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America First? A US-centric view of global capital flows

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Abstract

Both academic researchers and policymakers posit a unique role for the US in the international financial system. This paper investigates the characteristics and determinants of US cross-border financial flows and examines how these contrast with those of the rest of the world. We analyse the relative importance of US, country-specific, and global variables as determinants of aggregate and bilateral US financial flows and as determinants of country-level cross-border financial flows excluding those directly involving the US. Our results indicate that variation in US variables – notably the VIX and US dollar exchange rate – has a quantitatively important influence on global financial flows, but mostly via US cross-border flows. Global and national risk indicators perform better in explaining "rest of the world" flows. Moreover, we find that the correlation between US and rest of the world flows peaks in periods of elevated uncertainty. We interpret our findings as evidence for the existence of a global financial cycle, only some of which is driven by policies and events in the US.

Keywords: International capital flows, US financial system, VIX, US dollar exchange rate, monetary policy spillovers

JEL Classification: F15, F21, F36, F42, G15

Non-technical summary

The US financial system is the most sophisticated in the world and international financial flows vis-à-vis the US tend to be larger than those of any other individual country. This paper examines the determinants of *gross flows* of international capital, and investigates the extent to which events and policies in the US explain the variation in US and global capital flows, shedding light on the role of the US in the global financial cycle. Our motivation extends from the fact that, in much of the academic research, the term *global* has frequently embodied an implicit assumption that US variables should be important universally. This paper simplifies and extends that logic by taking a US-centric view of global capital flows.

We begin by investigating the characteristics and determinants of US cross-border gross financial flows and then examine how these compare and contrast with those of the "rest of the world", i.e. excluding those directly involving the US. We do this in a novel way by combining country-level unilateral data with bilateral US data. This allows for investigating the importance of US variables such as the VIX, Federal Reserve standard and non-standard monetary policy and the US dollar exchange rate. We then assess the relative importance of US, country-specific and global variables by comparing the results of estimations of aggregate US financial flows with those using bilateral US financial flows, and "rest of the world" flows.

This paper adds a number of important insights that are directly relevant for the ongoing debate on the global financial cycle. In the descriptive section we highlight that, while the US maintains a preeminent role in global finance, in recent decades emerging market economies (EMEs) have accounted for a growing fraction of international capital flows. The econometric results indicate that variation in US variables – notably the VIX and US dollar exchange rate – has a quantitatively important influence on global financial flows, but mostly via US cross-border flows. Global and national risk indicators perform better in explaining "rest of the world" flows. Moreover, we find that the correlation between US and rest of the world flows peaks around periods of elevated uncertainty.

Overall, our findings provide evidence for the existence of a global financial cycle, only some of which is driven by policies and events in the US. Should the US share of global financial flows continue to decline in the future, the validity of using US variables as proxies for global conditions may become increasingly tenuous. Our results indicate that truly global drivers of international capital flows, as proxied by alternative uncertainty indices, are becoming ever more important as events and policies in other important regions, such as the euro area or China, have an increasingly global impact. Given the high degree of interconnectedness, larger cross-border policy spillovers could necessitate further efforts to coordinate policy at a regional or global level.

1 Introduction

The US financial system is the most sophisticated in the world. It is home to many of the largest and most complex banks and financial institutions (Standard and Poor's 2017), its financial markets are the largest and most liquid, and its stock exchanges are the most valuable. US monetary policy decisions are often considered to have global implications, partly reflecting the dominant status of the US dollar as global reserve currency. The latter has granted the US an exorbitant privilege (Eichengreen 2012), helping it to sustain the largest current account deficit in the world (IMF 2017). Importantly, the global financial crisis originated in the US, with repercussions across the globe.

Yet, while the US maintains a preeminent role in global finance, in recent decades emerging market economies (EMEs) have accounted for a growing fraction of GDP, international trade and international capital flows (Lane and Milesi-Ferretti 2008, Bussière et al. 2016, Hoggarth et al. 2016, IRC 2016, McQuade and Schmitz 2017). Like the other superlatives, international financial flows vis-à-vis the US are regularly larger than those with respect to any other country.[1] And it is the determinants of these *gross flows* (Broner et al. 2013) which are the object of interest for this paper. We investigate to what extent events and policies in the US explain the variation in US and global capital flows, shedding light on the US role in the global financial cycle.

We begin by investigating the characteristics and determinants of US gross financial flows in isolation, and then examine how these compare and contrast with those of the rest of the world. We do this in a novel way by combining standard unilateral data with bilateral US data. We use these data to investigate the importance of US variables such as the VIX, Federal Reserve standard and non-standard monetary policy and the US dollar exchange rate. We then investigate the relative importance of US, country-specific and global variables (Baker et al. 2016) by comparing the results of estimations of aggregate US financial flows with those using bilateral US financial flows, and "rest of the world" flows excluding the US.

This paper feeds into an ongoing and lively debate regarding the importance of global variables in determining international capital flows. Our motivation extends from that fact that, in much of the academic research, the term *global* has frequently embodied an implicit assumption that US variables should be important everywhere. This paper simplifies and extends that logic by taking a US-centric view of global capital flows.

A number of the papers that use US variables as proxy for global factors have become very prominent and important in the literature. For instance, Forbes and Warnock (2012) highlighted the importance of the VIX, a measure of implied volatility in the US S&P 500 index, in explaining global surges and stops in capital flows. In a similar vein, Rey (2013) introduced the phrase *Global Financial Cycle*, a cycle that she argued moves with the VIX. The latter speech was given in the context of the *taper tantrum* episode that struck a number of EMEs after the US Federal Reserve

[1] That is, net purchases of foreign assets by US investors and net purchases of US assets by foreign investors

announced plans to reduce its purchases of financial assets in 2013. This event prompted a large number of studies examining the cross-border effect of US Federal Reserve unconventional monetary policy, with papers such as Aizenmann et al. (2016), Dedola et al. (2017), Eichengreen and Gupta (2015) and Georgiadis (2016) finding evidence of quantitatively important spillovers from the US. As a consequence of these spillovers, Rey (2015) suggested that the countervailing policy responses required of emerging markets central banks were so large that those economies could no longer be considered to be able to operate a truly independent monetary policy. As such the old international policy trilemma could actually be better viewed as a dilemma.

Such strong assertions have prompted some backlash. Cerutti et al. (2017) have challenged the prevailing view on the importance of global factors by arguing that US factors *only* explain about 25% of the variation in global capital flows. Using unilateral data, the authors argue that most of the variation in gross capital flows is independent of common shocks or observables in central countries, including the US. Again, much of the analysis rests heavily on the use of US variables as a proxy for global push factors.[2] Similarly, Avdjiev et al. (2017) highlight the central role of the US dollar spot exchange rate as a barometer of risk-taking capacity in capital markets, whereby cross-border bank lending falls as the dollar gets stronger, leading to greater deviations from covered interest parity. Relatedly, Gopinath and Stein (2018) highlight the considerable share of non-US bank and corporate liabilities, as well as central bank reserve asset holdings, denominated in US dollars to illustrate how the US currency established itself as the dominant currency in global financial markets.

This paper adds a number of important insights that are directly relevant for the ongoing debate on the Global Financial Cycle. The econometric results indicate that variation in US variables – notably the VIX and US dollar exchange rate – has a quantitatively important influence on global financial flows, but mostly via US cross-border flows. Global and national risk indicators perform better in explaining rest of the world flows. Moreover, we find that the correlation between US and rest of the world flows peaks around periods of elevated uncertainty. We interpret our findings as evidence for the existence of a global financial cycle, only some of which is driven by policies and events in the US. Should the US share of global financial flows continue to decline in future, the validity of using US variables as a proxy for global conditions may become increasingly tenuous.

Our paper proceeds as follows: Section 2 outlines the evolution of US financial flows in a global context. While the share of the US in global gross flows has declined in recent years, and its importance varies substantially across countries, it remains the largest single source and destination country of financial flows in the world. Section 3 briefly describes the data sources and econometric methodology, while Section 4 present the results of our empirical analysis. Section 5 concludes.

[2] For instance in their panel regressions, Cerutti et al. (2017) use contemporary values of eight US variables: (a) VIX; (b) real GDP growth rate; (c) nominal policy rate; (d) real policy rate; (e) TED spread; (f) yield curve slope; (g) change in the real effective exchange rate; and (h) M2 growth.

2 The evolution of US financial flows in a global context

After a decade of unprecedented financial integration (Lane and Milesi-Ferretti 2008), global gross asset (liability) flows reached a peak of approximately 22 (23) percent of global GDP in 2007Q3, of which the US alone accounted 3.2 (4.5) percentage points.[3] Figure (1) illustrates that, at the height of the global financial crisis, gross financial asset and liability flows turned negative, representing a sharp reversal of existing foreign asset and liability positions. Since then US gross flows, like those of the rest of the world, have remained subdued. In 2017Q1, global flows stood at 6.9 (6.7) percent of global GDP, of which 0.9 (1.4) percentage points were due to the US.

Looking over a somewhat longer period, the share of the US in global asset and liability flows has been decreasing gradually, reflecting not just the increasing share of China and other EMEs, but also the relatively high degree of financial integration in the euro area (see Figure 2). Examining 5-year averages, to smooth out short-term volatility, the share of the US in total global gross asset (liability) flows stood at 22.5% (28%) in 1985Q3, but this has declined substantially to 9.9% (19%) in 2017Q2.

Figure (3) presents the developments in US asset (liability) flows relative to US GDP broken down by asset category. As has been well documented, the US has generally tended to be 'long equity and short debt' (Lane and Milesi-Ferretti 2009). This phenomenon has largely persisted in recent years, as US residents continued to expand FDI and portfolio equity assets, while recording continued net sales of portfolio debt securities to foreign investors. It is also notable that the general trend in US flows is broadly similar to that of the global total displayed in Figure (1). That is, there was a reasonably consistent increase in both asset and liability flows in the pre-crisis period, a sudden collapse at the time of the global financial crisis and only a moderate recovery in the post-crisis period, implying that the great moderation in international capital flows described at a global level by McQuade and Schmitz (2017) also applies to the US.

Figure (4a) presents bilateral US financial flows where the counterpart countries are grouped as follows: euro area (EA); the United Kingdom (UK); Japan (JP), other advanced economies (OA); China (CN); emerging market economies (EMEs); and the rest of the world (RoW). In the pre-crisis period US asset flows were generally concentrated in advanced economies. At the height of the global financial crisis, US investors retrenched in particular from positions in the UK and EMEs. In contrast, US purchases of EA assets reached a low point later during the sovereign debt crisis in 2010-2012, but have recovered somewhat since then. In the post-crisis period, advanced economies net purchases of US assets – in particular those from the UK – have been subdued compared to earlier periods, while flows to EMEs have turned close to zero since

[3] As is common in the literature, the equivalent terms 'gross liability flows' and 'gross inflows' mean 'net acquisition of domestic assets by foreign residents'. This reflects the fact that what is usually loosely referred to as a 'gross' flow is from a statistical perspective a net concept as it refers to the difference between purchases and sales of cross-border assets by residents of a different jurisdiction.

late 2015, possibly reflecting the gradual unwinding of the US Federal Reserve's non-standard monetary policy.

On the side of US liability flows, net purchases of US assets by UK and euro area investors declined sharply at the peak of the crisis Figure (4b). While such a trough was not observed for China and EME inflows to the US, these have consistently declined since around 2014. In contrast, there was a pick-up in inflows from the euro area since mid-2014 bringing them close to pre-crisis levels.

Zooming in on the main categories driving asset and liability flows, Figure (5a) highlights the significant role of the UK as a destination for US gross other investment flows – which largely comprise cross-border bank lending – in the pre-crisis period, reflecting the status of London as a global banking center. These flows – and also to a lesser extent those to the euro area – reversed in the aftermath of the global financial crisis, while flows to Japan have exhibited more stability. As regards portfolio debt inflows of the US, China accounted for a substantial portion in the pre-crisis period, reflecting the persistent accumulation of reserves by the People's Bank of China (Figure 5b). These have turned negative since the second half of 2015, partly reflecting elevated domestic financial market uncertainty in China, which was associated with the release of reserves. At the same time euro area net purchases of US portfolio debt securities increased markedly, reflecting the international portfolio rebalancing associated with the European Central Bank's Asset Purchase Programme (Cœuré 2017; Bergant et al., 2018), while net purchases of EME's have remained persistently positive throughout. These developments highlight that US financial flows – in particular on the liability side – are influenced, to some extent, by economic developments in other major economies.

Taken together, the evidence in this Section illustrates the considerable similarity between developments in global and US capital flows since the onset of the global financial crisis, and are thus consistent with the existence of a global financial cycle in which the US continues to play a prominent role. Shifts in the geographic composition of US financial flows appear to be driven by both push (i.e. US-specific) and pull factors, both of which we will analyse more formally in the remainder of the paper.

3 Data and empirical strategy

In our regression analysis we first consider US cross-border financial flows retrieved from the Bureau of Economic Analysis (BEA). We examine both the asset and liability side and decompose total flows into FDI, portfolio equity and debt, and other investment (excluding US reserves and derivatives). As a first step we run the following regression on unilateral US data using the Prais-

Winsten estimator:[4]

$$Flow_t^{us} = \alpha + \beta \mathbf{X}_t^{us} + e_t \tag{1}$$

where e_t is a first-order autoregressive with an error term z_t, $\mathbf{Flow}$ is the gross asset or liability flows (expressed as a percentage of US GDP) at quarter $\mathbf{t}$. $\mathbf{X}^{us}$ is a vector of US explanatory variables. In our parsimonious framework the latter variables are – as contemporaneous values – the US VIX (in logs), US quarterly GDP growth (in percent), the change in Wu and Xia's (2015) shadow Federal funds rate (in percentage points), the change in the US nominal effective exchange rate (in percent), exports or imports of the US (relative to GDP).

Second, we switch from the unilateral US data to bilateral gross financial flows for the US with respect to 14 countries taken from the BEA.[5] In a novel approach, we use these data to derive so-called country-level "rest-of-the-world" (RoW) flows (i.e. excluding the US) for asset and liabilities. To this end, we subtract US bilateral flows from the aggregate country-level flows $\mathbf{world}$ (as obtained from the IMF and ECB Balance of Payments Statistics). Hence, gross liabilities flows (i.e. inflows) from the rest of the world $\mathbf{row}$ into country $\mathbf{i}$ at time $\mathbf{t}$ are calculated as follows:[6]

$$Liabilities_{it}^{row} = Liabilities_{it}^{world} - Assets_{it}^{us} \tag{2}$$

Similarly, gross asset (i.e. outflows) of country $\mathbf{i}$ to the rest of the world (excluding the US) are calculated as:

$$Assets_{it}^{row} = Assets_{it}^{world} - Liabilities_{it}^{us} \tag{3}$$

We run regressions separately for the six series outlined in equations (2) and (3), namely flows vis-à-vis the whole world, the US and the world excluding the US ($\mathbf{row}$):

$$Flow_{it} = \alpha_i + \beta \mathbf{X}_t^{us} + e_i \tag{4}$$

where $\mathbf{Flow}$ is the gross asset or liability flows from country $\mathbf{i}$ at time $\mathbf{t}$, and including country fixed effects $\mathbf{alpha}$. Flows variables are expressed as a percentage of country $\mathbf{i}$'s GDP. In this

[4] This method uses generalized least-squares to estimate the parameters in a regressions where the errors are serially correlated.

[5] The group of countries that we focus on, primarily determined by data availability, is Australia, Belgium, Brazil, Canada, China, France, Germany, India, Italy, Japan, South Korea, Mexico, the Netherlands, and the United Kingdom. Data for Argentina, Hong Kong, Luxembourg, Singapore, Taiwan Province of China and Venezuela are excluded because of partial data availability or for a variety of other country specific anomalies. Nevertheless, as a robustness test we also use the complete set of countries and regions available in the BEA dataset which leaves our main econometric results unchanged.

[6] We thus assume that the BEA's geographic allocation of US financial flows vis-à-vis the sample of 14 countries is accurate. While we do not need bilateral "mirror" data vis-à-vis the US reported by the 14 countries for our approach, we assume cross-country consistency in the recording of cross-border financial transaction in line with the IMF's Balance of Payments Manual 6.

framework the exchange rate variable used is the bilateral US exchange rate vis-à-vis the currency of country $\mathbf{i}$, while the other variables remain unchanged as compared to the unilateral estimations.

In addition to the VIX, we also include the Economic Policy Uncertainty Index (EPU) in these regressions (Baker, Bloom and Davis 2016). While the VIX is a measure of volatility over the next 30 days implied by S&P500 equity options, the EPU is based on *scraping* newspapers for words and phrases relating to uncertainty in a number of countries in addition to the US. It follows that the uncertainty captured in the EPU is likely to emanate from events with implications outside the next 30 days. Therefore, relative to the VIX, the EPU includes additional information because it is of longer-term nature, less equity market focused and more global. It is notable that, although particularly highly correlated at the height of the global financial crisis, the two variables have diverged somewhat in recent years (Figure 10). Whereas the VIX declined to historic lows in 2017, Baker, Bloom and Davis (2016) argue that the very high level of the Global EPU observed at the same time reflects, among other things, the increasingly acrimonious political climate in the US, as well as increased political and economic uncertainty in the EU following the Brexit referendum. Both of these events may be significant developments for the process of globalisation, one dimension of which is international capital flows.

We also run a set of regressions including an additional vector of country specific explanatory variables to examine how much the addition of these variables improves the fit of the model. In doing so we shed light on the relative importance of US and national variables in explaining global capital flows. These national variables are the national EPU indices, the Chinn Ito capital account openness index (Chinn and Ito 2006), the change in national sovereign bond yields and domestic real GDP growth.[7]

4 Empirical Results

4.1 Unilateral US financial flows

4.1.1 Asset flows

Table (1) displays the results of regressions applying equation (1) to unilateral US data, as described above in Section (3). The result in column (1) demonstrates that this relatively parsimonious specification can explain about 37% of total US gross asset flows.[8]

The most statistically significant explanatory variable is the VIX index, while an an appreciation of the US exchange rate is also very significantly associated with a decline in US asset flows.

[7] We use the *STATA* xtpcse command which is appropriate for linear cross-sectional time-series models when the disturbances are assumed to be heteroskedastic and contemporaneously correlated across panels. The disturbances may also be assumed to be autocorrelated within panel, using Prais-Winsten estimates. This approach is also adequate, because it is very likely that there is cross-sectional dependence in the panel model due to common global shocks.

[8] This compares favourably with the 25% r-squared statistic reported by Cerutti et al. (2017) when examining global flows.

This is consistent with the findings of Avdjiev et al. (2017) who highlight the central role of the US dollar spot exchange rate as a barometer of risk-taking capacity in capital markets.[9] The change in the the FED's monetary policy stance – as proxied by first differences in the Shadow Federal funds rate – is not statistically significant. Much of the explanatory power of the VIX is likely attributable to the collapse in international capital flows at the peak of the crisis, while at the same time the lack of statistical significance of the Shadow Federal funds rate variable may be due to the fact that the Federal Reserve drastically cut interest rates and introduced non-standard monetary policy programmes at times of financial stress, coinciding with declining cross-border financial flows (McQuade and Schmitz 2017).[10] Moreover, US unconventional monetary policies during this episode were often instantaneously reflected in exchange rate movements which may further explain the significance of this latter variable.[11]

Figure (6) displays the equivalent rolling regression coefficients for total US asset flows, with rolling windows of 20 quarters. Panel (a) displays the coefficient on the VIX, which is negative and highly statistically significant at the height of the global financial crisis and remains statistically significant for the majority of the period since, but gradually declining in magnitude. Panels (b) to (d) display the rolling coefficients of the Shadow Federal Funds Rate, US GDP growth, and the change in the US nominal effective exchange rate, respectively. Each of these variables is negative and statistically significant around the peak of the global financial crisis, but is not statistically significant for the majority of the post-crisis period. This shows, for instance, the positive role of more accommodative US monetary policy – in particular the quantitative easing packages – during the peak years of the global financial crisis. Yet overall, the VIX is the only variable that remains significant throughout the majority of the period under examination.

Across asset types of financial flows (columns (2) to (5) in Table 1), it is notable that the largest coefficient on the VIX index is recorded for other investment. This is in line with the view that banking flows are the most responsive to shifts in global risk aversion, which was particularly

[9] Froot and Stein (1991) provide an earlier discussion of the relation between the US dollar exchange rate and capital flows. Simplifying somewhat, their model predicts that when wealth increases, as is the case when the foreign country exchange rate appreciates, foreign demand for domestic assets also increases. At the same time, information asymmetries imply that external financing will be relatively more costly in information sensitive asset categories. The authors argue that a passive portfolio of stocks and bonds would not be information intensive, and could therefore be financed externally, independent of the exchange rate. It follows that changes in the exchange rate should have a greater influence on information sensitive assets categories. However, this assertion may not adequately reflect the impact of exchange rate changes on the wealth and credit worthiness of domestic agents, which would make domestic assets less attractive to foreign investors. Contrary to the predictions of Froot and Stein (1991), our results indicate that the statistical significance of the exchange rate variable is concentrated in portfolio debt and other investment asset categories, which are generally considered to be less information intensive than equity.

[10] These baseline results are generally robust to the inclusion of a crisis period dummy. If the latter variable is included in addition to the VIX, the coefficient on the VIX remains statistically significant in total, portfolio equity and portfolio debt categories, while the crisis dummy is statistically significant and negative for the other investment category.

[11] We control for trade developments as the gravity-model literature in international finance shows a strong correlation between trade and financial linkages in the cross-section dimension (see for instance Hellmanzik and Schmitz 2017). However, we did not have strong priors as to the expected sign on this variable in quarterly time series regressions. The results indicate that an increase in exports is associated with a decline in total asset flows.

visible during the peak of the global financial crisis (Milesi-Ferretti and Tille 2011). The VIX is also significant for portfolio debt and equity but not for US FDI flows, which is consistent with the descriptive evidence presented in Section (2) showing that US FDI flows did not exhibit a pronounced collapse during the global financial crisis. Interestingly, we find that the role of the US dollar exchange rate as a barometer of risk-taking capacity seems to mainly affect US investors' FDI and portfolio debt flows.

The four panels in Figure (7) show the rolling coefficients on the VIX across asset type, except for FDI. Whereas the VIX is statistically significant for other investment flows up until the 20 quarters window ending in 2012Q2, it becomes larger and more significant for portfolio equity until the end of 2016 and only turns significant for portfolio debt after 2012.

4.1.2 Liability flows

In Table (2) we run the same specification as for assets, but with US liability flows as the dependent variable. The size and statistical significance of the coefficients and the overall explanatory power of the model are similar to the US asset flows regressions. This is not surprising considering the high degree of correlation between asset and liability flows. The coefficient on the VIX is also large and highly statistically significant for both portfolio debt flows and other investment. Interestingly, the coefficient on the US nominal effective exchange rate remains negative and statistically significant in the US liability flows regression, particularly on other investment flows, which is consistent with the interpretation of this variable as a proxy for risk.

More rapid US GDP growth is associated with smaller net purchases of US financial instruments – notably debt securities – implying that foreign investors may choose to invest in non-US assets when US growth is stronger. This may be driven by US treasuries, which are generally considered to be the ultimate global risk free asset, becoming less appealing at times when US and global growth prospects become brighter.

Figure (8) displays the regression coefficients for total US liability flows flows based on windows of 20 quarters. As for US asset flows, we observe negative and statistically significant coefficients for all our variables around the peak of the global financial crisis – most notably for the VIX and the NEER – but waning statistical significance afterwards. Thus, there is evidence of a strong symmetry between the drivers of US assets and US liability flows over time.

4.2 Bilateral US financial flows

Table (3) shows results for the regression specification described in equation (4) using bilateral data on US flows vis-à-vis 14 countries. The results are broadly similar to those using unilateral data displayed in Table (1). Once again, the most statistically significant explanatory variables are the VIX index, and the exchange rate variable, although in this bilateral regression the respective

bilateral US exchange rates are used. An appreciation of the US exchange rate is associated with a decline in US asset flows, again for total and portfolio debt flows, but in addition also for bilateral other investment asset flows.

We run the same exercise also for bilateral US liability flows (in unreported regressions, available upon request) in which the results are very much in line with those of the unilateral regressions.[12]

To further explore the role of the US dollar for US asset flows, we make use of information from the BIS locational banking statistics. Specifically, we include in Table (4) the share of the US dollar in a country's cross-border bank liabilities. This variable – interacted with each of the other explanatory variables – is included in our baseline specification. The results suggest that a higher share of US dollar denominated liabilities is associated with lower responsiveness of bilateral US asset flows to the VIX and the US dollar exchange rate, in particular for portfolio debt and other investment. In countries with a high share of US dollar liabilities, the effect of US dollar appreciation is offset, canceling out the negative sign we observe in the baseline results. This implies that, if the US dollar appreciates, US investors tend to repatriate funds in general (in line with portfolio rebalancing), but provide relatively more cross-border loans to countries that have a high share of liabilities denominated in US dollars (columns (1) and (4)). This is likely being driven by US investors providing US-dollar denominated financial flows to these countries, thereby shielding themselves from valuation losses triggered by further appreciation of the dollar exchange rate. Thus, we find evidence that the pattern of financial flows from the US and the responsiveness of these flows to US specific variables is heterogeneous across countries depending on the currency funding mix.

4.3 US and global financial flows

4.3.1 Correlations analysis

Before running our regression models as outlined above, we visually inspect our measures of US and RoW financial flows. The red line in Figure 9, panel (a) shows the average correlation across countries between flows from the US to country $\mathbf{i}$, and inflows into country $\mathbf{i}$ from the rest of the world.[13] The chart illustrates that the correlation between US and RoW inflows to a given country are more highly positively correlated during periods of financial market stress, as proxied by the VIX (the green line). This is consistent with a narrative whereby both US and RoW investor liquidated their existing foreign asset positions at the peak of the global financial crisis. Moreover, it is compatible with the existence of a global financial cycle, which seems to be

[12] Our main findings also hold when we do not only include single countries, but also the regional aggregates available in the BEA dataset, which roughly doubles our number of observations.

[13] Similarly, the blue line in the figure shows the average correlation across countries between outflows (i.e. asset flows) from country $\mathbf{i}$ to the US and outflows from country $\mathbf{i}$ to the rest of the world.

particularly pronounced in crisis times, as stated by Passari and Rey (2015).[14] It is also notable that the correlation is more frequently negative in normal times. Somewhat speculatively, this could suggest foreign investors often purchase from each other rather than from domestic investors, as the latter may be more sticky due to home bias.

Figure 9, panel (b) presents the mean across countries of the same correlation described above.[15] However, in this chart the countries are split into two groups, with the red line representing the mean correlation for the two safe haven countries available in our bilateral dataset, namely Germany and Japan. The blue line displays the mean correlation for the remaining 12 countries. The results suggest that US and RoW flows to these safe havens are not more highly correlated during periods of elevated financial market stress. This could indicate that, in periods of uncertainty, RoW investors may unwind existing positions in safe havens more gradually, or even increase their exposure to the assets of safe havens relative to the assets of other economies. In contrast, US investors may prefer domestic assets as a safe haven during periods of crisis. This is consistent with the argument put forward in Goldberg and Krogstrup (2018), that global risk aversion is linked to capital flows and appreciation pressures in safe haven countries.[16]

4.3.2 Regression analysis

Table (5) applies the regression specification described in equation (4) for the following financial flows to each of the 14 countries included in our sample: (1) global liability flows, (2) US assets flows (i.e. those liability flows originating from the US, which we already analysed in Section 4.2), (3) the rest of the world (RoW) liability flows (i.e. excluding those directly from the US).

Looking at the results for total flows, the coefficients on the VIX index and the US bilateral exchange rate are statistically significant only in column (2), i.e. for US asset flows, in line with Table 3. In the case of global liability flows the VIX coefficient is on the border of statistical significance (column (1)). As observed in the previous subsection it is statistically significant in the case of US asset flows for portfolio equity, portfolio debt assets and other investment. While the VIX is significant for global portfolio debt liability flows, it is generally statistically insignificant for RoW flows. In Table (5) we also add the Global EPU variable to the regressions. This variable

[14] *"Large gross cross-border flows are moving in tandem across countries regardless of the exchange rate regime, they tend to rise in periods of low volatility and risk aversion and decrease in periods of high volatility and risk aversion, as measured by the VIX ... There is a global financial cycle."*

[15] The mean correlation across countries between inflows from the US to country $\mathbf{i}$, and inflows flows from the rest of the world to country $\mathbf{i}$.

[16] Goldberg and Krogstrup (2018) suggest that the materialisation of capital inflows into safe haven countries at a time of high risk aversion is dependent on a number of factors. Firstly, the designation *safe haven* is likely to be temporary and not an intrinsic country feature. Secondly, capital flows to safe havens may respond differently depending on whether a country's monetary authorities intervene to influence the local currency exchange rate, or whether capital flow pressures result in changes in the exchange rate or interest rate sufficient to discourage capital flows from being realised. In other words, during *risk-off* episodes, changes in risk aversion could materialise in the form of either capital flows into safe havens (as suggested by our analysis) or changes in exchange rates or interest rates.

is negative and statistically significant for total global liabilities, US assets and RoW liability flows (columns 1 to 3 respectively). Moreover, the EPU variable is statistically significant for World and RoW portfolio debt liability flows.

These results suggest the VIX is a better proxy of uncertainty for US flows, whereas the global EPU appears to be a better measure of global uncertainty and the resulting impact on global capital flows which mainly manifests itself in portfolio debt. Our findings are in line with those of Krogstrup and Tille (2018) who argue that the VIX is not a close proxy for global conditions in banking markets.

While – as observed in the previous subsection – US investors decrease their total, portfolio debt and other investment overseas investments when the US dollar appreciates, movements in the US dollar exchange rate are not statistically significant for any asset category of either global or RoW liability flows. Again, this suggests that the US dollar bilateral exchange rate works best for explaining US flows.

Next we proceed with the equivalent regressions for the opposite flows, i.e. (1) global asset flows, (2) US liability flows, (3) rest of the world (RoW) asset flows (i.e. excluding those flows directly going to the US). The evidence in Table 6 confirms that the VIX is significant only in the case of US flows – with the notable exception of portfolio equity flows where a significant negative coefficient is found for global and RoW flows. We take this as evidence that the VIX is the best barometer of global uncertainty for international financial flows related to equities, which is intuitive as it measures the volatility of the world's most important stock market index, the S&P500. However, strikingly it is not significant for foreign inflows to the US – which may be due to the fact that, at times of high financial market uncertainty, the US is still the favoured place to invest.

Compared to the US asset/Row liability side, the EPU index appears of increased relevance for US flows, as it is significant for total, portfolio debt and other investment flows. This suggest that in an environment of heightened economic policy uncertainty global investors also retrench from their overseas investments in the US. While this also applies to the RoW investments in terms of portfolio debt, this does not hold for other investment where the retrenchment is US-specific. Moreover, our evidence confirms that movements in the US dollar exchange rate are mainly statistically significant for US liability flows, in line with findings for US asset flows.

4.3.3 Regression analysis with national pull factors

Table (7) includes partner country specific variables in the regression for US asset/Row liability flows, namely the national EPU indices, the Chinn Ito capital account openness index, the change in national sovereign bond yields and domestic real GDP growth.

Higher capital account openness is associated with lower total RoW inflows (driven by other investment) and lower portfolio debt inflows from the US, but increased portfolio equity flows from the US. Countries with faster GDP growth experience larger total inflows from the RoW, driven by

the other investment, while this variable does not matter significantly for inflows by US investors.

The results for the national EPU indices are in line with those obtained in Table 5 for the global EPU indices and in addition, we also obtain a negative sign for RoW and global other investment inflows. To further investigate, we run auxiliary regressions of the 13 national EPU indices on time fixed effects to capture the country invariant component. We then include the estimated fixed effects (which can be thought of as the global component; see Figure 10, panel b) and the residuals (the country specific component) as separate variables in the bilateral regressions in Table (8). The results demonstrate that for total and portfolio debt liability RoW flows, it is the global component of the EPU that is negative and statistically significant. In the case case of other investment, it is the country specific component of the national EPU that is negative and statistically significant, thus providing additional insight compared to using the global or unfiltered national indices.

Overall, including the additional partner country specific variables does not substantially alter the findings obtained in the previous subsection, neither does it greatly increase the explanatory power of the model. The same conclusions apply in the case of unreported US liability/RoW asset estimations.

4.3.4 Alternative global cycle and risk indicators

In unreported regressions, we explore the role of a number of alternative indicators of the global risk and financial cycle put forward in the recent literature by including them in addition to the baseline specification presented in Table 5 and 6.

First, we investigate the OIS-Libor spread. The London Interbank Offer Rate (LIBOR) provides information on short-term borrowing costs that banks charge each other on unsecured loans (in this case in US dollars), whereas the Overnight Index Swap (OIS) rate provides the overnight rate for US dollar funding offered by the Federal Reserve. We include the US OIS-Libor spread as a proxy for stress in private interbank-funding markets (Goldberg, Kennedy and Miu 2011).[17] Relative to the VIX, the OIS-Libor spread is more reflective of international banking than US equity market conditions, and considering the sharp spike in the indicator in 2008, this variable appears to be a good proxy for the global financial crisis, which was more banking sector than equity market driven.

In regression analysis, the variable performs similarly to the VIX when it is included either with, or instead of, the VIX. Indeed, including both variables tends to greatly diminish the statistical significance of the VIX, most notably for other investment flows. When a dummy variable for the financial crises is also included, the significance of the OIS-Libor spread is not diminished,

[17] The OIS-LIBOR spread rose considerably in late 2007 before exhibiting a sharp and short-lived spike in 2008 at the height of the global financial crisis. Since then, the variable has generally remained comparatively low with exceptions observed in 2012, around the European sovereign debt crisis, and in 2015/16, when China experienced an episode of financial market instability.

suggesting that the variable helps to explain flows in the rest of the period under examination. The coefficients on the USD exchange rate variable are largely unaffected, as is the EPU.[18]

Second, we include the US cross-currency basis which is defined as the difference between the US Libor and the implied dollar interest rate by swapping foreign currency into dollars.[19] According to Avdjiev et al. (2017) the cross-currency basis measures deviations from the Covered Interest Parity (CIP) condition. Including the variable in the regression delivers coefficients with a positive sign, such that higher values of the cross-currency basis are associated lower global capital flows, particularly in the RoW regressions. However, in the US-specific regressions the US dollar variable remains statistically significant, while the cross-currency basis turns out to be statistically insignificant. These findings may relate to the fact that the US dollar and US cross-currency basis are closely related indicators, as Avdjiev et al. (2017) state that *the cross-currency basis appears to be the mirror image of dollar strength*.[20]

Third, we explore the role of broker-dealer leverage as a proxy for global liquidity, reflecting the leverage of global banks acting as broker-dealers, thereby facilitating cross-border lending (Bruno and Shin 2015a and 2015b; Krogstrup and Tille 2018). Broker-dealer leverage increased in the period up to 2007, before falling abruptly with the onset of the global financial crisis, and declining consistently thereafter, which suggests that weak financial conditions persisted for a considerable period.[21] This variable is generally statistically significant and positive, such that greater broker-dealer leverage, reflecting more favourable conditions, is associated with larger international financial flows. Including this variable along with both the VIX and the global EPU, tends to diminish the significance of the EPU also for RoW other investment flows. The statistical significance of the VIX and USD are largely unaffected.

Fourth, similar to Forbes and Warnock (2012), and in the spirit of Akinci and Chahrour (2018), we add a proxy for bad global economic news which is based on the difference between actual economic growth rates and the ones forecast for the respective time period two years ago, taken from the IMF World Economic Outlook (WEO). The variable is constructed by comparing forecasts across different vintages of the WEO to actual GDP outcomes taken from the IMF. As the WEO is only published semi-annually, we linearly interpolate values for the missing quarters. In unreported regressions, the coefficients on the deviation of world GDP from forecasts variable are typically positive and statistically significant for the total and other investment categories, which suggests

[18] Where available, we also tested the equivalent national series for the Libor-OIS spread, as a proxy for stress in interbank lending markets in the currencies of the individual counterpart countries (Ahn, Amiti and Weinstein 2011). Data are available from Bloomberg for the euro, Japanese yen, British pound sterling, Swiss franc, and Canadian dollar. We use the euro area values for each of the four euro area Member States in the analysis, such that there are eight counterpart countries to the US in the regressions. This variable also tends to be statistically significant and negative, such that higher levels of interbank market stress are associated with lower international capital flows, particularly other investment flows.

[19] Specifically, we include the average cross-currency basis of the euro, British pound, Japanese yen and Swiss Franc.

[20] That is, when the dollar strengthens, CIP deviations widen.

[21] According to Bruno and Shin (2015b), leverage is procyclical, such that broker-dealers are highly leveraged when the balance sheet is large, resulting in greater credit supply.

that both global and US banking sector flows have been highly pro-cyclical over the period under examination.[22]

Fifth, to further investigate the important global role of the Federal Reserve, we introduce the Husted, Rogers and Sun (2017) US monetary policy uncertainty index as an additional explanatory variable. The coefficient on this variable is statistically significant and negative for US portfolio equity and debt asset flows. This implies that elevated US monetary policy uncertainty tends to dampen US investors purchases of foreign portfolio securities. However, it is not statistically significant in RoW asset flows, or for liability flows.

In summary, the robustness tests indicate that using more global, longer-term and less equity market oriented indicators can be helpful in explaining the global financial cycle. In general, while the supplementary variables have their merits, they do not alter considerably our main findings and conclusions, which are based on the VIX and global EPU.

4.4 Sudden stop episodes

Finally, we investigate whether the importance of US variables differs in extreme episode compared to normal times. Figure (11), panel (a) displays sudden stop and retrenchment episodes as defined by Forbes and Warnock (2012).[23] Under this definition, a "stop" episode starts in the first quarter that flows decrease by more than one standard deviation below its rolling mean over the previous five-year period. The episode is considered to have ended once flows rise above one standard deviation below its mean.

In unreported probit regressions, the VIX performs better in explaining these episodes than the EPU, for both the US liability and RoW asset flows. This result is likely driven by the fact that these episodes are heavily concentrated around the period of the global financial crisis, when the spike in the VIX are markedly more pronounced than those observed in the case of the EPU. This result also applies to both US asset flows and RoW liability flows, consistent with Figure (11), panel (b), which shows that extreme US and the RoW capital flow events have generally tended to coincide.

A number of US flow events actually appear in the period immediately prior to RoW flow events. For instance, the financial shocks that initiated the global financial crisis, the Lehman Brothers shock, were apparent in America first. As a consequence, US variables may have been particularly relevant for explaining the global financial crisis. However, subsequent events, such as the European Sovereign Debt Crisis, or future shocks to the global financial system, may more

[22] In further estimations, we also tested the role of the geopolitical risk index from Caldara and Iacoviello (2018), and the residual of a regression of the Global EPU on the US EPU. The coefficients were generally not statistically significant.

[23] The results described are similar when the analysis is conducted using an alternative event definition, namely when a country is experiencing inflows in the bottom 25% observed in that country between 2002Q4 - 2017Q3. The latter definition has advantages, because it allows the inclusion of observations for the period prior to 2007. However, the Forbes and Warnock (2012) definition of sudden stops is preferred as it is more commonly used in the literature.

frequently emanate from other regions of the globe, particularly if the share of the US in global finance, trade and output continues to decline.

5 Conclusions

A number of papers posit a unique role for the US in the international financial system (Rey 2015, Cerutti et al. 2017). This paper investigates the characteristics and determinants of US financial flows and examines how these compare and contrast with those of the rest of the world.

Specifically, we combine IMF International Financial Statistics and bilateral US Bureau of Economic Analysis data to investigate the importance of US variables such as the VIX, Federal Reserve standard and non-standard monetary policy, and the US dollar exchange rate.

Our results suggest that variation in US variables has a quantitatively important influence on global financial flows. We interpret this as evidence supporting the existence of a global financial cycle, only some of which is driven by policies and events in the US. At the same time, the correlation between some of the US variables such as the VIX and the US dollar is stronger for the US component of global flows. Should the US share of global financial flows continue to decline in future, the validity of using US variables as a proxy for global conditions may become increasingly tenuous.

In considering the scale of the effects outlined above it is important to remember that these are confined to the impact of observable US variables. However, our results indicate that the truly global drivers of international capital flows, as proxied by alternative uncertainty indices, are becoming ever more important as events in other important regions such as the euro area or China could also have increasingly important global consequences. Given the apparent high degree of interconnectedness, larger cross-border policy spillovers could necessitate further efforts to coordinate policy at a regional or global level.

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Table 1: Determinants of Unilateral US Assets flows, 2003Q1 to 2017Q2

	(1) Total Assets	(2) FDI	(3) Port. Equity	(4) Port. Debt	(5) Other Inv.
VIX US volatility index	-1.976***	-0.048	-0.269*	-0.490**	-1.207**
	(0.544)	(0.142)	(0.143)	(0.214)	(0.480)
US q-o-q GDP growth	-0.274	-0.064	0.049	-0.108	-0.095
	(0.291)	(0.060)	(0.067)	(0.091)	(0.252)
Change in Shadow Federal funds rate	-0.224	-0.056	0.054	-0.046	-0.200
	(0.400)	(0.070)	(0.121)	(0.142)	(0.324)
Nominal effective exchange rate	-13.582**	-4.139***	-0.250	-4.421**	-3.886
	(5.894)	(1.439)	(1.968)	(1.758)	(4.214)
US Exports	-0.670*	0.117	0.046	-0.113	-0.780**
	(0.344)	(0.102)	(0.089)	(0.122)	(0.294)
Observations	58	58	58	58	58
R-squared	0.37	0.18	0.15	0.27	0.29

Notes: The dependent variable is the ratio of quarterly US capital flows (asset or liability flows) to US GDP; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Nominal Effective Exchange Rate, US exports and imports divided by US GDP. All variables are contemporaneous. Flows data are from the IMF IFS. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 2: Determinants of Unilateral US Liability flows, 2003Q1 to 2017Q2

	(1) Total Liabilities	(2) FDI	(3) Port. Equity	(4) Port. Debt	(5) Other Inv.
VIX US volatility index	-2.462***	-0.008	-0.053	-1.292***	-1.063**
	(0.756)	(0.181)	(0.128)	(0.330)	(0.408)
US q-o-q GDP growth	-0.720**	0.027	-0.004	-0.272**	-0.088
	(0.285)	(0.091)	(0.067)	(0.128)	(0.224)
Change in Shadow Federal funds rate	-0.405	0.033	-0.202	-0.244	0.005
	(0.399)	(0.094)	(0.128)	(0.189)	(0.334)
Nominal effective exchange rate	-13.669**	-0.160	-3.918***	-5.299*	-11.913***
	(6.457)	(2.060)	(1.420)	(2.950)	(4.057)
US Imports	-0.709	0.133	0.128	-0.281	-0.263
	(0.656)	(0.104)	(0.092)	(0.249)	(0.314)
Observations	58	58	58	58	58
R-squared	0.29	0.03	0.24	0.30	0.33

Notes: The dependent variable is the ratio of quarterly US capital flows (asset or liability flows) to US GDP; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Nominal Effective Exchange Rate, US exports and imports divided by US GDP. All variables are contemporaneous. Flows data are from the IMF IFS. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 3: Determinants of Bilateral US Assets flows, 2003Q1 to 2017Q2

	(1) Total Assets	(2) FDI	(3) Port. Equity	(4) Port. Debt	(5) Other Inv.
VIX US volatility index	-0.522***	0.023	-0.135**	-0.160**	-0.267**
	(0.187)	(0.056)	(0.057)	(0.077)	(0.114)
US q-o-q GDP growth	0.033	0.049*	0.005	-0.051	0.035
	(0.095)	(0.029)	(0.029)	(0.037)	(0.059)
Change in Shadow Federal funds rate	-0.067	-0.063*	-0.043	-0.023	0.046
	(0.124)	(0.037)	(0.038)	(0.049)	(0.078)
Bilateral US exchange rate	-4.893***	-0.182	0.052	-1.881***	-2.617***
	(0.919)	(0.266)	(0.260)	(0.352)	(0.614)
US Exports	-0.192	0.016	0.034	-0.029	-0.203**
	(0.150)	(0.052)	(0.047)	(0.083)	(0.094)
Observations	812	807	812	812	807
Within R-Squared	0.06	0.01	0.02	0.04	0.04
Overall R-Squared	0.01	0.02	0.00	0.02	0.01
Number of countries	14	14	14	14	14

Notes: The dependent variable is the ratio of quarterly US capital flows (asset or liability flows) to National GDP vis-à-vis 14 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. All variables are contemporaneous. Flows data are from the BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 4: Determinants of Bilateral US Assets flows, 2003Q1 to 2017Q2, BIS USD denominated liabilities

	(1) Total Assets	(2) Port. Equity	(3) Port. Debt	(4) Other Inv.
VIX US volatility index	-1.147**	-0.175*	-0.568***	-0.459
	(0.470)	(0.090)	(0.202)	(0.282)
US q-o-q GDP growth	0.026	0.005	-0.068	0.038
	(0.120)	(0.031)	(0.048)	(0.072)
Change in Shadow Federal funds rate	-0.052	-0.080	-0.090	0.155
	(0.315)	(0.061)	(0.129)	(0.196)
Bilateral US exchange rate	-9.826***	0.746	-3.138***	-7.113***
	(2.463)	(0.499)	(1.006)	(1.597)
BIS USD Liabilities	-4.416**	-0.289	-2.501***	-1.542
	(2.107)	(0.405)	(0.954)	(1.256)
VIX*BIS USD Liabilities	1.283*	0.041	0.812**	0.434
	(0.714)	(0.135)	(0.330)	(0.428)
Change in Shadow Fed rate*BIS USD Liabilities	0.080	0.074	0.160	-0.161
	(0.493)	(0.096)	(0.216)	(0.305)
Bilateral US exchange rate*BIS USD Liabilities	9.548***	-1.376*	2.340	8.505***
	(3.378)	(0.730)	(1.467)	(2.148)
US Exports	-0.209	0.013	0.034	-0.246*
	(0.218)	(0.057)	(0.111)	(0.139)
Observations	671	671	671	666
R-squared	0.17	0.10	0.13	0.06
Number of Countries	13	13	13	13

Notes: The dependent variable is the ratio of quarterly US capital flows (asset or liability flows) to National GDP vis-à-vis 14 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. The share of the US dollar in a country's cross-border bank liabilities is taken from the BIS locational banking statistics. All variables are contemporaneous. Flows data are from the BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 5a: Determinants of Bilateral US Assets flows/RoW Liabilities 2003Q1 to 2017Q2

	(1)	(2)	(3)	(4)	(5)	(6)
Asset Type	Total	Total	Total	Port. Equity	Port. Equity	Port. Equity
Asset or Liability	Liability	Asset	Liability	Liability	Asset	Liability
Country/Region	World	US	RoW	World	US	RoW
VIX US volatility index	-1.558	-0.449**	-0.976	0.764	-0.118**	-0.062
	(1.398)	(0.192)	(1.265)	(0.471)	(0.058)	(0.131)
Global EPU Index	-2.100*	-0.253*	-1.991**	-0.281	-0.058	-0.005
	(1.100)	(0.138)	(0.994)	(0.378)	(0.043)	(0.095)
US q-o-q GDP growth	-0.169	0.006	-0.107	-0.037	-0.001	0.043
	(0.667)	(0.095)	(0.619)	(0.224)	(0.029)	(0.069)
Change in Shadow Federal funds rate	0.635	-0.058	0.629	0.192	-0.043	0.131
	(0.844)	(0.124)	(0.782)	(0.284)	(0.038)	(0.090)
Bilateral US exchange rate	-1.263	-4.564***	2.433	-1.688	0.108	-0.412
	(5.317)	(0.913)	(5.017)	(1.917)	(0.259)	(0.638)
Observations	798	812	798	802	812	802
Number of Countries	14	14	14	14	14	14
Within R-Squared	0.08	0.07	0.06	0.01	0.02	0.02
Overall R-Squared	0.15	0.04	0.12	0.17	0.00	0.00

Notes: The dependent variable is the ratio of quarterly world, US or RoW capital flows (asset or liability flows) to National GDP vis-à-vis 13 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. EPU Indices are taken from Baker, Bloom and Davis (2016). All variables are contemporaneous. Flows data are from the IMF IFS and the BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 5b: Determinants of Bilateral US Assets flows/RoW Liabilities 2003Q1 to 2017Q2

	(7)	(8)	(9)	(10)	(11)	(12)
Asset Type	Port. Debt	Port. Debt	Port. Debt	Other Inv.	Other Inv.	Other Inv.
Asset or Liability	Liability	Asset	Liability	Liability	Asset	Liability
Country/Region	World	US	RoW	World	US	RoW
VIX US volatility index	-0.588*	-0.141*	-0.390	-1.389	-0.231**	-1.108
	(0.333)	(0.079)	(0.292)	(1.013)	(0.116)	(0.904)
Global EPU Index	-0.834***	-0.069	-0.779***	-1.071	-0.119	-1.057
	(0.270)	(0.059)	(0.233)	(0.766)	(0.081)	(0.684)
US q-o-q GDP growth	-0.269*	-0.057	-0.202	0.173	0.023	0.234
	(0.153)	(0.037)	(0.138)	(0.495)	(0.059)	(0.456)
Change in Shadow Federal funds rate	-0.187	-0.021	-0.201	0.529	0.048	0.449
	(0.192)	(0.048)	(0.174)	(0.629)	(0.077)	(0.579)
Bilateral US exchange rate	-1.362	-1.820***	0.432	1.574	-2.482***	3.356
	(1.309)	(0.349)	(1.176)	(3.982)	(0.617)	(3.742)
Observations	778	812	778	802	807	797
Number of Countries	14	14	14	14	14	14
Within R-Squared	0.08	0.04	0.07	0.06	0.04	0.06
Overall R-Squared	0.01	0.03	0.01	0.04	0.01	0.03

Notes: The dependent variable is the ratio of quarterly world, US or RoW capital flows (asset or liability flows) to National GDP vis-à-vis 13 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. EPU Indices are taken from Baker, Bloom and Davis (2016). All variables are contemporaneous. Flows data are from the IMF IFS and the BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 6a: Determinants of Bilateral US liability flows/RoW Assets 2003Q1 to 2017Q2

	(1)	(2)	(3)	(4)	(5)	(6)
Asset Type	Total	Total	Total	Port. Equity	Port. Equity	Port. Equity
Asset or Liability	Asset	Liability	Asset	Asset	Liability	Asset
Country/Region	World	US	RoW	World	US	RoW
VIX US volatility index	-1.770	-0.766***	-0.721	-0.333***	-0.074	-0.211*
	(1.597)	(0.233)	(1.424)	(0.115)	(0.058)	(0.126)
Global EPU Index	-2.344*	-0.322*	-2.358**	-0.133	-0.005	-0.149
	(1.317)	(0.173)	(1.163)	(0.092)	(0.042)	(0.100)
US q-o-q GDP growth	-0.213	-0.169	0.038	0.101**	0.003	0.101*
	(0.753)	(0.112)	(0.696)	(0.051)	(0.028)	(0.056)
Change in Shadow Federal funds rate	0.636	-0.082	0.743	0.020	-0.055	0.071
	(0.976)	(0.146)	(0.902)	(0.067)	(0.036)	(0.074)
Bilateral US exchange rate	-2.800	-3.800***	0.569	-0.858*	-0.597**	-0.303
	(5.900)	(1.042)	(5.586)	(0.449)	(0.240)	(0.484)
Observations	751	812	751	739	812	739
Number of Countries	14	14	14	13	14	13
Within R-Squared	0.09	0.06	0.07	0.07	0.02	0.05
Overall R-Squared	0.19	0.06	0.21	0.09	0.03	0.07

Notes: The dependent variable is the ratio of quarterly world, US or RoW capital flows (asset or liability flows) to National GDP vis-à-vis 13 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. EPU Indices are taken from Baker, Bloom and Davis (2016). All variables are contemporaneous. Flows data are from the IMF IFS and the BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 6b: Determinants of Bilateral US liability flows/RoW Assets 2003Q1 to 2017Q2

	(7)	(8)	(9)	(10)	(11)	(12)
Asset Type	Port. Debt	Port. Debt	Port. Debt	Other Inv.	Other Inv.	Other Inv.
Asset or Liability	Asset	Liability	Asset	Asset	Liability	Asset
Country/Region	World	US	RoW	World	US	RoW
VIX US volatility index	-0.279	-0.352**	0.100	-1.569	-0.312**	-1.048
	(0.238)	(0.149)	(0.254)	(0.988)	(0.144)	(0.845)
Global EPU Index	-0.696***	-0.191*	-0.417**	-0.931	-0.220**	-0.962
	(0.180)	(0.116)	(0.198)	(0.764)	(0.102)	(0.650)
US q-o-q GDP growth	-0.093	-0.105	0.025	-0.105	-0.011	0.049
	(0.119)	(0.069)	(0.122)	(0.481)	(0.074)	(0.428)
Change in Shadow Federal funds rate	0.250*	-0.041	0.280*	0.378	0.007	0.378
	(0.150)	(0.089)	(0.156)	(0.611)	(0.096)	(0.543)
Bilateral US exchange rate	-2.360**	-1.970***	-0.083	1.525	-1.331*	1.988
	(1.003)	(0.634)	(1.062)	(3.861)	(0.707)	(3.512)
Observations	745	812	745	802	810	800
Number of Countries	13	14	13	14	14	14
Within R-Squared	0.10	0.04	0.03	0.05	0.02	0.05
Overall R-Squared	0.07	0.02	0.01	0.06	0.01	0.05

Notes: The dependent variable is the ratio of quarterly world, US or RoW capital flows (asset or liability flows) to National GDP vis-à-vis 13 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. EPU Indices are taken from Baker, Bloom and Davis (2016). All variables are contemporaneous. Flows data are from the IMF IFS and the BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 7a: Determinants of Bilateral US Assets flows/RoW Liabilities 2003Q1 to 2017Q2, pull factors

	(1)	(2)	(3)	(4)	(5)	(6)
Asset Type	Total	Total	Total	Port. Equity	Port. Equity	Port. Equity
Asset or Liability	Liabilities	Assets	Liabilities	Liabilities	Assets	Liabilities
Country/Region	World	US	RoW	World	US	RoW
VIX US volatility index	-1.785	-0.301	-1.287	-0.241	-0.145**	-0.056
	(1.123)	(0.186)	(0.994)	(0.152)	(0.061)	(0.140)
National EPU Index	-1.437**	-0.251*	-1.322***	0.030	-0.040	0.075
	(0.599)	(0.133)	(0.511)	(0.078)	(0.035)	(0.070)
US q-o-q GDP growth	-0.575	0.006	-0.519	0.064	0.011	0.040
	(0.541)	(0.095)	(0.496)	(0.078)	(0.031)	(0.076)
Ch. in Shadow Fed. rate	0.789	0.020	0.689	0.072	-0.045	0.141
	(0.685)	(0.121)	(0.626)	(0.098)	(0.040)	(0.095)
Bilateral US exchange rate	-3.814	-4.803***	0.282	-0.337	0.053	-0.405
	(4.361)	(0.917)	(4.052)	(0.697)	(0.277)	(0.690)
Chinn Ito KA. openness	-0.817**	-0.092	-0.796**	0.148	0.088*	0.049
	(0.349)	(0.109)	(0.324)	(0.105)	(0.046)	(0.079)
Ch. Yield	-0.180	0.008	-0.150	-0.019	-0.012	-0.002
	(0.300)	(0.063)	(0.274)	(0.045)	(0.019)	(0.043)
GDP Growth	0.368*	0.016	0.396**	0.025	-0.012	0.044
	(0.196)	(0.044)	(0.186)	(0.037)	(0.014)	(0.036)
Observations	737	751	737	741	751	741
Number of Countries	13	13	13	13	13	13
Within R-Squared	0.09	0.07	0.07	0.03	0.03	0.02
Overall R-Squared	0.01	0.00	0.01	0.01	0.01	0.00

Notes: The dependent variable is the ratio of quarterly world, US or RoW capital flows (asset or liability flows) to National GDP vis-à-vis 13 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. EPU Indices are taken from Baker, Bloom and Davis (2016). Capital account openness is taken from Chinn and Ito (2006). GDP growth is taken from Eurostat, IMF and national sources. Yields are taken from the IMF and national sources. All variables are contemporaneous. Flows data are from the IMF IFS and the BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 7b: Determinants of Bilateral US Assets flows/RoW Liabilities 2003Q1 to 2017Q2, pull factors

	(7)	(8)	(9)	(10)	(11)	(12)
Asset Type	Port. Debt	Port. Debt	Port. Debt	Other Inv.	Other Inv.	Other Inv.
Asset or Liability	Liabilities	Assets	Liabilities	Liabilities	Assets	Liabilities
Country/Region	World	US	RoW	World	US	RoW
VIX US volatility index	-0.386	-0.035	-0.274	-1.178	-0.187*	-0.894
	(0.292)	(0.078)	(0.271)	(0.783)	(0.109)	(0.686)
National EPU Index	-0.665***	-0.071	-0.612***	-0.750*	-0.101	-0.743*
	(0.162)	(0.053)	(0.145)	(0.455)	(0.093)	(0.383)
US q-o-q GDP growth	-0.097	-0.032	-0.057	-0.337	-0.016	-0.244
	(0.134)	(0.037)	(0.130)	(0.394)	(0.057)	(0.358)
Ch. in Shadow Fed. rate	-0.135	0.026	-0.179	0.466	0.073	0.371
	(0.167)	(0.048)	(0.162)	(0.498)	(0.072)	(0.451)
Bilateral US exchange rate	-1.692	-1.942***	0.209	-1.106	-2.460***	0.988
	(1.156)	(0.353)	(1.095)	(3.178)	(0.626)	(2.916)
Chinn Ito KA openness	-0.324*	-0.121*	-0.209	-0.397*	-0.011	-0.449**
	(0.177)	(0.063)	(0.138)	(0.204)	(0.074)	(0.189)
Ch. Yield	0.087	0.044*	0.045	-0.344	-0.022	-0.295
	(0.081)	(0.026)	(0.076)	(0.219)	(0.042)	(0.196)
GDP Growth	-0.025	-0.012	-0.006	0.356**	0.047	0.331**
	(0.059)	(0.017)	(0.057)	(0.145)	(0.034)	(0.134)
Observations	717	751	717	741	746	736
Number of Countries	13	13	13	13	13	13
Within R-Squared	0.11	0.06	0.08	0.06	0.04	0.06
Overall R-Squared	0.00	0.00	0.00	0.02	0.01	0.02

Notes: The dependent variable is the ratio of quarterly world, US or RoW capital flows (asset or liability flows) to National GDP vis-à-vis 13 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. EPU Indices are taken from Baker, Bloom and Davis (2016). Capital account openness is taken from Chinn and Ito (2006). GDP growth is taken from Eurostat, IMF and national sources. Yields are taken from the IMF and national sources. All variables are contemporaneous. Flows data are from the IMF IFS and BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Table 8a: Determinants of Bilateral US Assets flows/RoW Liabilities 2003Q1 to 2017Q2, local vs. global uncertainty

	(1)	(2)	(3)	(4)	(5)	(6)
Asset Type	Total	Total	Total	Port. Equity	Port. Equity	Port. Equity
Asset or Liability	Liabilities	Assets	Liabilities	Liabilities	Assets	Liabilities
Country/Region	World	US	RoW	World	US	RoW
VIX US volatility index	-1.860*	-0.344*	-1.383	-0.229	-0.150**	-0.034
	(1.122)	(0.181)	(1.002)	(0.152)	(0.061)	(0.140)
National EPU, ex. time FE	-0.004	-0.001	-0.004	-0.001	-0.000	-0.000
	(0.005)	(0.002)	(0.004)	(0.001)	(0.000)	(0.001)
National EPU, time FE	-0.014*	-0.001	-0.013*	0.000	-0.000	0.000
	(0.008)	(0.001)	(0.007)	(0.001)	(0.000)	(0.001)
US q-o-q GDP growth	-0.583	0.005	-0.532	0.060	0.009	0.036
	(0.542)	(0.095)	(0.498)	(0.078)	(0.031)	(0.076)
Ch. in Shadow Fed. rate	0.813	0.024	0.707	0.073	-0.045	0.144
	(0.685)	(0.120)	(0.629)	(0.098)	(0.040)	(0.095)
Bilateral US exchange rate	-3.415	-4.863***	0.712	-0.282	0.074	-0.348
	(4.385)	(0.920)	(4.090)	(0.704)	(0.279)	(0.698)
Chinn Ito KA openness	-0.572	-0.082	-0.546	0.107	0.082*	0.020
	(0.416)	(0.127)	(0.403)	(0.111)	(0.046)	(0.094)
Ch. Yield	-0.205	0.011	-0.172	-0.021	-0.013	-0.004
	(0.300)	(0.063)	(0.275)	(0.045)	(0.019)	(0.043)
GDP Growth	0.340*	0.018	0.369*	0.024	-0.013	0.041
	(0.200)	(0.045)	(0.190)	(0.038)	(0.014)	(0.038)
Observations	737	751	737	741	751	741
Number of Countries	13	13	13	13	13	13
Within R-Squared	0.08	0.07	0.07	0.03	0.03	0.02
Overall R-Squared	0.02	0.01	0.03	0.01	0.01	0.00

Notes: The dependent variable is the ratio of quarterly world, US or RoW capital flows (asset or liability flows) to National GDP vis-à-vis 13 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. EPU Indices are taken from Baker, Bloom and Davis (2016). Capital account openness is taken from Chinn and Ito (2006). GDP growth is taken from Eurostat, IMF and national sources. Yields are taken from the IMF and national sources. All variables are contemporaneous. Flows data are from the IMF IFS and BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

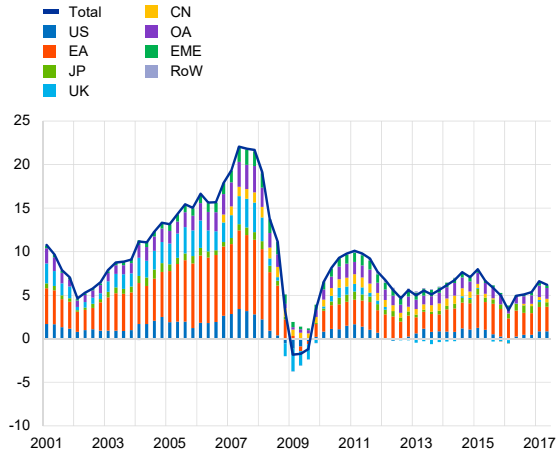
Table 8b: Determinants of Bilateral US Assets flows/RoW Liabilities 2003Q1 to 2017Q2, local vs. global uncertainty

	(7)	(8)	(9)	(10)	(11)	(12)
Asset Type	Port. Debt	Port. Debt	Port. Debt	Other Inv.	Other Inv.	Other Inv.
Asset or Liability	Liabilities	Assets	Liabilities	Liabilities	Assets	Liabilities
Country/Region	World	US	RoW	World	US	RoW
VIX US volatility index	-0.403	-0.053	-0.300	-1.304*	-0.191*	-1.039
	(0.288)	(0.077)	(0.273)	(0.762)	(0.108)	(0.672)
National EPU, ex. time FE	-0.000	-0.001	0.000	-0.004	0.000	-0.005*
	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.003)
National EPU, time FE	-0.009***	-0.000	-0.008***	-0.005	-0.001	-0.004
	(0.002)	(0.000)	(0.002)	(0.005)	(0.001)	(0.004)
US q-o-q GDP growth	-0.119	-0.032	-0.085	-0.322	-0.018	-0.234
	(0.128)	(0.037)	(0.125)	(0.393)	(0.058)	(0.357)
Ch. in Shadow Fed. rate	-0.116	0.026	-0.159	0.459	0.078	0.361
	(0.161)	(0.048)	(0.158)	(0.495)	(0.073)	(0.448)
Bilateral US exchange rate	-1.409	-1.944***	0.486	-1.104	-2.477***	0.990
	(1.117)	(0.353)	(1.063)	(3.187)	(0.629)	(2.928)
Chinn Ito KA Openness	-0.105	-0.146**	0.034	-0.444*	0.038	-0.536**
	(0.183)	(0.066)	(0.153)	(0.258)	(0.097)	(0.234)
Ch. Yield	0.063	0.044*	0.025	-0.337	-0.019	-0.289
	(0.079)	(0.026)	(0.075)	(0.219)	(0.043)	(0.195)
GDP Growth	-0.047	-0.011	-0.027	0.363**	0.046	0.339**
	(0.059)	(0.017)	(0.056)	(0.148)	(0.034)	(0.136)
Observations	717	751	717	741	746	736
Number of Countries	13	13	13	13	13	13
Within R-Squared	0.12	0.07	0.10	0.06	0.04	0.06
Overall R-Squared	0.00	0.00	0.00	0.02	0.01	0.01

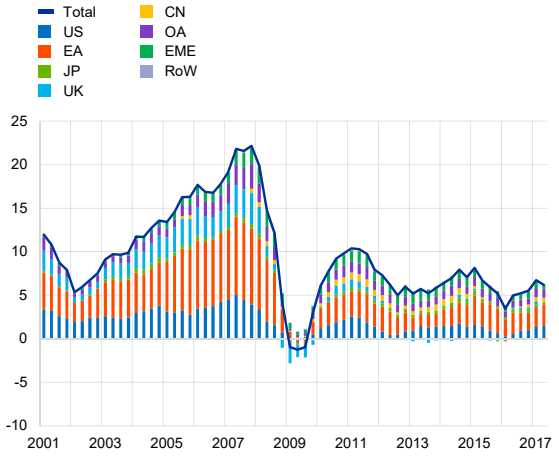
Notes: The dependent variable is the ratio of quarterly world, US or RoW capital flows (asset or liability flows) to National GDP vis-à-vis 13 countries; the explanatory variables are the US VIX, US GDP growth, the change in the Shadow Federal Funds Rate (Wu and Xia 2015), the USD Bilateral Exchange Rate, US exports and imports divided by US GDP. EPU Indices are taken from Baker, Bloom and Davis (2016). Capital account openness is taken from Chinn and Ito (2006). GDP growth is taken from Eurostat, IMF and national sources. Yields are taken from the IMF and national sources. All variables are contemporaneous. Flows data are from the IMF IFS and BEA. Robust standard errors in brackets. * significant at 10% level; ** significant at 5% level, *** significant at 1% level.

Figure 1: US and global gross asset and liability flows

(a) Asset flows



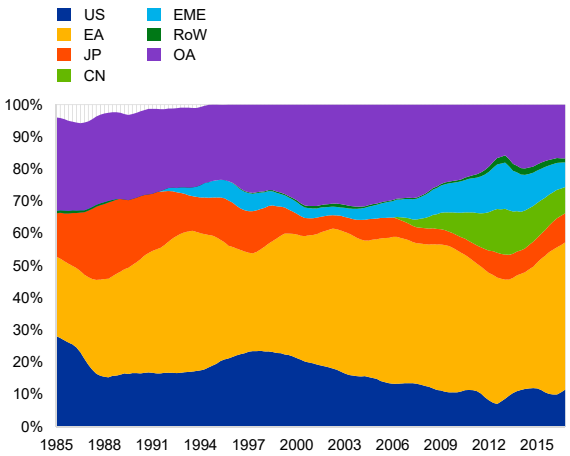
(b) Liability flows



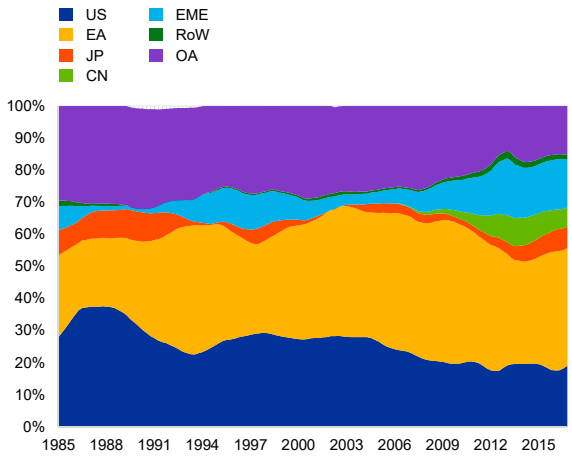
Sources: IMF and ECB Balance of Payments Statistics; 4 quarter sums; own calculations
Notes: As percentages of Global GDP. EA = euro area, JP = Japan, CN = China, OA = other advanced, EMEs = Emerging Market Economies, RoW = the rest of the world.

Figure 2: Shares of global gross asset and liability flows

(a) Asset flows



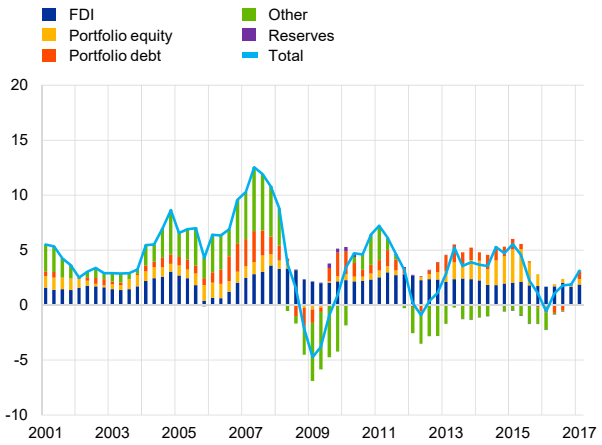
(b) Liability flows



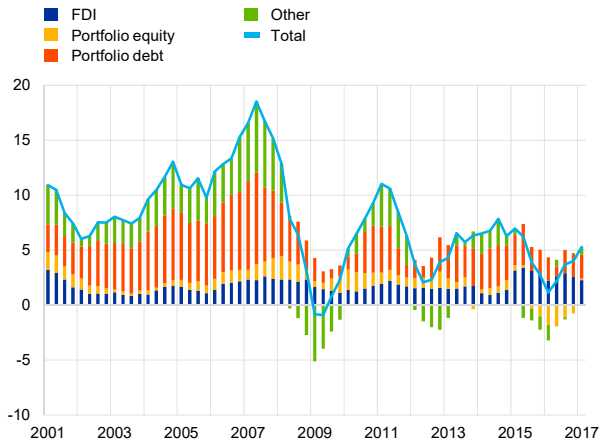
Sources: IMF and ECB Balance of Payments Statistics; 20 quarter sums; own calculations
Notes: As percentages of total global flows. EA = euro area, JP = Japan, CN = China, OA = other advanced, EMEs = Emerging Market Economies, RoW = the rest of the world. Values sum to less than 100 when regions experience negative asset/liability flows. Data for China asset (liability) flows are only available from 2006 (2007).

Figure 3: US gross asset and liability flows, by asset type

(a) Asset flows



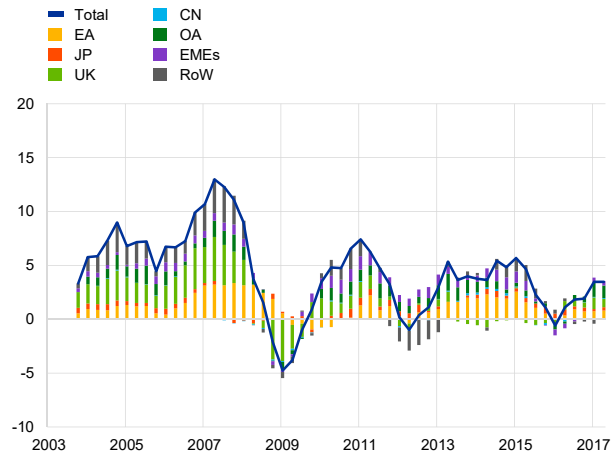
(b) Liability flows



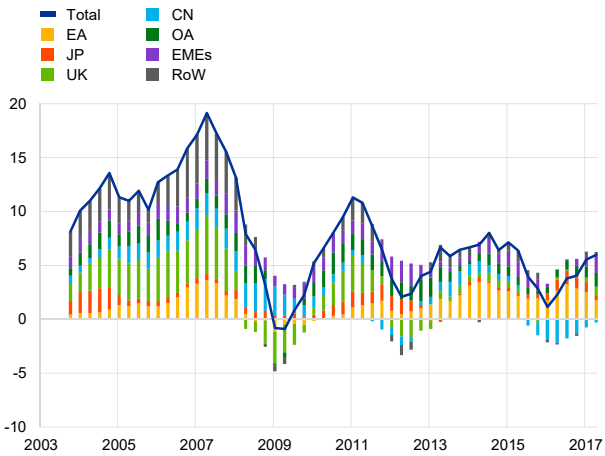
Sources: IMF and ECB Balance of Payments Statistics; 4 quarter sums; own calculations
Notes: As percentages of US GDP.

Figure 4: US gross asset and liability flows, by country group

(a) Asset flows



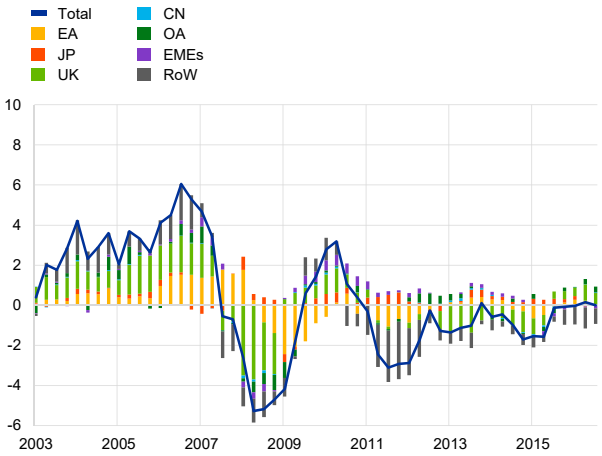
(b) Liability flows



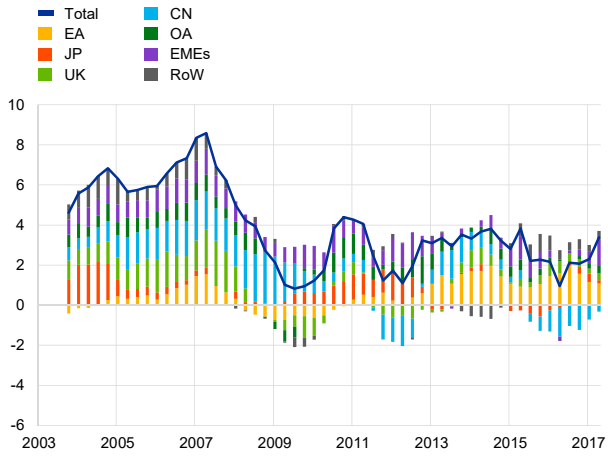
Sources: Bureau of Economic Analysis Balance of Payments Statistics; 4 quarter sums; own calculations
Notes: As percentages of US GDP. EA = euro area, JP = Japan, CN = China, OA = other advanced, EMEs = Emerging Market Economies, RoW = the rest of the world.

Figure 5: US gross other investment asset and portfolio liability flows

(a) Other Investment Asset flows

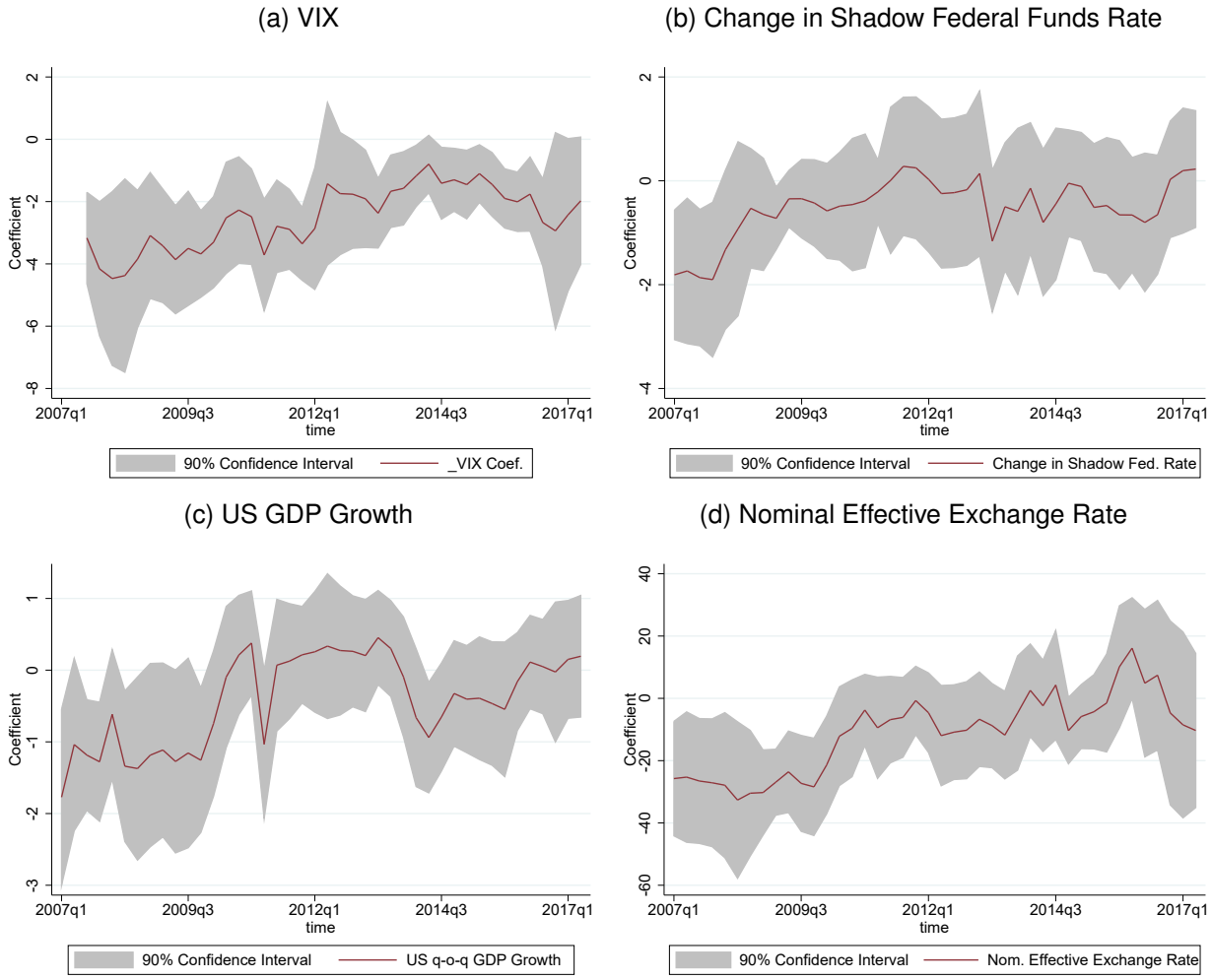


(b) Portfolio Debt Liability flows



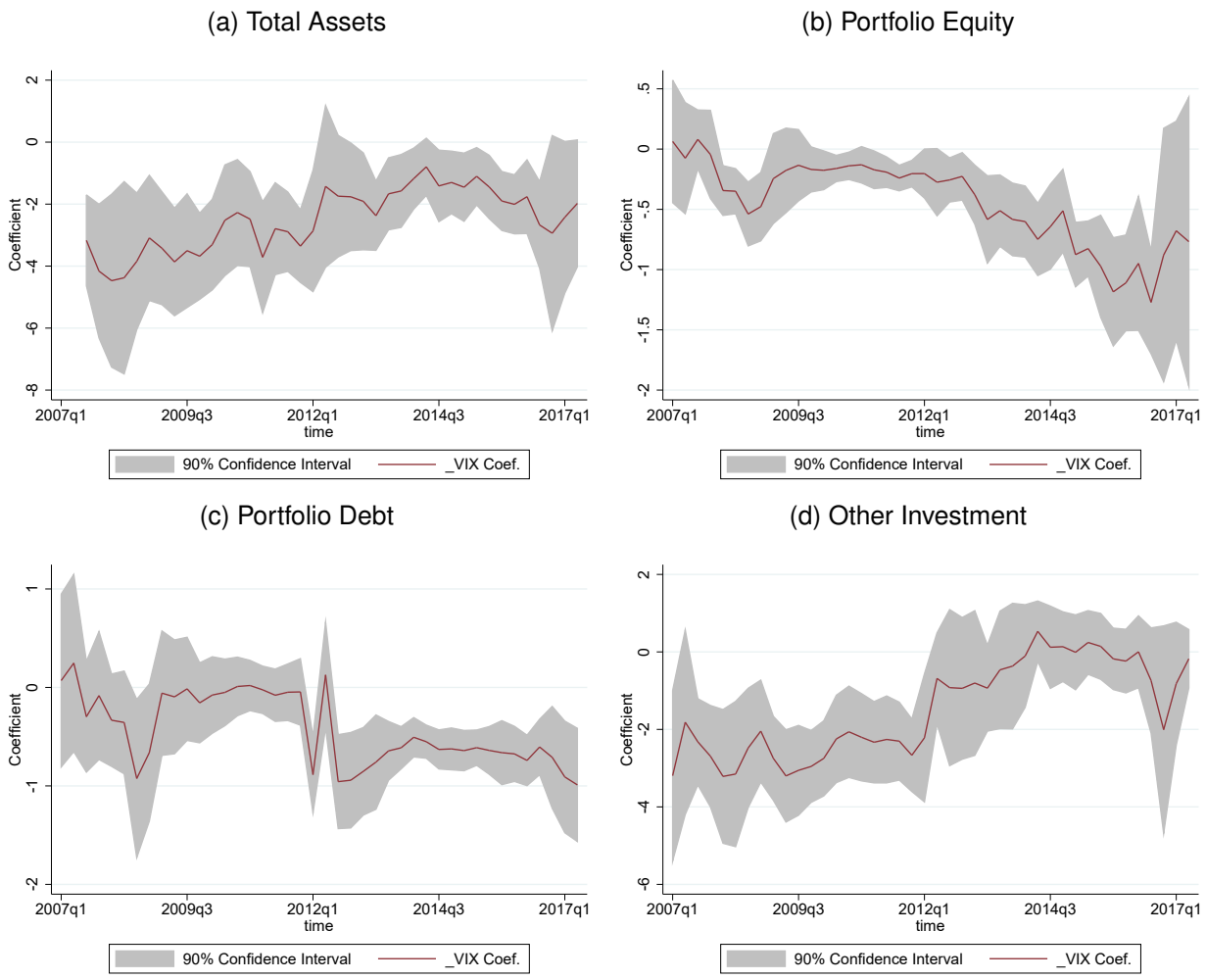
Sources: Bureau of Economic Analysis Balance of Payments Statistics; 4 quarter sums; own calculations
Notes: As percentages of US GDP. EA = euro area, JP = Japan, CN = China, OA = other advanced, EMEs = Emerging Market Economies, RoW = the rest of the world. Data for Australia are missing for 2004 and 2005.

Figure 6: Rolling coefficients on Unilateral US Asset data



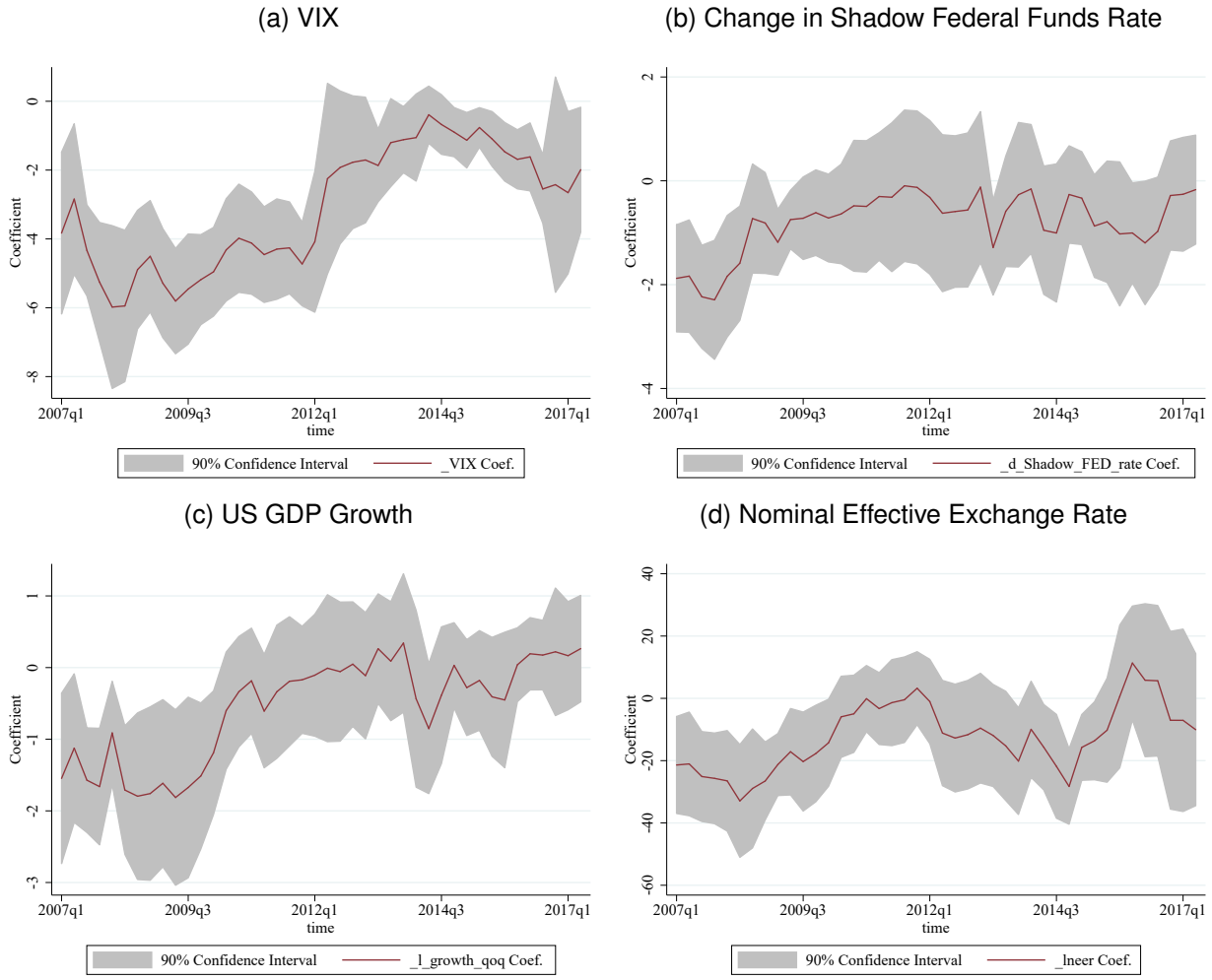
Sources: Flows data are from the Bureau of Economic Analysis Balance of Payments Statistics; own calculations
Notes: Rolling unilateral regression coefficients on total assets. Regression window 20 quarters. Rhs variables: VIX, Change in the Shadow Federal Funds Rate, US GDP growth, Change in the US Nominal Effective Exchange Rate.

Figure 7: Rolling VIX coefficients on Unilateral US data



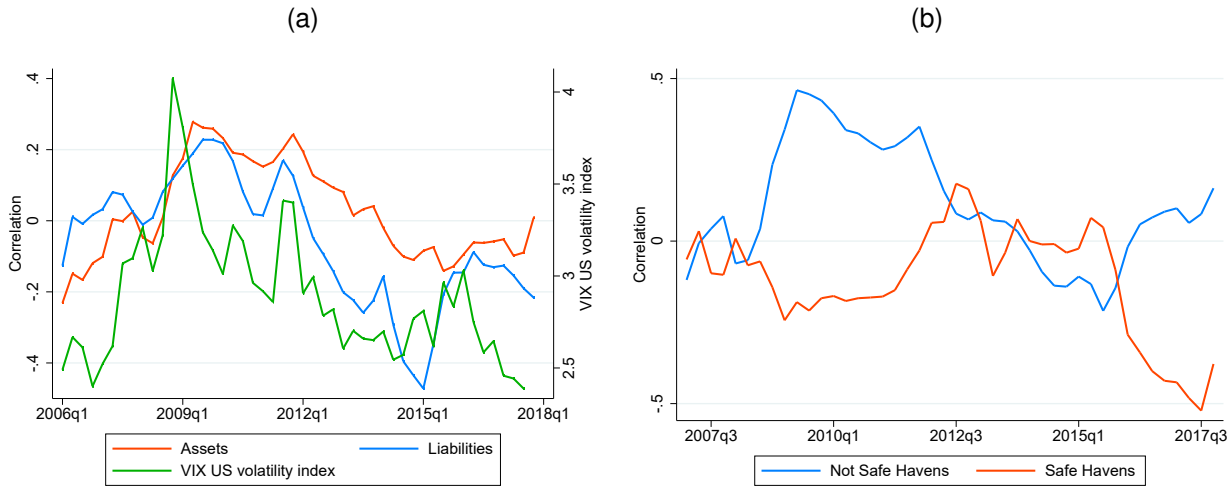
Sources: Flows data are from the Bureau of Economic Analysis Balance of Payments Statistics; own calculations
Notes: Rolling unilateral regression coefficients on total assets. Regression window 20 quarters. Rhs variable: VIX

Figure 8: Rolling coefficients on Unilateral US Liability data



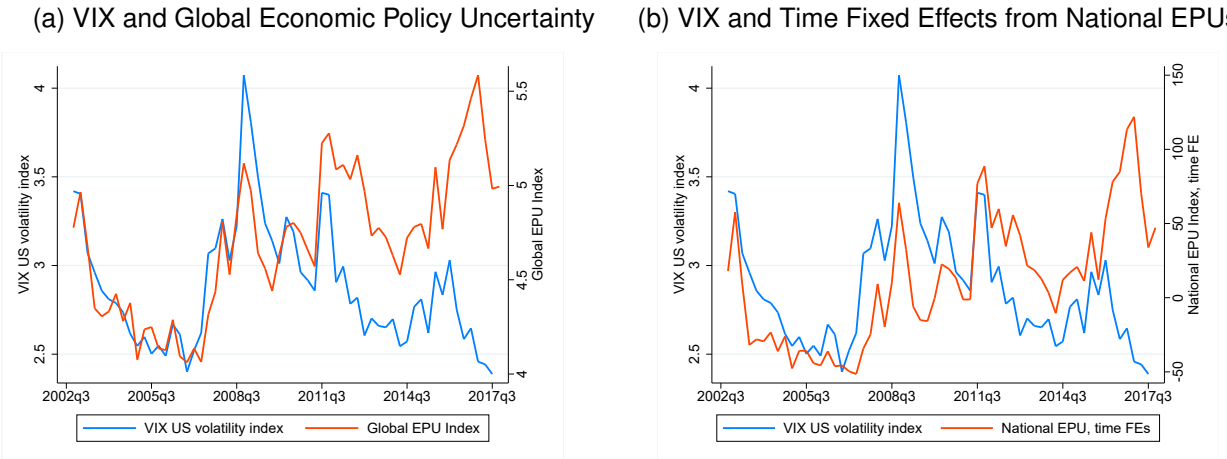
Sources: Flows data are from the Bureau of Economic Analysis Balance of Payments Statistics; own calculations
Notes: Rolling unilateral regression coefficients on total liabilities. Regression window 20 quarters. Rhs variables: VIX, Change in the Shadow Federal Funds Rate, US GDP growth, Change in the US Nominal Effective Exchange Rate.

Figure 9: Correlation between US Asset and RoW Liability Flows, across countries



Sources: Flows data are from the Bureau of Economic Analysis, IMF and ECB Balance of Payments Statistics; 4 quarter sums; own calculations.
Notes: VIX in natural logarithms.

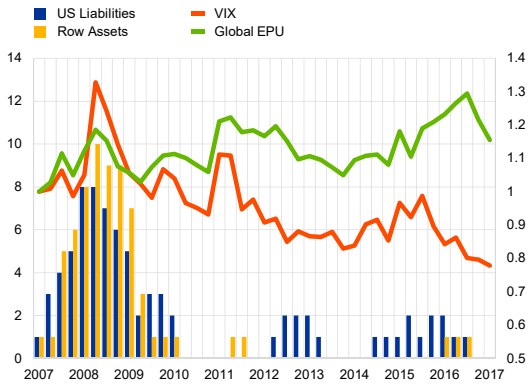
Figure 10: VIX and Economic Policy Uncertainty



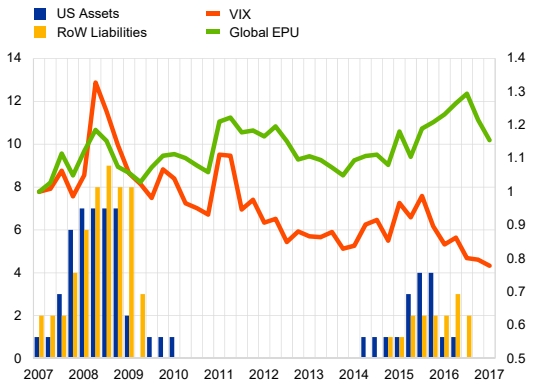
Source: Global Economic Policy Uncertainty (Baker, Bloom and Davis 2016).
Notes: Series in logs.

Figure 11: Extreme Capital Flow Events

(a) US Liabilities, Row Assets



(b) US Assets, RoW Liabilities



Notes: Note: The left-hand axis counts the number of countries experiencing a sudden stop episode in a given quarter. A sudden stop is defined as in Forbes and Warnock (2012). The right-hand axis shows the level of the VIX and Economic Policy Uncertainty Indices, where 2007 Q1=100.

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