The Uncertain Exorbitant Privilege and Duty *

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This Version: February 2025

Last Version: Link

Abstract

This paper examines how shocks to the exchange rate and macroeconomic uncertainty affect the United States' net foreign asset position. I employ a Structural Vector Autoregressive (SVAR) model incorporating a combination of external instruments, narrative identification, and shock-dependent restrictions to address the endogeneity of uncertainties and their relationship with net portfolio flows. The results indicate that exchange rate and macroeconomic uncertainty shocks help reduce the United States' net foreign asset deficit. Notably, macroeconomic uncertainty has a more persistent impact than exchange rate shocks. While reducing the deficit increases macroeconomic fluctuations in the short run, it dampens them in the long run. Furthermore, the analysis shows that macroeconomic uncertainty shocks are associated with heightened exchange rate volatility. In contrast, greater exchange rate volatility tends to dampen macroeconomic uncertainty. These findings align with the literature on convenience yields and dominant currency pricing, suggesting that heightened volatility affects core economies by altering foreign demand for safe assets and destabilizing global terms of trade.

Keywords: Uncertainty, Net Foreign Asset Position, Exchange Rate, Capital Flows

JEL Codes: E44, F31, F44, C32, C38

*I thank Xiaoji Lin Lin, Juliana Salomao, Daniel te Kaat, Laura Sunder-Plassmann, Michael Bergman, Marcus Asplund, Fane Groes, Katja Mann, Humberto Martinez, and Lizbeth la Cour for the comments and discussion that helped improve the paper significantly. Additionally, the participants of International Finance and Banking Society Annual Conference 2025 - Oxford, the Society for Computational Economics (SCE) annual Conference 2025, Seminar on VAR Analysis at Copenhagen University, the Junior Seminar at Copenhagen Business School, and the Brown Bag Seminar at the Economics Department of Copenhagen Business School and the University of Minnesota.

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1 Introduction

Feedback effects in capital flow behavior endogenously determine relationships between domestic and foreign asset prices across internationally integrated economies. Recent exchange rate liberalization has deepened financial integration—facilitating global investment, enhancing liquidity, and enabling freer capital mobility. However, this integration comes with costs: capital inflows and outflows introduce volatility in asset prices, which is reflected in fluctuations in exchange rates.

In recent years, the United States (US) has benefited from sustained global demand for its liquid financial instruments—particularly safe assets such as Treasury bills and government bonds. This demand has enabled the US to maintain trade and current account deficits while keeping interest rates relatively low, (Gourinchas and Rey, 2007, 2014, 2022). These inflows are offset by substantial outbound portfolio investment by US investors, who earn higher returns reflecting foreign risk premia. This dynamic underpins the so-called "exorbitant privilege," where the US achieves high returns on foreign assets at relatively low cost, coupled with the "exorbitant duty" of providing global safe assets—especially during periods of heightened financial stress.

However, under conditions of elevated uncertainty, domestic risk premia rise alongside exchange rate volatility. In such cases, foreign investors may rebalance their portfolios, triggering a sudden stop or retrenchment of capital flows. These dynamics raise questions about the persistence of the United States' exorbitant privilege and duty, and their implications for global financial stability.

In this paper, I examine how exchange rate and macroeconomic uncertainty affect gross portfolio capital flows to the US, with a particular focus on their implications for the Net Foreign Asset (NFA) position in long-term assets. I build on the frameworks of Gabaix and Maggiori (2015), Farhi and Gabaix (2016), Koijen and Yogo (2020), and Camanho, Hau, and Rey (2022), which study the links between capital flows, asset demand, and exchange rate movements. Specifically, I aim to disentangle the effects of global foreign exchange volatility during perceived "rare disaster" episodes, which often trigger rebalancing by both domestic and foreign investors. This helps determine whether capital inflows to the US remain persistent during episodes of elevated macroeconomic or exchange rate uncertainty.

Consistent with the literature on capital flows, I expect that periods of heightened uncertainty induce inflows to the US in search of safe assets—such as Treasuries, agency bonds, and investment-grade corporate debt—thereby amplifying the country's exorbitant duty. At the same time, precautionary behavior leads to a sudden stop in outward equity flows, as domestic investors rebalance their portfolios and forgo their privilege. I find evidence that rising uncertainty affects the NFA position through a contraction in foreign asset holdings by domestic investors that exceeds the reduction in US asset holdings by foreign investors. Macroeconomic uncertainty shocks lead to reduced foreign demand for both US bonds and equities. By contrast, domestic investors maintain demand for foreign bonds but reduce their exposure to foreign equities. The effects of exchange rate uncertainty are asymmetric: foreign investors do not reduce demand for US safe assets, while US investors rebalance away from foreign markets.

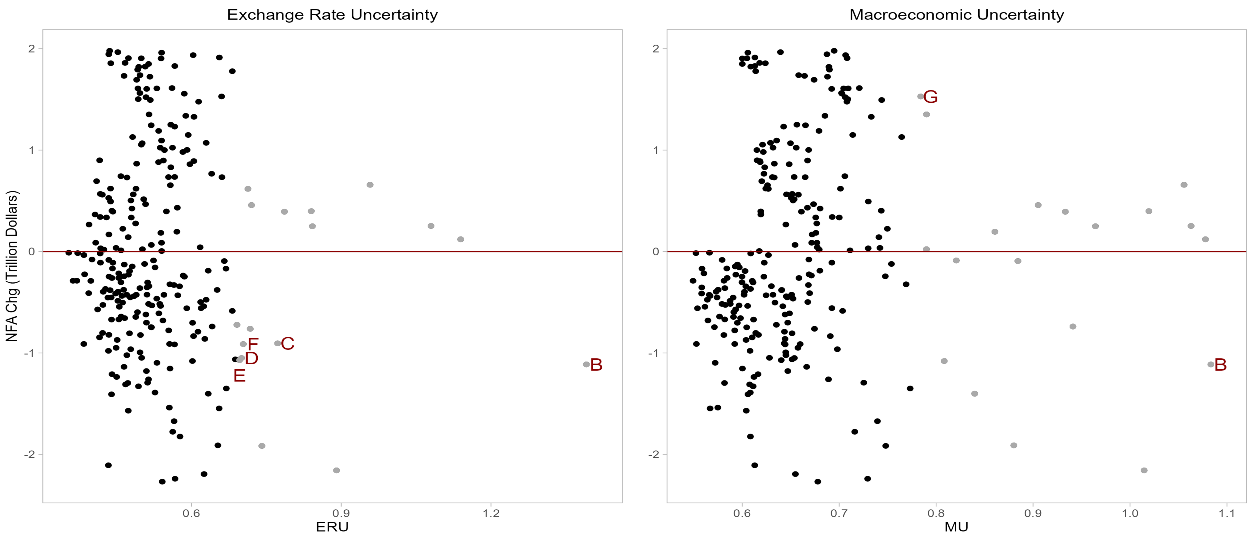
The empirical framework follows the Structural Vector Autoregressive (SVAR) models of Ludvigson, Ma, and Ng (2017) and Ludvigson, Ma, and Ng (2021), where uncertainty is treated as an endogenous variable rather than an exogenous shock. I use the Exchange Rate Uncertainty (ERU) index developed by Fernandez-Mejia (2022) to capture the role of currency volatility in portfolio decisions. Macroeconomic uncertainty is proxied using the index from Jurado, Ludvigson, and Ng (2015), based on US macroeconomic data. As argued by Ramey (2016), macroeconomic uncertainty likely exhibits a contemporaneous relationship with other macro variables, particularly those with high persistence. Following Bloom (2009a), Bloom (2014), and Alfaro, Bloom, and Lin (2023), investment dynamics are expected to exhibit strong feedback with uncertainty shocks, as firms tend to delay or scale back expenditures during such periods, amplifying future volatility.

The identification strategy recovers structural shocks without imposing traditional short- or long-run exclusion restrictions. Many SVAR identification schemes rely on assumptions that may not hold empirically (Kilian, Plante, and Richter, 2022). External instruments (e.g., Stock and Watson, 2012; Montiel Olea, Stock, and Watson, 2021) face challenges due to the high correlation between uncertainty and other macroeconomic shocks (Berthold, 2023). Similarly, sign and inequality restrictions (e.g., Uhlig, 2004) can suffer from identification fragility, as shown in Wolf (2022). To address these limitations, I apply a combination of narrative identification and shock-dependent restrictions, as in Antolín-Díaz and Rubio-Ramírez (2018) and Ludvigson et al. (2017), using critical high-uncertainty episodes to discipline the identification. This approach avoids the pitfalls of overreliance on short- or long-run restrictions and improves differentiation between macroeconomic and exchange rate uncertainty shocks. To the best of my knowledge, this is the first paper to quantify the impact of capital flows within a model that endogenizes both uncertainty and asset flows.

One of this paper's key contributions is the use of exchange rate uncertainty to study fluctuations in capital flows to and from the US. Fernandez-Mejia (2022) shows that although ERU periods often overlap with macroeconomic uncertainty, the two indices capture distinct dynamics. As shown in Figure 1, certain events—such as the September

2001 attacks—are visible in macroeconomic uncertainty indices (Jurado et al., 2015; Baker, Bloom, and Davis, 2016) but not in ERU.[1]

Figure 1. Uncertainty Indices and US Net Foreign Asset Position



Note: The plot shows changes in the monthly NFA position for the US from January 1999 to December 2019, alongside measures of exchange rate and macroeconomic uncertainty. Grey dots mark observations exceeding the 90th percentile of uncertainty. Red-labeled points correspond to key historical events: B (October 2008, post-Lehman default), C (September 2011, start of European debt crisis and Operation Twist), D (January 2015, end of Swiss franc peg and ECB QE), E (August 2015, Chinese yuan devaluation), F (January 2016, negative rates in Japan and Chinese growth concerns), G (September 2001, US market crisis). *Sources:* Author's calculations; Fernandez-Mejia (2022); Jurado et al. (2015); Treasury International Capital (TIC) System.

Economies experiencing elevated uncertainty face heightened volatility in capital flows and are prone to extreme episodes, as frequent portfolio rebalancing destabilizes exchange rates. As the dominant currency issuer and anchor of the global financial system, the US occupies a unique position (Gopinath, Boz, Casas, Díez, Gourinchas, and Plagborg-Møller, 2020; Gopinath and Itskhoki, 2022). Persistent demand for US safe assets during both booms and busts generates a convenience yield (Caballero, Farhi, and Gourinchas, 2017; Jiang, Krishnamurthy, and Lustig, 2021), supporting its role as a global financial intermediary. This has afforded the US the exorbitant privilege of running external deficits while maintaining stable demand for its liabilities—effectively acting as the world's venture capitalist by issuing safe assets and reinvesting globally. However, under high exchange rate uncertainty, demand for US assets may weaken. Domestic investors may increasingly perceive foreign markets as riskier and reallocate toward higher-return domestic assets,

[1]In Appendix A3 of Fernandez-Mejia (2022), the author shows that exchange rate uncertainty is more closely correlated with FX volatility (e.g., Menkhoff, Sarno, Schmeling, and Schrimpf, 2012) than with the VIX, and it is less correlated with measures of financial, real, or macroeconomic uncertainty.

triggering a retrenchment of outflows and further compressing the NFA deficit (Atkeson, Heathcote, and Perri, 2022).

Volatile capital flows have broader implications for financial stability. Central banks and private firms, especially those with foreign exchange-denominated liabilities, face heightened balance sheet risks when capital structure mismatches are exposed (Bruno and Shin, 2015b; Salomao and Varela, 2022). This fragility constrains liquidity, raises risk premia, and feeds back into uncertainty. Exchange rate and macroeconomic uncertainty thus destabilize capital flows, impair investment decisions, and amplify the demand for safe assets as a form of insurance (Caballero, 2016; Akinci, Kalemli-Özcan, and Queralto, 2022; Bloom, 2009b).

Literature Review The role of uncertainty in shaping macroeconomic dynamics has long attracted interest in the literature, recognizing how expectations and shocks influence agents' decisions. Since the global financial crisis of 2007–2008, research has increasingly focused on measuring uncertainty and its implications for economic activity. The paper by Bloom (2009b) was one of the first to analyze uncertainty in relation to stock market volatility. They used the Chicago Board Options Exchange's (CBOE) Volatility Index (VIX) and the difference between forecasted and realized firm earnings. Other measures of uncertainty rely on news-based indices, such as the Economic Policy Uncertainty (EPU) index of Baker et al. (2016), or on forecast error distributions, as in Rossi and Sekhposyan (2015). Jurado et al. (2015) proposed a new measure of uncertainty derived from a VAR with factors that forecast different macroeconomic variables, from which they subtract realized values and calculate uncertainty as conditional volatility.

Recent research has implemented different methodologies to assess uncertainty and investigate how it influences capital flows. The VAR methodology is widely used for uncertainty analysis because it incorporates uncertainty as part of a system of endogenous variables to understand its shocks. Rey (2015) and Bruno and Shin (2015a) demonstrated that an increase in the VIX has negative consequences for capital flows, leading to decreased inflows into the country. Bacchiocchi, Bastianin, Missale, and Rossi (2020) used an SVAR with mixed-sampling frequency and found that the outcomes may differ based on the frequency used, as higher periodicity shows larger reductions of flows to the US than lower ones. Mandalinci and Mumtaz (2019) analyzes the impact of both regional and global variations on capital flows using a Factor-Augmented VAR (FAVAR), incorporating the VIX and regional uncertainty measures from Mumtaz and Theodoridis (2017). This study contributes to the existing literature by introducing a novel framework to analyze the effects of uncertainty shocks on capital flows, emphasizing both the net position and gross capital flows. In the model, uncertainties arise endogenously rather than being conditioned by variable ordering.

I use the SVAR model of Ludvigson et al. (2021), which takes different types of uncertainty—financial and macroeconomic—and estimates their shocks as endogenous. Early versions of the paper initiated the debate on whether uncertainty should be treated as an endogenous or exogenous shock and on the use of instrumental variables. Caldara, Fuentes-Albero, Gilchrist, and Zakrajšek (2016) use an SVAR with a penalty function to distinguish between financial and macroeconomic shocks, finding that the worst types of shocks combine both. Bonciani and Ricci (2020) calculate financial uncertainty using 1,000 realized volatilities of different countries and take the first principal component. They use linear projections to estimate the effects of different variables. Caggiano, Castelnuovo, and Figueres (2020) estimate the impact of uncertainty using October 1987 and September 2008 as shock events. Carriero, Mumtaz, Theodoridis, and Theophilopoulou (2015), Carriero, Clark, and Marcellino (2018), and Carriero, Clark, and Marcellino (2020) propose using external instruments within the Proxy-VAR framework of Stock and Watson (2012) and Mertens and Ravn (2013), which has the advantage of avoiding measurement error bias. Angelini, Bacchiocchi, Caggiano, and Fanelli (2019) and Angelini and Fanelli (2019) use variations of that methodology and present applications showing that uncertainty behaves as an exogenous shock to domestic output. Carriero, Clark, and Marcellino (2021) reconcile these strands of the literature by using a VAR with stochastic volatility that accounts for the effects of uncertainty on both mean and variance.

The assessment of the impact of exchange rate uncertainty on capital flows involves a thorough examination of its influence on significant movements in gross capital flows, including surges, stops, flights, and retrenchments. The analysis of these extreme movements was initially carried out by Forbes and Warnock (2012) and further expanded upon in Forbes and Warnock (2021), which builds upon Calvo (1998) to characterize their timing. Other authors, such as Schmidt and Zwick (2015), have also explored these extreme movements in relation to uncertainty, using a panel with various uncertainty measures to analyze different instances of extreme capital flows in the euro area. Wang and Yan (2021) use a dynamic panel with quantile regression to evaluate the impact of push and pull factors on capital flows, finding that the VIX affects both quantiles by reducing the level of flows. In this paper, I examine the changes in each component of gross capital flows and the influence of uncertainty on the portfolio decisions of international investors, filling the gap regarding the effects produced by macroeconomic and exchange rate uncertainty.

2 Econometric Model

I follow the VAR identification model of Ludvigson et al. (2017) and Ludvigson et al. (2021) that uses event restrictions to identify the effects of Uncertainty, particularly the effects of financial. Their measure uses event and external instrumental variables to identify uncertainty shocks. The model, like sign restriction identification, provides a set of outcomes that align with the recognition of the uncertainty around the true model. This differs from the point identification of the traditional VAR models, as it does not allow a point identification of the effect but rather a set of possible values it may take[2]. We can write the reduced form VAR model with an AB representation and p lags as;

$$y_t = \sum_{i=1}^{p} A_i y_{t-i} + B\varepsilon_t \qquad\qquad \varepsilon_t \sim N(0, I_N) \tag{1}$$

where y_t is an N-vector variable, A_i are the p autoregressive parameters, $B = H\Sigma$, H and Σ are diagonal matrices of ones and the variance of the structural shocks, and ε_t are the structural shocks. The reduced VAR model innovations are defined by the second term of the equation, such that we can write them as $u_t = B\varepsilon_t$, where $u_t \sim (0, \Sigma)$, $\Sigma = PP'$, and P is the non-negative lower-triangular.

We must restrict the reduced form model to identify the structural shocks. It implies imposing a contemporaneous relationship between the variables in y_t or including external instruments. The literature on the effect of uncertainty shocks in the economies presents disagreements towards identifying endogenous or exogenous shocks. I will follow Antolín-Díaz and Rubio-Ramírez (2018) and Ludvigson et al. (2021) and impose narrative restrictions on shocks on significant events, precisely where there is high Uncertainty. I will define the narrative restrictions on the uncertainty index data and historical events that will allow us to determine its effects robustly.

If we provide no additional restrictions, then we have the only restrictions that we have to correspond to the reduce-form covariance structure of u_t such that

$$\overline{g_z}(B) = vech(\Sigma) - vech(BB') = 0 \tag{2}$$

Where the Σ is the estimated variance-covariance matrix of u_t. As the model requires for complete identification, $N \times N$ restrictions and $\overline{g_z}(B)$ only provide $\frac{N(N-1)}{2}$, it does not provide enough for the whole system to be identified. Then, it has infinite solutions, and

[2]A thorough explanation of both methods can be found in Kilian and Lütkepohl (2017).

shocks of the components of y_t cannot be retrieved (Kilian and Lütkepohl, 2017). We then will require additional restrictions or assumptions on the model to be able to identify it using conventional short or long-run restrictions. Nevertheless, we can β to construct different B that reflect the relationship of the variables and estimate the possible values of the shocks on relevant dates. We then construct multiple $\tilde{B} = PQ$ such that Q is an orthonormal matrix. As in Ludvigson et al. (2021), I construct 1.5 million random orthogonal matrices of Q to derive each $\tilde{B}$ from a QR decomposition. This will help us create different generated shocks and estimate possible values of shocks that events may take conditional on the unconstrained structure of the $\overline{g_z}$.

Event Inequality Constraints

The event inequality constraints used in the model will complement the model defined in Equation 1. The events focus on the historical peaks of the period analyzed for both the macroeconomic and exchange rate uncertainty[3]. Using the periods of high Uncertainty is coherent with identifying shocks that reflect the data, an improvement concerning general ad-hoc identification traditional of SVAR models. Event constraints allow us to use historical and data-driven events in which we can conclude unequivocally that the structural shock corresponds to a specific variable of interest. The events provide an identification of the model which is defensible both empirically and theoretically compared to traditional structural models. The identified events have to satisfy the following constraints:

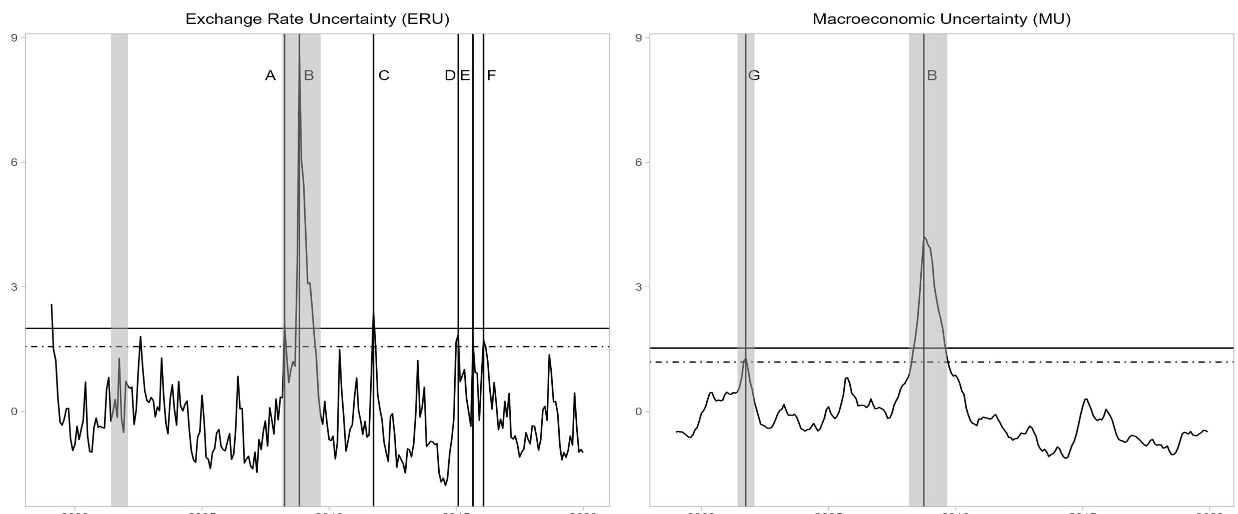
$$
\begin{aligned}
&\text{Event 1 } (\overline{g_1}): \ \varepsilon_{M,1} \geq \delta_1 \ \text{ at September 2001} \\
&\text{Event 2 } (\overline{g_2}): \ \varepsilon_{ER,1} \geq \delta_2 \ \textit{ or } \ \varepsilon_{M,2} \geq \delta_3 \ \text{ at October 2008} \\
&\text{Event 3 } (\overline{g_3}): \ \varepsilon_{ER,2} \geq \delta_4 \ \text{ at September 2011} \\
&\text{Event 4 } (\overline{g_4}): \ \varepsilon_{ER,3} \geq 0 \ \text{ at January 2015} \\
&\text{Event 5 } (\overline{g_5}): \ \varepsilon_{ER,4} \geq \delta_5 \ \text{ at October 2015} \\
&\text{Event 6 } (\overline{g_6}): \ \varepsilon_{ER,5} \geq \delta_6 \ \text{ at January 2016} \\
&\text{Event 7 } (\overline{g_7}): \ \sum \varepsilon_{NFA,6} \leq 0 \ \text{ from September 2008 to June 2009}
\end{aligned}
$$

In Figure 2, I present the identified events using a threshold of the 1.64 and 1.28 standard

[3]Using the identified episodes from the Financial Uncertainty calculated by Ludvigson et al. (2021) may be attractive. However, as shown in Fernandez-Mejia (2022), and in Appendix A, the estimated events for the ERU and the Financial Uncertainty are different. The ERU captures shocks from external events that might not capture the factor of their financial assets.

deviations (95 and 90% percentile of the normal distribution) above the mean of both macroeconomic and exchange rate uncertainty. The difference between both percentiles has implications on the identification itself, where we can see that exchange rate specifics have a lesser magnitude, which we could expect to have a lower effect on the variable of interest. For Macroeconomic Uncertainty, Events $\overline{g_1}$ and $\overline{g_2}$ correspond to the 9/11 attack on the Twin Towers and the Lehman Brothers Bankruptcy. The first event marked a terrorist attack directed specifically at the financial markets center, one of the only moments where the stock market in different parts of the world was shut down in fear of further attacks, but also preceded a fractured market after the dot com crash in 2000. The life costs and subsequent economic costs that it had at the time, accompanied by constant fear, characterized this period as one of high Uncertainty. Event 2 coincides with the greatest financial crisis in recent times, which triggered a contraction in the world markets, reduced the value of the foreign portfolios, and triggered a capital outflow in the US. Both events coincide with the ones used in Ludvigson et al. (2017), Ludvigson et al. (2021), and Berthold (2023).

Figure 2. Exchange Rate and Macroeconomic Uncertainty in Time



Note: The graph presents the ERU and Macroeconomic Uncertainty with the series' mean standardized to zero. The horizontal line corresponds to the 1.65 standard deviations above the mean, defining each series's important episodes. The dashed line is the 1,28 deviation line above the mean. The vertical line is the peak period of each period identified and used as the event constraint. Point A is the beginning of the Term Auction Facility (TAF) by the Federal Reserve; Point B is the Lehman default; C is the beginning of talks of an overall European Debt Crisis and the Start of Operation Twist in September 2011; D is the event in which the Swiss Central Bank stopped the peg against the Euro as well as the expansion of the Asset Purchasing Program by the ECB in December 2014; E is when China decided to devaluate their currency on August 2015; F when Japan decided to allow interest rates to become negative and China growth concerns on January of 2016; G is the September 2001 crisis in the US market. *Sources:* Ludvigson et al. (2021), Fernandez-Mejia (2021), and Author own calculations.

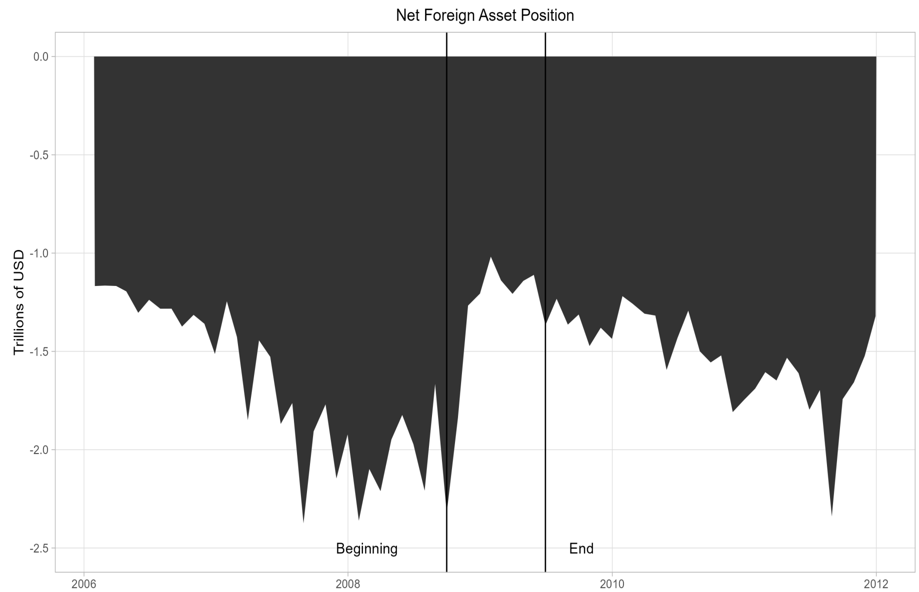
The other events correspond precisely to the Exchange rate Uncertainty and the NFA post-GFC behavior events. Event $\overline{g_3}$, corresponds to the increase in the overall concerns towards the ability to meet the debt obligations by the most prominent European countries, which began the overall pessimistic forecasts of the prospects of growth of the world economies in September 2011. During this time, the Federal Reserve decided to conduct Operation Twist by buying long-term and selling short-term to invert the yield curve. The high demand from the federal reserve for these assets impulsed the rebalance of both foreign and domestic investors, which reflected an increase in inflows of treasury bills during the time. Both high demand for the currency and the heightened Uncertainty about the economy may reflect higher exchange rate uncertainty during the month.

Event $\overline{g_4}$ is the announcement of the expansion of the Asset Purchasing Program (APP) by the European Central Bank and coincides with the end of the peg to the Euro by the Swiss Central Bank. The first of these events relates to the increased asset purchasing of assets that change its valuation, changing the demand for them by foreign investors. Benigno, Canofari, Di Bartolomeo, and Messori (2023) explains this effect as the interest rate channel of the ECB program, as the portfolio rebalancing increases in the exchange rate fluctuations during the period. On the other side, the Swiss cap removal created exchange rate fluctuations through changes in the liquidity of a safe haven currency such as the Swiss Franc and the changes of the foreign exchange accumulation by the Central Bank to a parity (Amador, Bianchi, Bocola, and Perri, 2020; Breedon, Chen, Ranaldo, and Vause, 2023).

China's devaluation of the Renminbi/Yuan, Event $\overline{g_5}$, triggered high financial market fluctuations as changes in the valuation of one of the most liquid currencies and one of the countries with the highest demand for US assets, will indeed have repercussions on capital flows. Also, with changes in the terms of trade of one of the central economies in world trade, the current account of most countries will be affected, and so will their exchange rates. The last Event shock restriction is the $\overline{g_6}$, which represents the beginning of the negative rates in Japan as a monetary policy tool and heightened concerns about the state of the Chinese economy. Both economies, the owners of a significant percentage of the US market assets, will have an impact on the capital flows and exchange rates, as both the Yen and Yuan have a higher turnover participation in the overall market.

The last restriction implies that the cumulative effect of the crisis shock and the increase in the interest rate by the Federal Reserve had a negative effect on the NFA. The US crisis and interest rate increase are a pull factor in the literature on capital flows, especially for emerging markets (Caballero, Farhi, and Gourinchas, 2008a; Koepke, 2019; Davis, Valente, and van Wincoop, 2021). The crisis will create a retrenchment of capital inflows, and the

Figure 3. NFA and the restriction of event six ($\overline{g_6}$). 2006-2012



Note: The Figure presents the NFA position on long-term assets from 2006 to 2012. The beginning of the analyzed period is September 2018, with the failure of Lehman Brothers, and the end is June 2019, as dated by the end of the recession in NBER dates. *Sources:* Author's calculations and TIC data.

tightening of the monetary policy will reflect lower valuations of the financial assets and an increase in the "Duty" of the Central Bank.

As in Ludvigson et al. (2021), I determine the values of the parameters $\delta = [\ \delta_1,\ \delta_2,\ \delta_3,\ \delta_4,\ \delta_5,\ \delta_6,\ \delta_7]$ that define the standard deviations above the mean, using the 75th percentile of the random rotations of B of the unconstrained set. The estimated parameters are δ=[2.90, 2.74, 2.52, 1.84,2.16, 1.99], and they will define the identity of the IRF of the model.

We can define the event constraints as a system such that:

$$\overline{g}(\varepsilon_i(B), \delta) \geq 0 \tag{3}$$

External Variable Constraints

I use two variables to identify the model further, taking advantage of the information on the correlation with the identified shocks of interest. I will center around two stylized empirical results to determine the variables to include as external to the model. Gold and Oil prices are two variables standard in the literature for their relationship with the macroeconomic and exchange rate uncertainty from a global perspective. Then, we can define the External Variables as $EX = [EX_g, EX_o]$, where EX_g is the gold and EX_o are the oil return shocks. The constraints on the external variables follow the restrictions:

$$\text{External 1 } (\overline{EC_1}): \ \rho(\varepsilon_i(B), EX_g) \geq 0$$
$$\text{External 2 } (\overline{EC_2}): \ \rho(\varepsilon_i(B), EX_o) \leq 0$$

External variable constraints take advantage of the information on the correlation between variables related to Uncertainty. The first constraint, $\overline{EC_1}$ relates to the correlation between high levels of Uncertainty and the demand for gold as a consistent store of value in crisis periods, as shown in the model of Caballero, Farhi, and Gourinchas (2008b). The second constraint, $\overline{EC_2}$ uses the negative correlation between fluctuations in exchange rates and adverse shocks of fluctuations in oil prices, which is an empirical result derived from Känzig (2021). Oil and commodity shocks are known drivers of demand for exchange rates, as shown in Amano and van Norden (1998), Chen and Chen (2007), Chen, Liu, Wang, and Zhu (2016), and Basher, Haug, and Sadorsky (2012). So, we can use the relationship between both variables to identify the shocks of the model by its expected behavior.

We can define the external constraints as

$$\overline{g}_C(\varepsilon_i(B), EX) \geq 0 \tag{4}$$

3 Data

I will use different sources to estimate the shocks from Uncertainty to capital flows. First, the daily Exchange Rate Uncertainty measure constructed in Fernandez-Mejia (2022) from 31 exchange rates span between January 1999 to December 2019. I Transformed the data from daily to monthly by taking the monthly median, which is better than averaging the uncertainty shocks or ignoring its effects by only using the last month's value. Construction of the data from daily to monthly has identification advantages. Alessandri and Mumtaz (2019) show that using low-frequency data, rather than building from a higher frequency, creates identification problems. The data frame is a balanced panel with 249 data points for each time series. To control for the effects of macroeconomic Uncertainty, I will use the monthly macroeconomic Uncertainty of Jurado et al. (2015), which will help separate the exchange rate effects from the macroeconomic effects of the central economy[4]. The data

[4] They use the monthly FRED-MD macroeconomic database of McCracken and Ng (2016) that consist of 134-time series that combine both financial and macroeconomic variables of the US economy. I downloaded the 2020 vintage from Sydney Ludvigson's webpage at https://www.sydneyludvigson.com/macro-

from the Net Foreign Asset Position comes from The US Department of the Treasury's Treasury International Capital (TIC), which contains the portfolio capital flows between US residents and foreign residents in long-time securities[5]. I transform the data using the X13-ARIMA Seats algorithm to adjust the series of seasonal effects and differentiate if it presents evidence of unit roots, to be approximately stationary[6].

The data includes the components of the portfolio capital flows as the gross purchases of assets by foreigners of US assets (Inflows) and sales of Foreigners to US residents (Outflows). The assets in the database are US Treasury Bonds, US Government Agency Bonds, US Corporate Bonds, US Corporate Stocks, Foreign Bonds, and Foreign Stocks. Consistent with the classification of Gourinchas and Rey (2007), Gourinchas and Rey (2014), and Atkeson et al. (2022), I follow the definition of the Net Foreign Asset (NFA) position as the market value of Foreign assets held by US residents minus the value of US assets held by foreigners. Then, I construct the NFA as the foreign stocks and bonds demanded by the US minus the Inflows after subtracting the demand of foreigners for foreign stocks and bonds.

Figure 4 shows the behavior of Inflows and Outflows, as the behavior of our primary variable of interest, the NFA[7]. Consistent with the narrative of Gourinchas and Rey (2007) and Caballero et al. (2008a), inflows to the US surpassed the outflows from the start of the 2000s and increased consistently until the global crisis. The surge in inflows and sudden stop in late 2018 is part of the restrictions imposed in the model on $\overline{g_5}$. After the crisis, the NDA stabilized at a deficit of approximately between -2 and -1.5 Trillion USD.

The Price of Gold is the average monthly USD per ounce from the London Bullion Market Association (LBMA), deflated by the US Consumer Price Index (CPI) from the Federal Reserve of St. Louis Economic Database (FRED). The other instrument will be the oil supply news shocks of Känzig (2021). Using the shock rather than the oil price returns will allow me to separate the effect of oil shocks from just the oil price changes and have a structured relationship between the variables. In Figure 5, I present the logarithmic returns of the gold prices and the oil shock, where we can see that both instruments

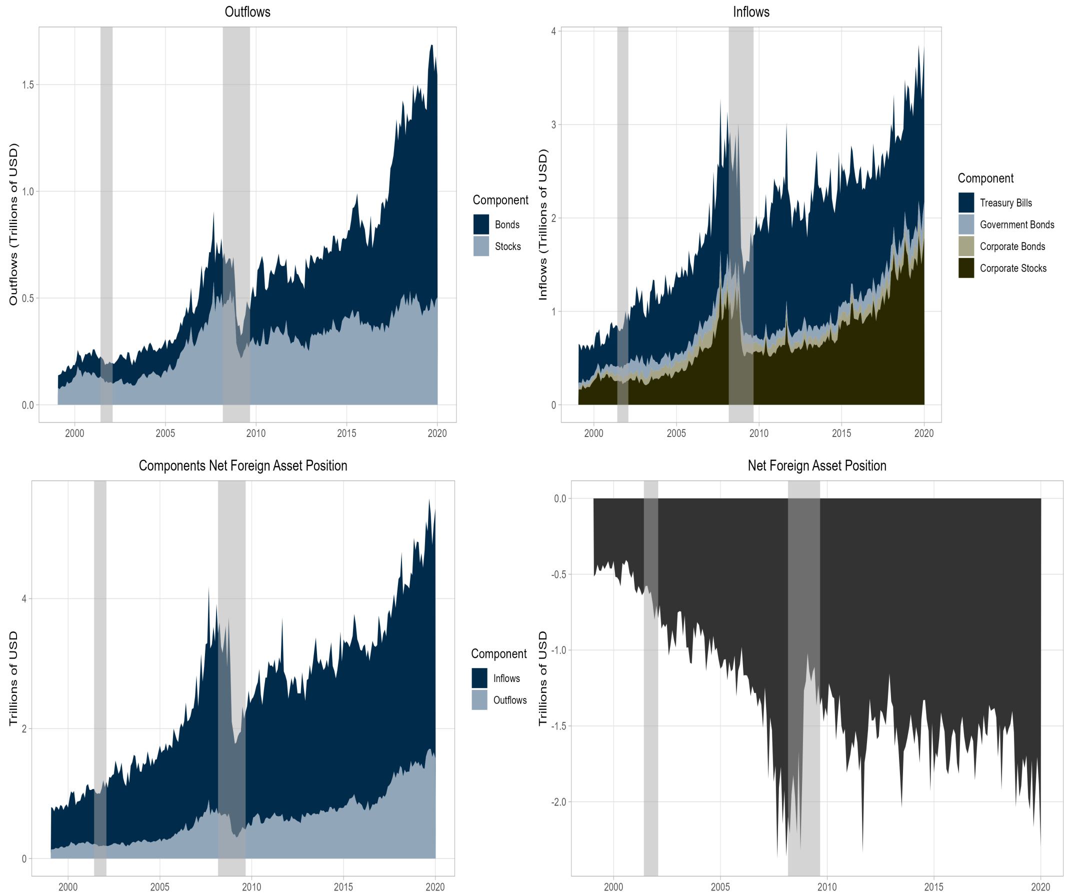
and-financial-uncertainty-indexes

[5]The data focuses only on portfolio transactions between US residents and foreigners and does not include Foreign Direct Investment (FDI). As noted in Koepke (Koepke) and Forbes and Warnock (2021), capital flow volatility is given by the variation of the position in portfolio assets rather than FDI, as the last involves long-term investments with low liquidity. It is available to download from https://home.treasury.gov/data/treasury-international-capital-tic-system-home-page/tic-forms-instructions/securities-a-us-transactions-with-foreign-residents-in-long-term-securities

[6]In Table C1 of the Appendix C, I present the descriptive statistics of the variables and the unit root test of each series after adjusting for the seasonal effects.

[7]In Appendix B I briefly present the components of the NFA that correspond to the components of the Outflow of domestic assets and the inflows from the demand of US assets by foreigners.

Figure 4. Stacked Graph of Inflows, Outflows, and the Net Foreign Asset Position (Tril. USD)



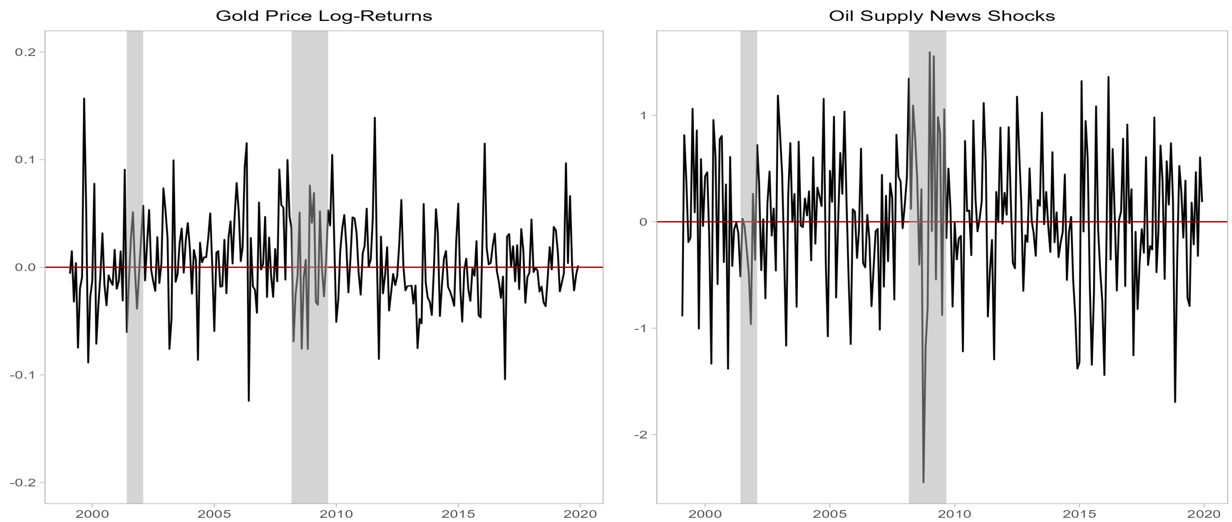
Note: The Figure presents different stacked graphs of the Portfolio capital inflows, outflows, and their Net Foreign Asset Position. The position is derived from the demand for foreign assets by US residents minus the demand for US assets by foreigners. *Sources:* TIC and Author's calculations

present different levels of volatility and extreme episodes. The events that stand out are the financial crisis in 2007 and the negative shock of oil that affected its price between mid-2018 and early 2009.

4 Results

I present the results in two parts. First, I will estimate the model focusing on the effect of macroeconomic and exchange rate uncertainty on the Net Foreign Asset Position. The second part will estimate the effect on each of the inflows and outflows, as well as the most significant contributions to their fluctuations, the demand for bonds and stocks. Focusing only on the net flows may give an incomplete view of the underlying mechanism and

Figure 5. External instruments - Log-returns of Gold and Oil News Supply Shocks



Note: The gold price logarithmic returns are calculated using the monthly auction averages of the London Bullion Market Association (LBMA) in USD per ounce of gold at 5 PM. The gold price is later deflated using the CPI from FRED with base January 2018. The Oil Supply Shocks are calculated in Känzig (2021). *Sources:* LBMA, Känzig (2021), and author's own calculations.

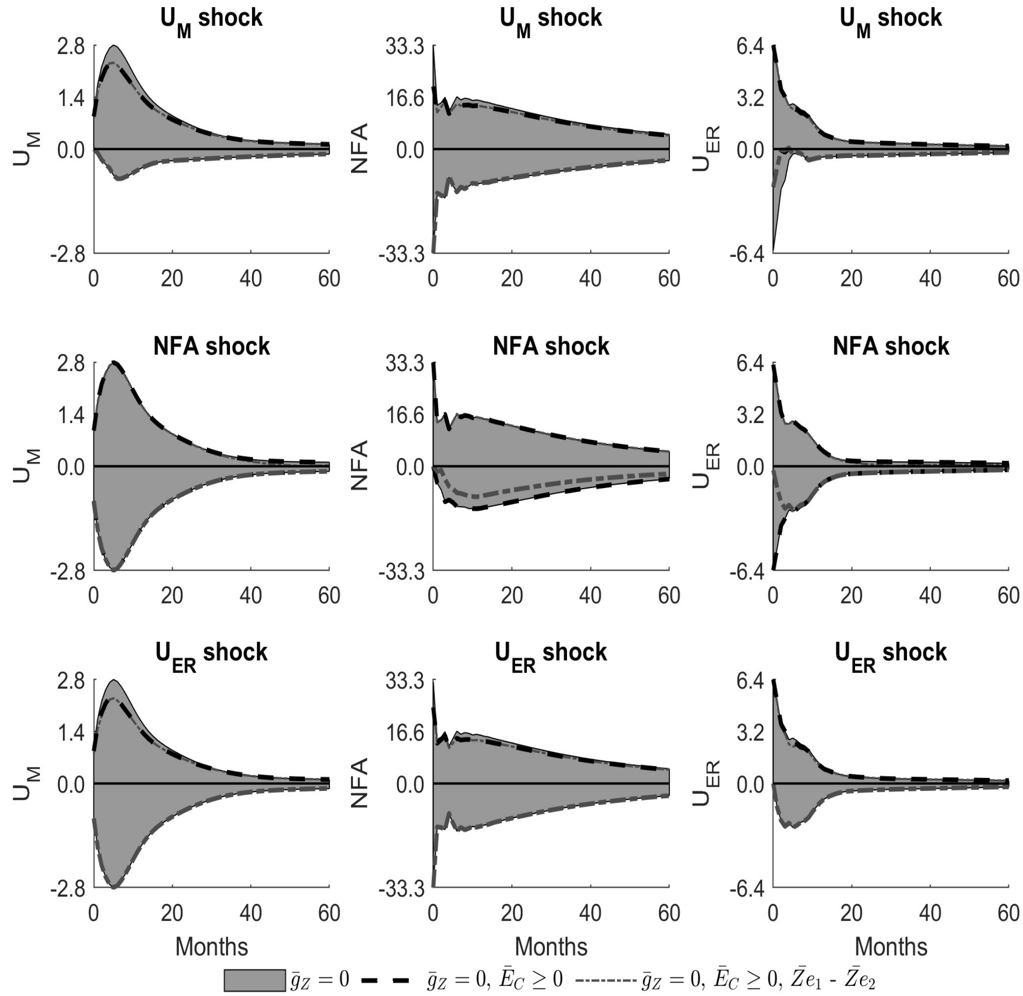
relationship between variables.

4.1 Net Foreign Asset Position

In Figure 6, I present the different types of Impulse Response Functions (IRF) for different specifications of the model described by Equation 1, but excluding the narrative restrictions. The vector of endogenous variables of the model is composed by $X_t = [U_{M,t}, NFA_t, U_{ER,t}]'$. Where $U_{M,t}$ is the Macroeconomic Uncertainty of Jurado et al. (2015) under one-month ahead structure, NFA_t is the Net Foreign Asset Position for the United States, and $U_{ER,t}$ is the Exchange Rate Uncertainty (ERU) of Fernandez-Mejia (2022). I estimate the VAR model with six lags; although initially, the optimal lag of the model suggested the use of two, the model had a persistent serial correlation. The Figure presents the IRF of different levels of restrictions on the model; with no restrictions, sign restrictions on the external variables defined in $\overline{g}_C$, and with the restrictions on the sign of some shocks ($\overline{g}_{4,7}$).

Based on the model's results following the reduced-form model such that $\overline{g}_z(B) = 0$, we can see that the IRFs do not produce any conclusive result. By definition, we cannot identify the shocks. It also reflects the need for further restrictions on the model to obtain causality results. The IRFs of the model with external variables $\overline{g}_C$ and some narrative sign restrictions $\overline{g}_{4,7}$ show slight improvements in the results, as they allow the model to be

Figure 6. Impulse Response Functions Different Restrictions

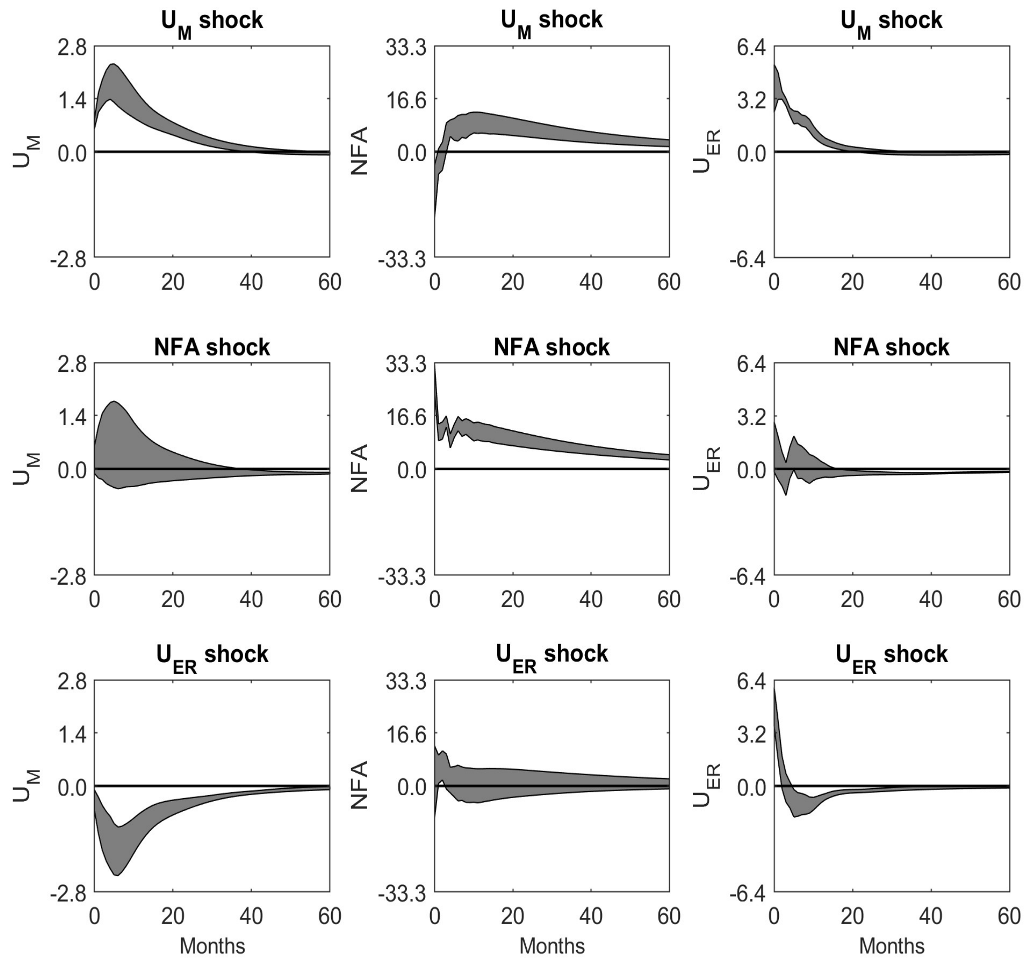


Note: The Figure presents the IRFs of the estimated model using the reduce-form model $\overline{g}_z = 0$, with sign restrictions on external variables $\overline{g}_c \geq 0$, and with some event sign restrictions $\overline{g}_c$ and $\overline{g}_{4,7}$. Based on the number of restrictions, only the last model has the least number of restrictions to identify shocks. The columns are the source of the shock, and the rows are the variables that receive the shock. Then, in the same row, all variables receive the shock of the same source. The NFA is the changes in the Net Foreign Asset Position in Trillions of Dollars. *Sources:* Author's calculations.

fully identified. There is some slight effect of the macroeconomic uncertainty shocks on the Exchange rate Uncertainty, but the rest of the results are not informative. Figure 6 shows the need to use further informative restrictions to optimally identify our shocks of interest. Having Big Event narrative shocks may give further information to adequately determine the effect of interest.

In Figure 7, we can see the results of the estimation of the model with the minimal restrictions $\overline{g}_z$, the external variable $\overline{g}_C$, and the complete narrative events $\overline{g}$. The complete

Figure 7. Impulse Response Functions Full Model



Note: The Figure presents the IRFs of the estimated model using the Fully identified model $g_z = 0$, with sign restrictions on external variables $g_c \geq 0$, and with both general and narrative sign restrictions g_c and $\overline{g}$. The columns are the source of the shock, and the rows are the variables that receive the shock. Then, in the same row, all variables receive the shock of the same source. The shaded region is the shock identified by the restrictions. The NFA is the changes in the Net Foreign Asset Position in Trillions of Dollars. *Sources:* Author's calculations.

estimation includes now the Big Event restrictions of 9/11 ($\overline{g}_1$), the European Debt crisis, ($\overline{g}_3$), China's currency devaluation ($\overline{g}_5$), and the negative interest rates of Japan ($\overline{g}_6$). The Figure graphs the identified shocks following the Full model under the shaded region. If we compare it with Figure 6, we assess the comparative advantage of specific narrative restrictions to the model with just sign restrictions.

The IRFs reflect that the Macroeconomic Uncertainty shock initially has a negative effect, deepening the NFA and reversing its effect with a high permanent increase in later periods.

The response shows that high Uncertainty increases the demand for domestic assets, principally safe assets, as shown in Figure B1 of the Appendix B. However, this may come from different channels. An increase in inflows increases the demand for foreign assets (increasing outflows). Another channel is reducing the demand for risky domestic assets (reducing inflows) and reducing the NFA deficit. Conversely, the exchange rate uncertainty has no representative effect on the NFA other than a negligible effect on the first periods. The ERU effect is less pervasive than the macroeconomic; exchange rates absorb shocks rapidly, and we could expect the effects to be short-lived. The overall result suggests the benefits of macroprudential policies oriented to control the uncertainty levels, especially macroeconomic, to avoid instability of the NFA and its lasting effects on the international accounts.

One unique feature of the model is that it allows us to characterize the effect of the shocks on the NFA and the feedback effect between Uncertainty types. Macroeconomic affects the Exchange Rate by increasing it consistently in the first periods. Fluctuations in the state of the economy are a sign of fragility, which in turn limit the portfolio capital inflows and outflows. As the world's dominant currency and the base of the calculation of the ERU, the effect of the macroeconomic conditions is expected to have a higher effect. Exchange rate uncertainty shocks show a pattern of decrease in Macroeconomic Uncertainty consistently. The channel in which the Exchange rate affects macroeconomic conditions is through the depreciation of foreign currencies and changes in terms of trade for the US economy. An increase in the overall fluctuations of the world economy will trigger portfolio rebalancing, turning to safe-haven assets, mostly provided by the US (Camanho et al., 2022; Caballero, Farhi, and Gourinchas, 2016, 2021) .

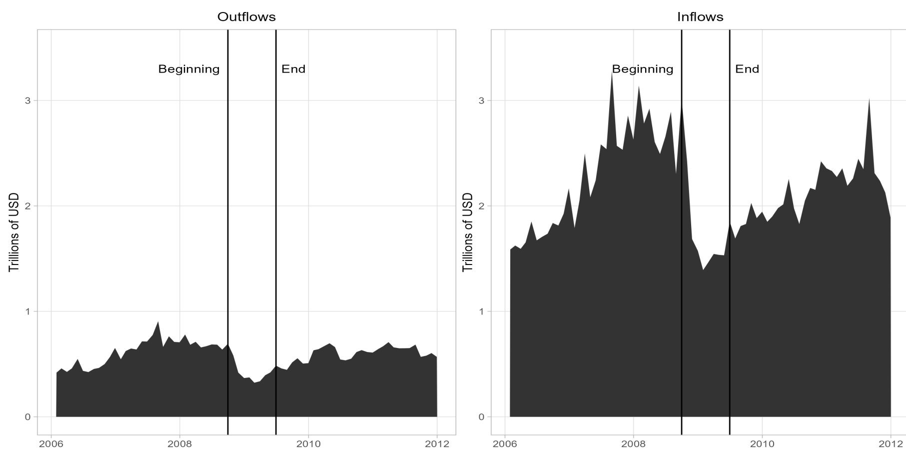
4.2 Gross Capital Inflows and Outflows

We now analyze Uncertainty's effect on gross capital inflows and outflows. This will help us understand the effect that predominantly changes the long NFA position, as both effects may counter each other and lead us to underestimate their impact. To this end, I will take the restriction on the behavior of the NFA in Event 7 and change them to match the events of gross capital flows. The events will be defined as,

$$\begin{array}{lll} \text{Event 8} & (\overline{g_8}) : \sum \varepsilon_{USO,8-9} \leq 0 & \text{from September 2008 to June 2009} \\ \text{Event 9} & (\overline{g_9}) : \sum \varepsilon_{FI,8-9} \leq 0 & \end{array}$$

where $\varepsilon_{USO,8-9}$ are the shocks to the Ouflows, while $\varepsilon_{FI,8-9}$ is the shock to the inflows. We can see the periods of analysis for both in Figure 8, which presents both the beginning and end of the restriction period—as in the NFA, the period remained between the crisis in September 2008 to the end of the recession in June 2009. There is an apparent decrease in both in that period, but the effect is steeper for the inflows. If we turn to the behavior of the gross capital flows in Figure 4, the post-crisis period reduced the overall flows to the economy, and the contraction of the position lasted during the period. Posterior to it, the inflows grew more than the outflows, worsening the position. This is due to the loss of position in the international markets and the growth of US residents' demand for domestic assets, contradicting the privilege earned before, as mentioned by Atkeson et al. (2022). Under a higher level of Uncertainty in both the exchange rate value and macroeconomic conditions, the high levels of risk aversion in the market reduce the demand for US assets and the capital inflows. Nevertheless, as noted by Caballero et al. (2016), the scarcity of safe assets in a high-risk period will increase the demand for them from international investors and central banks. We can see this rise in the level of demand for both inflows and outflows of bonds.

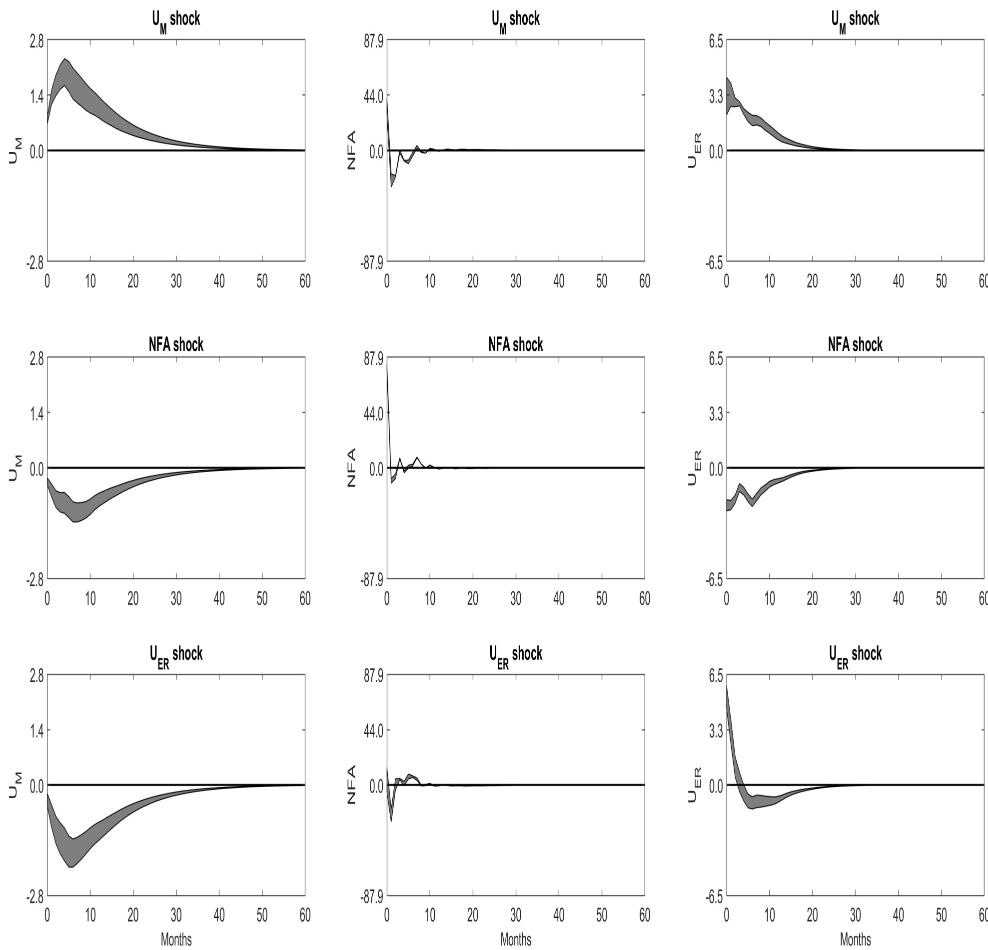
Figure 8. Restrictions to capital Inflows and Outflows. 2006-2012



Note: The figure presents the restrictions imposed in $\overline{g_7}$ and $\overline{g_8}$ on outflows and inflows. They correspond to contractions of gross capital flows between the Lehman bankruptcy and the recession's end, as dated by the NBER's Business Cycle Dating Committee. *Sources:* Author's calculations and TIC data.

In figures 9 and 10, I plot the Impulse response functions of the outflows and inflows of portfolios following the previous model. Compared to the NFA VAR model, it is more restrictive, and the identified impulse responses are limited. Both uncertainties impact the first months, reducing inflows and outflows (second column of both graphs). The outflow response to macroeconomic shocks exhibits a negative effect that lasts approximately a year, while the effect is pervasive in exchange rate uncertainty, lasting around two years. Then, the deterioration of the macroeconomic conditions in the US economy, which comes with an increase in the fluctuations of the exchange rates, deteriorates the demand for foreign assets that contract for the first year.

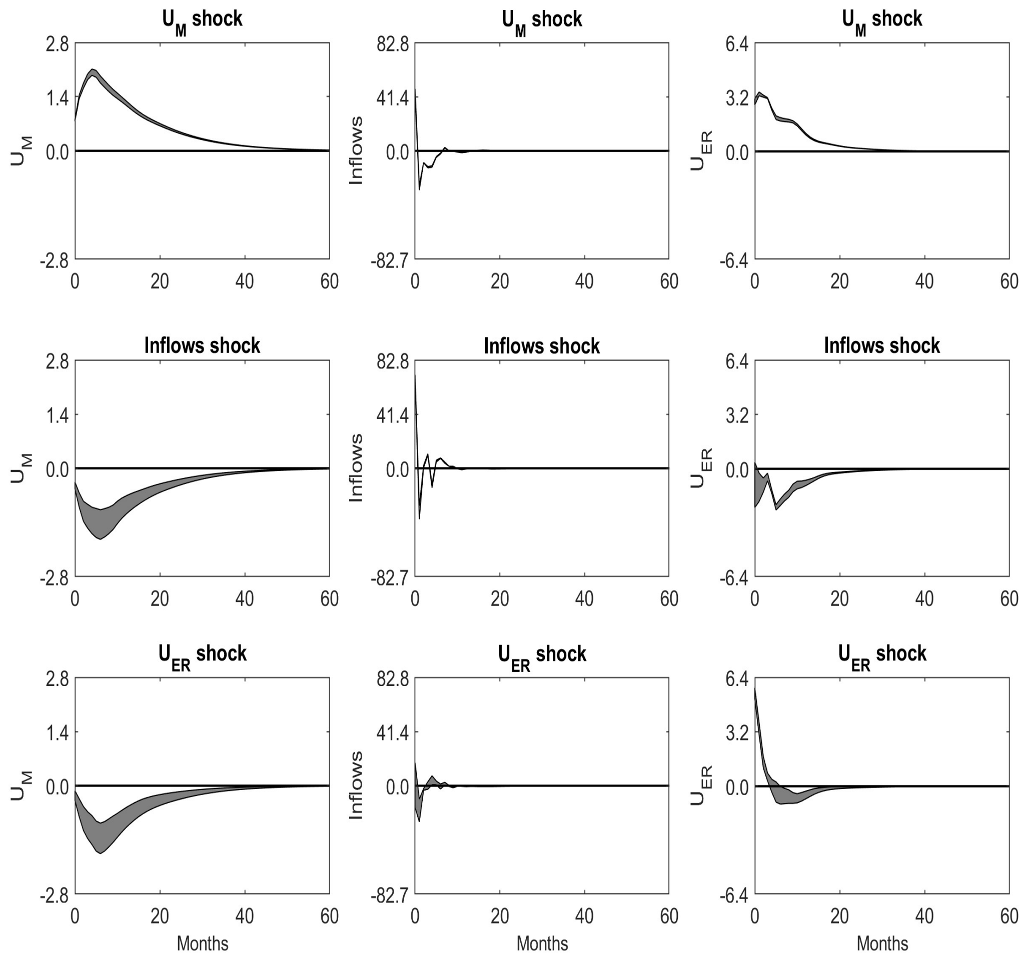
Figure 9. Identified Set Impulse Response Functions full model for Outflows



Note: The Figure presents the IRFs of the estimated model using the reduce-form model $\overline{g}_z = 0$, with sign restrictions on external variables $\overline{g}_c \geq 0$, and with both general and narrative sign restrictions $\overline{g}_c$ and $\overline{g}$. Based on the number of restrictions, only the last model has the least number of restrictions to identify shocks. The columns are the source of the shock, and the rows are the variables that receive the shock. Then, in the same row, all variables receive the shock of the same source. Sources: Author's calculations.

Nevertheless, the effect lasts less time than the normalization of the exchange rate uncertainty, suggesting that investors tolerate certain uncertainty levels. For the exchange rate, the shocks suggest a different scenario. As the previous general model for the NFA, exchange rate shocks have a negative effect on the uncertainty level and a negative effect on the outflows that later become positive. Then, the exchange rate, contrary to the macroeconomics, has an initial negative effect. Once perceived, it recovers later, suggesting investors reduce their position and readjust after the shock. We expect this to happen as exchange rates capture international shocks, which increase the demand for foreign assets because some of the shocks come in the form of increases in the dollar value that will decrease the cost of investments.

Figure 10. Identified Set of Impulse Response Functions full model for Inflows



Note: The Figure presents the IRFs of the estimated model using the reduce-form model $\overline{g}_z = 0$, with sign restrictions on external variables $\overline{g}_c \geq 0$, and with both general and narrative sign restrictions $\overline{g}_c$ and $\overline{g}$. Based on the number of restrictions, only the last model has the least number of restrictions to identify shocks. The columns are the source of the shock, and the rows are the variables that receive the shock. Then, in the same row, all variables receive the shock of the same source. *Sources:* Author's calculations.

The shocks to the inflows in Figure 10 show a similar history to the one in the outflows. The effect of macroeconomic Uncertainty on exchange rate uncertainty and inflows have similar forms and signs. However, the reaction of inflows to both uncertainties differ in magnitude and the identified set. The shocks present an evident negative effect in Inflows compared to outflows, which may be the driving force of the positive effect obtained in the results of the general model in Figure 7. This is also the case for exchange rate, where shocks create an adverse effect, but it is more minor for outflows than inflows, which justifies the increase in the NFA position increase. These increases imply that uncertainty shocks in the context of the analyzed period reduce the gap in the position of the US, being the macroeconomic the most relevant in closing the difference.

4.3 Components of the gross portfolio Inflows and Outflows

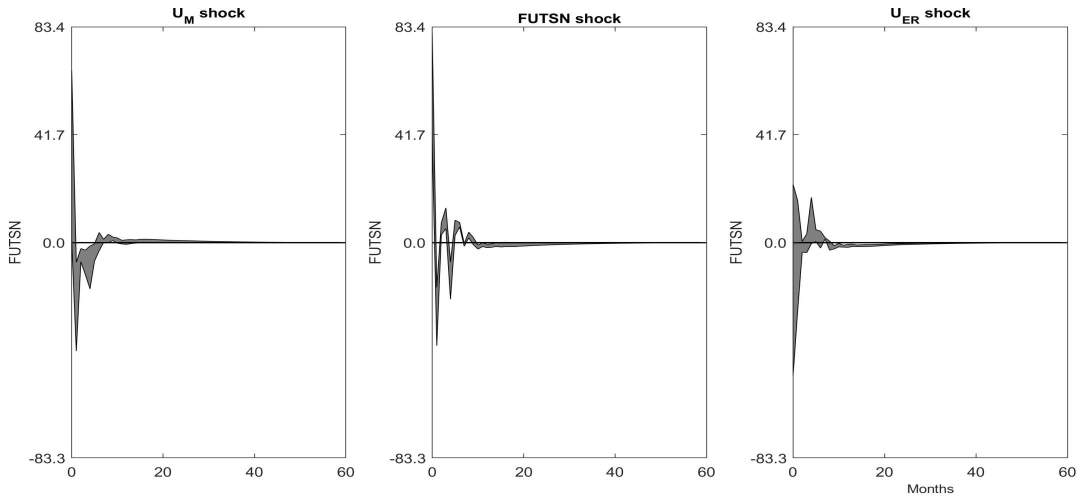
Suppose we decompose the inflows and outflows' highest components, the demand for stocks and bonds by foreigners. In that case, we can determine the sources of the fluctuations of inflows and outflows in greater detail. High risk will have implications on demand for risky assets like corporate stocks. However, it will be higher for macroeconomic Uncertainty than the exchange rate, as exchange rate volatility can be hedged, and valuations may outweigh the loss in value in the USD. Then, the increase in macroeconomic Uncertainty will reflect negative changes in the demand for risky assets from foreigners. In contrast, the exchange rate will have a rather short-lived effect. I will focus on the gross portfolio inflows and outflows with higher value components and the determinants of their fluctuations: Treasury Bonds and Corporate Stocks. I build on the previous model and restrictions imposed on the Outflows and Inflows to change their flow restriction to match;

$$\text{Event j} \quad (\overline{g_j}) : \sum \varepsilon_{j,8-9} \leq 0, \qquad \text{from September 2008 to June 2009}$$

The events will match the four components (j) of the inflows and outflows I analyzed: the Foreign Demand for US Treasury Bills and Notes, Foreign Demand for Corporate Stocks, US Demand for Foreign Bonds, and US Demand for Foreign Corporate Stocks. The analysis of these components allows us to assess the changes of the exorbitant privilege and the duty, in the sense of Gourinchas and Rey (2007, 2014, 2022), as the demand of US and foreign assets will determine the changes in the privileges that they have. In Figures 11 and 12, I present the IRFs of the inflows and outflows of bonds, represented by the FUTSN and the UFB.

We can see that the effect is not equal between the inflows and outflows of bonds, where an increase in macroeconomic uncertainty decreases the demand for Bonds from foreigners. At the same time, I find no evidence that it changes the demand for foreign bonds in the US

Figure 11. IRFs for the Foreign Demand of US Treasury Bills and Notes (FUTSN)

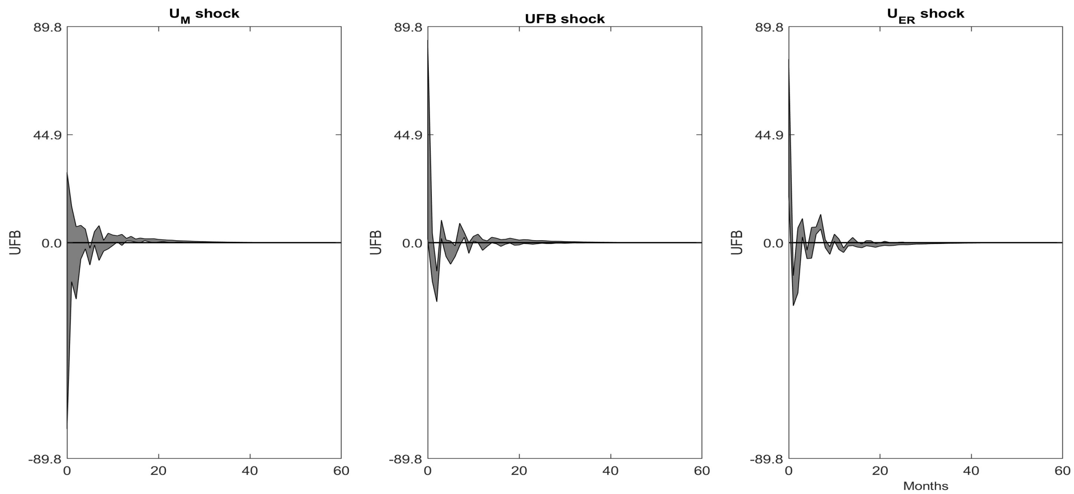


Note: The Figure presents the IRFs of the estimated model using the reduce-form model $g_z = 0$, with sign restrictions on external variables $g_c \geq 0$, and with both general and narrative sign restrictions g_c and $\overline{g}$. Based on the number of restrictions, only the last model has the least number of restrictions to identify shocks. The columns are the source of the shock, and the rows are the variables that receive the shock. Then, in the same row, all variables receive the same source. *Sources:* Author's calculations.

market. This result is consistent with the fact that it will affect the perception of the economy's risk, that even though it is the provider of safe assets, it will still reduce the demand for their assets. This effect may be due to valuation effects, such as high Uncertainty, which can lead to interest rate increases to control fluctuations. Increases in interest rates lower the value of bonds and the value of the foreign position more than the volume demanded.

Conversely, we could expect a lack of connection between bond outflows and uncertainty, as the effect is mitigated by domestic investors rebalancing their portfolios to diversify sovereign risk with other foreign safe assets. As a significant percentage of the portfolio capital inflows and outflows are in bonds, the movements of the NFA will come due to changes in the inflows rather than increases in outflows. In contrast, exchange rate uncertainty has the opposite effect. Increases in exchange rate uncertainty do not affect foreigners' demand for treasury bills and notes. As the biggest provider of safe assets, they demand to provide insurance against extreme events, regardless of exchange rates. For the demand for foreign bonds, the result is the contrary, as the exchange rate uncertainty dampens the outflows initially, followed by an increase in posterior periods. Higher volatility in the exchange rate lowers the value of foreign returns of the coupons and returns of the bonds and is linked to high deviations of interest rate parity (Kalemli-Özcan and Varela, 2021; Fernandez-Mejia, 2022).

Figure 12. IRFs for the US Demand of Foreign Bonds (UFB)



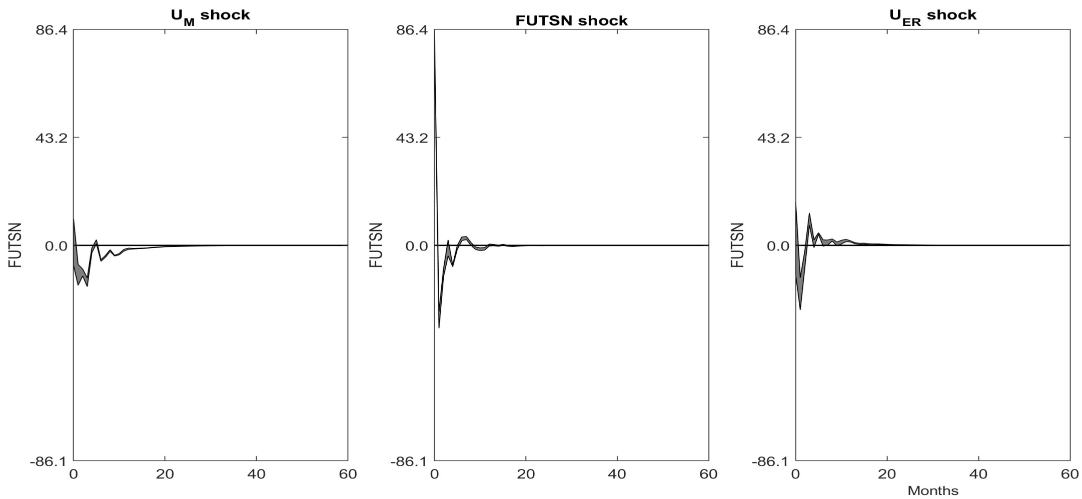
Note: The Figure presents the IRFs of the estimated model using the reduce-form model $g_z = 0$, with sign restrictions on external variables $g_c \geq 0$, and with both general and narrative sign restrictions g_c and $\overline{g}$. Based on the number of restrictions, only the last model has the least number of restrictions to identify shocks. The columns are the source of the shock, and the rows are the variables that receive the shock. Then, in the same row, all variables receive the shock of the same source. *Sources:* Author's calculations.

Let us consider corporate stocks in comparison to bonds. The demand has a symmetrical result between inflows and outflows but with a higher effect on outflows than on inflows. Macroeconomic uncertainty shocks have an initial decrease in the demand for foreign stocks, which is coherent with the effect of foreign investors taking a "wait-and-see" approach and deferring their investment decisions, as noted in Baker et al. (2016). The effect of the domestic market is more profound and more persistent in comparison. For the exchange rate uncertainty shocks, there is also an initial decrease in the gross flows accompanied by an increase in the amount for several periods. In general, for both types of uncertainties, the effect is somewhat similar.

Based on the previous results, we can see that the components of the gross portfolio capital inflows and outflows have a heterogeneous and asymmetrical response to both the macroeconomic and exchange rate uncertainty. The effect of the inflows shocks is more significant than those of the outflows, which creates the result obtained in Figure 7. Shocks exhibit a positive effect on NFA position, so the transfer effect is similar to that found by Gourinchas and Rey (2022) after the crisis. Exchange rate uncertainty effects tend to be higher than macroeconomics, but they also tend to be less persistent. The lack of persistence is coherent with the shock absorption effect of exchange rates. If we compare

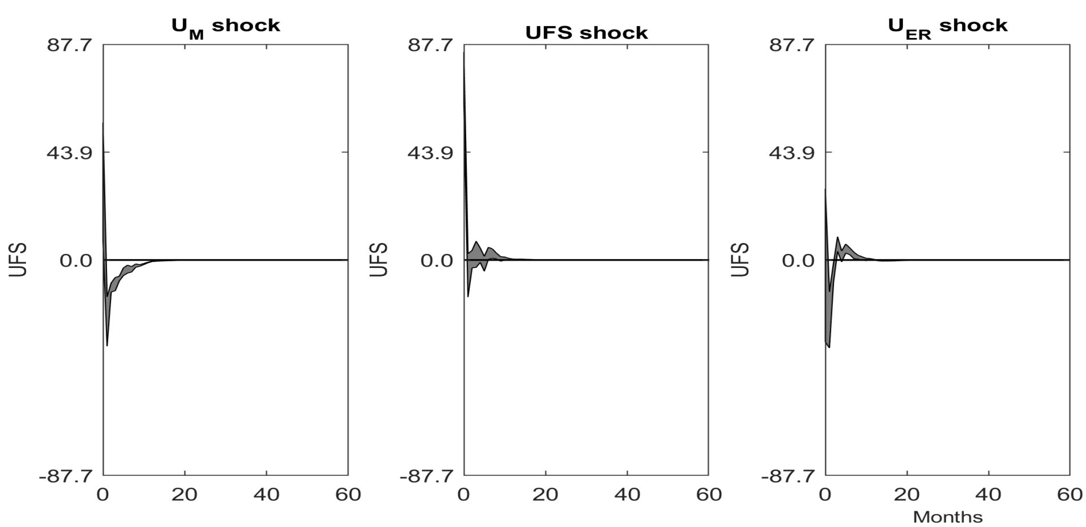
,

Figure 13. IRFs for the Foreign Demand of Corporate Stocks



Note: The Figure presents the IRFs of the estimated model using the reduce-form model $g_z = 0$, with sign restrictions on external variables $g_c \geq 0$, and with both general and narrative sign restrictions g_c and $\overline{g}$. Based on the number of restrictions, only the last model has the least number of restrictions to identify shocks. The columns are the source of the shock, and the rows are the variables that receive the shock. Then, in the same row, all variables receive the shock of the same source. *Sources:* Author's calculations.

Figure 14. IRFs for the US Demand of Foreign Corporate Stocks



Note: The Figure presents the IRFs of the estimated model using the reduce-form model $\overline{g}_z = 0$, with sign restrictions on external variables $\overline{g}_c \geq 0$, and with both general and narrative sign restrictions $\overline{g}_c$ and $\overline{g}$. Based on the number of restrictions, only the last model has the least number of restrictions to identify shocks. The columns are the source of the shock, and the rows are the variables that receive the shock. Then, in the same row, all variables receive the shock of the same source. *Sources:* Author's calculations.

both uncertainties in Figure 2, we can see those macroeconomic shocks tend to be less frequent but last longer. Consistent with the investment reduction, we can think that the privilege is reduced once the uncertainty shocks come, as foreign economies reduce the demand for bonds and stocks. The US also reduces its NFA position in the presence of Uncertainty, but this effect is lesser if there is only an exchange rate shock. If both occur, we can expect the shock to be more significant and the NFA to change considerably, which aligns with the exorbitant duty narrative. The loss of the position increases the value of the foreign debt position and can be seen as a transference of liquidity to the foreign markets.

5 Conclusions

I examine the effects of exchange rate and macroeconomic uncertainty on the United States' Net Foreign Asset (NFA) position. The analysis employs a VAR model estimated under different identification schemes—sign, narrative, and external instrument restrictions. Using multiple identification approaches isolates uncertainty innovations by imposing narrative-based restrictions centered on high-uncertainty episodes. This design distinguishes between macroeconomic and exchange rate uncertainty shocks and allows their individual effects to be identified.

Modeling the role of the United States in the global financial system with both macroeconomic and exchange rate uncertainty as independent drivers requires careful empirical treatment. The VAR estimates reveal asymmetric interactions: macroeconomic uncertainty increases exchange rate volatility, whereas exchange rate uncertainty does not significantly amplify macroeconomic uncertainty.

The impact of macroeconomic uncertainty on the NFA differs from that of exchange rate uncertainty, particularly during high-uncertainty periods. The United States' "privilege" deteriorates more persistently when fluctuations originate from macroeconomic shocks. Shocks to the NFA, in turn, do not meaningfully affect either form of uncertainty. The relationship between the two types of uncertainty is asymmetric—macroeconomic shocks raise exchange rate volatility, while exchange rate shocks modestly dampen macroeconomic uncertainty. These results support the identification strategy used to separate the effects of distinct uncertainty sources on the variables of interest.

The effect of macroeconomic uncertainty on the NFA likely operates through multiple channels: increased risk aversion that reduces demand for foreign assets (i.e., lower outflows) and heightened demand for United States safe assets during periods of market stress. This greater demand for safety also affects exchange rate dynamics, amplifying capital flow volatility and global financial risk.

Disaggregating the NFA into inflows and outflows reveals patterns that the net measure alone conceals. The influence of uncertainty on outflows is smaller than its effect on inflows, accounting for the observed contraction in the NFA. When focusing on bond and equity flows, the main components of portfolio transactions, I find that macroeconomic and exchange rate uncertainty display different response patterns. Macroeconomic shocks significantly alter foreign demand for United States safe assets, while exchange rate uncertainty does not. By contrast, exchange rate shocks—particularly those associated with depreciation—reduce foreign demand for bonds. For equity flows, both uncertainty types depress foreign demand. These results are consistent with the "privilege–duty" framework: under uncertainty shocks, the United States' privilege diminishes while its duty persists, as global investors continue to demand safe assets. This pattern suggests that the United States retains the benefits of sustained global demand for its liabilities but faces increasing costs related to debt sustainability.

These findings can inform the calibration of models incorporating uncertainty shocks into capital flow dynamics and the evolution of the NFA. Further research could extend this framework by distinguishing how exchange rate volatility and domestic macroeconomic shocks independently influence capital movements. The results also imply that macroprudential policy should mitigate both macroeconomic and exchange rate uncertainty using a combination of conventional and unconventional monetary instruments. A key limitation of the analysis is that the data aggregate capital flows, making it difficult to separate valuation effects from actual financial transactions, as noted by Gourinchas and Rey (2007, 2014) and Atkeson et al. (2022). While the endogenous model captures dynamic responses and shock persistence, a framework accounting for investor heterogeneity, such as in Camanho et al. (2022), could better explain portfolio rebalancing under exchange rate shocks. Moreover, because the identification relies on set rather than point identification, the estimates are associated with wide confidence intervals. As a result, the precision of model parameters is limited, and the policy implications should be interpreted cautiously.

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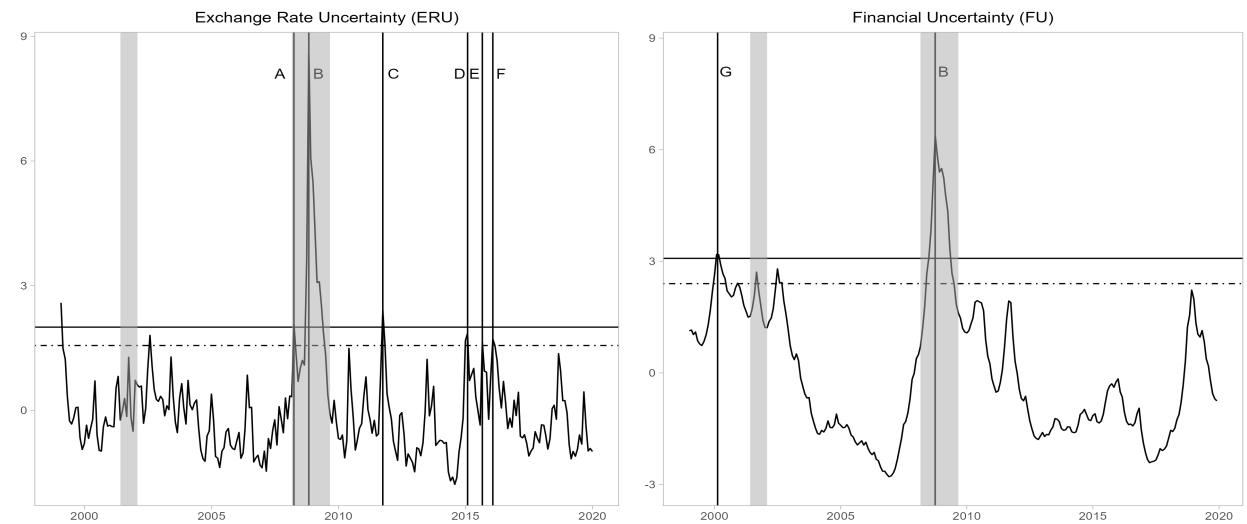
Appendix

A Uncertainty Comparisons

In Figure A1, I show the calculated for the ERU and the Financial Uncertainty of Ludvigson et al. (2021). Without looking at the events, it is clear that the behavior of both variables is different. The episodes of financial Uncertainty are given by: F is the dot-com crisis in 2000; G is the 9/11 terrorist attacks; H is the second market correction posterior to the crisis; I is the Lehman Default. None of the first three events is significant in the ERU.

Appendix Figure A1. Exchange Rate and Financial Uncertainty

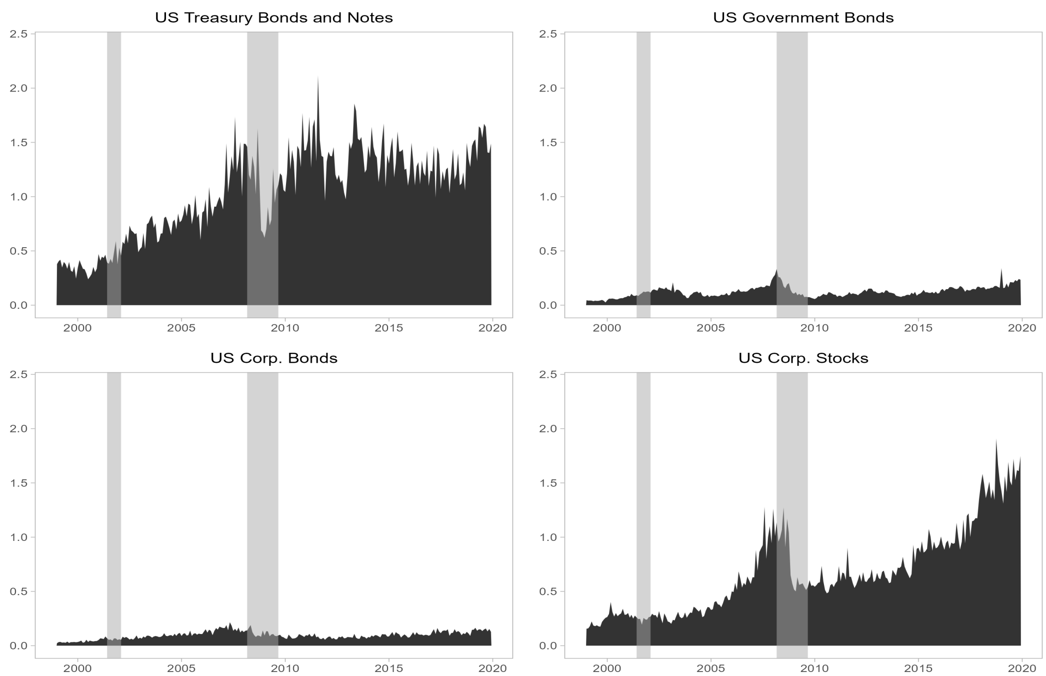


Note: The graph presents the ERU and Financial Uncertainty with the mean of the series standardized to zero. The horizontal line corresponds to the 1.65 standard deviations above the mean, defining each series's important episodes. The vertical line is the peak period of each period identified and used as the event constraint. *Sources:* Ludvigson et al. (2021), Fernandez-Mejia (2021), and Author own calculations.

B Net Foreign Asset Position Composition

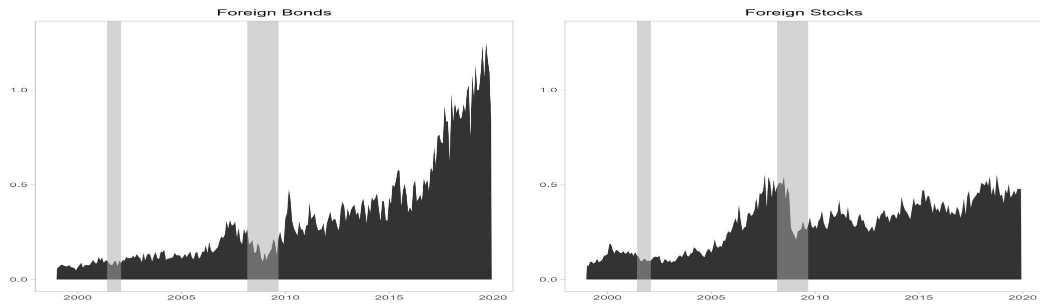
In Figures B1 and B2, I present the components of the Net Foreign Asset Position of the United States that define the gross portfolio capital inflows and outflows. The inflows are the purchases of US Treasury Bonds and Notes, US Government Bonds, US corporate bonds, and US corporate stocks. At the same time, the Outflows consist of the demand for Foreign Bonds and Foreign stocks. By looking at the magnitudes, we can conclude that foreigners' higher demand for US assets is related to the Treasury Bonds and Stocks, consistent with the literature on NFA and the Exorbitant Privilege. In comparison, the outflows go consistently to foreign bonds, which we can presume are for diversification motives and because of their high yields.

Appendix Figure B1. Gross Outflows of Portfolio Capital Flows



Sources: TIC

Appendix Figure B2. Gross Outflows of Portfolio Capital Flows



Sources: TIC

C Descriptive Statistics

Table C1 presents the descriptive statistics of the raw data gathered to estimate the model of Equation 1. The whole data set includes the Uncertainty of interest, the price of gold, and the Oil Supply news shocks. The other variables correspond to the components of the portfolio inflows and outflows of the series. One part of the components is the gross purchases of the Foreigners of US Treasury Bills and Notes (FUSTN), Government Bonds (FUSB), Corporate Bonds (FUSCB), Corporate Stocks (FUSS), Foreign Bonds (FFB), and Foreign Stocks (FFS) which are the Inflows. The other part is the gross sales of foreigners to the US residents of US Treasury Bills and Notes (UUSTN), Government Bonds (UUSB), Corporate Bonds (UUSCB), Corporate Stocks (UUSS), Foreign Bonds (UFB), and Foreign Stocks (UFS) which are the Outflows. Finally, the Net Foreign Assets are defined as:

$$NFA = (UFS + UFB) - (FUSTN + FUSB + FUSCB + FUSS + FFB)$$

We can see that based on the Augmented Dickey-Fuller, the last column in the Table C1, the variables of interest U_M, U_{ER}, and Oil Supply do not need to be transformed as we find no evidence of the presence of unit root in the series. This is not the case with the Gold price, to which I calculate the logarithmic Returns.

Table C2 presents the Lag selection of the VAR model such that the optimal number of lags of the VAR model minimizes the majority of the criteria. We can see that according to each, the best model for the estimation is that it uses two lags. Nevertheless, it still presents some level of serial correlation in the errors. Then, I use the more parsimonious model with no evidence of serial correlation, the one with six lags.

Appendix Table C1. Descriptive Statistics

Variable	Min	Q1	Median	Mean	Q3	Max	St.Dev.	Range	ADF
Unc. Macro	0.55	0.61	0.64	0.66	0.69	1.08	0.09	0.08	-3.36
Unc. ER	0.35	0.46	0.51	0.53	0.57	1.39	0.12	0.12	-5.17
gold.inf	373.11	543.50	1138.01	1036.49	1362.01	2080.20	472.07	818.50	-1.14
oil.shocks	-2.45	-0.37	0.01	0.02	0.44	1.59	0.65	0.82	-10.92
FUSTN	0.25	0.72	1.17	1.04	1.35	1.91	0.40	0.63	-1.90
FUSB	0.03	0.09	0.12	0.12	0.15	0.34	0.05	0.06	-2.53
FUSCB	0.02	0.07	0.09	0.10	0.12	0.20	0.03	0.04	-2.45
FUSS	0.16	0.32	0.60	0.68	0.92	1.81	0.39	0.59	-0.35
FFB	0.06	0.12	0.24	0.33	0.40	1.22	0.28	0.28	1.02
FFS	0.08	0.15	0.31	0.29	0.39	0.56	0.13	0.24	-1.32
UUSTN	0.25	0.70	1.15	1.03	1.34	1.90	0.40	0.64	-1.89
UUSB	0.02	0.08	0.10	0.11	0.13	0.32	0.05	0.05	-2.58
UUSCB	0.01	0.07	0.08	0.08	0.10	0.18	0.03	0.04	-1.71
UUSS	0.16	0.32	0.59	0.68	0.92	1.83	0.40	0.60	-0.43
UFB	0.06	0.12	0.26	0.33	0.39	1.21	0.27	0.27	0.68
UFS	0.07	0.15	0.32	0.30	0.39	0.58	0.13	0.24	-1.46
FI	0.58	1.26	2.05	1.94	2.50	3.86	0.79	1.23	-0.99
USO	0.14	0.26	0.61	0.62	0.78	1.69	0.38	0.52	0.41
NDA	-2.37	-1.63	-1.41	-1.32	-0.98	-0.41	0.47	0.65	-2.15

Notes: The table presents different statistics for each of the 19 variables used in constructing the model. Min is the minimum, Q1 is the first quartile, Q3 is the third quartile, Max is the Maximum, St. Dev. is the Standard deviation of the series, Range is the Interquartile difference between Q3 and Q1, and ADF is the test statistic of the Augmented Dickey-Fuller test with drift. For the ADF test, the null hypothesis is that the series has a unit root. There are 249 data points, so the ADF test's critical value is -2.87.

Appendix Table C2. Lag Selection of the VAR Model

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
AIC	-6.69	-7.62	-7.62	-7.62	-7.58	-7.55	-7.50	-7.49	-7.43	-7.40	-7.37	-7.33	-7.27	-7.24
HQ	-6.62	-7.50	-7.45	-7.39	-7.30	-7.21	-7.11	-7.05	-6.94	-6.85	-6.77	-6.68	-6.56	-6.48
SC	-6.51	-7.32	-7.18	-7.05	-6.88	-6.72	-6.54	-6.39	-6.20	-6.04	-5.87	-5.71	-5.51	-5.36
FPE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

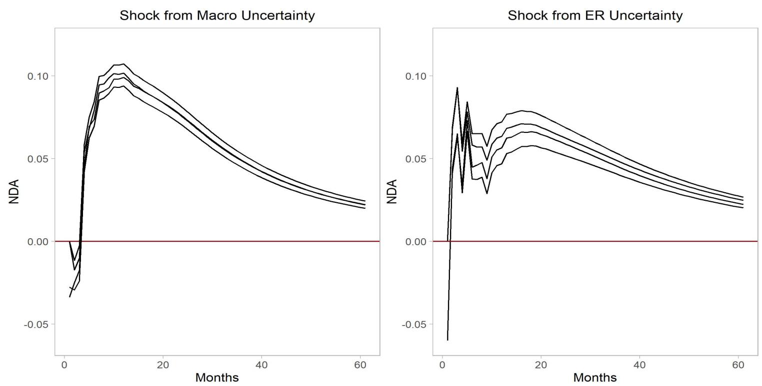
Notes: The table presents the different information criteria for selecting the number of lags for the VAR model. The optimal lag model should be such that it minimizes each.

D Multiple Specifications of VAR

I estimate different combinations of the VAR model using the recursive identification by Cholesky decomposition to contrast the robustness of the model. The identification requires imposing contemporaneous relationships between variables and response delays between others. As there is no framework to define a strict order in which to accommodate the endogenous variables, I will estimate all the possible permutations of the vector of variables $X_t = [U_{M,t}, NFA_t, U_{ER,t}]'$. This implies estimating 2^3 VAR models and obtaining their respective IRFs. In Figure D1, I present the result of estimating two a shock of each Uncertainty shock on the Net Foreign Asset Position.

The result of the VAR shows consistency in the relationship indifferent to the ordering of the variables. The change in the different models reflects an order of magnitude rather than an effect change. The main difference with the results of Figure 7 is the initial effect

Appendix Figure D1. Recursive VAR



Note: The Figure presents the orthogonal IRFs from the Macroeconomic and Exchange Rate Uncertainty shocks in the NFA under different models. Each line represents the mean IRF of one of the six models constructed from the permutation of the three variables that determine the recursive ordering identification. The calculated IRF error bands (not shown) are derived by bootstrapping with a thousand runs. *Sources:* Author's Calculations

of the shock in the NFA. In the VAR, the initial effect is a modest, non-significant decrease with a later significant increase in the position's value. Due to the imposed narrative restrictions, I identify a substantial shock from macroeconomic and exchange rate uncertainty, the highest and most persistent for the first. As we see episodes like the financial crisis of 2008, we can compare the behavior of the uncertainties and NFA in Figures 2 and 4, where we can see that the increase in Uncertainty is related to episodes of lower positions. The difference highlights the advantage of the identification scheme used over the short and long-run identification restrictions in the VAR model.