Safe haven portfolio flows

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Abstract

In this paper we set out to study the impact of shocks to global risk aversion (such as after Lehman) as well as shocks with a clearer geographical connotation (the European debt crisis) on cross border portfolio flows. We find robust evidence of a systematic retrenchment of foreign investors after both types of shocks, in particular the global shocks. Our results suggest that information asymmetries that have been highlighted in the literature as potential explanations of the home bias in finance are also important to understand the safe haven behaviour of international investors.

Keywords: Safe haven, portfolio flows, information, risk aversion, home bias.
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1 Introduction

Home bias in financial portfolios as a result of information asymmetry between domestic and foreign investors has been long recognised as a key theme in the finance literature (Gehrig 1993, Brennan and Cao 1997, Tille and van Wincoop 2009). Recent contributions have emphasised that incentives for information acquisition may be different between domestic and foreign investors and may also be decisive for their portfolio allocation behaviour (Van Niewenburg and Veldkamp 2010; Mondria and Wu 2010). There is also a literature on distance as a relevant factor in finance; see Portes and Rey (2005), Grinblatt and Keloharju (2001) and Okawa and van Wincoop (2010).

While this literature has contributed to improving our understanding of the role of distance as a factor in portfolio allocation from a static perspective, relatively little is known on how domestic and foreign investors react to news *in a dynamic setting*. Do domestic and foreign investors behave differently over time, conditional on well-identified shocks? In particular, the recent global financial crisis provoked a sudden reversal in the process of international financial integration, showing how the home bias may become a powerful factor in an environment of rising uncertainty and risk aversion, where investors are increasingly concerned about the "safety" of their investment compared to the potential return that can be obtained. Indeed, Broner et al. (2011) document that, as a stylised fact, gross capital flows tend to re-trench in crisis periods (both domestic investors from foreign assets abroad and foreign investors from domestic assets).[1]

In this paper, we study how foreign investors react to innovations in global and idiosyncratic risk in financial markets. The main question we want to address is whether foreign investors are systematically more pessimistic (or optimistic) on - and hence more likely to sell (or buy) - certain foreign assets in times of stress and if they show any clear investment pattern (in particular safe haven purchasing of foreign securities) related to the issuance countries and the types of securities. Information asymmetry is not the only possibly reason for divergent behaviour between domestic and foreign investors; for example, Broner et al. (2010) have suggested that in case of sovereign distress domestic agents are less likely to be defaulted on than foreign agents (because the government cares

[1] Broner et al. (2011) use annual data from 1970 to 2009, while we use quarterly data in this paper. Moreover, Broner et al. only look at two categories of portfolio flows (equity and debt) while we consider a more detailed breakdown of portfolio flows.

for them more than for foreigners). For this reason, it is important to look at different categories of assets, for which the protection of property rights may be more or less a matter of concern.

Unlike Broner et al. (2011), we are mainly interested in understanding whether and how certain countries or certain assets are safe haven assets in crisis times, countering the general tendency for cross border portfolio flows to retrench in times of stress. Moreover, in our empirical work (unlike in previous recent literature) we control for issuance activity, which turns out to be very important for the results.

In terms of data, we focus on the external liabilities in balance of payments statistics in order to gauge foreign demand for domestic securities. Similar to Forbes and Warnock (2011) we attempt at identifying "surges" (i.e. sharp increases) and "stops" (i.e. sharp decreases) in capital inflows that are driven by foreigners. We analyse different asset classes as well as risk shocks of different nature: *global* and *local* (but with potential global reverberations). To the extent that the quantities issued are relatively stable or increasing (a factor which we control for in our empirical analysis), a fall in external liabilities is likely to represent a reallocation from foreign to domestic investors. Indeed, Forbes and Warnock (2011) show that the factors driving surges and stops in capital inflows driven by foreigners are different compared to those driving capital outflow of domestic investors and net flows.[2] Moreover, one main advantage of this approach is the possibility to identify any potential "safe haven" pattern, as the country of issuance or the asset class of those securities that are demanded by foreign investors against a risk shock, without necessarily relying on asset price developments that embed the interaction of domestic and foreign demand.

From a methodological perspective, episodes that may lead to significant re-allocation of foreign portfolios are identified in two ways: a narrative approach and a formal econometric approach. In the narrative approach, we study specific periods that were associated with sharp drops in the global stock market and coincided with sharp increases in the VIX index, a popular proxy for global risk and global risk aversion, focussing in particular on the period following the collapse of Lehman (an example of global shock) and the euro debt crisis in the summer and autumn of 2011 (an idiosyncratic shock to the euro area but with significant external effects). In the econometric approach, two types of shocks -

[2] See also Rothermberg and Warnock (2011).

a rise in global risk aversion (global shock) and a negative shock to confidence in the euro area periphery (idiosyncratic shock) - are identified through sign restriction in a small VAR model. An innovation compared with Forbes and Warnock (2011) is that we look at the demand by foreign investors conditional on the realisation of a certain structural shock and not in general, and we look at a longer sample and not just as the most recent crisis (as, e.g., in Milesi-Ferretti and Tille 2011). A comparison between the behaviour of foreign investors under *global* as opposed to *idiosyncratic* shocks is also a main objective of this paper, since we want to distinguish the case of international investors generally re-trenching from foreign investment *as such* in any given country in times of high global risk aversion from their behaviour when faced with risk shocks hitting that particularly country specifically.

The paper reaches three main results. First, on balance foreign demand tends to retrench after crises and risk shocks, and there are very few assets that are consistently safe haven in the sense of attracting foreign investors when risk is perceived to be higher. This is consistent with the idea that foreign investors may feel less well informed and that information is particularly valuable in crisis times. Second, we find that the euro debt crisis has been different from the Lehman episode in the sense that it led to outflows from the euro area high-yield countries specifically. Nonetheless, and this is our third result, we also find that a decomposition of the risk shocks into a global and an idiosyncratic component shows that foreign investors appear mostly to react to the global component only. (Add on interpretation).

The paper is organised as follows. In Section 2 we describe the data. Section 3 compares the behaviour of foreign investors during specific crisis episodes, such as Lehman in 2008 and the euro debt crisis in 2011. Section 4 presents the identification based on sign restrictions econometric model and Section 5 its results. Section 6 concludes.

2 Data

The main objective of this paper is the analysis of the foreign demand for domestic securities during periods of heightened financial market volatility, being caused by either reverberations of global shocks or domestic events. Since we aim at isolating the behaviour of foreign investors, the analysis focuses only on one side of the financial account, the

liability side, of the international financial transactions of each country. Hence rather than showing total portfolio flows, the data show only those flows that are related to securities issued by domestic residents and purchased by foreigners (a positive entry), or sold by foreigners to domestic residents, such as a bond redemption (a negative entry). In particular, we collect quarterly data from 1990 to 2011 for portfolio liabilities of the Balance of Payments Statistics of the International Monetary Fund (IMF), distinguishing between equity, debt securities and their breakdown between bonds and notes (securities with maturity longer than one year) and money market instruments (up to one year). In addition, we distinguish bonds and notes issued by the general government, which are of particularly interest for their potential safe haven features in crisis periods, from those issued by other non-government sectors. In order to control for differences in the size of the various countries' financial markets and ensure a comparable measure, financial flows from the balance of payments statistics are divided by the *stock* of external portfolio liabilities at time $t-4$, as reported by the IMF International Financial Statistics.

The sample of countries includes the US, Japan, Switzerland, which are generally considered as typical safe haven economies in periods of heightened uncertainty, and the euro area, as a whole and further divided in two sub-groups: low-yield economies and high-yield economies. The euro area "low-yield" is the aggregate of financial flows of Austria, Belgium (available since 2002), Finland, France, Germany, and the Netherlands; while the sub-group euro area "high-yield" is composed by the sum of flows of Ireland (as available), Italy, Portugal and Spain (Greece is excluded because of the lack of sufficiently long time series). It is important to note that data for the euro area net out all transactions between residents in two different countries of the euro area; whereas data for the two sub-aggregates of the euro area are obtained from national sources that include financial transactions between the residents of two different euro area countries. Data for euro area consolidated external liabilities are available since 2000 (since 2006 for government bonds and notes), and for Switzerland since 1999, implying a significantly shorter sample period for these countries.

The dataset contains a number of control variables and other variables that are necessary to identify the structural shocks. The most important control is the size of the *issuance* of securities by domestic residents, which is included in order to check to what extent foreigners are absorbing a larger supply of domestic securities than domestic in-

vestors. Data for the total issuance of securities are obtained from the Bank for International Settlements (BIS), including both domestic and international issuances, and are usually available only starting from 1994, restricting the sample size in the econometric exercise.[3] Other financial variables include the long-term (10-year) government bond yields and the main country stock market indices obtained from the OECD, the MSCI World Equity Index in local currency and the VIX index of the Chicago Board Options Exchange, measuring the implied volatility of S&P 500 index options, which were downloaded from Thomson Reuters/Datastream.

3 Comparing financial crises

3.1 First illustrative evidence

The first step of the analysis is a narrative account of the behaviour of financial flows, in particular domestic liabilities held by non-residents, during periods of rising global financial volatility with a focus on the two most recent episodes: Lehman and the euro area sovereign debt crisis. In order to identify crises periods in an objective manner, we rank the quarterly changes in the MSCI World Index since 1990, select the ten largest drops in the index and pick those (nine out of ten episodes) that coincided with an increase in the VIX index. These are associated with geopolitical global shocks, such as the 1990 Gulf War or the terrorist attack to the Twin Towers in 2001; shocks originating from the US financial markets, such as the collapse of the dot-com bubble at the end of 2000, the trough of the Dow Jones in 2002, the bail-out brokered by the US Federal Reserve of Bear Stearns at the beginning of 2008, the impact of the Lehman bankruptcy in the last two quarters of 2008; and, finally, the shock originating from the euro area debt crisis in the summer of 2011. In addition, we add some emerging market crises, namely the Mexican Peso crisis in 1994, the Asian crises in 1997 and the Russian default in 1998, which rank lower in terms of declines in the global stock market, but correspond to sharp quarterly increases in the VIX. *Table 1* summarises the main financial indicators during these periods compared to the average over the whole sample, separating Lehman and the euro area debt crises form all the other crises. The Lehman crisis corresponds to the largest global shock when measured by the decline in the global stock market and

[3] For equities, only data for international issuance are available.

the increase in global risk aversion. The euro area debt crisis in the third quarter of 2011 is also associated with one of the largest increases in global risk aversion, when measured by the VIX. The table includes the average quarterly returns and spreads vs. Germany of the euro area high-yield economies (Ireland, Italy, Portugal and Spain) to show how the impact of the domestic euro area shock differs from other global shocks for these economies. It is notable that the spread between the euro high-yield countries and Germany goes up and the stock markets in these countries falls more than the US (with the exception of emerging market crises). This suggests that high-yield countries are generally vulnerable to rises in global risk aversion, though the rise during the euro area debt crisis (88 basis points) stands out quantitatively.

(Table 1 here)

After an overview of prices, we now turn to quantities. *Figure 1* provides an overview of the foreign demand for domestic securities issued by the euro area and other countries, such as the United States, Japan and Switzerland, which are generally identified as safe haven economies. The charts compare financial flows in different crises periods - such as the euro area debt crisis in the third quarter of 2011, the average flow in the last two quarters of 2008 corresponding to the Lehman crisis, and the average of all other crisis periods - to the average flows across the whole sample. As mentioned in the previous section, these are flows for external liabilities according to different asset classes - debt securities, broken down by bonds and notes, of which government liabilities also shown separately, versus money market instruments, and equity - reported as a percentage of the stock of total external portfolio liabilities, in order to compare the size of any potential shock across countries.

(Figure 1 here)

Starting from the most recent episode - the euro area debt crisis - it is possible to note a large drop by about two percentage points in the foreign demand for debt securities issued by euro area high-yield countries (chart 1b), half of which is accounted by net sales of government securities by foreigners (chart 1e). The 2011 shock does not seem to have spared the safer euro area low-yield countries which also recorded small capital retrench-

ment by foreigners compared to other crisis periods and normal times.[4] Remarkably, Japanese debt securities attracted large safe haven foreign capital flows - some 6 percent of the total portfolio stock of liabilities - in the summer of 2011 (chart 1b), mainly in the form of short-term money market instruments (chart 1d) while non-Japanese residents were net sellers of Japanese equities, a behaviour similar to all the other crises periods (chart 1a) . There is also a large drop in the foreign demand for money market instruments issued by Swiss residents, which is difficult to square with the safe haven attraction of the Swiss franc. Moreover, during all crisis periods, non-Swiss residents increase their purchase of equity instruments issued by Swiss residents compared to normal periods (chart 1a). These trends are most likely related to the role of Switzerland as an international financial centre and the presence of money market and investment funds that reinvest proceeds abroad.

A number of atypical patterns in the flows of external liabilities coincide with the global shock following the Lehman bankruptcy in the second half of 2008. Again, there is a drop in foreign demand for debt securities issued by euro area high-yield countries by 1% of the portfolio stock, which is mainly accounted for by a decline in the demand for other - mainly private issues dominated by banking entities - bonds and notes (chart 1f), to lesser extent by government bonds. Looking at other countries, quite surprisingly, data show that foreigners withdrew their investment out of long-term government securities issued by the United States and Japan after the Lehman default, whereas euro area government securities, in particular those issued by the euro area low-yield economies continued to attract foreign interest (chart 1e). In this case, government securities, it is interesting to note how the flows change signs between the Lehman episode and the euro area debt crisis, when focussing on the euro area, United States and Japan. Finally, in a climate of heightened uncertainty, in late 2008, foreign investors searched for financial instruments with shorter maturities, in particular those issued by the euro area and the United States, not those issued by Japanese residents (chart 1d) and turned away from euro area and Japanese stock markets, while remaining more neutral as regards the United States (chart 1a).

[4]This result is consistent with Andritzky (2012), who finds that the global financial crisis led to a fall in the share of non-resident holdings of government bonds. He also finds a negative association between the share of securities held by non-residents and bond yields.

3.2 Basic regressions

In order to be able to evaluate the statistical significance of the effect of different crises and to introduce some control variables, we run a set of simple regressions, with a first-order autoregressive model of the foreign demand for securities issued by domestic residents in a certain country or currency area, including a number of dummies for the crisis periods. The estimated equation is

$$fd_{ijt} = \alpha_{ij} + \beta_{ij} fd_{ij,t-1} + \gamma iss_{ijt} + \Sigma_{x=1}^{5} \delta_{ijx} DUM_x + v_{ijt} \quad (1)$$

where fd_{ijt} is the foreign demand for securities issued in country i (as a share of country i's overall external portfolio liabilities), j is the asset class (say, bonds), and iss_{ijt} is the time series for the domestic and international issuance in that asset class (also as a share of country i's overall foreign portfolio liabilities).[5] The correction for issuance is important because we want to identify the *demand* from foreign investors in specific crisis episodes, controlling to what extent a greater supply of securities is absorbed by them (more discussion on this later). As noted, the inclusion of this variable restricts the sample period, as it is available only starting from 1994. DUM_x are five different dummy variables identifying the periods of financial turbulence according to our broad classification of the origin of the shock: the euro area debt crisis in 2011:3; the Lehman crisis in 2008:3 and 2008:4; the 9/11 terrorist attack to the Twin Towers in 2001:3; the US-based crises in 2000:4, 2002:3 and 2008:1; and, finally, the emerging market crises in 1994:4, 1997:4 and 1998:3. The regressions are estimated through OLS including Newey-West robust standard errors to account for potential residual autocorrelation and heteroskedasticity. *Table 2* reports the coefficients associated with the dummy variables, the focus of our analysis, while *Table 3* provides the full set of results, for completeness. A positive and significant coefficient for a certain dummy variable identifies the asset class and the country of issuance that attracts "safe haven flows" by foreigners in a certain type of crisis. A negative and statistical coefficient indicates that securities in a certain asset class/country are sold by foreigners during periods of financial stress. When the country of issuance of a certain asset is not the origin of the crisis, foreign investors are not reacting to an idiosyncratic shock; therefore a negative coefficient should reflect the predominance of

[5] As noted, for equities we are only able to control for international issuance.

home-bias by foreign investors and global portfolio reallocations to reduce risk (see for instance the negative statistical coefficients for equities in several advanced economies that are associated with emerging market crises).

(Tables 2-3 here)

A number of interesting trends and lessons emerge from the analysis of Table 2. First, it is difficult identify asset classes or countries that manage to attract safe haven flows in a consistent manner across different crisis episodes, with perhaps the exception of Swiss government bonds.[6] Second, the total number of statistically significant "negative" coefficients is three times larger than that of "positive" ones (last, column, last row). This shows that, *conditional to a crisis episode*, home bias is particularly strong, while there are fewer cases of safe haven portfolio flows. Third, focussing on the ratio of negative to positive statistical coefficients of the dummies by asset class (last row), as expected, in periods of heightened global risk aversion, investors usually drop risky foreign equities, as well as bonds that do not have the backing of the government sector, while only occasionally they buy into foreign money market instruments (e.g. euro area short-term securities in the Lehman crisis or Japanese in the latest crisis) or government bonds and notes (e.g. euro area low-yield and Japanese government bonds during emerging market crises or US bonds in the euro area sovereign debt crisis). Fourth, taking the perspective of the country of issuance (last column), there is a striking difference between the portfolio flows between high-yield euro area economies, where dummy coefficients are preponderantly negative and statistically significant, and the safe haven attraction of euro area low-yield economies, particularly in the 9/11 episode. Finally, comparing the latest two major shocks in 2008 (global) and 2011 (idiosyncratic), one notes that in the Lehman episode foreigners were buying money market instruments of the low-yield euro area economies and the United States, showing instead a significantly lower appetite for longer-term debt securities, with the usual exception of Swiss government securities. In the euro area debt crisis, instead, the idiosyncratic nature of the shock stands out.

[6] Another potential exception is represented by the equity securities issued by Swiss residents. As already noted, these specific portfolio flows probably reflect the sales to non-Swiss residents of the shares and units of investment funds based in Switzerland, which in turn reinvest abroad the proceeds. External portfolio assets (not shown), increase during crisis periods in Switzerland, differently from other countries. Therefore, positive equity portfolio inflows most likley reflect the role of Switzerland as a major financial centre, not necessarily as a safe haven.

Foreign demand for euro area securities is exceptionally low; whereas foreigners show a greater appetite for longer-dated US government securities and Japanese short term debt instruments.

Overall, this preliminary analysis confirms that the response in the appetite of foreign investors for euro area securities to the idiosyncratic shock hitting the euro area in 2011 was different from the global shock in 2008 and other major shocks. In general, several patterns in the foreign demand for domestic securities are broadly in line with the common narrative of crises: namely a tendency to shed risky assets issued by foreigners as such, such as equity, and shorten the maturity profile of the portfolio of foreign debt securities. However, other specific elements, such as the drop in the foreign demand for US and Japanese government securities in the wake of the Lehman default suggest that the safe haven properties, at least as measured by foreign demand, of certain asset classes are less solid than previously thought and may depend from the type of shock. It is indeed striking that, apart from the securities issued by the Swiss government, there is no a safe haven asset class that is really robust in different crisis episodes since the mid-1990s.

4 Identifying risk shocks through sign restrictions

After comparing the euro debt crisis, Lehman and other crisis episodes in a descriptive analysis and a simple regression framework, we then move to undertake a more formal econometric exercise using the sign restrictions approach to identify risk shocks. In the linear method that we apply, risk shocks are linear and continuous phenomena, in constrast with the previous section where we treated crisis episodes as stand-alone (hence implicitly non-linear). There are certainly pros and cons associated to each of these two approaches, and for this reason we apply them both, to test the robustness of the results and to gain additional insight.

The analysis consists of two stages, and we correct for the generated regressors bias using a bootstrapping procedure.[7]

First stage. We identify two structural shocks, namely a surprise increase in global risk aversion (henceforth G_t) as in Habib and Stracca (2012) and domestic risk shocks (D_t),

[7]Note that the error bands reflect the estimation uncertainty in both the first and the second stage simultaneously, but not model uncertainty related to the choice of one identification scheme among the many possible ones which satisfy the sign restrictions.

in particular an increase in the perceived riskiness of the euro area high-yield countries (proxied by the average behaviour of government bond yields in Spain, Italy, Ireland and Portugal as a spread over Germany).[8] We first estimate a 2-variable VAR model including the VIX (vix) and the quarterly return on the global unhedged stock market (Δs_t) over the sample 1994:1 to 2012:2. The SVAR model is

$$A_0 x_t = A(L)x_{t-1} + B\varepsilon_t \tag{2}$$

where

$$x = [vix_t, \Delta s_t] \tag{3}$$

The identification of the global risk aversion shock is based on sign restrictions (applied as in Rubio-Ramirez et al. 2010). In the same way as in Habib and Stracca (2012) we assume that the global risk aversion shock leads to (i) a rise in the VIX and (ii) a fall in the global stock return.[9] In *Figure 2*, we report the shock thus identified compared with a "naive" measure of global risk aversion shocks (based on simply summing the residuals from an unrestricted VAR in the same variables, taking the stock return residual with a minus sign and dividing both residuals by their respective standard deviations). The two measures of global risk aversion are remarkably consistent and plausible (e.g., they show a large peak during Lehman and smaller peaks in 1998, 2000, 2002 and 2011).

(Figure 2 here)

After identifying the global risk aversion shock, we run the following regression

$$spread_t = \rho spread_{t-1} + \lambda \widehat{g}_t + \chi R_t^{US} + \widehat{d}_t \tag{4}$$

where *spread* is the average 10-year government bond yield between euro area high-yield countries and Germany, $\widehat{g}_t$ is the estimated global risk aversion shock, and R_t^{US} is the 10-year US government bond yield (a proxy for the world risk-free interest rate). We interpret the residuals from this equation, $\widehat{d}_t$, as a valid estimate of the *idiosyncratic component* of the spread in the euro area high-yield countries; by construction, this series is orthogonal to the global risk aversion shock. Note the difference between this identification scheme

[8] Greece was not considered due to both data limitations and the rather extreme behaviour of its variables in the crisis period.

[9] See Habib and Stracca (2012) for further discussion on the motivation of this restriction.

and the analysis of crisis episodes in the previous section; in that case, crises may have both a local and a global dimension and we are not able to cleanly distinguish between the two. The euro area debt crisis, for example, had both a local dimension (the unusual rise in within-euro area spreads) but also caused a rise in global risk aversion. This is well illustrated by looking at *Figure 3*, which reports estimates for $\widehat{g}$ and $\widehat{d}$. While the two series are unrelated (by construction) for most of the sample period, they are strongly positively correlated in the 2010-2011 period, suggesting that the euro area debt crisis had significant global repercussions. In *Figure 4*, we derive impulse response functions from the two identified shocks by regressing each variable on various lags of them. The global risk aversion shock (thin black lines) leads, by construction, to a rise in the VIX and a fall in the global un-hedged stock return; moreover, it also leads to a rise in the government bond spread (euro area high-yield vs. Germany). The idiosyncratic shock leads (again by construction) to a rise in the spread, but to *no change* in the VIX and in global stock returns.

(Figures 3-4 here)

Second stage. After identifying the shocks in the first stage in the way we just described, we turn to run the following regression

$$fd_{ijt} = \alpha_{ij} + \beta_{ij} fd_{ij,t-x} + \gamma_{ij} iss_{ijt} + \delta^{g}_{ij}\widehat{g}_t + \delta^{d}_{ij}\widehat{g}_t + v_{ijt} \tag{5}$$

where fd_{ij} and iss_{ij} are the foreign demand for and the total issuance of securities, as in equation (1).[10] As noted, standard errors are adjusted for the generated regressor bias using a bootstrap procedure based on pooling residuals from both stages of the analysis simultaneously (i.e., $\widehat{g}$, $\widehat{d}$ and v_{ijt}). So, equation (5) is essentially the same as equation (1) after substituting the crisis dummies with the estimated structural shocks.

5 Results

Table 4 reports results for the second stage of the analysis, presented in the same way as in Table 3 (now with the estimated structural shocks in place of the crisis episodes). Three

[10] Note that we are assuming that the issuance does not depend on foreign demand, although may depend on other determinants (including the shocks).

key messages arise from these results, which have similarities but also some interesting differences from the analysis of crisis episodes in Section 3.

First, most of the coefficients (including those that are statistically significant) are again negative, suggesting that while some countries and assets can be safe haven assets at times, the common behaviour of foreign investors tends to be of re-trenchment, as also seen in Section 3. Exceptions appear to be again Swiss equities (see discussion above), US money market instruments and Japanese government bonds after a global risk aversion shock, Japanese money market instruments and (surprisingly) "other bonds" in euro area high yield countries after an idiosyncratic risk shock to the euro area high-yield countries.

Second, results confirm that it is important to control for issuance when analysing the effects of risk shocks on foreign demand for domestic securities. Indeed not only is issuance often statistically significant, but also has a decisive influence on the estimate of the effects of the shocks.[11] It appears that risk shocks have an impact on issuance which confounds the simple correlation between these shocks and foreign liabilities.

Third, we find that most of the statistically significant coefficients pertain to the global risk aversion shock and that the idiosyncratic shock appears to have, in itself, a very small impact on foreign demand for domestic assets. It is notable, for example, that we find no statistically significant impact of this shock on the foreign demand for government bonds issued in high-yield countries, once controlling for issuance and for the influence of the rise in global risk aversion following the euro debt crisis, differently from what we saw in Section 3 when taking the euro debt crisis as a crisis episode.

(Table 4 here)

6 Conclusions

In this paper we have analysed the influence of risk shocks on the behaviour of foreign investors, looking at the last two decades of data. We have sought to give a structural interpretation to these shocks and to control for issuance, which is likely to be a key confounding factor in the association between market stress and foreign demand for domestic securities. Similar to Broner et al. (2011) we have looked at crisis episodes but we

[11] Results omitting issuance are not included for brevity but are available from the authors on request.

have also identified risk shocks using a formal econometric approach and applying sign restrictions in a VAR model.

The most important result of our analysis is that re-trenchment prevails after global risk aversion shocks and crises, and find very few (and inconsistent) instances of safe haven assets. This suggests that not only information asymmetries between domestic and foreign investors are relevant from a static perspective (i.e. to explain home bias in financial investment), they are also important to understand investor behaviour after well-identified shocks from a dynamic perspective. After a negative risk shock, in particular, on balance foreign investors appear to be readier to sell assets (or not to purchase them) than domestic investors, though there are some exceptions.

One important limitation of our work is that we do not distinguish between different categories of investors, e.g. public vs. private or retail vs. institutional. While data limitations are daunting, it is nevertheless an unavoidable step to move this line of research forward.

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TABLE 1. VIX, stock returns and change in government bond spreads of Euro Area (EA) high-yield countries vs. Germany. Quarterly averages: 1990:1 - 2011:4

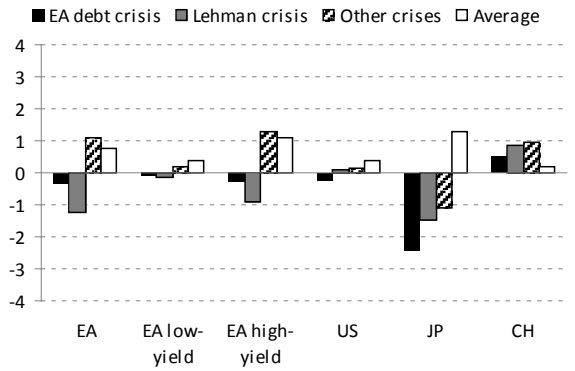
	VIX (index)		Stock market return (%)			Δ govt. bond spread (bp)
Crises	Change	Level	MSCI World	US	EA High-Yield	EA high-yield vs. DE
EA sovereign debt	13.0	30.4	-8.8	-7.0	-17.3	88.2
Lehman	18.8	41.7	-18.4	-18.0	-26.3	18.5
Other crises	5.5	26.2	-7.5	-5.6	-9.7	15.6
- US-based	8.1	29.0	-11.7	-11.1	-12.9	31.4
- Geopolitical	3.0	25.6	-8.6	-5.5	-12.6	25.2
- Emerging markets	5.3	24.1	-2.4	-0.1	-3.4	-9.7
Average	0.1	20.5	0.9	1.7	0.5	-1.0
St. Dev.	*(5.5)*	*(7.6)*	*(6.4)*	*(6.4)*	*(9.1)*	*(55.9)*

Sources: OECD, International Financial Statistics, Thomson Reuters/Datastream.

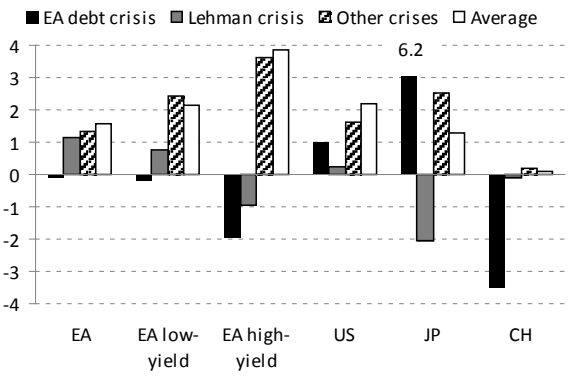
Notes: "EA sovereign debt" refers to the third quarter of 2011. "Lehman" refers to the average flow in the last two quarters of 2008. "Other crises" is the average for the following quarters: 1990:3, 1990:4, 2001:3 (geopolitical); 1994:4, 1997:4, 1998:3 (emerging markets); and 2000:4, 2002:3, 2008:1 (US-based); see main text for further details. Euro Area (EA) high-yield is the average of Ireland, Italy, Portugal and Spain. The MSCI World equity index is in local currency.

FIGURE 1. External liabilities. Flows by asset class 1990:1 – 2011:4
(as % of the outstanding stock of total portfolio liabilities in the previous year)

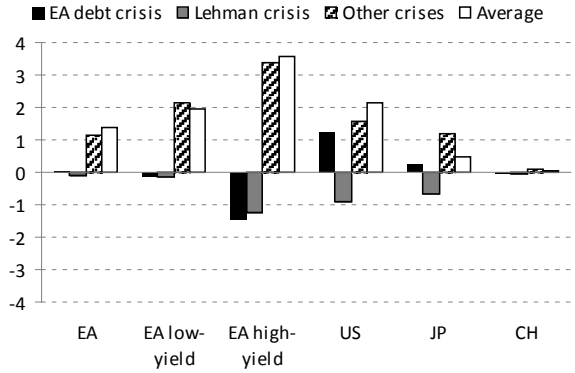
1a. Equity



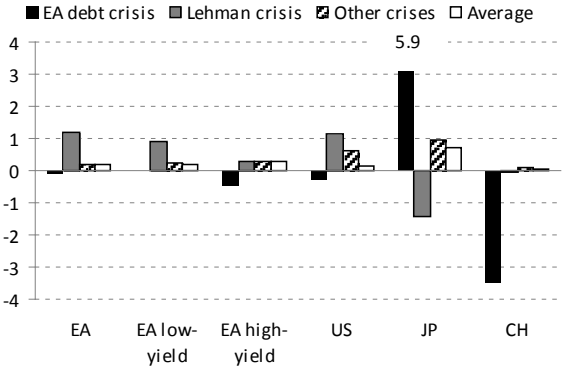
1b. Debt



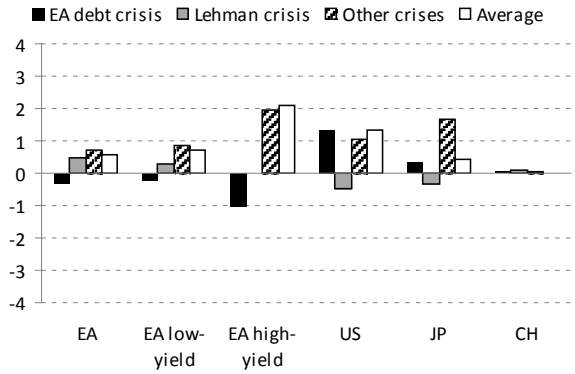
1c. Bonds and notes



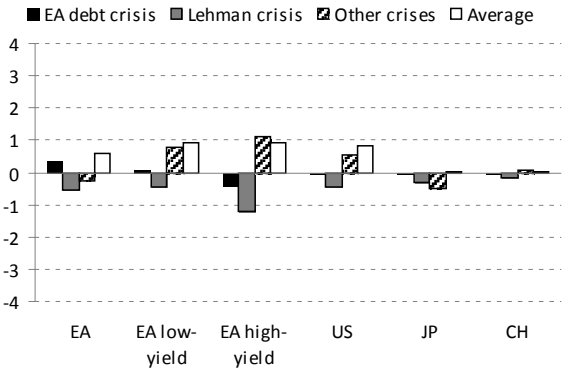
1d. Money market instruments



1e. Government bonds and notes



1f. Other bonds and notes



Sources: IMF Balance of Payments, International Financial Statistics, Swiss National Bank and authors' calculations.

Notes: EA debt crisis refers to the third quarter of 2011. Lehman crisis refers to the average flow in the last two quarters of 2008. Other crises is the average for the following quarters: 1990:3, 1990:4, 1994:4, 1997:4, 1998:3, 2000:4, 2001:3, 2002:3, 2008:1; see main text for further details. Euro Area (EA) high-yield includes Ireland, Italy, Portugal and Spain. Euro Area (EA) low-yield includes France, Germany, Netherlands, Finland, Austria and Belgium (since 2001). Aggregates for EA high-yield and EA low-yield do not net out intra-euro area transactions. Data for the Euro Area (EA) consolidated external liabilities, netting out intra euro-area transactions, are available since 2000 (since 2006 for government bonds and notes). Data for Switzerland are available since 1999.

TABLE 2. Crisis dummies from an AR(1) regression of quarterly external liabilities

		Equity	Debt	Money market	Bonds and notes	Government bonds	Other bonds	N. of -/+ significant dummies
Euro area	Euro area debt	*-0.61* **	0.08	*-0.15* *	0.30	*-0.62* *	-0.17	7/3
	Lehman	*-1.54* ***	-0.28	**1.00** ***	*-1.19* **	0.12	*-1.63* ***	
	9/11	**0.55** ***	0.13	*-0.47* ***	**0.62** ***	na	na	
	US-based	-0.01	0.13	0.04	0.15	0.66	-0.52	
	Emerging markets	na	na	na	na	na	na	
Euro area high yield	Euro area debt	*-1.16* ***	*-3.01* ***	*-0.61* ***	*-2.19* ***	*-1.29* ***	-0.04	17/1
	Lehman	*-1.49* ***	*-2.86* ***	-0.05	*-2.87* ***	*-0.65* ***	*-1.71* ***	
	9/11	**0.35** ***	*-2.67* ***	*-1.01* ***	*-1.44* ***	*-0.93* ***	*-0.24* **	
	US-based	0.03	-0.59	-0.05	-0.32	0.14	-0.18	
	Emerging markets	-0.20	0.44	0.02	-0.11	*-1.45* ***	*-0.72* **	
Euro area low yield	Euro area debt	*-0.25* **	*-1.66* ***	*-0.34* ***	*-1.67* ***	*-0.80* ***	-0.04	11/7
	Lehman	*-0.46* **	*-0.96* ***	**0.48** ***	*-1.54* ***	*-0.10*	*-1.21* ***	
	9/11	**0.54** **	**0.41** ***	-0.02	**0.29** **	**0.20** ***	**0.23** ***	
	US-based	-0.14	-0.10	0.22	-0.47	*-0.18* **	-0.07	
	Emerging markets	*-0.49* **	0.38	0.27	0.29	**0.60** ***	-0.41	
Unites States	Euro area debt	*-0.68* ***	**0.57** **	0.16	0.29	**0.43** ***	-0.13	17/3
	Lehman	*-0.30* ***	*-1.34* ***	**0.62** **	*-2.14* ***	*-1.46* ***	*-0.67* **	
	9/11	*-0.40* ***	*-1.19* ***	na	*-1.15* ***	*-0.41* ***	*-0.76* ***	
	US-based	-0.12	*-0.31* *	-0.02	*-0.34* **	0.14	*-0.52* *	
	Emerging markets	*-0.62* ***	*-1.65* *	na	-1.33	-0.67	*-0.57* ***	
Japan	Euro area debt	*-4.00* ***	**5.80** ***	**5.45** ***	-0.15	-0.04	-0.04	13/4
	Lehman	*-3.21* ***	*-3.73* ***	-2.06 ***	-1.09	-0.88	*-0.29* ***	
	9/11	*-2.54* ***	*-1.45* ***	-1.74 ***	0.35	0.57	*-0.15* **	
	US-based	*-4.34* ***	0.44	-0.76	1.23	1.47	*-0.25* **	
	Emerging markets	*-2.04* ***	2.33	**2.09** **	0.58	**1.51** *	*-0.84* ***	
Switzerland	Euro area debt	**0.70** ***	*-3.58* ***	*-3.60* ***	-0.02	**0.07** *	*-0.12* **	7/6
	Lehman	**1.02** ***	*-0.23* **	*-0.13* ***	-0.10	**0.11** ***	*-0.19* ***	
	9/11	-0.10	-0.06	-0.11	0.02	**0.10** ***	*-0.11* ***	
	US-based	**1.37** ***	0.05	-0.04	0.09	-0.01	0.10	
	Emerging markets	na	na	na	na	na	na	
Memo:								
N. of -/+ significant dummies		16/6	13/3	9/5	9/2	9/7	16/1	72/24

Notes: the table reports the coefficient associated with the dummies identifying crisis periods in the following regression:

$$fd_{ijt} = \alpha + \beta fd_{ij,t-1} + \gamma iss_{ijt} + \Sigma_{x=1}^{5} \delta_x DUM_x + v_{ijt}$$

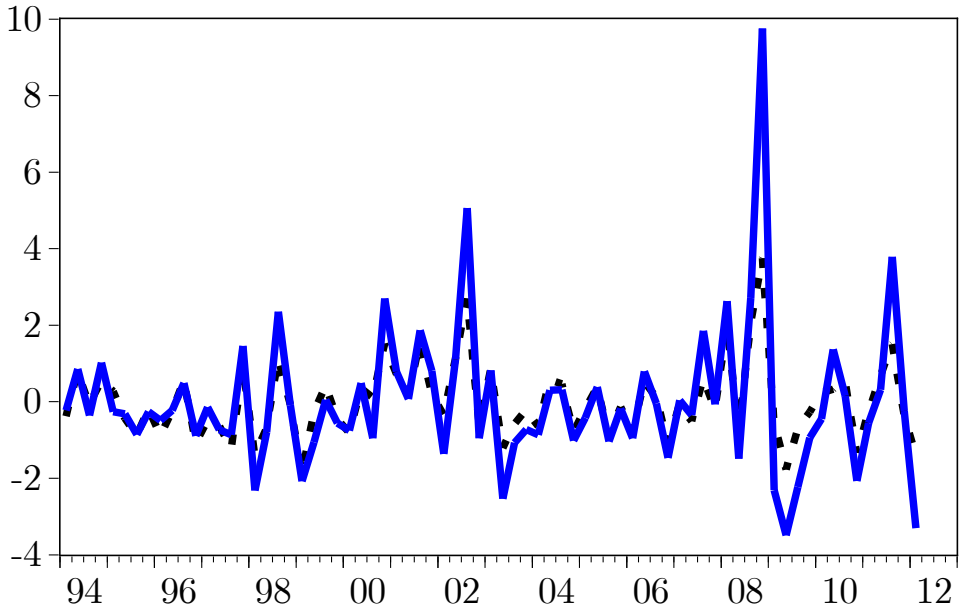
where the subscript t indicates the time-period, where fd_{ij} is the foreign demand for securities issued in country i (as a share of country i's overall foreign portfolio liabilities), j is the asset class, and iss_{ij} is the time series for the domestic and international issuance in that asset class (also as a share of country i's overall foreign portfolio liabilities). DUM_x are five different dummy variables identifying the periods of financial turbulence according to our broad classification of the origin of the shock: the euro area debt crisis in 2011:3; the Lehman crisis in 2008:3 and 2008:4; the 9/11 terrorist attack to the Twin Towers in 2001:3; the US-based crises in 2000:4, 2002:3 and 2008:1; and, finally, the emerging market crises in 1994:4, 1997:4 and 1998:3. The regressions are estimated through OLS including Newey-West robust standard errors to account for potential residual autocorrelation and heteroskedasticity. The sample is 1994:1 to 2011:4. The asterisks ***, ** and * indicate statistical significance at the 1, 5 or 10 percent level, respectively. Table 3 reports the full-set of coefficients and the R-squared of each regression. Euro Area high-yield includes Ireland, Italy, Portugal and Spain. Euro Area low-yield includes France, Germany, Netherlands, Finland, Austria and Belgium (since 2001).

TABLE 3. AR(1) model of quarterly external liabilities. Complete results

		Equity	Debt	Money market	Bonds and notes	Government bonds	Other bonds
Euro area	Lag of dep. variable	0.13 *	0.17	0.12	0.19	0.19	0.43 ***
	Issuance	1.60 ***	0.27 ***	0.19 ***	0.29 ***	0.26 *	0.17 **
	Euro area debt	-0.61 **	0.08	-0.15 *	0.30	-0.62 *	-0.17
	Lehman	-1.54 ***	-0.28	**1.00 *** **	-1.19 **	0.12	-1.63 ***
	Geopolitical (9/11)	**0.55 *** **	0.13	-0.47 ***	**0.62 *** **	na	na
	US-based	-0.01	0.13	0.04	0.15	0.66	-0.52
	Emerging markets	na	na	na	na	na	na
	R-squared	0.46	0.38	0.54	0.35	0.30	0.62
	N. of obs.	47	47	47	47	23	23
Euro area high yield	Lag of dep. variable	0.24 ***	0.23 **	0.29 **	0.17 *	0.33 ***	0.60 ***
	Issuance	0.24	0.12 ***	0.01	0.17 ***	0.31 ***	0.19 ***
	Euro area debt	-1.16 ***	-3.01 ***	-0.61 ***	-2.19 ***	-1.29 ***	-0.04
	Lehman	-1.49 ***	-2.86 ***	-0.05	-2.87 ***	-0.65 ***	-1.71 ***
	Geopolitical (9/11)	**0.35 *** **	-2.67 ***	-1.01 ***	-1.44 ***	-0.93 ***	-0.24 **
	US-based	0.03	-0.59	-0.05	-0.32	0.14	-0.18
	Emerging markets	-0.20	0.44	0.02	-0.11	-1.45 ***	-0.72 **
	R-squared	0.21	0.35	0.12	0.39	0.58	0.79
	N. of obs.	72	72	72	72	63	63
Euro area low yield	Lag of dep. variable	-0.13	0.39 ***	0.17 *	0.35 ***	0.31 **	0.38 ***
	Issuance	1.22 ***	0.13	0.21 ***	0.08	0.35 ***	0.33 ***
	Euro area debt	-0.25 **	-1.66 ***	-0.34 ***	-1.67 ***	-0.80 ***	-0.04
	Lehman	-0.46 **	-0.96 ***	**0.48** ***	-1.54 ***	-0.10	-1.21 ***
	Geopolitical (9/11)	**0.54 ** **	**0.41 *** **	-0.02	**0.29 ** **	**0.20 *** **	**0.23 *** **
	US-based	-0.14	-0.10	0.22	-0.47	-0.18 **	-0.07
	Emerging markets	-0.49 **	0.38	0.27	0.29	**0.60 *** **	-0.41
	R-squared	0.16	0.24	0.38	0.24	0.43	0.59
	N. of obs.	72	72	72	72	63	63
Unites States	Lag of dep. variable	0.49 ***	0.53 ***	0.24 **	0.56 ***	0.54 ***	0.70 ***
	Issuance	-0.06	0.10 ***	0.12 *	0.06 *	0.07 ***	0.03 **
	Euro area debt	-0.68 ***	**0.57 ** **	0.16	0.29	**0.43 *** **	-0.13
	Lehman	-0.30 ***	-1.34 ***	**0.62 ** **	-2.14 ***	-1.46 ***	-0.67 **
	Geopolitical (9/11)	-0.40 ***	-1.19 ***	na	-1.15 ***	-0.41 ***	-0.76 ***
	US-based	-0.12	-0.31 *	-0.02	-0.34 **	0.14	-0.52 *
	Emerging markets	-0.62 ***	-1.65 *	na	-1.33	-0.67	-0.57 ***
	R-squared	0.35	0.55	0.43	0.52	0.43	0.71
	N. of obs.	72	72	35	72	72	72
Japan	Lag of dep. variable	-0.06	-0.29 **	-0.21	0.02	-0.01	0.25
	Issuance	1.64	-0.06 **	0.00	-0.01	-0.03	0.00
	Euro area debt	-4.00 ***	**5.80 *** **	**5.45 *** **	-0.15	-0.04	-0.04
	Lehman	-3.21 ***	-3.73 ***	-2.06 ***	-1.09	-0.88	-0.29 ***
	Geopolitical (9/11)	-2.54 ***	-1.45 ***	-1.74 ***	0.35	0.57	-0.15 **
	US-based	-4.34 ***	0.44	-0.76	1.23	1.47	-0.25 **
	Emerging markets	-2.04 ***	2.33	**2.09 ** **	0.58	**1.51 * **	-0.84 ***
	R-squared	0.26	0.20	0.20	0.03	0.07	0.19
	N. of obs.	72	72	72	72	72	72
Switzerland	Lag of dep. variable	-0.03	0.45 ***	0.48 ***	0.27 **	0.11	0.11
	Issuance	0.35 ***	0.05 **	0.12	0.03 ***	0.05 **	0.02 **
	Euro area debt	**0.70 *** **	-3.58 ***	-3.60 ***	-0.02	**0.07 * **	-0.12 **
	Lehman	**1.02 *** **	-0.23 **	-0.13 ***	-0.10	**0.11 *** **	-0.19 ***
	Geopolitical (9/11)	-0.10	-0.06	-0.11	0.02	**0.10 *** **	-0.11 ***
	US-based	**1.37 *** **	0.05	-0.04	0.09	-0.01	0.10
	Emerging markets	na	na	na	na	na	na
	R-squared	0.41	0.78	0.81	0.17	0.20	0.22
	N. of obs.	51	51	51	51	51	51

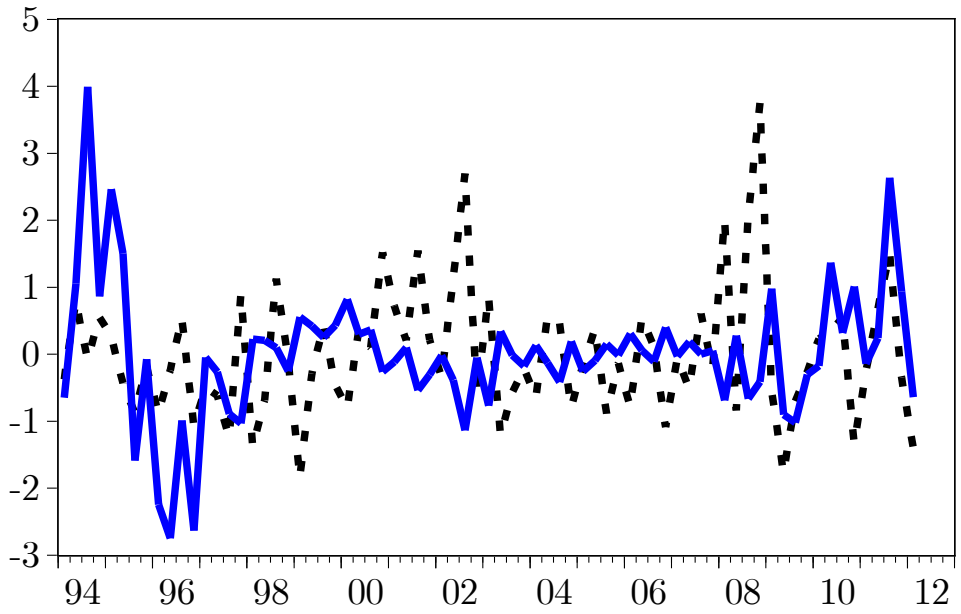
Notes: See notes to Table 2.

FIGURE 2: Estimated global risk aversion shocks



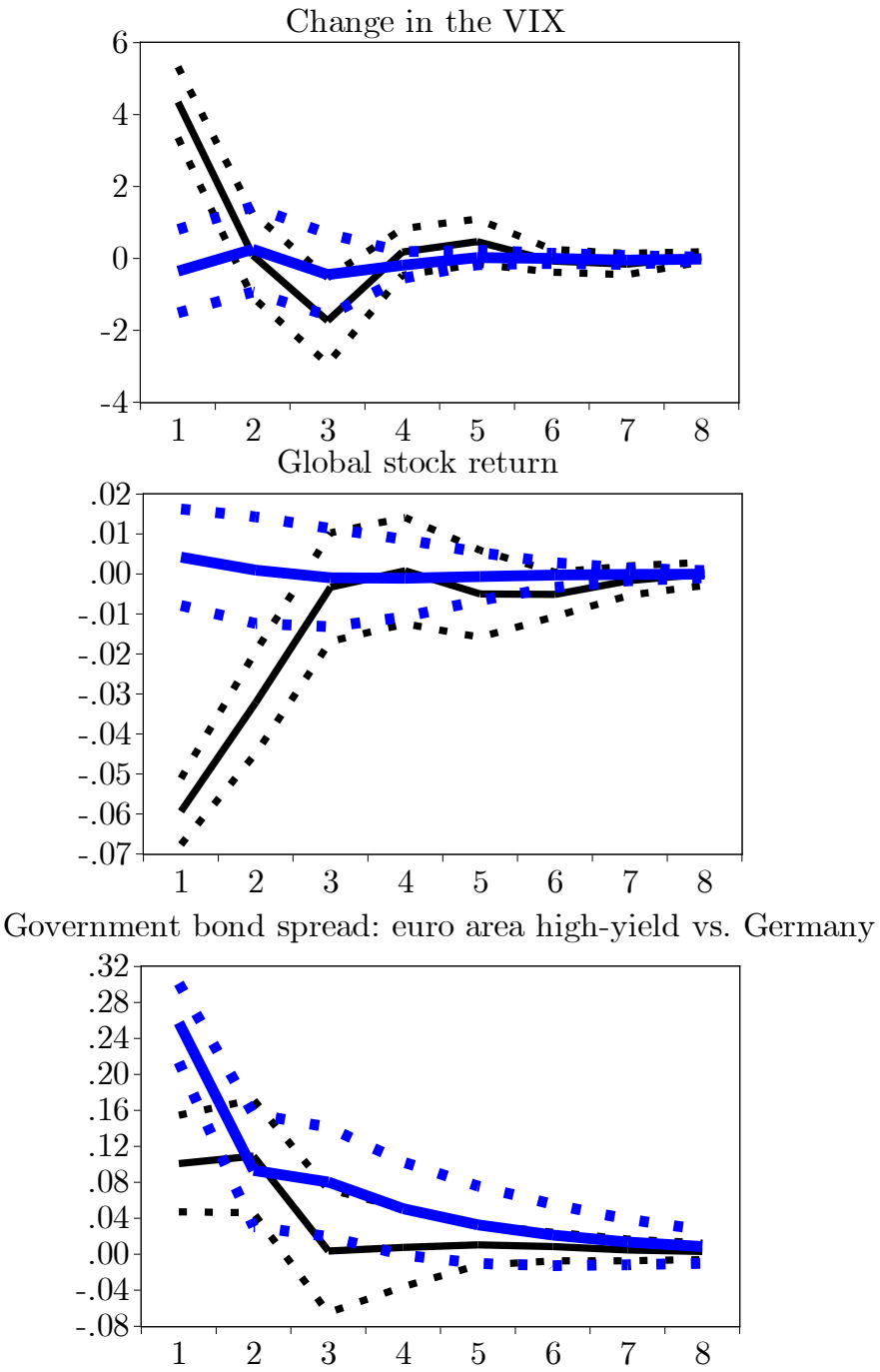
Notes: The figure reports estimated global risk aversion (GRA) shocks; each shock is rescaled so as to have unit standard deviation. The black dotted line reports the shock identified by estimating a VAR model over quarterly data from 1994:1 to 2012:2 including the change in the VIX and the return on a global un-hedged stock market and applying sign restrictions; see text, Section x.y, for the specification and the restrictions. The blue solid line is an estimate of the same shock by first estimating an unrestricted VAR model with the same variables and then taking the difference between the residual for the VIX and the residual for the global un-hedged stock return (both scaled by their respective standard deviations). The correlation between the two series is 0.92.

FIGURE 3: Estimated global risk aversion and euro area idiosyncratic shocks



Notes: The black dotted line reports estimated global risk aversion (GRA) shocks identified through sign restrictions; see notes to Figure 2. The blue solid line reports estimated idiosyncratic shocks to the euro area high-yield countries, obtained by regressing the 10-year government bond spread of four high-yield euro area countries (Italy, Spain, Ireland and Portugal) over Germany on one lag of itself, the estimated GRA shock, and the 10-year US government bond yield. Note that by construction the two estimated shocks are orthogonal.

FIGURE 4: Impulse responses to GRA and idiosyncratic euro area shocks



Notes: For the identification of GRA and idiosyncratic euro area shocks see notes to Figure 3. These impulse responses are obtained by regressing each of the three variables on lags of the two estimated shocks. Standard errors are corrected for the generated regressors bias using a bootstrap procedure.

TABLE 4: **Regression of quarterly external liabilities on estimated structural (global risk aversion and euro area idiosyncratic shock)**

		Equity	Debt	Money market	Bond and notes	Government bonds	Other bonds
Euro area	Lag of dep. Variable	0.22 **	0.15	0.20 *	0.18	0.05	0.41 ***
	Issuance	1.70 ***	0.27 ***	0.18 ***	0.29 ***	0.25 *	0.17 ***
	Global shock	-0.26 ***	-0.02	0.03	-0.01	0.02	-0.25 **
	Euro area id. Shock	-0.14 *	0.03	-0.22 ***	0.27	-0.12	0.34 **
	R-squared	0.41	0.35	0.40	0.32	0.22	0.59
	N. of obs.	47	47	47	47	23	23
Euro area	Lag of dep. Variable	0.29 ***	0.22 *	0.22 **	0.18	0.27 ***	0.63 ***
high yield	Issuance	0.10	0.10 ***	0.00	0.15 ***	0.30 ***	0.19 ***
	Global shock	-0.23 **	-0.84 ***	-0.20 **	-0.58 **	-0.24 *	-0.21 **
	Euro area id. Shock	-0.10	-0.31	-0.06	-0.20	-0.12	0.19 **
	R-squared	0.19	0.38	0.17	0.39	0.57	0.77
	N. of obs.	72	72	72	72	63	63
Euro area	Lag of dep. Variable	-0.12	0.36 ***	0.19 **	0.37 ***	0.30 **	0.42 ***
low yield	Issuance	1.16 ***	0.16	0.22 ***	0.11	0.39 ***	0.31 ***
	Global shock	-0.07	-0.14	0.08 *	-0.27 **	-0.01	-0.14
	Euro area id. Shock	-0.06	-0.11	-0.15 ***	0.06	0.02	0.06
	R-squared	0.14	0.21	0.47	0.21	0.35	0.53
	N. of obs.	72	72	72	72	63	63
United	Lag of dep. Variable	0.53 ***	0.52 ***	0.28 ***	0.54 ***	0.50 ***	0.70 ***
States	Issuance	-0.10	0.08 ***	0.11 **	0.06 **	0.08 ***	0.03 **
	Global shock	-0.17 ***	-0.17	0.18 ***	-0.31 **	-0.19 *	-0.12 **
	Euro area id. Shock	-0.01	-0.04	0.02	-0.04	-0.09	0.03
	R-squared	0.36	0.48	0.48	0.47	0.40	0.66
	N. of obs.	72	72	35	72	72	72
Japan	Lag of dep. Variable	-0.02	-0.27 **	-0.21	0.02	0.00	0.21
	Issuance	1.81 *	-0.04	0.01	-0.01	-0.02	0.01
	Global shock	-1.23 ***	0.55	0.24	0.38	0.51 *	-0.14 ***
	Euro area id. Shock	-0.17	-0.02	0.40 *	-0.43 **	-0.22	-0.20 **
	R-squared	0.29	0.12	0.09	0.09	0.11	0.27
	N. of obs.	72	72	72	72	72	72

Switzerland	Lag of dep. Variable	0.03	0.44 **	0.44 **	0.28 **	0.10	0.11
	Issuance	0.40 **	0.09 **	0.07	0.03 ***	0.05 **	0.02 **
	Global shock	0.27 ***	-0.15	-0.16	0.01	0.02	-0.01
	Euro area id. Shock	0.14	-0.37	-0.39	0.02	0.01	0.01
	R-squared	0.21	0.34	0.37	0.13	0.16	0.06
	N. of obs.	51	51	51	51	51	51

Notes: See notes to Table 2. For the identification of global and euro area idiosyncratic shocks, see notes to Figure 3.