/the local currency asset price at a higher frequency. We will focus on 30-day overlapping changes using daily data. Moreover, we will then study the causal effect of changes in equity demand on exchange rate or local currency asset price movements by instrumenting $\triangle \widetilde{H}_t^{l,E}$. The instrument is the change in demand for ETF iShare funds that is orthogonal to the VIX (i.e. one proxy for the global financial cycle and risk on/risk off episodes) and past fund performance. We will interpret the exogenous variation as capturing ETF investors' changes in demand due to investor-specific beliefs about country-specific news and exogenous demand shocks such as idiosyncratic liquidity shocks of investors,for example.

First, in Figure 7, we start by presenting the regression coefficient from regressing 30-day overlapping changes of $\triangle \widetilde{H}_t^l$ on $\triangle p_t^l$ and $\sum_{j \neq l} \nu^{l,j} \triangle s_t^{l/j}$, respectively, for both asset classes. We will further compare the estimated coefficients to the estimates in Figure 6, which are based on annual changes and a measure of foreign holdings directly observed in the CPIS data.

We find similar patterns between Figures 6 and 7 despite the fact that in this Section we use 30-day overlapping changes, rather than annual changes, and rely on market-price based proxies of foreign holdings rather than observed foreign holdings. More specifically, the set of




FX




Asset Price

Figure 7: Broad Set of Investor Countries

Overlapping 30-day regressions. Newey-West heteroscedasticity and autocorrelation adjusted standard errors.

countries for which in Figure 6 an increase in foreign investor equity holdings was associated with a currency depreciation rather than appreciation, or the results were insignificant, are JPY, HKD, CHF, USD, CNH and SGD. In Figure 7, these countries include HKD, JPY, CNH and USD. In the daily data regressions, the CHF and SGD have a slight local currency appreciation associated with higher foreign equity demand, but the estimated coefficients are fairly small. Moreover, similarly to Figure 6, we find that higher long-term debt holdings are always associated with a statistically significant appreciation of the local currency index, with a sizeable estimated coefficient for Japan.

Finally, when we focus on the link between holdings and movements in asset prices in local currencies, in Figure 7, as in Figure 6, we find that the estimated coefficients for equities are always large, positive and statistically significant. With respect to long-term debt, the estimated coefficients are still positive, but smaller in magnitude than the ones for equity, which echos the weaker link between long-term debt holdings and ten-year government bond prices in Figure 6. Recall the limitations we discussed in the previous section with respect to using the long-term debt CPIS data for the purposes of this decomposition, which can explain why our market-price-based proxy of foreign investors' long-term government debt holdings is more strongly correlated with the price of long-term government debt.

## 4.1 Instrument

In order to show the tight link between our daily market-price based measures of foreign holdings and foreign demand, in this section we present an instrument for foreign equity demand. It is constructed based on the 30-day growth rate of the BlackRock MSCI iShare ETFs' outstanding shares, where the ETFs (Exchange Traded Funds) are issued and traded primarily in the US (each ETF is country specific, see Appendix for details).[13] The iShare ETFs, associated with the MSCI index of each individual stock market, are some of the most

[13]The ETF that we use to capture the US stock market is iShares-Core-SP-500-UCITS-ETF-USD-Acc and is traded in the UK and Eurozone.

liquid and frequently traded ETFs, which also report daily data on the shares outstanding and the net asset value of the fund (i.e. the price per share). If the shares outstanding increase, it means that final investors are buying shares in the ETF and thus there are positive inflows into the ETF (the opposite is true if the shares outstanding decrease). Thus, the growth rate in the outstanding shares captures the decision of ETF investors to pick a given stock market, rather than valuation effects. Figure A.33 in the appendix presents the total net assets of these funds in USD as well as the shares outstanding.

The decision of the final ETF investor whether to invest in an ETF associated with a given stock market, is driven by many factors. For example, fluctuations in risk aversion (which is a key driver of the global financial cycle and can be proxied using the VIX – see Rey and Stavrakeva (2024)) may be important. Past performance of the ETF itself, which captures the performance of the local stock market, is another driver.

To control for these effects, we regress the 30-day growth rate of outstanding shares of a given ETF on contemporaneous and past VIX growth rates and past fund performance. We treat the residual of these regressions as a proxy for foreign equity demand that we will use to instrument the market-price based measure of foreign demand holdings. Our interpretation of this instrument is that it captures idiosyncratic beliefs of ETF investors regarding contemporaneous country-specific news (as lagged stock market performance correlates with passed news, which we control for) and idiosyncratic demand shocks due to liquidity shocks, for example, of this segment of ETF investors. This instrument therefore reflects the "idiosyncratic" demand side of the ETF market for a given country[14].

The specific regression that we run to clean the growth rate of shares outstanding from

[14]More could be done to "clean" this instrument from common factors. We leave this for future work. For the purpose of this paper, we are satisfied that this residual mainly reflects idiosyncratic country-specific demand effects.

time-varying risk aversion and past fund performance is given by:

$$\frac{\Delta \text{SharesOutstanding}^i_{t,t-30}}{\text{SharesOutstanding}^i_{t-30}} = \alpha^i + \sum_{j=1}^{4} \beta_j^{i,\text{NAV}} \frac{\Delta \text{NAV}_{t-30j,t-30(j+1)}}{\text{NAV}_{t-30(j+1)}} + \sum_{j=0}^{4} \beta_j^{i,\text{VIX}} \frac{\Delta \text{VIX}_{t-30j,t-30(j+1)}}{\text{VIX}_{t-30(j+1)}} + \epsilon^{ShOut,i}_{t,t-30}$$

where $NAV_t$ is the price of one share of the fund. The results from this regression, estimated using overlapping daily data, are reported in Table A in the Appendix. The estimated coefficient on the contemporaneous VIX growth rate tends to be almost always negative and statistically significant, implying that high VIX is associated with outflows. In contrast, the first lag of the fund past performance tends to be almost always positive and statistically significant, implying that positive lagged performance is associated with more inflows in the ETFs.

We run the following IV regression specifications:

$$\triangle p^{l,E}_{t,t-30} = \gamma^{P,l} + \zeta^{P,l} \triangle \widetilde{H}^{l,E}_{t,t-30} + \epsilon^{P,l}_{t,t-30} \tag{8}$$

$$\sum_{j \neq l} \nu^{l,j,E} \triangle s^{l/j}_{t,t-30} = \gamma^{s,l} + \zeta^{s,l} \triangle \widetilde{H}^{l,E}_{t,t-30} + \epsilon^{s,l}_{t,t-30} \tag{9}$$

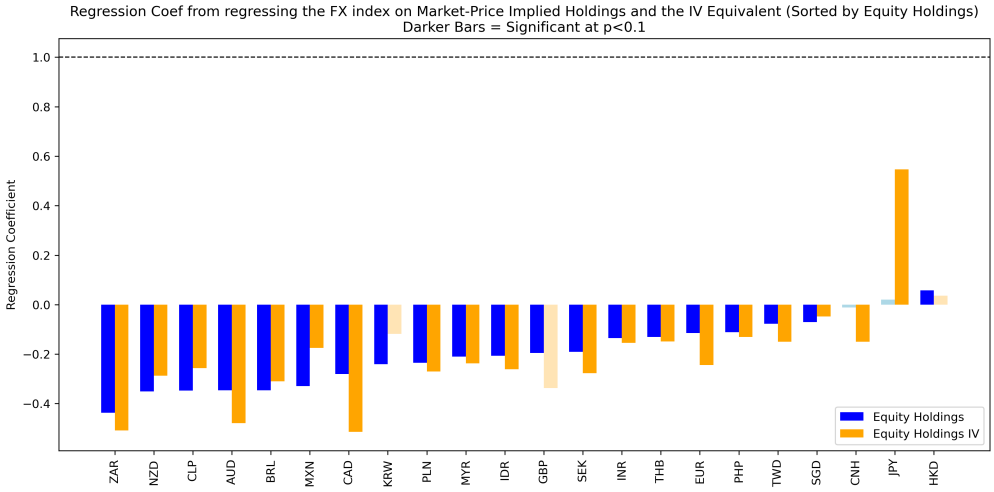
where we use the residual, $\epsilon^{ShOut,i}_{t,t-30}$, to instrument $\triangle \widetilde{H}^{l,E}_{t,t-30}$.

The results (IV and non-IV regressions) are reported in Figure 8 where we have kept only countries for which there was a positive correlation between $\epsilon^{ShOut,i}_{t,t-30}$ and $\triangle \widetilde{H}^{l,E}_{t,t-30}$ and also where the instrument is a strong instrument, i.e. the F statistics above 2. What one can notice is that the non-IV regression coefficients (the blue bars) which capture by how much the local stock market price (or the exchange rate index) appreciate in response to a one percent increase in foreign equity holdings have always the same sign and are also somewhat close in magnitude to the regression coefficients from the IV regressions (yellow bars). This is encouraging and implies that our market-based measures of holdings co-moves with asset prices in a similar way as more exogenous measures of demand, which do not contain any valuation effects. It confirms the centrality of some investor countries and the

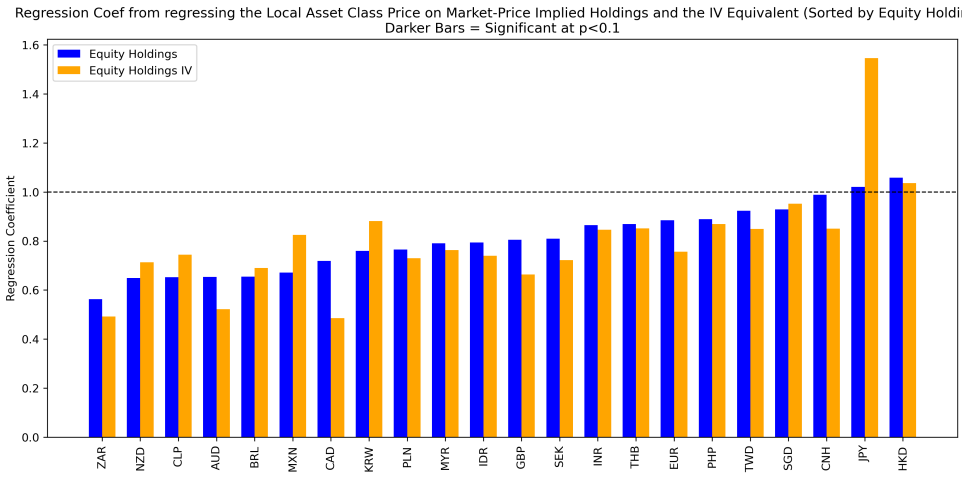
growing importance of equity in equilibrating the exchange rate markets. The three countries whose IV regression coefficients indicate the largest exchange rate appreciation (ZAR, AUD, CAD) have a high equity share in their liabilities and are mostly funded by USD and EUR investors (see Figures 27 and 28). The HKD, at the other end of the spectrum, is pegged to the USD.

JPY stands as an outlier, as it is the only country where the IV regression implies that higher equity demand by foreign investors in Japan is associated with currency depreciation (instead of appreciation) in a statistically significant way. Given the relatively higher sensitivity of the Japanese exchange rates to movements in long-term sovereign debt foreign holdings (see top panel of Figure 7) and the fact that our ETF measure of residual demand may not fully clean for country-specific news, it could be the case that inflows in Japanese equity markets by US investors due to Japan specific news coincide with outflows from long-term Japanese debt markets which leads to the depreciation of the yen.

The IV regression coefficients capture how much local stock market price growth rates and exchange rate growth rates increase in response to an increase in foreign holdings due to an increase in demand by ETF final investors located in the US (where we have cleaned the demand for a proxy of the global financial cycle, i.e. the VIX, and past fund performance). We can conclude that for all countries in our sample (besides Japan, Hong Kong and the set of countries where the instrument was weak), the equity market equilibrates in response to foreign (US) increases in demand both by an appreciation of the exchange rate and an appreciation of the local stock market price, where the impact on the local stock market price always tends to be larger than the impact on the exchange rate index. In some cases, this can be traced back to the exchange rate being managed, which has to induce a stronger price adjustment in the equity market. However, the response of both assets is almost always statistically significant.




Equity and FX




Equity and Asset Price

Figure 8: Broad Set of Investor Countries

Regression Overlapping 30-day regressions. Newey-West heteroscedasticity and autocorrelation adjusted standard errors.

# 5 The Trump Shock and the USD: a Historical Perspective

So far we have introduced a novel market-price based proxy for foreign investor holdings in both equity and long-term sovereign debt markets. We further showed that the market-price based proxy of equity holdings correlates strongly with measures of foreign equity demand using data on ETF inflows/outflows. We documented that the response of both exchange rates and local stock market prices to market price-based proxy of foreign equity holdings is very similar to the response of the same asset prices to the ETF-based demand measure, cleaned for a proxy of the global financial cycle and past fund performance.

in this section, using this apparatus, we will try to understand the sizeable and (counter-intuitive) USD movements after the Trump tariff announcement on the 2nd of April 2025. In order to provide a historical perspective, we will also look back at the Global Financial Crisis and the COVID-19 shocks.

In this section, we re-write the relationship between holdings and exchange rates, implied by equation 6 and studied in the previous sections, in relative terms as exchange rates are a relative price.

More specifically, we will plot the relative change in exchange rate indices in equity markets,
$\sum_{j\in\Omega^l} \frac{\nu^{l,j,E}}{1-\sum_{j\neq\Omega^l}\nu^{l,j,E}} \triangle s_t^{l/j} - \sum_{j\in\Omega^{USD}} \frac{\nu^{USD,j,E}}{1-\sum_{j\neq\Omega^{USD}}\nu^{l,j,E}} \triangle s_t^{l/j}$, against the change in relative foreign equity holdings, calculated based on market-price proxies, $\Delta\widetilde{H}_t^{l,E} - \Delta\widetilde{H}_t^{USD,E}$. We will also plot the relative change in holdings against the USD exchange rate, $\triangle s_t^{l/USD}$ separately. Since the US is the main investor country, the FX indices co-move very strongly with the USD, as we will see in the Graphs below. We will plot growth rates from the date of the event relative to 30 days into the future.

Finally we will present the same set of graphs for the long-term government debt markets for each event.

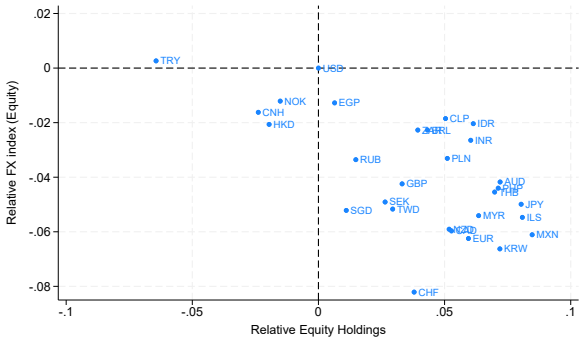
Figures 9 and 10 present the plots for the equity and long-term government debt markets, respectively. Figures 11 and 12 show the response of asset prices during Covid, while Figures A.34 and A.35 in the Appendix focus on the Global Financial Crisis.

We begin by examining the 30-day response to the Trump tariff announcement on April 2, 2025. The pronounced depreciation of the U.S. dollar observed across most currencies aligns closely with a relatively larger decline in foreign holdings of U.S. equities compared to those in other equity markets. (Here, "demand" is used interchangeably with "holdings.") Notably, the vast majority of countries fall into the lower-right quadrant of the response graph. When we turn to long-term government debt one can observe a very similar pattern. In summary, the USD depreciation against most currencies post the Trump tariff announcement can be explained by investors shifting their demand to both non-US equity markets and non-US long-term sovereign debt markets [15].

We next contrast this result to the role exchange rates played in equilibrating asset markets during COVID-19. One can see the exact opposite pattern. Most of the non-US countries observed a higher decrease in foreign equity demand relative to the US stock market, and the same was true for long-term government debt (i.e. they experienced a lower increase in demand or even a decrease in demand). As a result, the COVID-19 shock is a story of foreigners fleeing disproportionately more into US long-term government debt and disproportionately less out of US stocks.

The patterns that we observe during the global financial crisis are very similar to COVID-19.

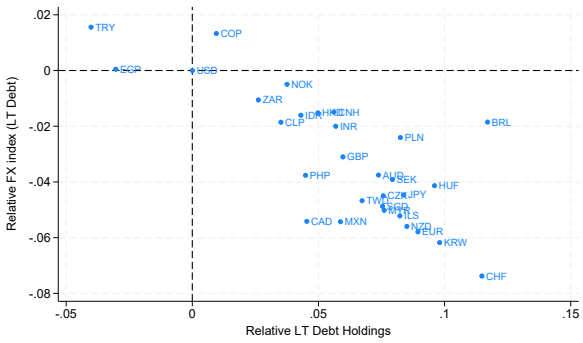
[15] This is in contrast to the predictions of conventional macroeconomic models and to the effect of Trump tariffs during his first presidency (see Jeanne and Son (2024).




Equities; FX index


Equities; FX (l/USD)

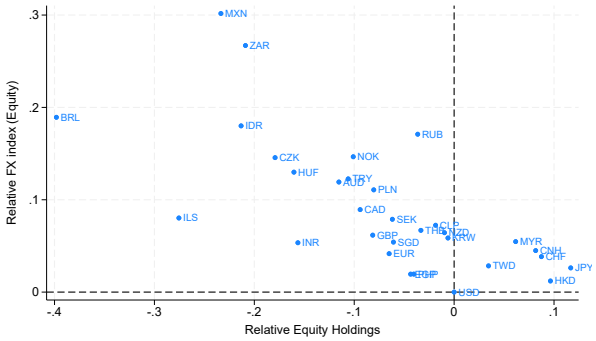
Figure 9: Trump Tariffs Effect on FX; 30 day window post announcement; 2 April 2025.[16]




LT Government Debt; FX index


LT Government Debt; FX (l/USD)

Figure 10: Trump Tariffs Effect on FX; 30 day window post announcement; 2 April 2025





Equities; FX index

Equities; FX (l/USD)

Figure 11: Covid Effect on FX; 30 day window post US closure; 5 March 2020



LT Government Debt; FX index

LT Government Debt; FX (l/USD)

Figure 12: Covid Effect on FX; 30 day window post US closure; 5 March 2020

# 6 Conclusion

We study the evolving nature of the international finance network, focusing on portfolio equity and debt. We uncover several striking facts. First, there is growing multipolarity in the international finance equity network beyond the USD, with important gross borrowing from EUR and GBP, as well as increasingly AUD, CAD, KRW. Second, we see a deepening in cross-border capital markets particularly for equity liabilities. These are good news for international financial stability. Third, the US and the Euro area have shifted over time, between 2008 and 2023, from being net equity creditors to net equity borrowers. As holdings demand for emerging or advanced economies' assets fluctuates, markets clear by adjusting both the prices of the portfolio securities and the value of currencies in a differentiated manner across countries. We study the cross section of adjustments using CPIS data on international portfolio holdings and find evidence of strong comovements between equity and debt positions and asset prices as well as exchange rates. Several currencies stand out as having different comovements, hence different hedging properties than others: USD, JPY and CHF. We then construct a high-frequency proxy of changes in holdings of equity and long-term government bonds for more than 30 countries around the world using market prices and data on cross-country asset holdings. By using an instrument for the demand side, we show that high-frequency changes in holdings affect equity and bond prices, as well as exchange rates. This set of facts calls for theories of optimal capital flow management such as the one developed for example by Jeanne and Sandri (2023). We finally use this framework to understand salient episodes of market turbulences. The 2020 COVID shock shows patterns that agree well with the role of the USD as a reserve currency. There is a relative shift into the USD equity and debt markets and appreciation of USD. There was a similar pattern after the Lehman Brothers shock, though there is also evidence of a limited shift towards Asia. This is probably because the crisis originated in the US and Asia seemed more insulated from it. The Trump tariff announcement is the first major negative shock during which foreigners fled disproportionately away from US equities relative to other countries' stock

markets. This is despite the large negative effect of the tariffs on other countries as well. Similarly, foreign investors invested more into other countries' sovereign long-term debt than into US government long-term debt, which is in stark contrast to the usual flight-to-safety channel and the role of the USD as a reserve currency. Our new high-frequency proxy should prove useful in assessing how persistent these changes in the international financial structure are likely to be.

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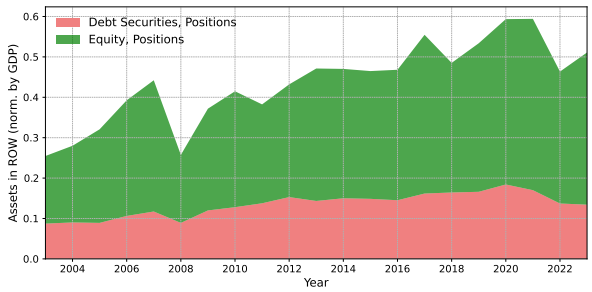
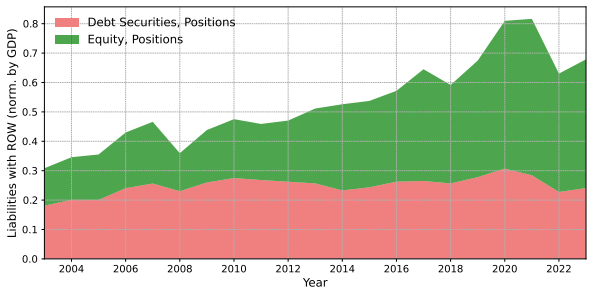
# 7 Tables and Figures

## 7.1 Asset and Liability Position by region

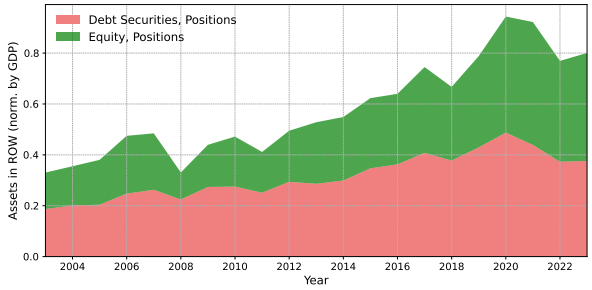



Assets in ROW, USD norm. by GDP

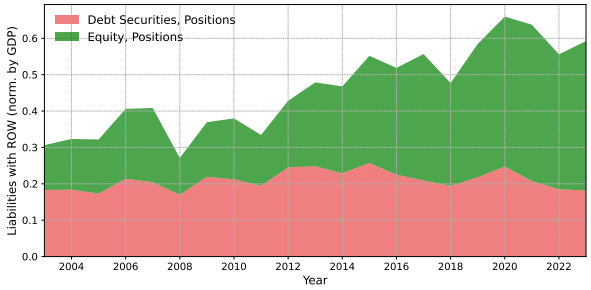



Liabilities from ROW, USD norm. by GDP

Figure 13: United States (incl. CYM, BHS, BMU)

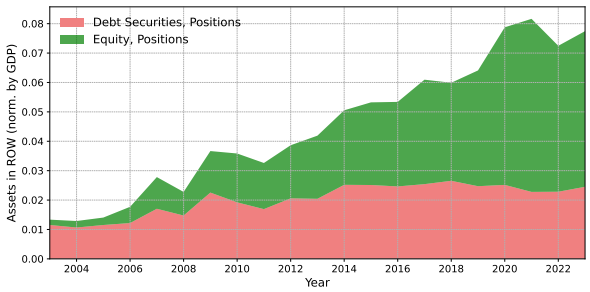



Assets in ROW, USD norm. by GDP

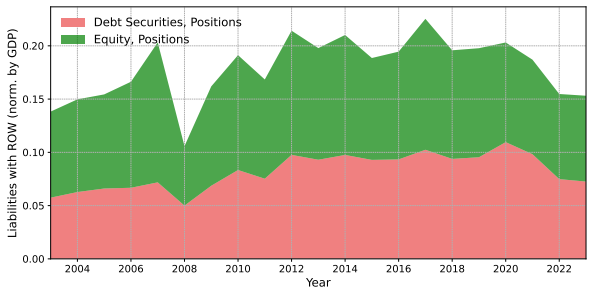



Liabilities from ROW, USD norm. by GDP

Figure 14: Euro Area+

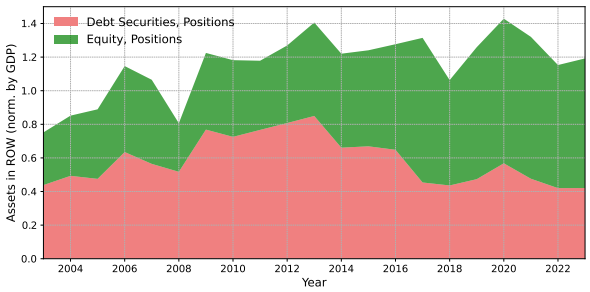



Assets in ROW, USD norm. by GDP

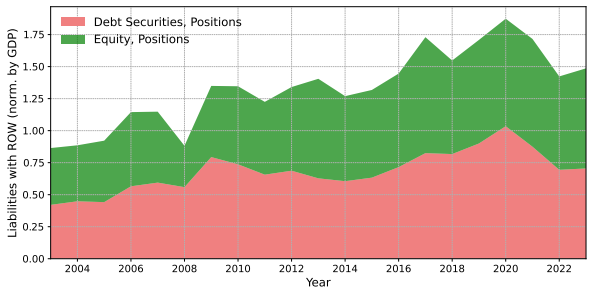



Liabilities from ROW, USD norm. by GDP

Figure 15: ASEAN

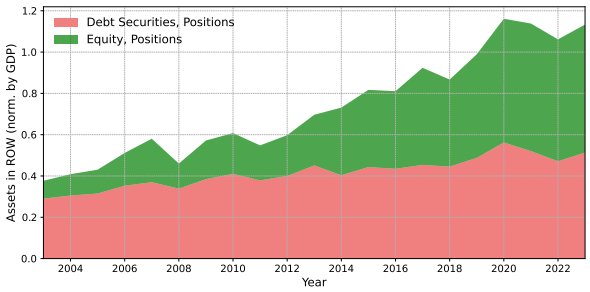



Assets in ROW, USD norm. by GDP

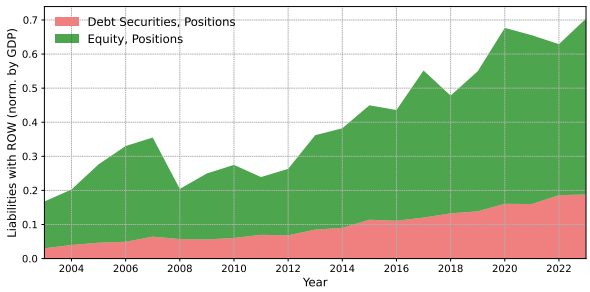



Liabilities from ROW, USD norm. by GDP

Figure 16: Great Britain

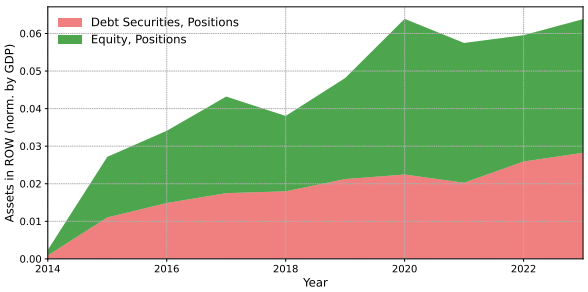



Assets in ROW, USD norm. by GDP

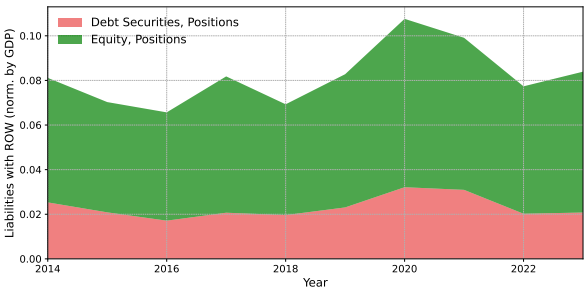



Liabilities from ROW, USD norm. by GDP

Figure 17: Developed Asian nations (JPN, KOR, SGP, HKG, TWN)

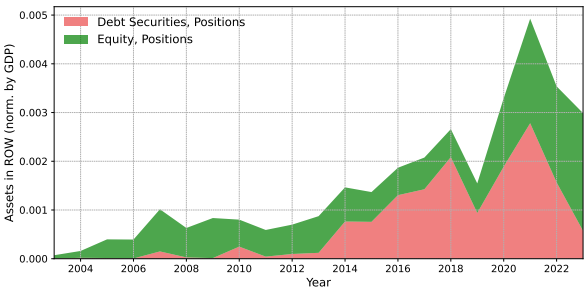



Assets in ROW, USD norm. by GDP

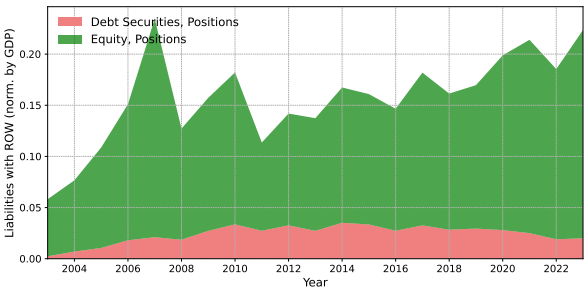



Liabilities from ROW, USD norm. by GDP

Figure 18: China incl. MAC, excl. HKG

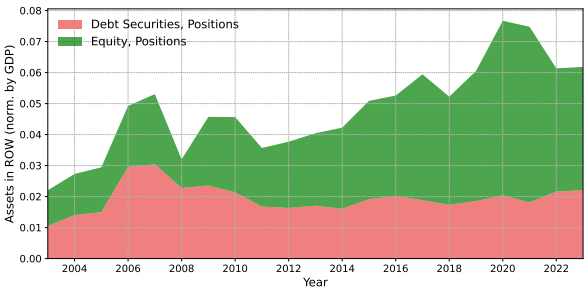



Assets in ROW, USD norm. by GDP

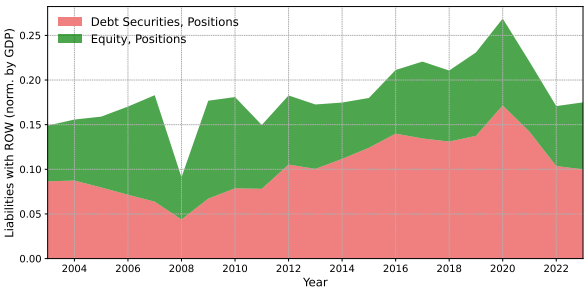



Liabilities from ROW, USD norm. by GDP

Figure 19: South Asia (AFG, BGD, BTN, IND, MDV, NPL, PAK, LKA)

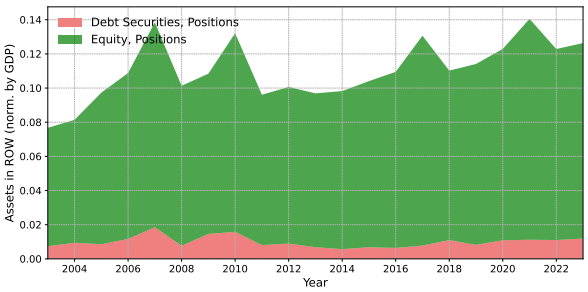



Assets in ROW, USD norm. by GDP

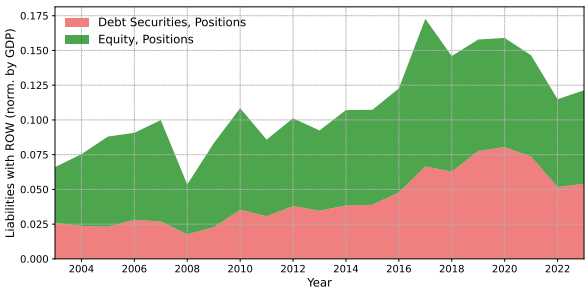



Liabilities from ROW, USD norm. by GDP

Figure 20: South and Central America excl. (CYM, BHS, BMU)

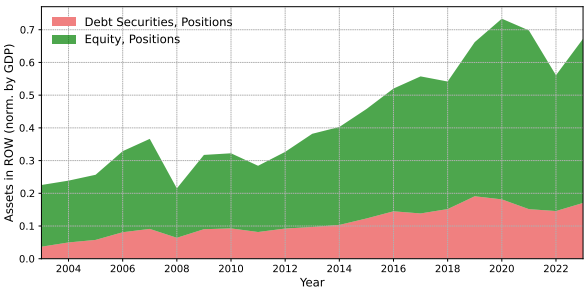



Assets in ROW, USD norm. by GDP

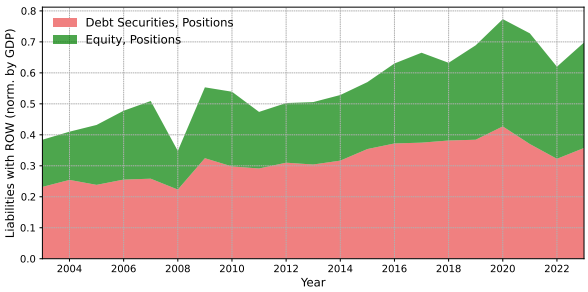



Liabilities from ROW, USD norm. by GDP

Figure 21: Africa

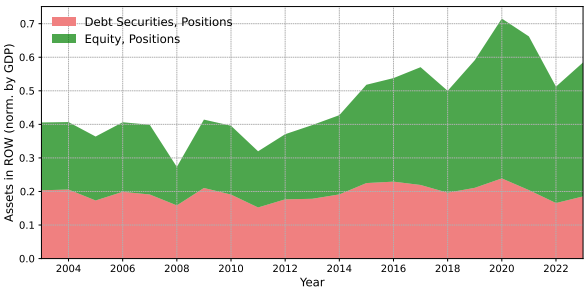



Assets in ROW, USD norm. by GDP

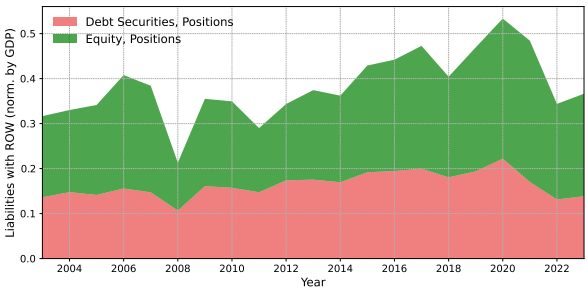



Liabilities from ROW, USD norm. by GDP

Figure 22: Other developed nations (CAN, NZL, AUS, ISR)

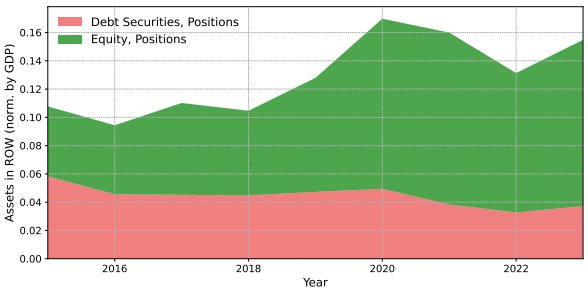



Assets in ROW, USD norm. by GDP

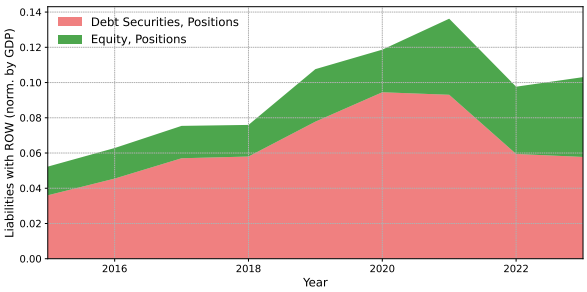



Liabilities from ROW, USD norm. by GDP

Figure 23: Rest of Europe




Assets in ROW, USD norm. by GDP




Liabilities from ROW, USD norm. by GDP

Figure 24: Rest of Asia and Oceania

## 7.2 International Positions

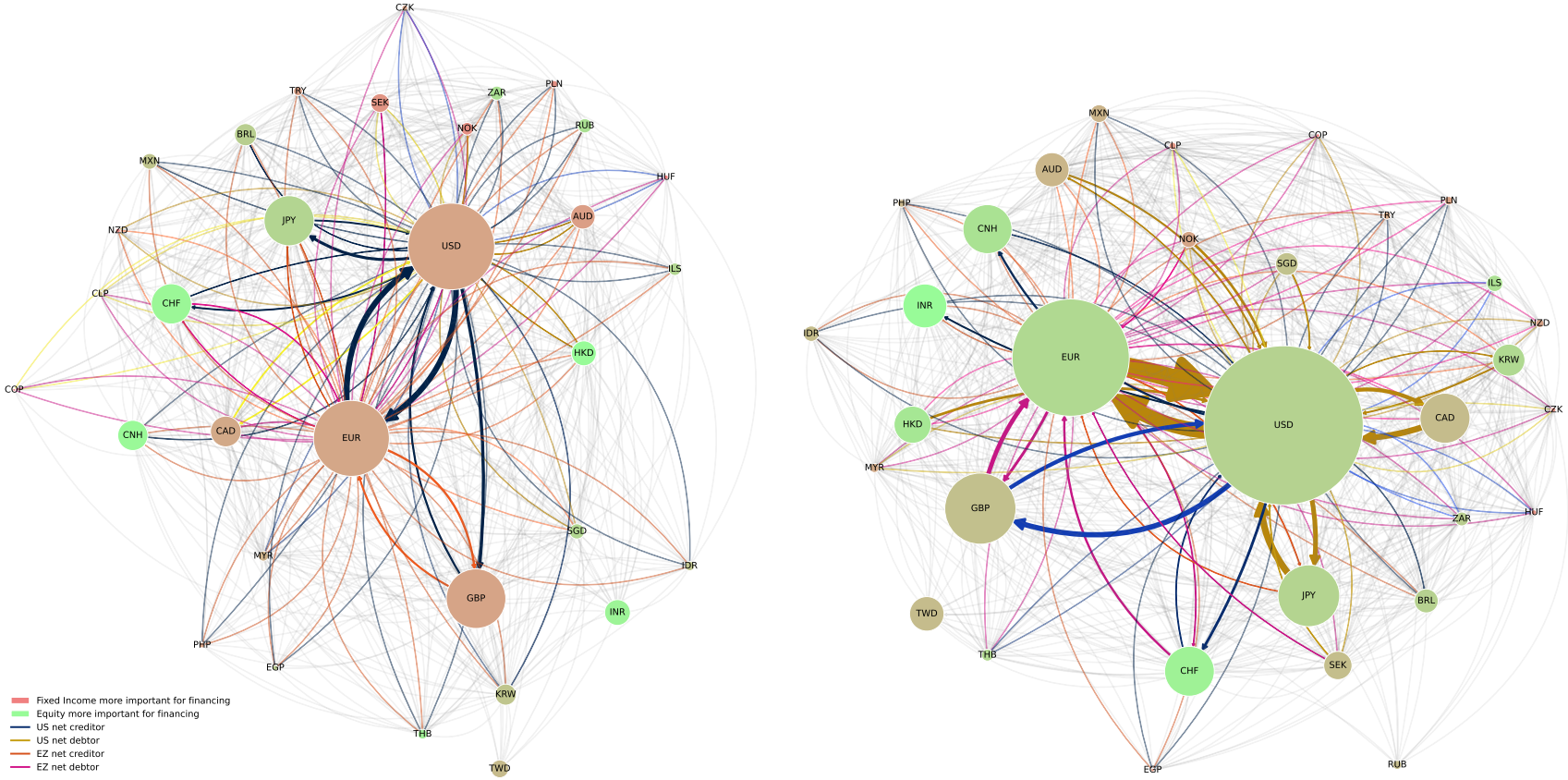



Figure 25: International Equity Positions: left = 2008, right = 2023

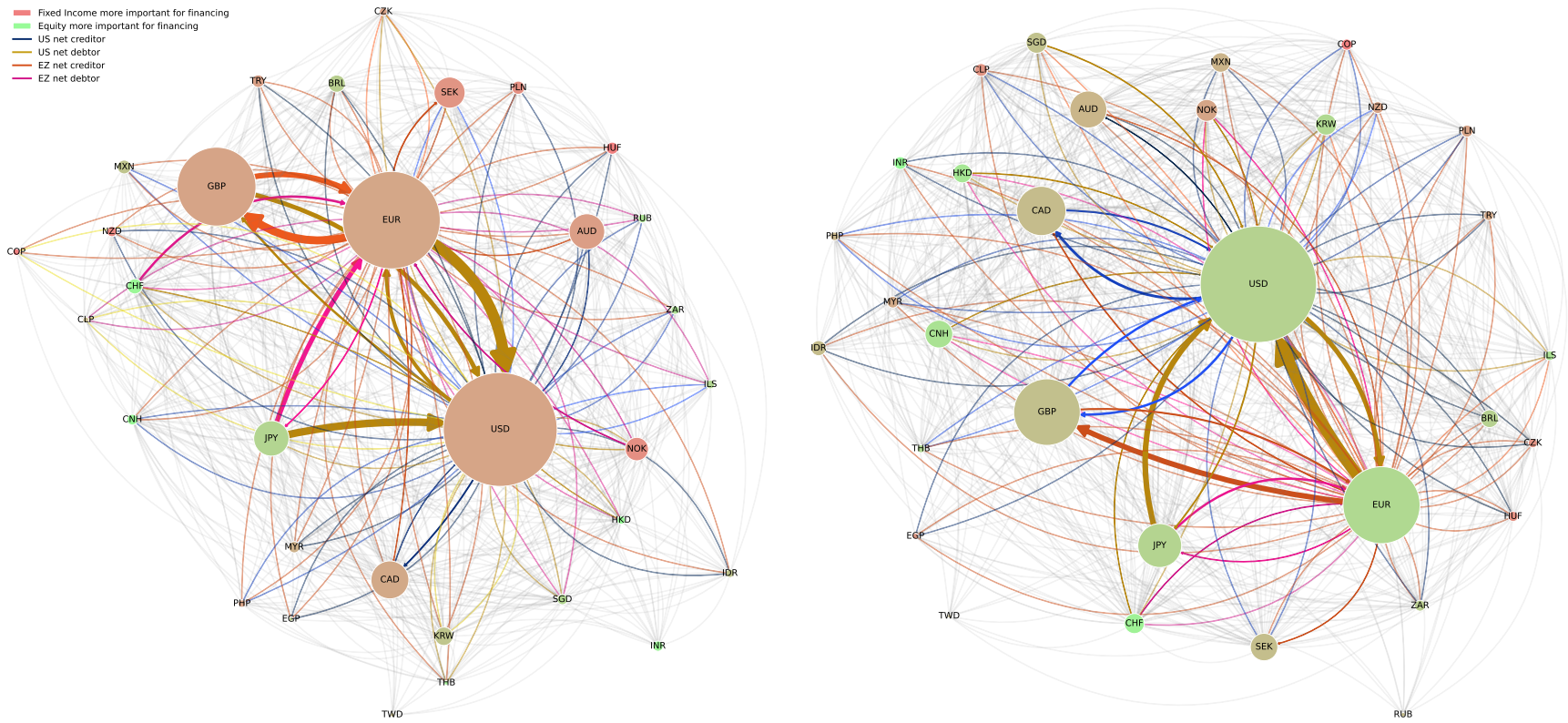



Figure 26: International Debt Positions: left = 2008, right = 2023

## 7.3 Importance of asset classes and investors for recipient countries

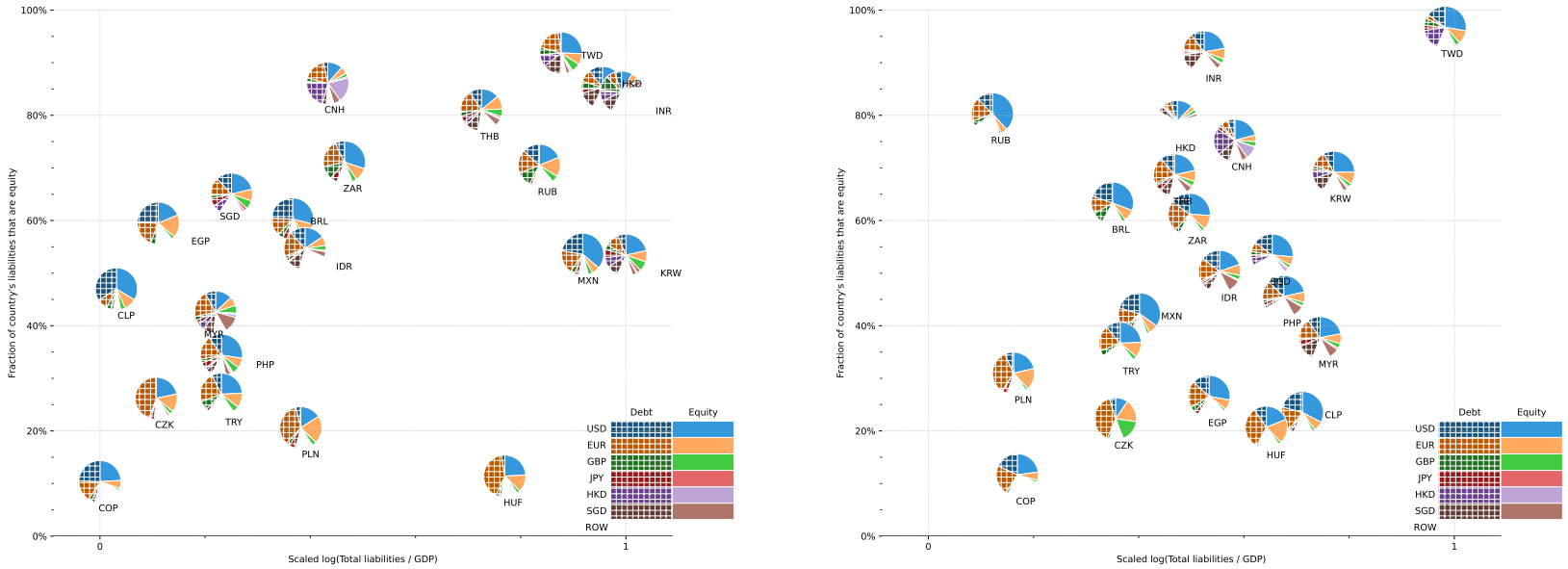



Figure 27: Importance of investor and asset class to EM-economies: left = 2008, right = 2023

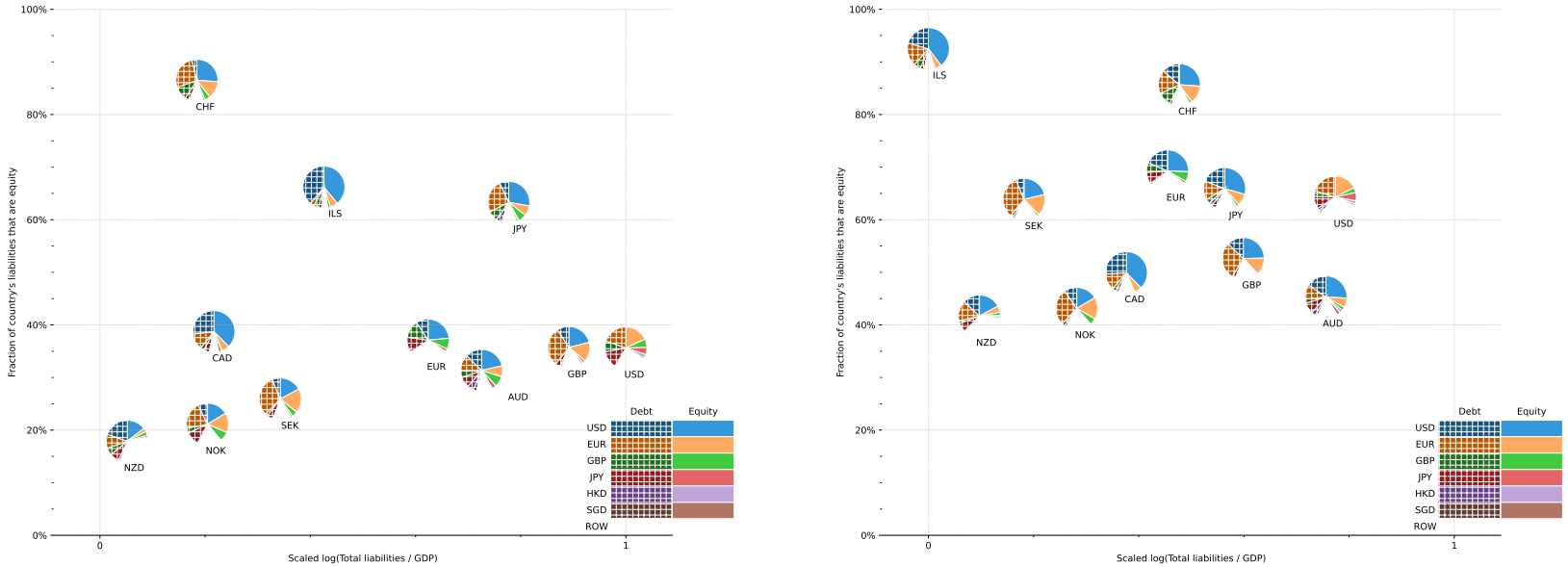



Figure 28: Importance of investor and asset class to Advanced-economies: left = 2008, right = 2023

# Appendix

# A Additional Graphs and Tables

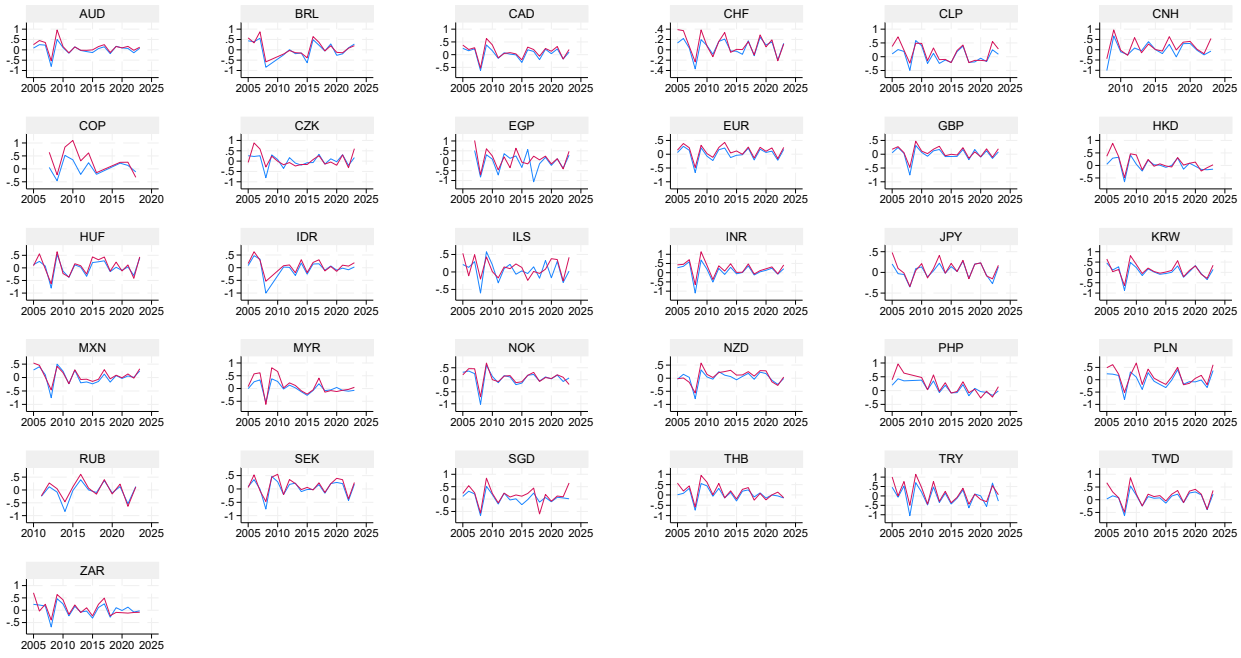
Table A.1

| Country | $\widehat{\beta}_{VIX,0}$ | $\widehat{\beta}_{VIX,1}$ | $\widehat{\beta}_{VIX,2}$ | $\widehat{\beta}_{VIX,3}$ | $\widehat{\beta}_{VIX,4}$ | $\widehat{\beta}_{NAV,1}$ | $\widehat{\beta}_{NAV,2}$ | $\widehat{\beta}_{NAV,3}$ | $\widehat{\beta}_{NAV,4}$ | $R^2_{adj}$ | N |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia | -0.084*** | 0.027 | 0.096** | 0.024 | 0.006 | 0.283*** | 0.147** | 0.105** | 0.013 | 0.109660 | 7339 |
| Brazil | -0.046* | 0.042 | 0.044 | 0.085** | 0.100*** | 0.129*** | 0.105*** | 0.048* | 0.053* | 0.099000 | 7231 |
| Canada | -0.090*** | 0.034 | 0.109*** | 0.062** | -0.019 | 0.267*** | 0.200*** | 0.062 | -0.068 | 0.103421 | 7124 |
| Switzerland | 0.052* | 0.049 | 0.011 | 0.000 | 0.016 | 0.132** | 0.084 | 0.098* | 0.103* | 0.038179 | 7193 |
| Chile | -0.158*** | -0.107* | 0.012 | -0.102* | -0.098* | 0.120 | 0.086 | -0.121** | -0.194*** | 0.068189 | 5749 |
| China | 0.056 | 0.091** | 0.057 | 0.037 | 0.007 | 0.172*** | 0.042 | 0.026 | -0.070 | 0.031867 | 4546 |
| Eurozone | -0.095*** | 0.056 | 0.080 | 0.029 | -0.014 | 0.262*** | 0.213*** | 0.086 | 0.102 | 0.070878 | 7103 |
| United-Kingdom | -0.032 | -0.058 | -0.036 | -0.037 | -0.034 | 0.136** | 0.051 | 0.043 | 0.051 | 0.050664 | 7258 |
| Hong-Kong | -0.098** | -0.023 | 0.073 | 0.093 | 0.052 | 0.203*** | 0.114** | 0.084 | -0.051 | 0.052791 | 7265 |
| Indonesia | -0.116** | 0.241*** | 0.202*** | 0.058 | -0.039 | 0.318*** | 0.101* | -0.016 | -0.058 | 0.098889 | 5034 |
| Israel | -0.056 | 0.039 | -0.046 | -0.027 | -0.037 | 0.168** | 0.016 | 0.203*** | 0.134* | 0.050263 | 5589 |
| India | -0.134** | -0.140** | -0.020 | 0.033 | -0.026 | 0.327*** | 0.180** | 0.358*** | 0.005 | 0.173335 | 4133 |
| Japan | -0.064 | 0.064* | 0.047 | 0.008 | -0.050* | 0.450*** | 0.264*** | 0.166*** | 0.027 | 0.156976 | 7525 |
| South-Korea | -0.033 | 0.034 | 0.088** | 0.066 | 0.031 | 0.223*** | 0.163*** | 0.063 | 0.065 | 0.106530 | 7495 |
| Mexico | -0.309*** | -0.066 | 0.164* | 0.199** | 0.040 | 0.067 | 0.015 | 0.188* | 0.102 | 0.067494 | 7389 |
| Malaysia | -0.181*** | -0.006 | 0.034 | -0.050 | -0.098* | 0.472*** | 0.096 | 0.021 | -0.128 | 0.115980 | 7287 |
| Norway | 0.112 | 0.202 | 0.075 | 0.095 | 0.058 | 0.302** | 0.441*** | 0.517*** | 0.036 | 0.088558 | 4075 |
| New-Zealand | -0.117*** | -0.105** | -0.000 | -0.039 | 0.018 | 0.509*** | 0.290*** | 0.021 | 0.111 | 0.181840 | 4840 |
| Philippines | -0.194*** | 0.045 | 0.059 | 0.075 | 0.016 | 0.641*** | 0.158 | 0.203** | -0.032 | 0.156806 | 4774 |
| Poland | -0.113*** | 0.013 | 0.096* | -0.060 | -0.124** | 0.101 | 0.122** | -0.073 | -0.096 | 0.052022 | 4730 |
| Sweden | -0.199*** | 0.040 | -0.071 | -0.132* | -0.189*** | 0.426*** | 0.070 | -0.054 | 0.068 | 0.116180 | 7103 |
| Singapore | -0.080*** | 0.010 | 0.123*** | 0.106*** | 0.006 | 0.276*** | 0.235*** | 0.133*** | -0.005 | 0.174586 | 7656 |
| Thailand | -0.157*** | 0.013 | 0.025 | 0.005 | -0.054 | 0.318*** | 0.186** | 0.128 | -0.055 | 0.090405 | 5590 |
| Turkey | -0.168*** | -0.213*** | -0.128* | -0.025 | 0.021 | 0.064 | -0.040 | -0.005 | 0.093 | 0.060324 | 5606 |
| Taiwan | -0.088*** | -0.001 | 0.071*** | 0.069** | 0.011 | 0.222*** | 0.177*** | 0.107** | 0.035 | 0.142034 | 7022 |
| United States | 0.008 | -0.027 | 0.002 | 0.010 | 0.015 | -0.049 | 0.020 | 0.023 | -0.005 | 0.002578 | 4428 |
| South-Africa | -0.064* | 0.089** | 0.057 | 0.133** | 0.041 | 0.234*** | -0.051 | -0.034 | -0.107** | 0.071680 | 7067 |

Overlapping 30-day regressions. Newey-West heteroscedasticity and autocorrelation adjusted standard errors.

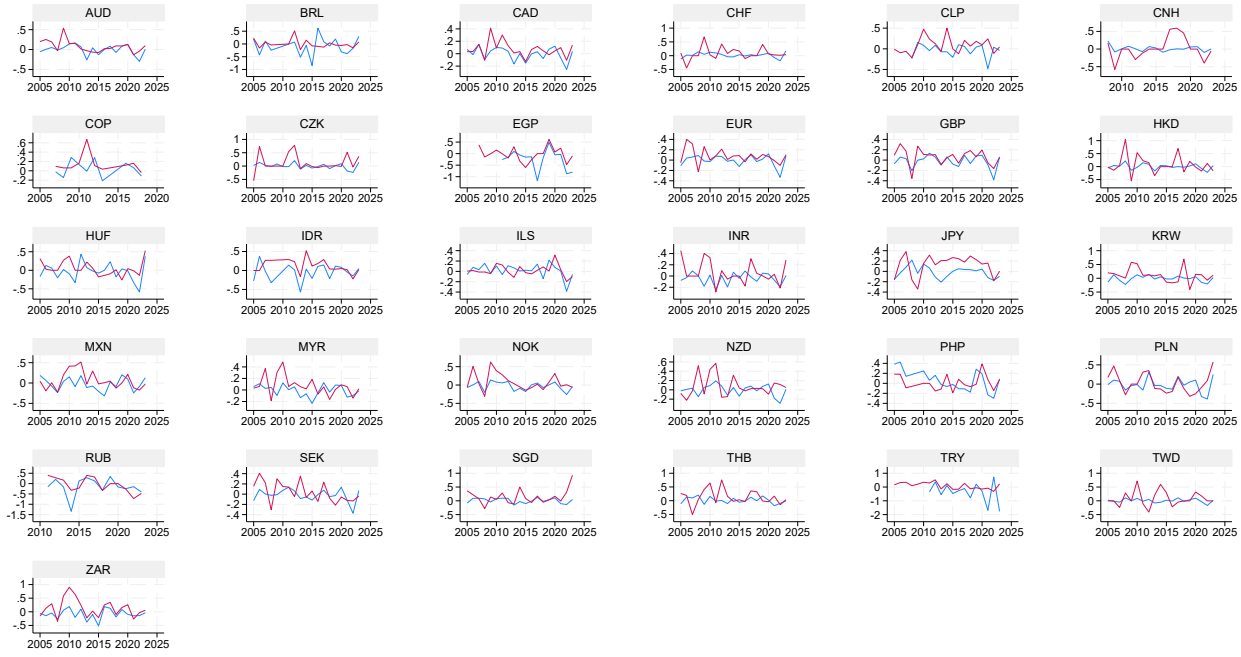
Figure A.29: Investor Country: US

Figure A.30: Equity Holdings




Blue -- Implicit Equity Holdings Backed out From Equity Prices and Exch Rates
Red -- CPIS-Implied Equity Holdings

long-term Debt Holdings




Blue -- Implicit Long Term Debt Holdings Backed out From Debt Prices and Exch Rates
Red -- CPIS-Implied Long Term Debt Holdings

Figure A.31: Scaled Covariances; Investor Country: US

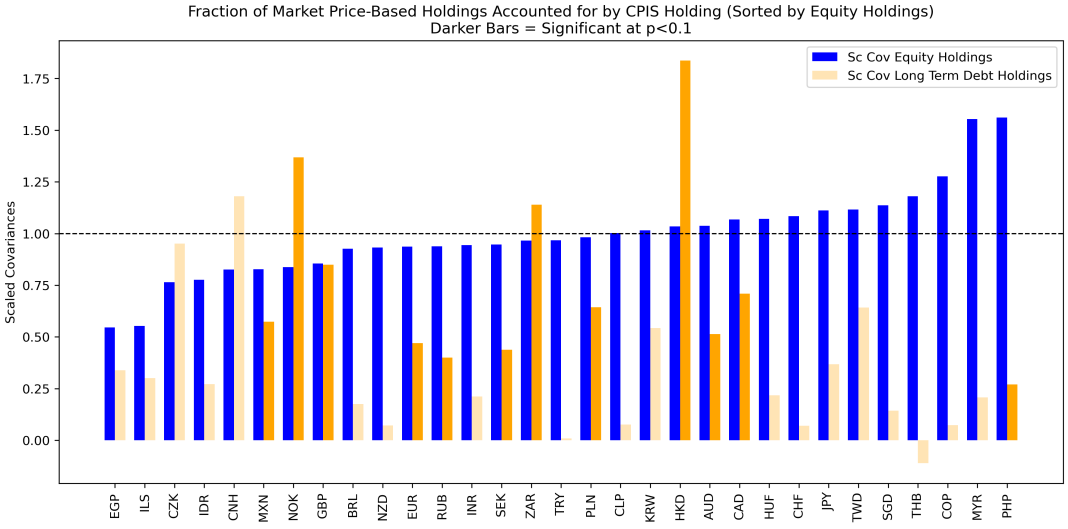
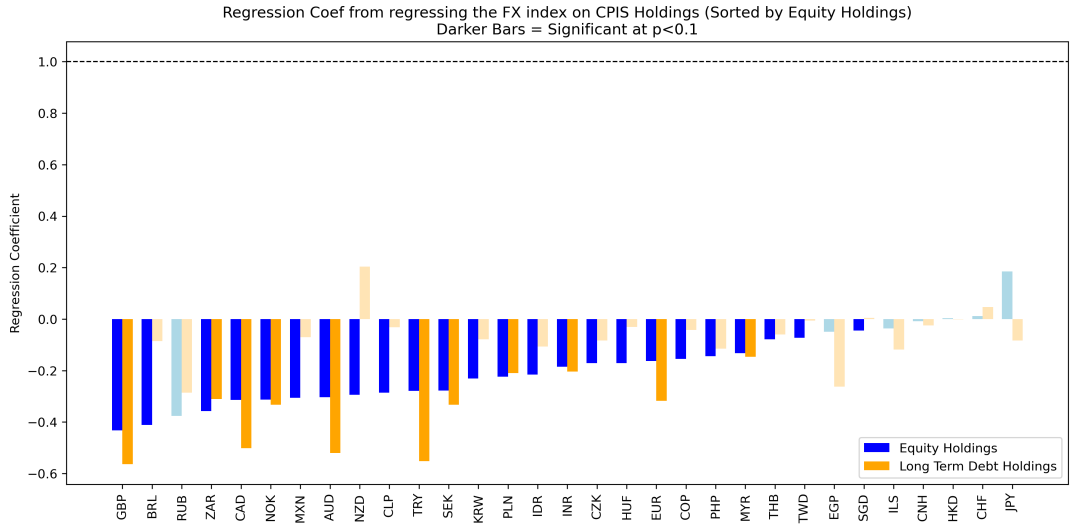
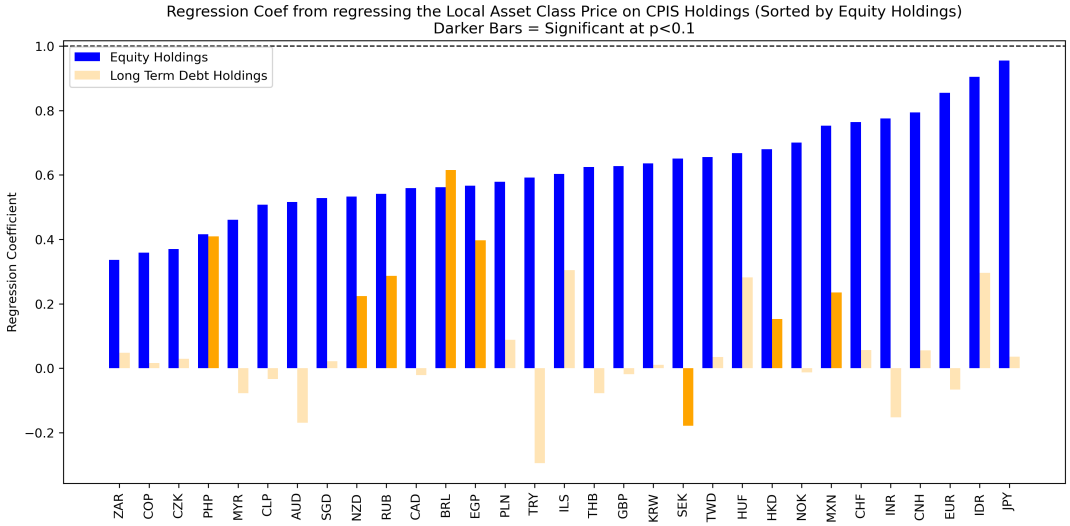


Figure A.32: Investor Country: US

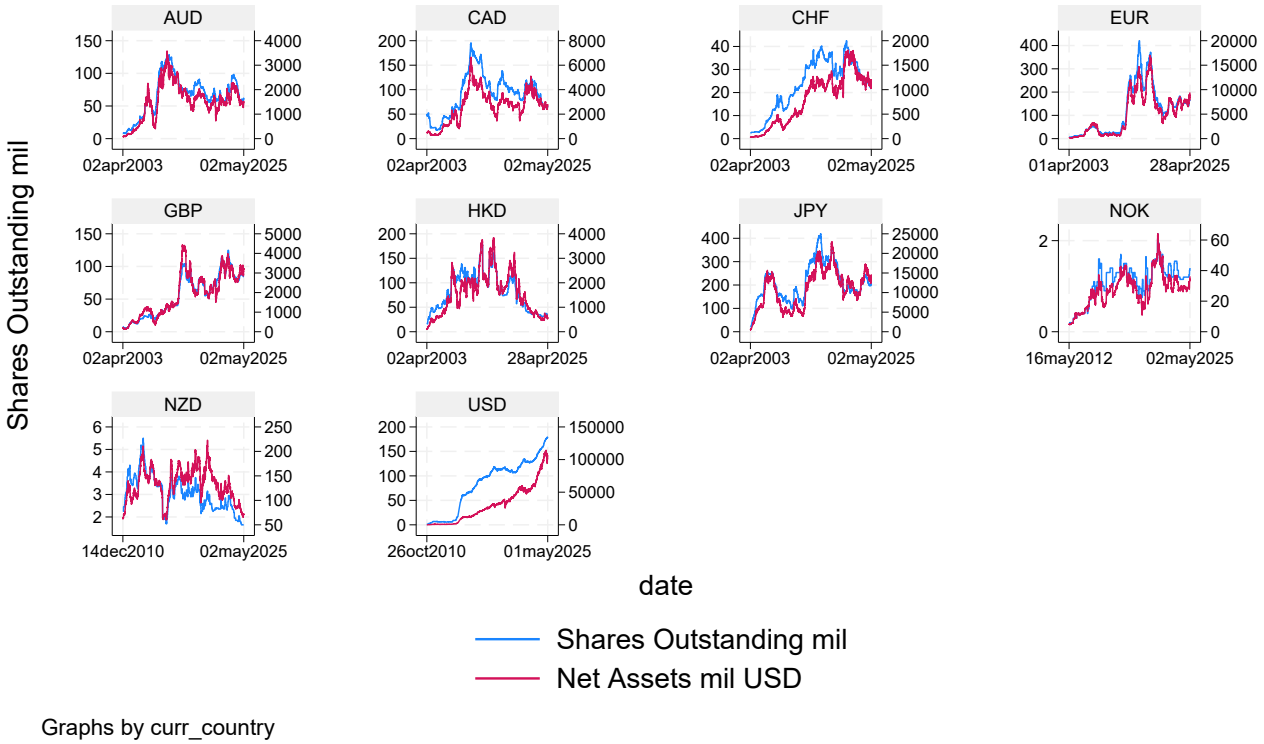


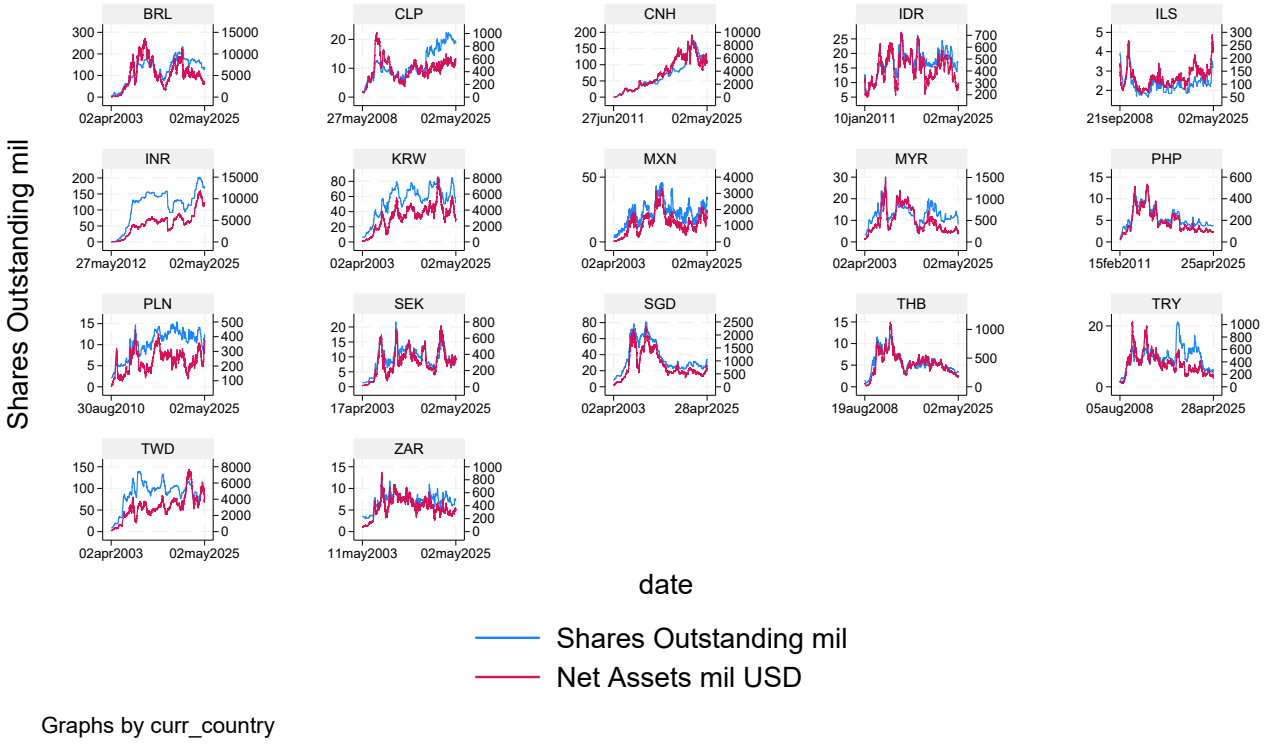

FX




Asset Price

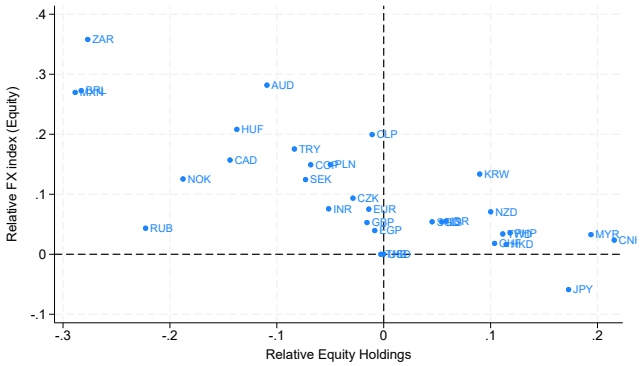
Figure A.33: Blackrock iShare Funds



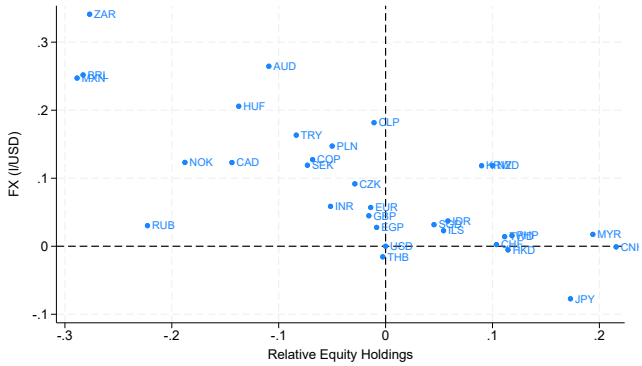






Millions of USD Total Assets and Millions of Shares Outstanding. iShare MSCI funds issued in the US where for the US stock market we use iShares-Core-SP-500-UCITS-ETF-USD-Acc issued



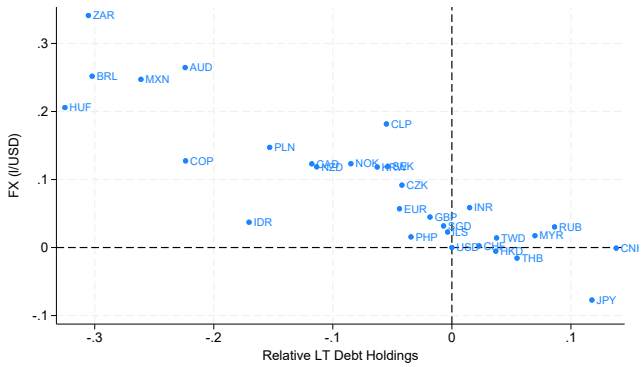

Equities; FX index




Equities; FX (l/USD)

Figure A.34: GFC on FX; 30 day window post Lehman Failure; 15 Sept 2008


LT Government Debt; FX index




LT Government Debt; FX (l/USD)

Figure A.35: GFC on FX; 30 day window post Lehman Failure; 15 Sept 2008