Cross-Border Financial Linkages:

Identifying and Measuring Vulnerabilities*

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Abstract

This paper examines the importance of cross-border financial positions in determining macro-financial risk exposures. While the currently-available international financial datasets capture the rapid growth in financial globalisation and increased dispersion in net external positions over the last two decades, these lack the detailed information (in particular, the matrix of sectoral exposures) to provide a sufficient basis for risk surveillance and monitoring. We briefly outline some of the data innovations that can offer substantial gains relative to the status quo.

Keywords: cross-border financial linkages, external vulnerability, financial globalisation

* Prepared for the 2014 IMF Statistical Forum. I thank Caroline Mehigan and Rogelio Mercado for excellent research assistance. I also thank the Institute for New Economic Thinking for research support. Email: plane@tcd.ie.

I. INTRODUCTION

There are two main approaches to measuring cross-border financial linkages: (i) price-based measures; and (ii) volume-based measures. The price-based approach examines correlations in asset prices and returns across countries, with cross-border financial linkages captured by the importance of international, regional and global factors in determining financial returns. Importantly, the price-based approach is silent on the extent of international financial flows required to generate co-movements in asset prices. Moreover, if investors face similar environments, high correlations can occur even if there is no actual cross-border financial trade through similar shifts in sentiment across countries.

This paper focuses on volume-based measures, derived from the observed data on international financial flows and international investment positions. International financial flows may affect domestic macroeconomic and financial variables through a variety of mechanisms, in addition to any impact through asset prices. For instance, cross-border financial holdings provide an important "balance sheet" transmission mechanism by which international shocks affect the value of financial assets and financial liabilities, while also proxying for vulnerability to shifts in the funding and liquidity environments in overseas financial markets.

Within this general category, there are myriad relevant international financial linkages. Cross-border bank-related debt flows have received a lot of attention during the international

financial crisis.[1] Domestic and multinational banks are major intermediaries of international debt flows, while financial-sector FDI has been an important source of equity funding for banking systems in many countries.[2]

However, other sectors and other types of flows also play important roles. In relation to governments, international markets are a source of foreign funding for sovereign debt, while official reserves and the foreign portfolios of sovereign wealth funds are a significant proportion of aggregate foreign assets for many emerging and developing economies. For domestic corporates, international non-bank sources of debt financing (bond markets, alternative loan providers) provide an alternative to bank-based debt, while foreign portfolio investors and foreign direct investors are sources of equity funding. *A fortiori*, multinational corporates can draw on multiple financial systems in optimising its capital structure and treasury operations. Finally, households may hold foreign deposits, foreign portfolios and foreign real estate investments and obtain foreign debt funding.

International financial integration promises significant benefits. The funding of current account imbalances by net international financial flows can support welfare-enhancing consumption smoothing and efficient international capital allocation. In addition, gross

[1] See Committee on International Economic Policy and Reform (2012) for a comprehensive treatment of cross-border banking. See also Hills and Hoggartj (2013).

[2] See McCauley et al (2010), Cetorelli and Goldberg (2011, 2012a, 2012b) and Claessens and Van Horen (2014a,
[2] See McCauley et al (2010), Cetorelli and Goldberg (2011, 2012a, 2012b) and Claessens and Van Horen (2014a,
2014b).

international financial flows provide an important mechanism by which international risk diversification can be implemented, while also enabling more intense competition in the provision of financial services.

However, international financial integration also can prove costly. It may amplify domestic distortions if poor local corporate governance and inadequate financial regulation permit risk-taking entrepreneurs and aggressive domestic banks to expand more rapidly by taking on international leverage. Similarly, access to international financial markets may facilitate excessive borrowing by governments suffering from "debt bias." Through such non-optimal behaviour, consumption volatility might increase and the efficiency of international capital allocation decrease, in contrast to textbook predictions.

Even without such distortions, international financial integration also presents new types of financial risks. External financial shocks might trigger a reversal in the scale and direction of international financial flows, while shifts in international asset prices and exchange rates can generate sizeable valuation effects on the holdings of foreign assets and foreign liabilities. Moreover, the macro-financial impact of domestic shocks may be amplified by the pro-cyclical response of international financial flows.

In relation to sudden stops in international financial flows, a rapid narrowing of a current account deficit is typically costly in terms of the adverse impact on output.[3] In relation to the most recent sudden stop episode triggered by the 2008-2009 global financial crisis, Lane and Milesi-Ferretti (2012, 2014) document a very strong correlation between the scale of current account adjustment since 2008 and the scale of output recesssions, reaffirming that "expenditure reduction" tends to dominate "expenditure switching" in such episodes. Even for countries with a zero or positive current account balance, a sudden stop in international financial flows can disrupt the rolling over of external debt obligations. Corroborating evidence is provided by Catao and Milesi-Ferretti (2014), who show that that the stock of net external debt is a robust predictor of external crises, even controlling for the current account balance.

In addition to the risks associated with non-zero net positions (flows and stocks), financial shocks can also operate through gross foreign asset and foreign liability positions. On the asset side, adverse movements in foreign asset prices and exchange rates may generate valuation losses for domestic investors, with these negative wealth effects in turn affecting domestic macro-financial variables.[4] This is especially problematic if there is a high

[3] See, amongst many others, Obstfeld and Rogoff (2007), Blanchard et al (2010) and Mendoza (2010). Even if a sudden stop is not experienced, excessive current account imbalances may also be sub-optimal in terms of the implications for long-term growth performance (Blanchard 2007, Lane 2013).

[4] Broadbent (2012) shows that the non-UK balance sheet was the source of most of the losses of the major UK banks during the global financial crises. Losses on foreign assets also played an important role in the banking crises in Iceland and Ireland.

correlation between domestic and foreign asset values, such that foreign losses are incurred at the same as a downturn is taking place in the domestic financial system.

On the liability side, exchange rate depreciation raises the real burden of foreign-currency debt, while external borrowing can amplify the leverage cycle by permitting a faster expansion in debt but also raising the risk of forced deleveraging if there is a shock to the sources of foreign debt funding. Fluctuations in foreign equity funding can also be disruptive, both directly (through associated declines in domestic equity values) but also in terms of increasing the risk profile of the international balance sheet, if foreign equity funding is replaced by foreign debt funding.

In addition to increasing exposure to external financial shocks, international financial integration can also amplify the impact of domestic shocks. Foreign debt inflows can amplify a domestic credit boom; in turn, the international flight of deposit and wholesale funding (by both foreign and domestic investors) can trigger and/or exacerbate a domestic banking crisis.[5] Similarly, all else equal, a sovereign debt crisis is more likely if investors opt to exit the sovereign debt market for a troubled government in favour of alternative investments elsewhere.[6]

[5] See Borio et al (2011), Calderon and Kubota (2012), Bruno and Shin (2014), Carvalho (2014) and Lane and McQuade (2014) on the relation between international financial flows and domestic credit.

[6] Conversely, financial repression measures to limit the ability of domestic investors to exit the sovereign debt market have been widely-used in the stabilisation of sovereign debt markets (Reinhart and Sbrancia 2014).

II. THE DYNAMICS OF FINANCIAL GLOBALISATION

Based on international investment position data and the methods described in Lane and Milesi-Ferretti (2007), Figure 1 shows the rapid expansion in cross-border financial positions since the mid-1990s. At a global level, the stocks of foreign assets and foreign liabilities have increased from about 75-77 percent of world GDP in 1995 to about 165-168 percent of world GDP in 2012. Figure 2 provides one indicator of the imperfect measurement of cross-border positions: there is a persistent global gap between measured foreign assets and measured foreign liabilities, with the gap corresponding to 3.7 percent of world GDP in 2012.

The composition of international balance sheets is shown in Figure 3. While debt instruments account for the majority of cross-border positions, the share of debt in total foreign liabilities has declined from 69 percent in 1995 to 57 percent in 2012. Within the equity category, the split between portfolio equity and FDI fluctuates over time, with the portfolio equity share in total foreign equity liabilities at 41 percent in 2012.[7]

From a macroeconomic perspective, net external imbalances represent a significant type of external financial risk for both debtor and creditor economies.[8] Figure 4 shows the global distribution of current account imbalances and net international investment positions. While

[7] Since most countries still primarily measure FDI at book value, variation in the ratio of market values to book values accounts for much of the fluctuations in FDI values relative to portfolio equity values. FDI is relatively important for emerging and developing countries.

[8] See Lane and Milesi-Ferretti (2012, 2014) and International Monetary Fund (2014a).

there has been some narrowing of current account imbalances since 2008, the dispersion in net international investment positions remains high relative to historical levels.

Figures 5-7 show the importance of offshore financial centres in cross-border financial positions.[9] Figure 5 shows the share of offshore centres in the cross-border positions of BIS reporting banks; Figure 6 shows the share of offshore centres in global cross-border portfolios; and Figure 7 shows the share in global foreign direct investment positions. Since offshore centres are predominantly intermediaries, the large share of cross-border positions that are attributed to this group makes it more difficult to uncover the underlying linkages between ultimate beneficial owners and ultimate destinations (including the original source countries due to roundtripping practices).

In understanding the cross-border linkages across financial systems, it is important to appreciate the growth in the non-bank financial sector in recent years.[10] Based on a sample of major economies, Figure 8 shows the expansion in the scale of financial assets held by "other financial intermediaries," insurance companies and pension funds. In related fashion, Figure 9 shows that the domestic banking system has declined in relative importance as a source of credit for the non-financial private sector, with cross-border bank credit and bond issuance accounting for an increasing proportion of total credit. Finally, Figure 10 highlights the

[9] See Lane and Milesi-Ferretti (2011) on the role of small international financial centres. Felettigh and Monti (2008) provide an illuminating account of the ultimate geographical distribution of assets held by mutual funds in Ireland and Luxembourg.

[10] See International Monetary Fund (2014b, 2014c) and Financial Stability Board (2014) for overviews of the non-bank financial sector.

financial interconnections between banks and "other financial intermediaries", such that intermediation chains between these two sectors form an important part of the overall credit process.

In summary, the current datasets on cross-border financial positions succeed in demonstrating the scale and growth of financial globalisation. In terms of patterns, it is evident that international financial linkages are formed through a variety of instruments (bank debt, portfolio debt, portfolio equity, FDI) and a range of sectors (banks, non-bank financial entities, non-financial corporates, households and governments). For some analytical purposes, the large net external imbalances evident in the data are sufficient to guide macro-financial risk surveillance. However, the risks embedded in the large gross cross-border positions cannot be adequately analysed at the level of aggregation shown in the current datasets. In the next section, we turn to some innovations that can improve our understanding of cross-border financial risks.

III. MEASUREMENT AND INTERPRETATION ISSUES

Despite the vast expansion in the availability of international financial data over the last 10-20 years, the existing data sets remain inadequate for the interpretation and analysis of cross-border financial linkages. Currently, international investment position datasets focus on the measurement of foreign assets and liabilities on a category-by-category basis (portfolio debt, other debt, portfolio equity, foreign direct investment, official reserves). Only a limited number of countries report the sectoral identities of international investors (banks, other

financial corporations, non-financial corporates, households and governments). Even in those cases, the sectoral identities of the cross-border counterparts are not reported, while information on the domestic financial positions of international investors is also necessary in order to obtain a full picture of the matrix of financial linkages.

To some extent, the existing cross-border datasets can be combined with domestic sectoral financial data in order to infer the financial linkages between sector i in country A and sector j in country B. For instance, Errico et al (2014a) outline the scope for a limited global flow of funds analysis through combining international investment position data, data from the Coordinated Portfolio Investment Survey (CPIS), the Coordinated Direct Investment Survey (CDIS), the BIS International Banking Statistics (IBS) together with domestic financial data from the IMF's Standarized Report Forms (SRFs) provided by national central banks and Government Financial Statistics (GFS).[13]

Errico et al (2014b) provide an application of global flow of funds analysis that provides insights into the roles of European counterparties in the growth of the US shadow banking system. Still, it is also evident from these contributions that considerable data gaps and limits to data sharing mean that the full exploitation of currently-available data is restricted. Moreover, to take account of multi-country entities (international banks, multinational corporations), this residence-based approach has to be supplemented with complementary data on consolidated positions.

[13] In addition, data on reserve assets can be obtained from the Currency Composition of Official Foreign Exchange Reserves (COFER) dataset and the Survey of Securities Held as Foreign Exchange Reserves (SEFER).

In related manner, the currently-available official data on the currency composition of cross-border positions is quite sparse. Using indirect methods and considerable guesswork, Lane and Shambaugh (2010) and Benetrix et al (2014) show that gross and net foreign currency positions are quite considerable and can account for substantial currency-induced fluctuations in the value of foreign assets and foreign liabilities. For instance, Figure 11 shows the evolution of the cross-country distribution of net foreign currency positions (relative to GDP) over 2002-2012. However, such estimates are a poor substitute for the official collection of the currency composition of foreign assets and foreign liabilities, cross-indexed by sector and instrument.

Finally, within sectors, it is also important to differentiate between domestic and foreign-owned entities since the nationality of ownership is essential in understanding the distribution of ultimate risk exposures.[14] The importance of foreign-owned entities in the acquisition of foreign assets and issuance of foreign liabilities means that it is essential to differentiate between domestically-controlled and foreign-controlled firms in both the financial and non-financial sectors. While its status as an international financial centre means that it is not representative of the typical economy, Figure 12 highlights the importance of this distinction for Ireland: domestic "ultimate controlling parents" account for only 15 percent of foreign assets and 17 percent of foreign liabilities.

[14] For instance, losses on foreign loans issued in country A by a foreign-owned bank that is owned by a parent in country B would ultimately show up (depending on the accounting treatment) as a decline in FDI income earned by country B in country A or a writedown in the value of the FDI assets held by country B in country A.

In relation to cross-border banking, recent moves to improve the international banking statistics collected by the BIS are welcome (Committee on Global Financial System 2012). Stage I of this process does not require additional data collection from the reporting banks but involves an expansion in the data categories assembled by the national central banks from the underlying data. These include the presentation of full balance sheets for banking systems, so that the international banking data can be integrated with domestic banking positions. In addition, the reporting of the geographical composition of the "locational by nationality" data enables a new perspective on consolidated banking data, since it provides details on the office-by-office exposures on both the liability and asset sides.[15] The Stage I process also includes a more extensive currency breakdown of banking positions.

Stage II of this process requires the collection of new data from reporters. First, Stage II aims to improve measurement of country credit risk by providing a more detailed counterparty sectoral breakdown in the consolidated banking statistics, with the additional inclusion of consistent measures of bank equity and the total balance sheet. Second, the "locational by residence" data will decompose the banking system between domestic banks, foreign branches and foreign subsidiaries, while the locational data will also show the breakdown of cross-border borrowing by resident banks, non-bank financial institutions and the non-financial private sector.[16] Third, the consolidated data will include a breakdown of liabilities

[15] Avdjiev and Takats (2014) illustrate the value of the newly-available geographic breakdown of the "locational by nationality" data by examining the relative contributions of borrower-side and lender-side factors in the slowdown of cross-border bank lending to emerging economies during the taper tantrum.

[16] See Hoggarth et al (2013) on the importance of differentiating between foreign branches and affiliates in credit dynamics.

between deposits, debt securities (short-term and long-term), derivatives, other liabilities and total equity. Finally, Stage II will also seek to fill in data gaps and improve access to the international banking statistics.

As indicated in Section II, the non-bank financial sector has also grown rapidly over the past decade. As highlighted by Shin (2013), non-bank funding sources (and non-bank liability issuers) have played a significant role in the post-crisis growth in cross-border financial flows to emerging economies. Despite its importance, there is no corresponding cross-border dataset for this sector that is comparable to the international banking statistics collected by the BIS. In addition to the direct financial linkages between non-bank financial sector and the non-financial sector, non-bank financial intermediaries are also an important counterparty for the banking sector (as was shown in Figure 10). While the improvements to the BIS banking statistics outlined above may help to capture the linkages between the non-bank financial sector and banks, the linkages between the non-bank financial sector and the non-financial sector fall outside the remit of the BIS.

In relation to the international financial positions of non-financial corporates, it is desirable to gain a better understanding along two dimensions. First, in addition to its domestic funding sources, this sector also obtains direct cross-border credit from foreign banks and through issuing international debt securities, while also raising equity funding from foreign investors. Second, the intra-firm cross-border financial transactions of multinational corporates require special attention. In addition to the internationally-integrated funding of business activities, some multinational corporates may treat treasury operations as a profit centre. For example,

Shin and Zhao (2013) highlight the role of such firms as financial intermediaries by simultaneously issuing liabilities in some locations and currencies and acquiring financial assets in other locations and currencies.[17] Clearly, such cross-border speculative activity may pose risks to the stability of some financial systems if such trades go wrong.

In relation to the household sector, the direct cross-border positions of households can include foreign bank deposits and other financial assets, real estate and, on the liability side, foreign loans. The tracking of the foreign financial assets of households is problematic, especially in relation to assets held in offshore centres (Zucman 2013, Johannesen and Zucman 2014). In addition, the ownership of foreign real estate is part of the foreign direct investment category but data collection in this area is quite varied across countries.

Finally, the prominence of official reserves and sovereign wealth funds in aggregate foreign assets (especially for emerging and developing economies) means that greater transparency about the asset and currency composition of these holdings would improve overall understanding of the matrix of cross-border positions. On the liability side, more information on the geographical and sectoral identities of foreign investors in sovereign debt markets would help governments in understanding the nature of the investor base in this category.[18]

[17] There are also examples of non-financial corporates incurring heavy losses through speculative trades in derivative markets.

[18] See also Andritsky (2012) and Arslanap and Lam (2012).

Furthermore, the quality of the available cross-border data is compromised by imperfect implementation at the national level of the balance of payments manual. One vivid illustration is provided by IMF (2014d), which reports the results of a survey of those countries that showed large discrepancies between home- and host-based estimates of the stocks of direct investment assets and liabilities in the Coordinated Direct Investment Survey (CDIS). Significant deviations from official standards are reported in this survey. These include differences in the valuation methods for listed and unlisted equity, the listing of geographic allocations by ultimate counterpart versus immediate counterpart, limited coverage of special purpose enterprises (SPEs), differences in the application of the directional principle (outward direct investment from country A to country B might be listed by country B as either inward direct investment or negative outward direct investment) and even differences in the definition of country or geographic territory. One implication is that researchers should be wary of interpreting cross-country data without adequate filtering for such implementation problems.

The collection of the extra data required to improve understanding of cross-border financial linkages would be greatly facilitated by the standardisation of financial data. Since 2012, there has been considerable progress in the promotion of legal entity identifier (LEI) codes, with the establishment of the Global LEI Foundation (GLEIF) in June 2014 an important milestone.[19] The widespread adoption of LEI codes will make it easier to identify

[19] See more information on the LEI initiative, see www.leiroc.org.

counterparts in a consistent manner.[20] As described by Gross (2014a), the Global LEI System (GLEIS) will collect two types of data. Level 1 data will identify an entity through a 20-digit code and provide basic information about the legal entity. Level 2 data will represent relationships between entities registered at Level 1 (for example, the relationships among affiliates and a parent firm).[21]

As emphasised by Gross (2014b), the adoption of common definitions for financial instruments would further facilitate the collection of useful data. In turn, the representation of financial instruments in terms of the underlying constituent elements would help to clarify risk exposures and enable greater use of IT in the automatic collection and reporting of financial exposures.[22] Taken together, the adoption of LEI codes and standardised financial product identifier (PI) codes would enable a much richer understanding of the matrix of financial interconnections, both domestically and across borders.

In the meantime, in the absence of greater near-term availability of cross-border data sets, another productive strategy is to pursue internationally-coordinated research strategies that address common questions with common research methods but do not require cross-border data sharing. This is the goal of the recently-formed International Banking Research Network (IBRN) which seeks to exploit the information in national bank-level datasets through

[20] In addition to the benefits for financial statistics that is the focus here, the LEI project would also enable individual firms to improve risk management, while standardisation would also lower barriers to entry in the market for financial services (Ali et al 2012).

[21] The complex organisational structures of global banks are described and analysed in Cetorelli and Goldberg (2014).

[22] See also the Project Actus initiative (www.projectactus.org).

coordinated research by national-level research teams.[23] There are currently twenty-six central banks and international institutions participating in the network.[24] As summarised by Buch and Goldberg (2014), the IBRN has already delivered fruitful output from its initial 2013 research project that investigated how funding shocks affecting parent banks are transmitted into foreign countries through their cross-border banking activities.

IV. CONCLUSIONS

In recent years, there has been an impressive expansion in the volume of international financial data. We now know much more than was previously possible about the level, composition and geography of cross-border financial positions. In parallel, there has also been a recent expansion in the availability of sectoral financial data in domestic national accounts. In combination, these different datasets can be exploited to advance our understanding of risks and vulnerabilities embedded in cross-border financial positions.

Still, compared to the scale of financial globalisation and the social costs of financial crises, the available data remains remarkably limited and insufficient for comprehensive risk analysis. Accordingly, the filling of gaps in current datasets and innovations such as the upgrading of the BIS international banking statistics and, importantly, the LEI initiative have

[23] For more details, visit www.newyorkfed.org/IBRN/index.html.

[24] The confidential bank-level dataset for the global systemically-important banks (G-SIBs) that is hosted by the International Data Hub at the BIS represents another important use of bank-level data to monitor international financial stability.

the potential to sharply improve the evidence base for analysts and policymakers. To this end, it is important that the current momentum to make progress in these areas is maintained and reinforced.

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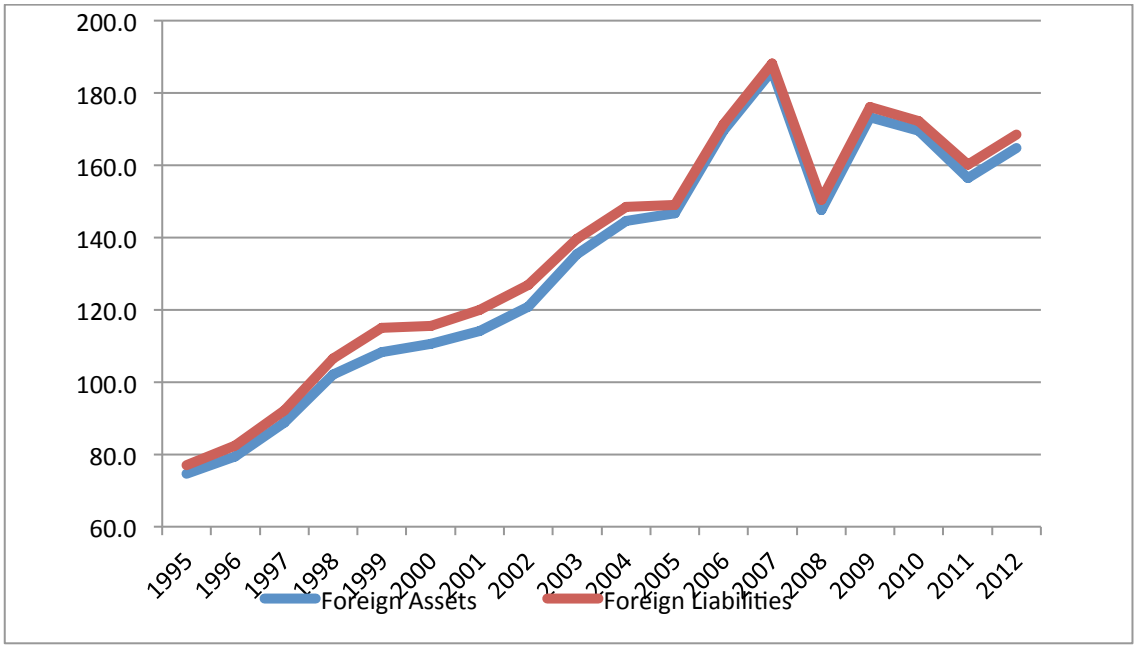
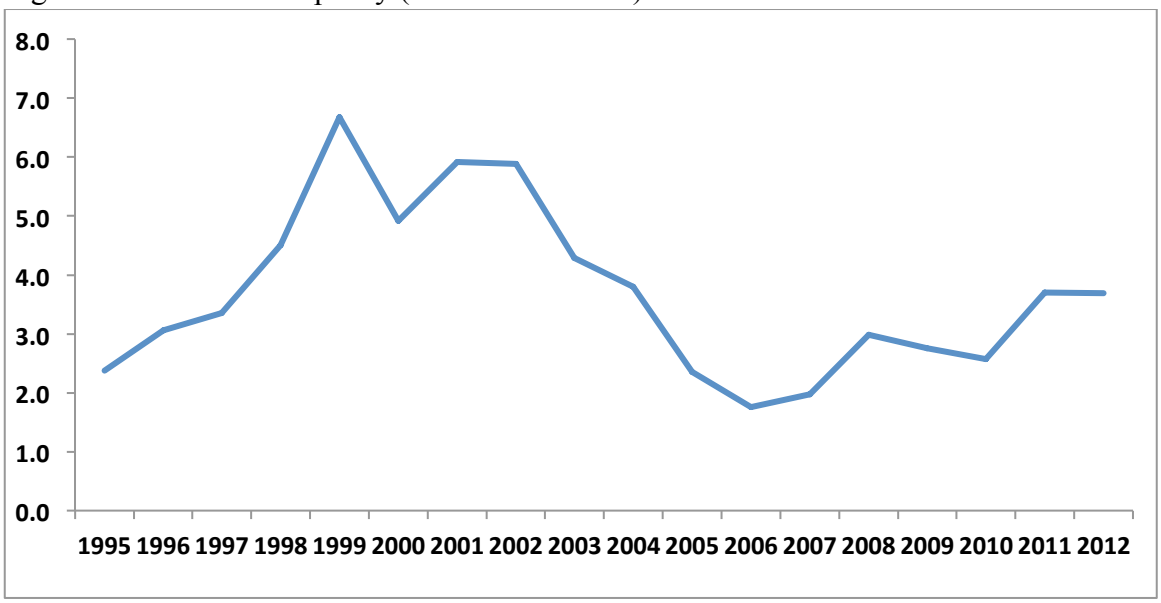
Zucman, Gabriel (2013), "The Missing Wealth of Nations: Are Europe and the US Net Debtors or Net Creditors?," *Quarterly Journal of Economics* 128(3), 1321-1364.

Figure 1. Foreign Assets and Foreign Liabilities (World Aggregates)



Note: Calculated from updated version of External Wealth of Nations data, as described in Lane and Milesi-Ferretti (2007). Percent of world GDP.

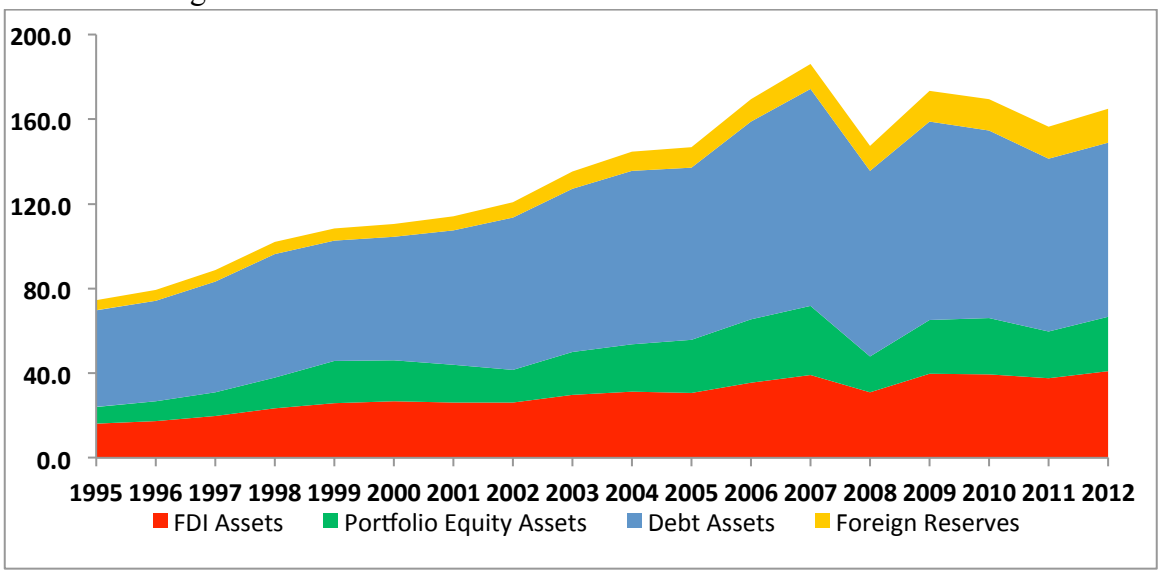
Figure 2. Global Discrepancy (% of World GDP)



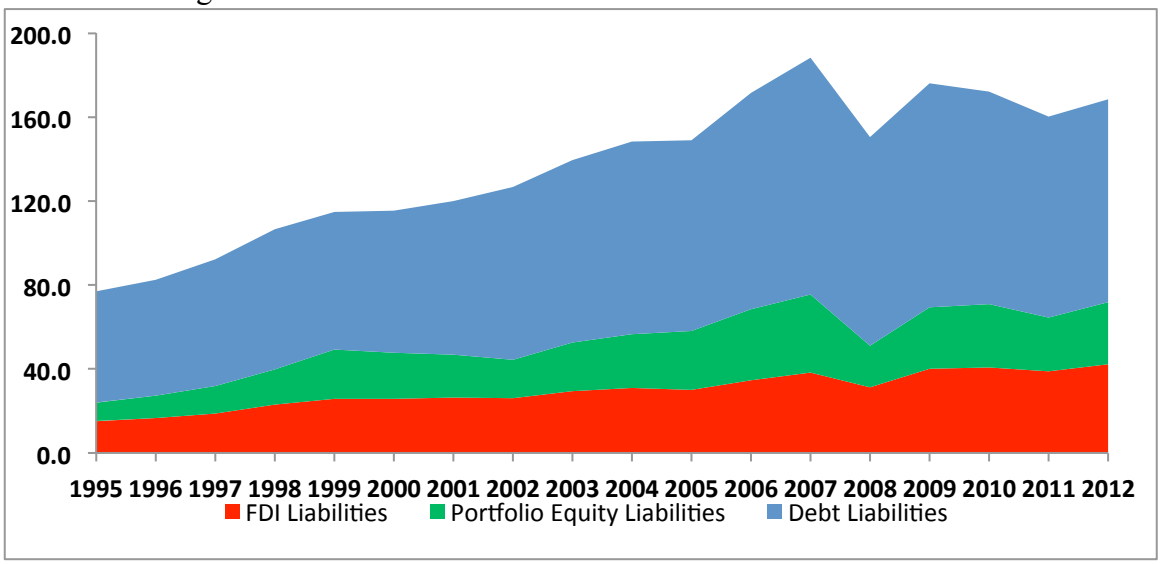
Note: Global sum of foreign liabilities minus global sum of foreign assets, percent of world GDP. Calculated from updated version of External Wealth of Nations data, as described in Lane and Milesi-Ferretti (2007).

Figure 3. Composition of International Balance Sheets

Panel A. Foreign Assets



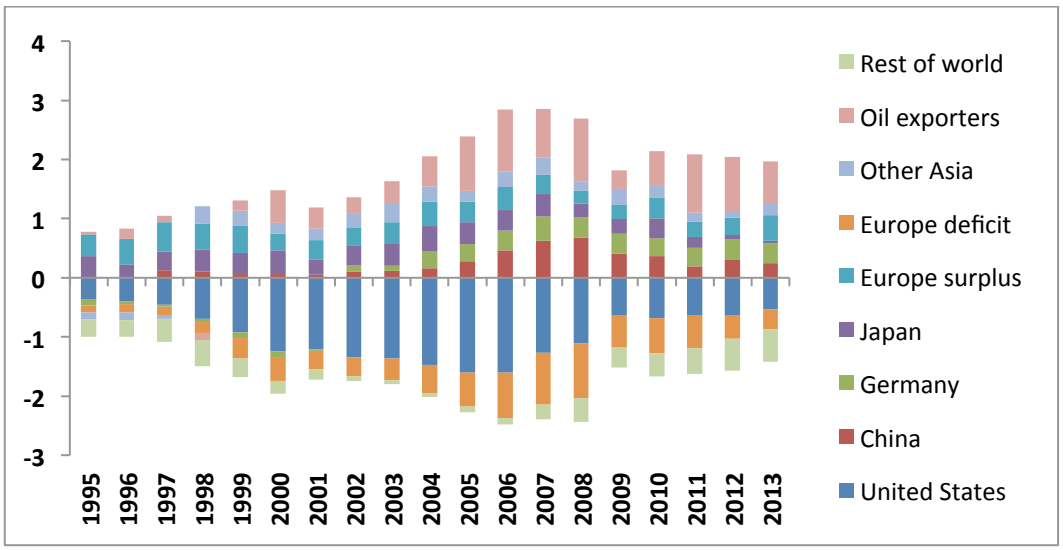
Panel B. Foreign Liabilities



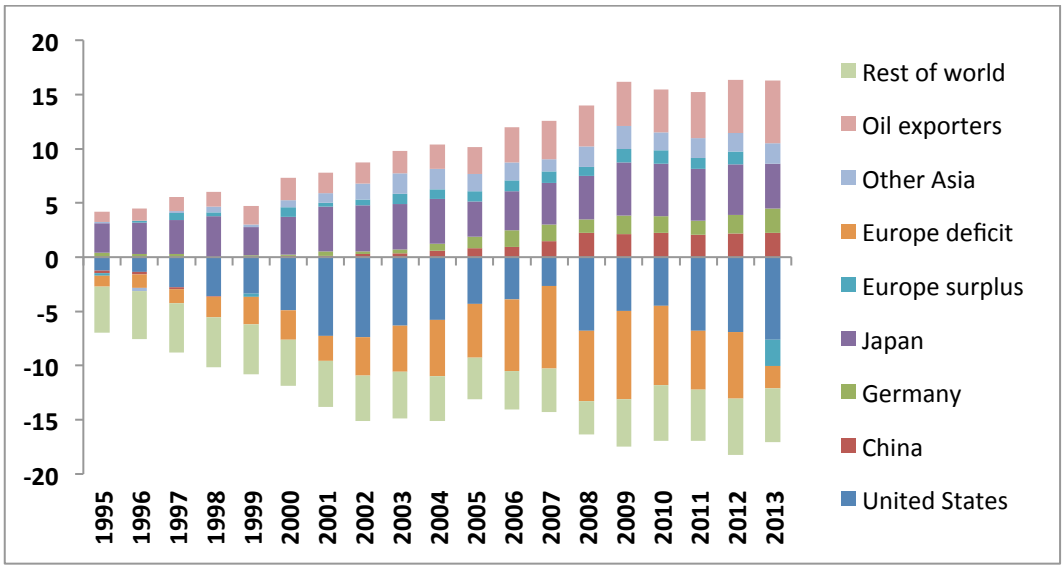
Note: Calculated from updated version of External Wealth of Nations data, as described in Lane and Milesi-Ferretti (2007).

Figure 4. Global Imbalances: Current Accounts and Net International Investment Positions (% of world GDP)

Panel A. Current Accounts

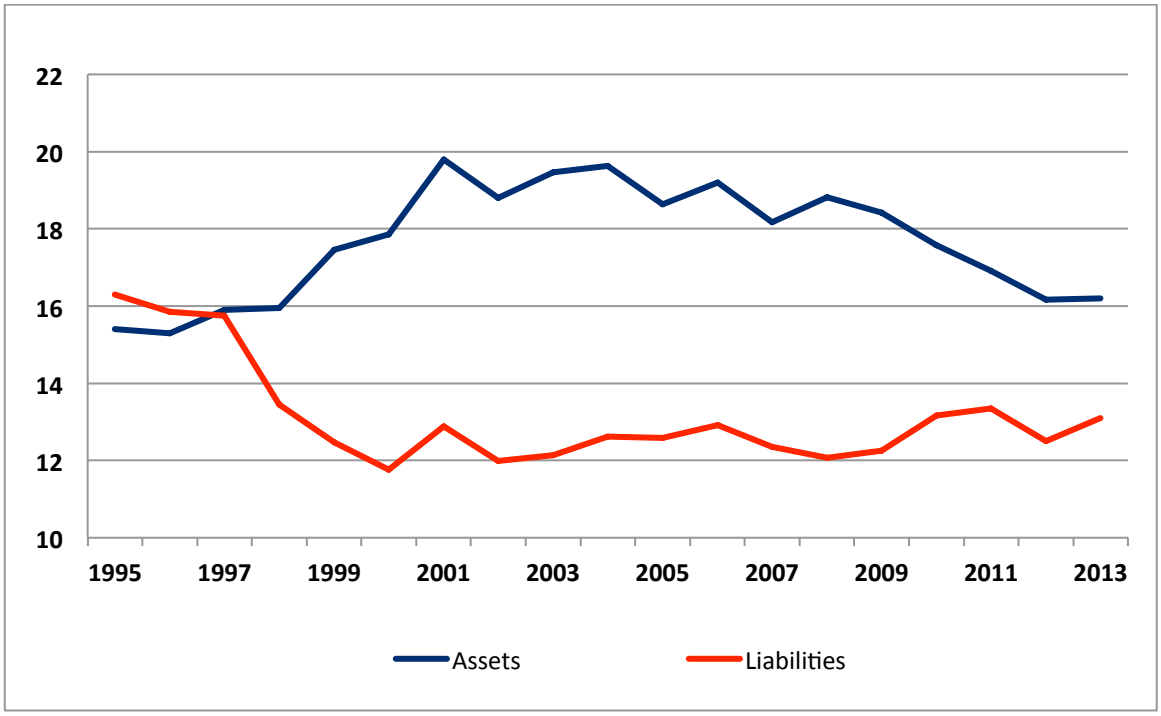


Panel B: Net International Investment Positions



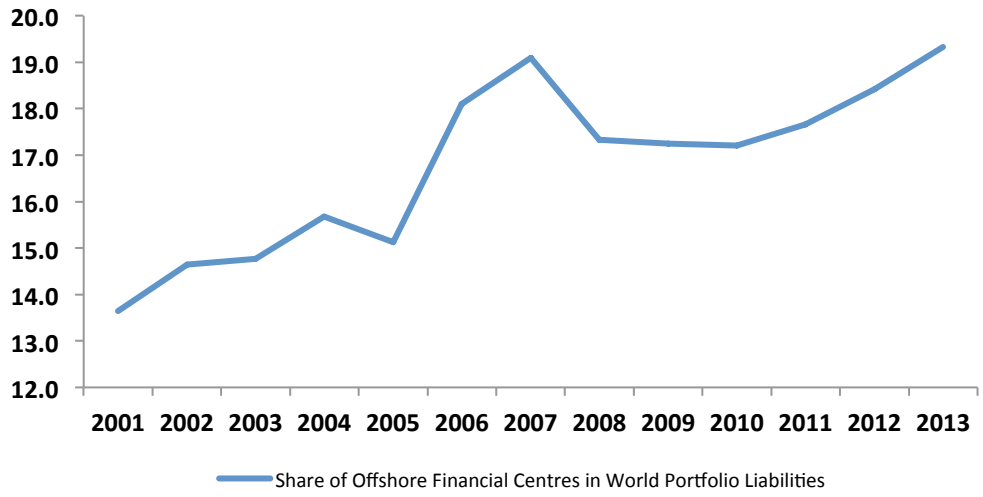
Note: Drawn from IMF's World Economic Outlook (October 2014).

Figure 5. Share of Offshore Centres in Cross-Border Bank Positions



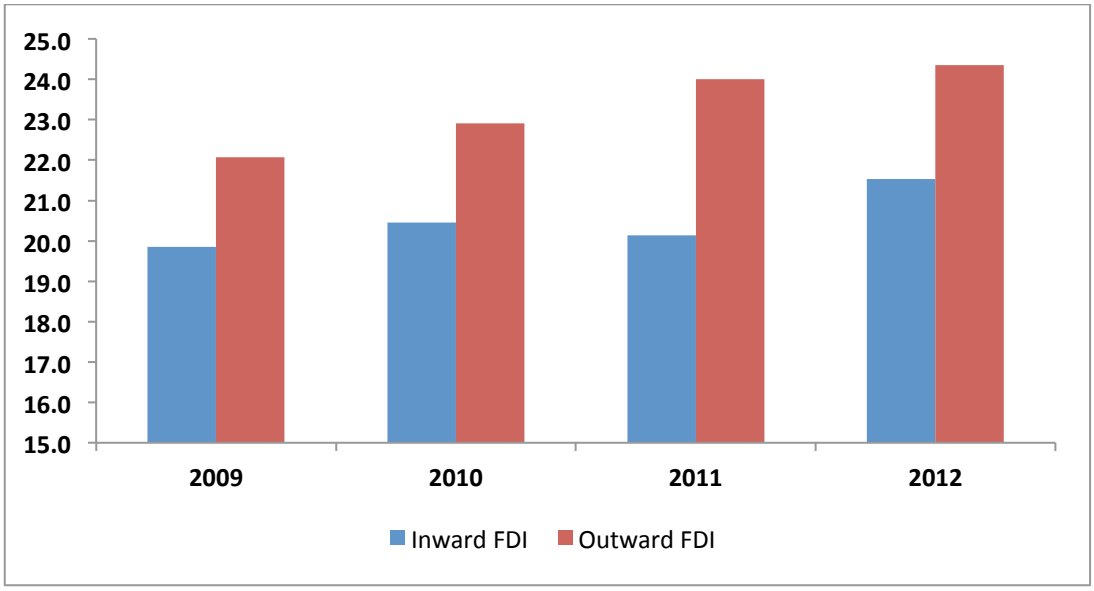
Note: Calculated based on BIS data. Offshore aggregate follows BIS definition of offshore centres.

Figure 6. Share of Offshore Centres in Cross-Border Portfolio Holdings



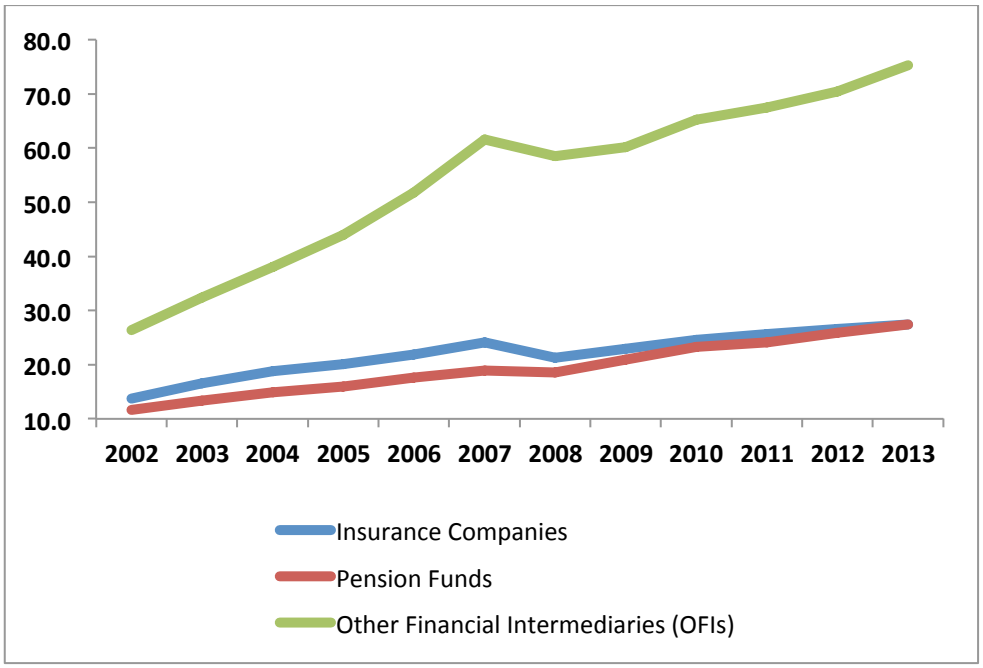
Note: Calculated Based on Coordinated Portfolio Investment Survey data. List of offshores based on IMF-OECD lists.

Figure 7. Share of Offshore Centres in FDI Positions.



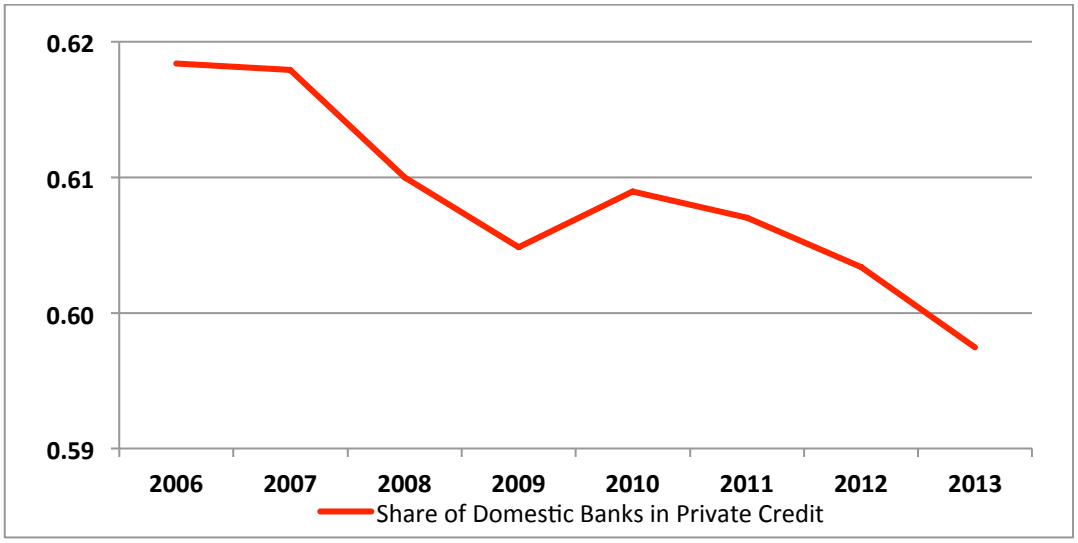
Note: Calculated based on Coordinated Direct Investment Survey data. List of offshores based on IMF-OECD lists.

Figure 8. Scale of Non-Bank Financial Sector



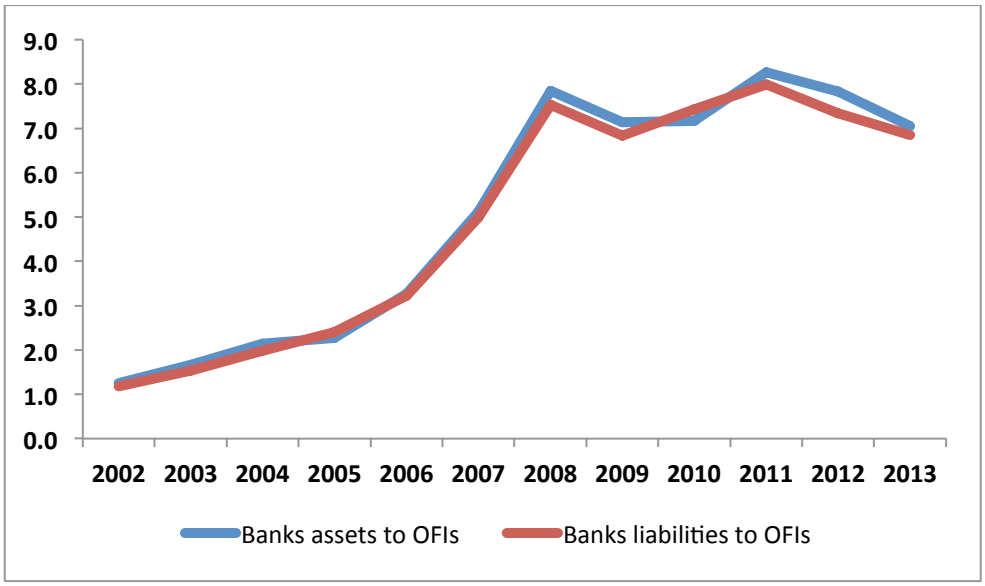
Note: Trillions of US dollars. Based on Financial Stability Board "Monitoring the Shadow Banking System" dataset.

Figure 9. Proportion of Total Private Credit Provided by Domestic Banks



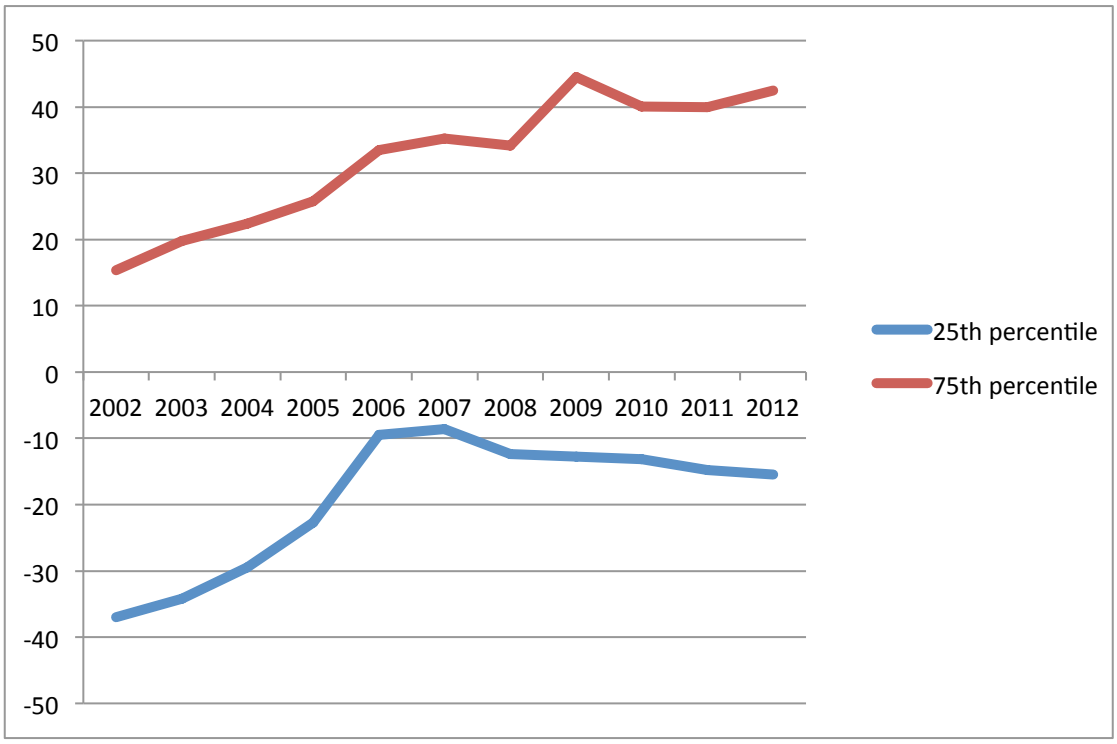
Note: Based on BIS "Credit to Private Sector" database. Total private credit is sum of credit from domestic banking system, cross-border bank credit and bond issuance.

Figure 10. Linkages between Banks and Other Financial Intermediaries



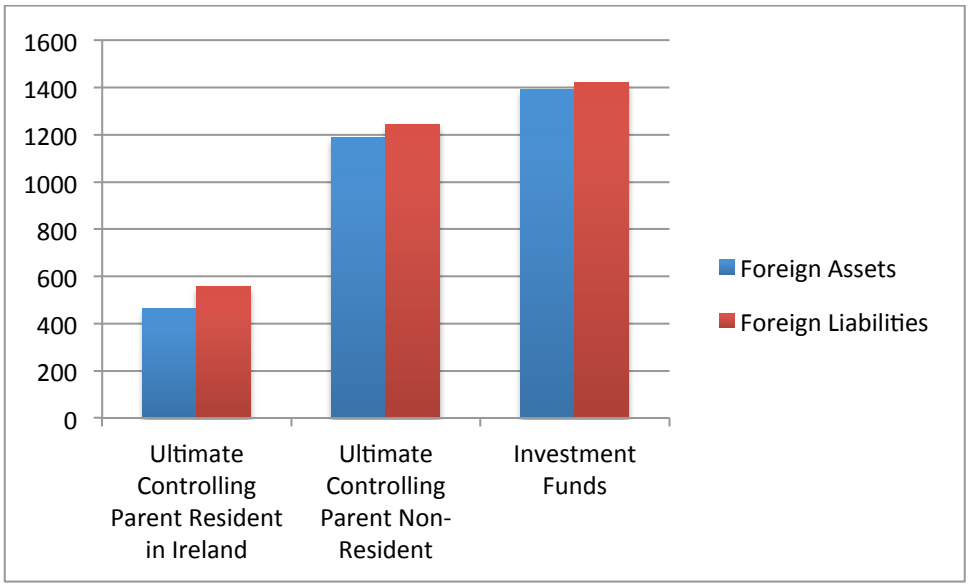
Note: Trillions of US dollars. Based on Financial Stability Board "Monitoring the Shadow Banking System" dataset.

Figure 11. Distribution of Net Foreign Currency Positions, 2002-2012



Note: Adapted from Benetrix et al (2013). NETFX is ratio of net foreign-currency assets to GDP.

Figure 12. The Irish International Investment Position: Resident and Non-Resident Ultimate Controlling Parents



Note: Q1 2014 values. Based on data from Central Statistics Office (Ireland).