

The Financial Crisis and The Geography of Wealth Transfers[☆]

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Abstract

This paper studies the geography of wealth transfers between 2007Q4 and 2008Q4, at the height of the global financial crisis. We construct valuation changes on bilateral external positions in equity, direct investment and portfolio debt to measure who benefited and who lost on their external exposure. We find a very diverse set of fortunes governed by the structure of countries' external portfolios. In particular, we are able to relate the gains and losses on debt portfolios to the country's exposure to ABS, ABCP conduits and the extent of dollar shortage.

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1. Introduction

Two stylized facts dominate the global economy since 1970: the explosion in cross-border financial flows and positions, and the -more recent- emergence of unusually large current account surpluses and deficits (the so-called ‘global imbalances’). In the span of a little less than two generations, the size and structure of international balance sheets has been altered dramatically. Consider the case of the United States (Table 1). Forty years ago, in 1971, as the Bretton Woods system of fixed but adjustable exchange rates teetered on the verge of collapse, the United States was a creditor country, with a positive Net International Investment Position (NIIP) of about 6 percent of U.S. output. More importantly, U.S. gross external claims and liabilities were quite small, at 17 and 11 percent of output respectively, reflecting the large direct and indirect costs of cross-border financial transactions. About a third of these cross-border positions took the form of bank loans. Most (80 percent) of the remaining claims were direct investment, while a sizeable share (45 percent) of remaining liabilities were in the form of foreign holdings of US government securities. Fast forward to 2007, on the eve of the worst financial crisis since the Great Depression. By then, the U.S. has become a sizeable debtor country, with a negative NIIP of about 12 percent of output. More dramatically, gross external claims and liabilities soared, respectively, to 119 and 131 percent of output. While cross-border loans still represent roughly a third of cross-border positions, the structure of the rest of the U.S. external balance sheet has become substantially more complex. Debt instruments now account for about half of the remaining external liabilities. However, holdings of US government securities represent only half of that amount. The other half includes corporate debt and, more importantly, structured credit instruments such as US mortgage-backed securities. The composition of gross external claims has changed too, with equity holdings and direct investment each accounting for 40 percent of remaining external claims. The case of the United States is hardly unique. As the seminal work of [Lane and Milesi-Ferretti \(2001\)](#) and [Lane and Milesi-Ferretti \(2007\)](#) has demonstrated, cross-border participations increased tremendously for many countries, including all advanced economies.

Beyond this common trend, however, countries differ markedly in the structure of their external balance sheet. As [Gourinchas and Rey \(2007\)](#) and others have pointed out, the U.S. external balance sheet displays a very specific pattern: short in ‘safe’ or liquid securities and long in ‘risky’ or illiquid ones. Interestingly, these patterns can persist through time, despite the profound structural transformations described above. For instance, the share of ‘safe’ and liquid securities –defined as bank loans and debt instruments– in overall US external liabilities was 67 percent in 1971 and 63 percent in 2007. Similarly, the share of ‘risky’ and illiquid securities in gross external claims –defined as direct investment and equity claims– was 54 percent in 1971 and 60 percent in 2007 (see Table 1). What constitutes ‘safe’ or ‘risky’ securities may have changed over time, but the overall pattern of *liquidity and maturity transformation* revealed by the analysis of the U.S. external balance sheet did not.

If the U.S. invests abroad in risky assets and funds itself with safe liabilities, two implications follow. First, we expect the US to earn a risk premium. A large body of evidence on this question strongly suggests that it does (see [Gourinchas, Rey and Govillot \(2010\)](#) for recent estimates).¹ Second, and this is the focus of this paper, the US should suffer dispropo-

¹But see [Curcuro, Dvorak and Warnock \(2008\)](#) for a contrarian view.

portionate losses in times of crisis, when the value of its risky external financial portfolio collapses relative to the value of its safe external liabilities. As [Gourinchas, Rey and Govillot \(2010\)](#) document, this is indeed the case. Between 2007Q4 and 2009Q1, the US net foreign asset position deteriorated by 21% of GDP, of which about 16% represents the net valuation loss suffered by the US on its external portfolio (Table 2). This valuation loss amounts to roughly \$2,200 billion. Losses were especially acute for US equity and direct investments abroad which shrunk in half over that period while U.S. government debt liabilities increased by almost \$1,000 bn, or about 7 percent of output.²

By construction, if the US is persistently short ‘safe’ and liquid assets and long ‘risky’ and illiquid ones, the rest of the world must display -in the aggregate– the exact opposite pattern: long in ‘safe’ or liquid assets and short in ‘risky’ or illiquid ones. In normal times, it earns lower return on its safe external claims than it pays on its risky external liabilities. In times of crisis, however, the valuation *loss* of the US represents a valuation *gain* for the rest of the world. In some of our other work ([Gourinchas, Rey and Govillot \(2010\)](#)), we have argued that this pattern of wealth transfer in crisis times and excess returns in normal times can be interpreted as a form of risk sharing between the US and the rest of the world where the US plays the role of a ‘*global insurer*’. Because of their deep, liquid and historically safe market for government securities, the U.S. exhibit a comparative advantage in liquidity and maturity transformation. Since these attributes have remained largely intact through the modern period, they also help us understand why the US retains its role at the center of the International Monetary System, despite the lack of formal arrangement since the collapse of the Bretton Woods system, and why the structure of its external balance sheet, while experiencing profound transformations, still performs essentially the same aggregate liquidity and maturity transformation functions. Unlike earlier explanations emphasizing the role of trade or economic size and network externalities for the determination of the international currency, this interpretation emphasizes instead that it is a combination of domestic financial development, economic size, and the fiscal capacity of the sovereign, that determine whose currency and government security endogenously emerge as reserve currency and reserve asset.³

It does *not* follow from the preceding discussion that all countries benefit equally from their exposure to the US. It is well-known, for instance, that the financial crisis, having originated in the subprime segment of the U.S. housing market, propagated to rest of the world partly through the heavy losses some European financial institutions suffered on their

²Some of the decline in equity and direct investment represents net sales of foreign assets by US investors over that period since both US and foreign investors ‘retrenched’ during the crisis ([Forbes and Warnock \(2010\)](#)). Some of the increase in US government securities liabilities to foreigners also represent net purchases of these instruments over the period.

³Currency internationalisation has been discussed in various contexts in the literature - see for example [Cohen \(1971\)](#), [McKinnon \(1979\)](#), [Krugman \(1984\)](#), [Alogoskoufis and Portes \(1993\)](#), [Matsuyama, Kiyotaki and Matsui \(1993\)](#), [Zhou \(1997\)](#), [Hartmann \(1998\)](#), [Portes and Rey \(1998\)](#), [Rey \(2001\)](#). The role of the centre country in the international monetary system has mostly been construed as the one of international liquidity provider. Because the medium of exchange function is characterized by network externalities, large economies and economies dominating world trade such as nineteenth century Britain issue the international currency. The importance of network externalities in foreign exchange markets is reflected in their organization around vehicle currencies through which most of the transactions are done.

holdings of US mortgage-backed securities ([Acharya and Schnabl \(2010\)](#)). Recent work also documents that many emerging market economies concentrated their -growing- holdings of external financial claims in the form of US government securities, which provided a safe haven in the midst of the crisis ([Bernanke et al. \(2011\)](#) and [Bertaut et al. \(2011\)](#)). These two examples illustrate the fact that different countries or regions may choose different locus on the risk-return frontier offered by the menu of US financial assets. Beyond these direct linkages, different countries may also have substantially different *indirect* exposure, through their holdings of third-country assets, themselves differentially exposed to the financial crisis. For instance, some countries may hold equity and debt claims on the European financial sector, and thus be indirectly exposed to US housing risk. Others, as discussed extensively by [McGuire and von Peter \(2009\)](#) in the context of the European dollar shortage, may rely on short-term foreign currency borrowing, exposing themselves to rollover and funding risk and to potentially severe deleveraging. Hence, countries were simultaneously hurt by their exposure to the US financial markets (especially structured credit products) and sheltered from the global financial storm through their holdings of Treasuries and Agencies debt.

The determinants of international portfolios can be quite complex and it is not the purpose of this paper to explain the heterogeneity of portfolios across countries.⁴ Rather, we take them as given and explore the consequences of the crisis on net and gross foreign asset positions.

Understanding the overall structure of global financial linkages during the financial crisis and the associated wealth transfers requires that we go beyond measuring changes in gross and net foreign positions as recorded in the Net International Investment Position. Instead, one needs estimates of *bilateral* external claims and liabilities and of their change during the crisis. Such data would allow us to answer the following critical question: where did the \$2,200 billion US wealth transfer go?⁵ This paper represents an attempt at answering this question. It produces the first ‘*heat-map*’ of the geographic distribution of gains and losses, by country and asset class between 2007Q4 and 2008Q4 for portfolio and direct investment. Consider figure 1. It reports gains and losses in billion of US dollar in different shades of grey. Darker areas correspond to countries who suffered larger losses (in excess of \$400bn) while lighter grey areas correspond to winners with gains in excess of \$400bn.⁶ The figure identifies *relative* winners and losers from the financial crisis, once direct and indirect external wealth transfers are taken into account. To be sure, most countries were badly hit by the crisis and their *total* financial wealth declined massively, as we will see shortly. But, at the same time, they made gains and losses on their external asset positions, which are not negligible, even when compared to total wealth losses.⁷ Furthermore, external valuation gains and losses

⁴For recent attempts to endogenize the portfolio structures of the US vis a vis the rest of the world, see [Mendoza, Quadrini and Rios-Rull \(2009\)](#) and [Gourinchas, Rey and Govillot \(2010\)](#).

⁵For an early discussion of this issue see the interesting column of [Milesi-Ferretti \(2009\)](#) in *voxeu*.

⁶A color versions of these heatmaps is available in the online appendix at **XXX**.

⁷For instance, a country that suffers a collapse in its domestic stock market will suffer a decline in domestic wealth. To the extent that some equities are held by foreigners, the corresponding losses will be transferred to them in the form of a capital gain on the net foreign equity position. In other words, conditional on a given decline in domestic asset and currency values, domestic residents are better off if foreigners hold some domestic equities than if they do not. In both cases, however, domestic residents will be worse off than if the decline in asset and currency did not occur.

differed greatly across countries, so that there are relative losers and relative gainers. For instance, according to figure 1 countries like China, the Eurozone, or Switzerland all suffered external losses, although more moderate than the US, while the UK enjoyed significant net gains on its external position.

In this paper we focus on this heterogeneity, which depends on the geography of cross border linkages. We build on the careful and timely work of [Milesi-Ferretti, Strobbe and Tamirisa \(2010\)](#) who construct a dataset of bilateral gross and net external positions on the eve of the financial crisis for countries and groups of countries accounting for more than 97 percent of global external assets and liabilities.⁸ We extend their work along several dimensions. First, we construct quarterly estimates of net and gross bilateral positions from 2007:4 to 2008:4. Second, we present separate estimates of bilateral positions for Brazil, Russia, India, and most importantly, China, by relying on hand collected data of the balance sheet of large state banks, in particular. This enables us to have a more precise measure of Chinese portfolio debt and equity holdings. Third, we decompose the role of the exchange rates and of asset prices in accounting for the gains and losses on external positions. Finally, we study the bilateral determinants of gains and losses during the height of the crisis.

Our analysis is in some ways similar to [He, Khang and Krishnamurthy \(2010\)](#) who studied balance sheet adjustments during the financial crisis. Their analysis focused on the balance sheet of various US financial institutions and changes in holdings of securitized assets. Ours concentrates on the external wealth of nations and changes in bilateral holdings of various broad classes of assets. Both shed light on the evolution of leverage during the crisis.

It is important to emphasize from the outset that data limitations induce substantial uncertainty in an exercise of this nature. High-quality data on bilateral positions and flows are not systematically available. Instead, we are forced to rely on a number of empirical assumptions and educated guesses in putting together our database. Important data limitations arise from the limited coverage of bilateral banking transactions at market value; the residence principle that underlies balance of payment data and results in excessively large holdings attributed to custodial and offshore financial centers; and the general lack of data availability for some groups of countries, including offshore financial centers, many middle-east oil producing countries as well as some emerging economies. Nevertheless, we believe that despite the necessary inaccuracies implied by our empirical assumptions, some consistent patterns emerge from the data, which will survive the additional empirical scrutiny that we hope will be possible in the near future. We also endeavour to provide several versions of the estimates of gains and losses of countries, some multilateral, some bilateral, some which includes offshore centers, some which ventilates their positions across countries, some based on FDI estimated at market value, some where FDI is at current cost, etc... in order to do robustness checks.

Our exercise reveals a number of important findings. First, as exemplified in figure 1, we see large valuation changes during the crisis period, varying widely across countries. Most countries made capital gains on their portfolio equity positions in the crisis as they were

⁸Earlier work by [Kubelec and Sa \(2010\)](#) also constructs bilateral holdings between 1980 and 2005 for a larger group of countries using gravity equations to fill-in some of the positions.

either short on equity overall (like the UK, who made a gain of about \$284 bn –see Table 3) or held equity assets whose value declined less than equity liabilities during the crisis. On the other side, taking the capital loss, is of course the US, who is long equity and made very large losses on its portfolio equity position (\$1,153bn, according to table 3). The structure of the external debt portfolio, in particular whether debt assets are mostly government bonds or corporate bonds or asset backed mortgage securities, is also a crucial determinant of the valuation gains and losses. Countries who self-insured by holding mostly US government bonds tended to limit their losses or even post gains on their net debt portfolios, while countries who levered heavily to invest in risky asset backed mortgage securities or other toxic assets experienced losses on their net debt. We find a clear positive correlation in the data between the countries with losses on their net debt portfolios and those who set-up ABCP conduits or who loaded up on Asset Backed Securities. Though the sample coverage is relatively small, we also find a positive correlation between countries who set up ABCP conduits and the [McGuire and von Peter \(2009\)](#) measure of US dollar shortage, suggesting that the lack of dollar liquidity in the banking system was associated with important losses on external debt portfolios.

The next section reviews the evolution of the external balance sheets of the countries in our sample and puts them in perspective by comparing them to changes in total wealth of countries. We provide a world heatmap of external losses and decompose the effect of exchange rates and asset prices on capital gains and losses. Section 3 discusses our empirical methodology to construct bilateral gross and net positions for portfolio and direct asset holdings, for which we have the most detailed data and presents the matrices of bilateral gains and losses by asset class. Section 4 relates the distribution of wealth transfers to observable determinants, such as the exposure to asset backed commercial paper (ABCP), the overall dollar shortage as well as to measures of the regulatory environment. Section 5 concludes.

2. External Balance Sheet Adjustments

We begin our analysis by reviewing the evolution of the *aggregate* external balance sheet for a large sample of countries from the end of 2007 to the end of 2008. This period covers the most acute phase of the crisis during the fourth quarter of 2008 following the collapse of Lehman Brothers, and is therefore the most relevant from the perspective of wealth transfers.

The recovery in many asset markets around the world in 2009 did reverse some of the wealth transfers documented in this paper, perhaps as a result of the coordinated and aggressive macroeconomic policies that may have helped stabilize the world economy. What interests us here is a measure of the external wealth transfers resulting directly from the crisis itself, i.e. measured at a time when the possibility and the effectiveness of coordinated countercyclical policies remained remote and the risk of a second Great Depression was on everyone’s mind. It would be interesting to quantify the impact of these external transfers on the recovery path of the real economy across countries. Such an enterprise however goes well beyond the current paper. One difficulty consists in controlling for the relative size of the shocks hitting the various economies. Another lies in the endogeneity of the policy responses. Instead, this paper focuses on the determinants of the relative gains and losses

on the external positions of countries and put those valuations in perspective by comparing them to the contemporaneous changes in domestic household wealth.

2.1. Data and Methodology

Our sample includes most industrial countries (Canada, the Euro area, Japan, Switzerland, the UK, the US), a group of other advanced economies (Australia, Denmark, New Zealand, Norway and Sweden), some major emerging economies (Brazil, China, India, Russia, Singapore, Hong-Kong) and a group of emerging Asian economies composed of Indonesia, South Korea, Malaysia, the Philippines and Thailand. Missing from this sample are oil exporters and offshore financial centers, both with potentially large gross and net cross-border positions.⁹ For each country in the sample, we construct an estimate of the aggregate valuation gain/loss as:

$$VA_t^i = NA_t^i - NA_{t-1}^i - CA_t^i,$$

where NA_t^i denotes the net foreign asset position at time t for country i and CA_t^i the current account balance during period t . We further break down the net foreign asset position into net direct investment, equity, portfolio debt and other assets (mostly bank loans), according to $NA_t^i = \sum_c NA_t^{i,c}$ where $NA_t^{i,c}$ represents the net position of country i in asset class c at time t . Using the balance of payment identity, we can write the valuation term as the sum of the changes in the net asset position by asset classes, $\Delta NA_t^{i,c} = NA_t^{i,c} - NA_{t-1}^{i,c}$, corrected for the net financial flows in asset category c over the period, denoted $NF_t^{i,c}$.¹⁰

$$VA_t^i = \sum_c \Delta NA_t^{i,c} - NF_t^{i,c}. \quad (1)$$

2.2. Aggregate gains and losses

We collect quarterly and annual data on foreign assets and liabilities, at market value whenever possible, with corresponding financial flows, for this set of 11 individual countries and 3 country groups between 2007 and 2009. Assets and liabilities positions are broken down into the following assets classes: portfolio debt, portfolio equity, direct investment, other investment and reserves (with matching flows, but excluding financial derivatives). For debt, equity, direct investment and other investment positions we rely on national sources for Canada, China, the Euro Area, Japan, Switzerland, United Kingdom and the United States, whereas data for all other countries are from the IMF Balance of Payments Statistics. For reserves we use “Total reserves minus gold” obtained from the IMF International Financial Statistics. All flow data were obtained from the IMF Balance of Payments Statistics.¹¹

We first offer a geographical ‘heatmap’ of aggregate gains and losses around the globe in figure 1. As mentioned previously, countries with darker colors bear the largest losses (in excess of \$400bn). Conversely, countries with the lightest grey enjoyed the largest gains (in

⁹See Lane and Milesi-Ferretti (2009) for some estimates of offshore financial centers net asset positions. We will use some bilateral data on offshore financial centers in section 3 and assess the robustness of our results when we include them in our bilateral estimates of valuations.

¹⁰The sum of net financial flows equals the current account balance, up to errors and omissions and unilateral transfers and remittances, which we ignore in this decomposition.

¹¹The list of countries and groups of countries is in the appendix. For more details on our data see the online appendix available at XXX.

excess of \$400 bn). Countries in plain white, such as, for example, African countries, are those for which we have no data, or for whom the estimated gains or losses remained smaller than \$10 bn. At a glance, we can see that most of the external valuation losses are spread across the US, the Euro Area, Switzerland and China. The UK on the other hand is at the other end of the spectrum and made large capital gains on its net external asset position, while Brazil, Russia and India made moderate gains.

Table 3 reports the corresponding numerical estimates (all the numbers are in billions of US dollars) and figures 2-3 present the corresponding heatmap for each asset class (debt, equity, FDI and foreign exchange) with the same color coding. Finally, figure 4 reports the breakdown of gains/losses by asset class and country. For each country, or group of countries, this last figure reports VA_t^i (the solid line) as well as the various components $\Delta NA_t^{ic} - NF_t^{ic}$ according to equation (1).¹²

Figure 4 also includes the valuation gain/loss for the ‘rest of the world’ (RoW), defined as the counterpart of the aggregate valuation term in our data: $VA_t^{\text{row}} = -\sum_i VA_t^i$. This valuation term accounts both for incomplete geographical coverage as well as any measurement error. Accordingly, its interpretation should be subject to extra caution.

For the purpose of comparability across countries, we constructed figure 4 and Table 3 with US direct investment positions measured at *current cost*. This brings down the overall US valuation loss between 2007:4 and 2008:4 from \$2,069bn when using direct investment at market value as in Table 1 and 2, to \$863bn.¹³

A number of important features emerge from the data. First, the simple proposition that all countries benefited from the US valuation losses is not supported by the data. The Euro area, mainland China and Switzerland all experienced sizeable losses, of \$185bn, \$158bn and \$53bn respectively whereas the UK (\$542bn), Russia (\$317bn), Brazil (\$292bn) and emerging Asia (\$245bn) were the main net beneficiaries. Taken together, the countries of our sample –outside the US– experienced a positive wealth transfer of \$1,145bn exceeding the \$863bn losses of the U.S., the difference being attributed to the rest of the world.

Second, most of the US losses arise from the \$1,153bn decline in its net equity portfolio. By construction, the cross section distribution of valuations within each asset class sums to zero, that is for each asset class c :

$$\sum_i VA_t^{i,c} = 0,$$

where $VA_t^{i,c} = \Delta NA_t^{i,c} - NF_t^{i,c}$. Inspection of table 3 and figure 4 reveals that the counterpart of the US net equity losses were widely distributed, most countries realizing gains on their equity portfolio, especially the Euro area (\$506bn), the UK (\$284bn), Russia (\$208bn), Brazil (\$205bn), emerging Asia (\$192bn) and Japan (\$176bn). In all these countries, the gains arise from a drastic reduction in the value of equity liabilities, relative to equity holdings. All these countries had short cross border equity positions as of 2007.

¹²For table 3 and 4 we grouped debt and foreign exchange reserves in the debt category.

¹³The valuation component on US net direct investment at market value is -\$1,150bn and \$56bn at current cost. By construction, the difference, equal to \$1,206bn, must be accounted for by valuation gains on net direct investment (at market value) in other countries. The next section will provide rough estimates of bilateral direct investment positions at market value.

Third, the gains/losses attributable to US cross-border portfolio debt holdings are relatively small, all of the increase in debt liabilities (\$505bn) being more than accounted for by gross capital inflows (\$591bn) especially into US government securities. The small associated valuation loss on US portfolio debt liabilities (-\$86bn) underlies the relative stability of U.S. government securities during the crisis. By contrast, the U.K., experienced a valuation gain of \$339bn on its net debt position, largely due to the decline in the value of its debt liabilities (-\$515bn), some of which can be attributed to the decline in the value of the Sterling relative to the US dollar during that period. Conversely, the Euro area suffered large valuation losses on its external debt claims (-\$461bn) most likely related to the collapse in the value of its portfolio of US structured credit products. Overall, the contrast between these three countries is consistent with the US issuing safe public debt and risky private-label debt (see [Bernanke et al. \(2011\)](#)); the Euro area holding a portfolio of risky private-label debt assets; the U.K. issuing Sterling denominated debt and risky private-label debt both of which declined in value during the crisis.

Fourth, despite large holdings of U.S. public securities China suffered an overall negative wealth transfer during the crisis (\$158bn), representing about 3.5 percent of its output. It is worth emphasizing however that Chinese data on external positions are among the less reliable in our sample. China suffered a \$61bn loss on its foreign exchange reserve holdings, which seems to be a result of the markdown on Chinese non-dollar reserves when most currencies lost ground against the US dollar.¹⁴ These valuation losses seem greatly overestimated in the aggregate data however. Although we do not know exactly how the data from SAFE (from which we extract the foreign exchange positions) are recorded, it looks unlikely that the capital gains on government bonds holdings are factored in. In Table 8, which contains bilateral valuations, we provide more reliable estimates of valuation gains and losses on foreign exchange reserves for China, taking into account both exchange rate changes and capital gains on bonds. The capital gains on US bonds in particular more than offset the exchange rate losses on Sterling and euro assets. These findings highlight that the decline in China’s net external wealth would have been much more pronounced, were it not for its large holdings of US government securities. The official IIP figures also indicate increases in the value of Chinese FDI and equity liabilities. These numbers are however not at market value. Given that the Chinese stock market suffered a massive decline during the crisis, Chinese liabilities are likely to be overstated in official IIP data. Hence, Chinese losses on its equity and FDI net positions are likely to be also overstated. As result, it is very possible that on net, China benefited from a positive wealth transfer during the crisis. In the next section of the paper we discuss in more details the shortcomings of Chinese data and give our own market value estimates of Chinese equity, FDI and portfolio debt valuation changes (see Table 5-6-7 for details).

Taken together, the results from table 3 and figure 4 reveal a remarkable pattern. If we define *ex-post global insurers* as the set of countries that provided significant positive transfers to the rest of the world during the financial crisis, this set includes the following

¹⁴We measure gains and losses in dollars. If we measured valuation effects in a currency basket instead, such as the SDR, China would record a gain of about 2.6 bn SDR on its official foreign exchange holdings, as the SDR depreciated against the dollar at the height of the crisis. Except for this “level effect” the choice of a numeraire has no consequence on our results.

countries: the United States (\$863bn, 6 percent of GDP), the Euro area (\$185bn, 1.36 percent of GDP), Switzerland (\$53bn, 10.6 percent of GDP) and China (\$158bn, 3.5 percent of GDP).¹⁵¹⁶ The channels through which each of these countries experienced valuation losses vary. For the US, it is the collapse in its long net equity position, relative to its short debt position, which did not decline nearly as much. For Switzerland and the Euro area, it is the decline in the value of their debt holdings, which were infested by toxic assets, and the decline in the value of their long direct investment position. For China, as discussed above, it is the losses on the non-dollar components of its foreign exchange reserves, due to a dollar appreciation.

These findings indicate that the heatmap of gains and losses is substantially more complex than expected. In particular, it suggests that it is incorrect to think of the United States as the single provider of global liquidity. The allocation of losses is still extremely asymmetric –with the US accounting for about 68 percent of the cross border wealth losses, the Euro area for 15 percent, China for 13 percent and Switzerland for 4 percent.¹⁷ Nevertheless it provides perhaps an early indication that the global economy may have already moved towards a *multilateral system*, where the provision of global liquidity is not concentrated in the hands of the United States any longer. On the whole, our results are also consistent with the recent work emphasizing the resilience of emerging economies during the recent crisis (see [Kose and Prasad \(2010\)](#) and [Gourinchas and Obstfeld \(2011\)](#)).

2.3. *Exchange rate accounting, total wealth and valuations*

The crisis period has been characterized by large gyrations in exchange rates, with, in particular a substantial appreciation of the dollar against most currencies. It is interesting to decompose gains and losses on external balance sheets into fluctuations in asset prices (equity, FDI, bond prices) and exchange rate movements. We attempt here such an accounting exercise in order to assess how much exchange rate movements explain our change in valuations.

We use the geographical distribution of bilateral weights of assets and liabilities as well as some crude assumptions on their currency composition to compute the relevant exchange rate movements. In particular, we assume that all FDI and equities holdings are in the currency of the issuer and that all bank loans are fully hedged and hence immune to exchange rate effects. We use [Lane and Shambaugh \(2010\)](#)'s exchange rate weights for the debt data.¹⁸

¹⁵The Chinese losses are however far smaller if we use our Table 8 capital gains estimates on government bonds held in the foreign exchange reserves. Losses shrink to less than \$10bn.

¹⁶Technically, the list should also include Singapore (\$56bn valuation loss representing 29 percent of its output). However, Singapore is a regional financial center and discrepancies between claims and liabilities lead to us to interpret these numbers with caution.

¹⁷For the reasons mentioned above and discussed in more details below, the numbers for China are likely to be overestimated. In contrast, the share of the US losses in total losses would be even larger if we measured direct investment at market value since the US valuation loss would be roughly three times as large.

¹⁸In our benchmark case, we assume that all the assets that a source country owns in offshore centers are in US dollars. This may be a problematic assumption for some of our countries, like the UK, which have substantial links with offshore centers and is likely to use sterling for at least part of its transactions. As a robustness check, we assumed that all the UK assets vis-à-vis all offshore centers are in Sterling. The only large difference is for the exchange rate valuation on FDI assets: instead of incurring a loss of \$80 bn, the UK would incur a loss of \$156 bn. While not negligible, this is unlikely to change our results in a material

The results presented in table 4 exhibit striking features. All the countries we identified in the previous section as *ex post global insurers* (US, Euro Area, Switzerland, China), with the addition of Japan and Singapore suffered valuation losses due to adverse exchange rate movements. These are countries whose currencies have tended to hold rather well or even to appreciate at the height of the crisis in part due to their role as safe havens. Liabilities of these countries are mainly in domestic currency and their assets mainly in foreign currencies, hence an appreciation of the domestic exchange rate tends to decrease the value of their net foreign assets. Our table shows that exchange rate movements account for about 31% of US external valuation changes when US FDI is measured at market value. This sizable number, corresponding to a valuation loss of about \$650 bn, is not surprising as the currency composition of US external assets and liabilities is very asymmetric: almost all US liabilities are in dollars while about two thirds of US assets are in foreign currencies. As the dollar appreciated sharply in 2008 in part due to inflows into the Treasuries market, the value of US external claims went down. For Switzerland and Japan, the losses stemming from the strength of their currencies were partly compensated by an increase in the value of their external claims. Both Switzerland and Japan have short equity positions and benefit from a collapse in equity prices. A contrario, the Sterling collapse led to large exchange rate gains on the UK net external positions. Those gains explain 139% of the total valuation changes, meaning that they were partly offset by decreases in the value of UK net external assets

One legitimate question to ask is whether the international wealth transfers this paper focuses on are relevant compared to the change in domestic financial wealth that occurred during the crisis. We report in table 4 (last two columns) changes in total domestic household wealth for the subset of countries for which we could find data.¹⁹ First, declines in wealth are indeed very large during the period we consider: \$17.3 trillion for the United States, \$2.7 trillion for the UK, \$2.3 trillion for Japan, and \$1.3 trillion for the Eurozone. This should come as no surprise as our period spans the height of the financial crisis during which many financial and real estate markets performed dismally. External valuation gains or losses, though smaller, are nevertheless quite sizeable as a proportion of total wealth changes. Their absolute value range from 3% (for Japan) to 20% for the UK, reflecting both the openness of the UK as a small open economy and the important role of London as an international financial centre. For the US, external valuation changes amount to 12% of the change in total household wealth, and for the Euro Area 14%. Hence, while there is no doubt the negative domestic wealth effects dominate the macroeconomic landscape for most of our countries, the international wealth transfers, determined by the heterogeneity of external balance sheets, are far from being negligible.

3. Bilateral valuation gains and losses

Our world maps showed considerable geographical heterogeneity in external wealth changes at the country level. We now refine our analysis and estimate the distributions of *bilateral*

way since UK offshore FDI assets are only 15% of total UK FDI assets.

¹⁹Source: OECD Economic Outlook (2011). Our data cover the US, the UK, the Euro Area (limited here to Germany, Italy and France), Japan and Canada.

valuations gains and losses during 2007-2008. Balance of payment data and international investment positions are based on the concept of residency. This concept is not fully adequate to analyze risk sharing in the international economy. Ideally, we would like to have data on final ownership of assets. These data do not exist for portfolio investment or FDI however, for which we will have to assume that residency and ownership coincide. The presence of important financial links with offshore financial centers, which act merely as intermediate financial platforms distort further the geographical picture of our data.²⁰ All our results are therefore subjected to these limitations. A second important difficulty is the estimation of bilateral investment positions and bilateral flows in different asset classes. Kubelec and Sa (2010) and Milesi-Ferretti, Strobbe and Tamirisa (2010) have done pioneering work in trying to estimate bilateral investment positions. Nevertheless, data limitations remain severe in terms of country coverage in particular and availability of data at market value (see the online appendix for a more detailed discussion of data issues).²¹

3.1. Data and Methodology

For each asset class, we estimate the bilateral distribution of valuation gains and losses VX_{t+1}^{ij} at time $t + 1$ between country i and j during the height of the crisis, between 2007Q4 and 2008Q4. We derive VX_{t+1}^{ij} using the following accounting identity:

$$VX_{t+1}^{ij} = PX_{t+1}^{ij} - PX_t^{ij} - FX_{t+1}^{ij}, \quad (2)$$

where PX_t^{ij} denotes the holdings of country i in country j at time t , while FX_t^{ij} represents the net financial purchases by residents of country i in country j in the asset class considered between t and $t + 1$.

Yearly data on some components of bilateral international portfolios holdings by asset classes are available through the CPIS survey and other sources in recent years for a number of countries. Bilateral flow data coverage is, however, generally far from complete or not available. We use the following methodology to estimate bilateral flows on quarterly data.²²

Portfolio debt and portfolio equity

We compute the bilateral portfolio weights w_t^{ij} of country i vis-à-vis country j for a given asset class at date t using bilateral CPIS data as: $w_t^{ij} = PX_t^{ij} / \sum_{j \in CPIS} PX_t^{ij}$. The coverage of the CPIS data is not exhaustive, hence the sum of all the bilateral positions of country i for portfolio debt or equity covered by the CPIS does not correspond to the reported aggregated

²⁰For an attempt to assess the robustness of our results to the inclusion of offshore centers, see below.

²¹We chose not to compute bilateral financial matrices for bank loans. The locational banking statistics of the BIS, based on the concept of residency, give data on bilateral banking positions. These data however are bound to be of little use for our purposes as loan books and large parts of the banking books are not marked to market. The speed of write downs and the provisioning for bad loans have differed widely across countries and it is unclear how much of this is reflected in the BIS numbers of 2007-2008. Furthermore, there are large differences between consolidated statistics and locational statistics, suggesting that the concept of residency, compatible with balance of payment accounting is bound to be very different from the ultimate geographical distribution of gains and losses. Rather than attempt a heroic effort at reconciling loan data on a bilateral basis, we preferred not to do bilateral financial matrices for this asset category.

²²We provide all our data sources for specific countries in the online appendix. When CPIS data are not available (as in the case of China) we use national data sources.

IIP for these assets. Accordingly, we construct a *coverage rate* for country i at date t as $\alpha_t^i = \sum_{j \in CPIS} PX_t^{ij} / PX_t^i$, where PX_t^i is the reported aggregate (multilateral) international investment position for country i .²³ We denote the aggregate flow in a given asset class by $F\hat{X}_{t+1}^i$, and estimated variables with a ‘hat’. Our goal is to construct an estimate of the quarterly bilateral flows $F\hat{X}_t^{ij}$. Our working assumption is that the geographical distribution of flows over each quarter corresponds to the portfolio weights at the beginning of the quarter. Scaling total flows in proportion to the data coverage on the positions, it results that our estimated bilateral flows are constructed as:

$$F\hat{X}_{t+1}^{ij} = w_t^{ij} F\hat{X}_{t+1}^i \alpha_t^i.$$

An estimate of next quarter’s positions (ex-valuation gains) can then be constructed as:

$$P\hat{X}_{t+1}^{ij} = PX_t^{ij} + F\hat{X}_{t+1}^{ij}$$

The procedure is then iterated by defining the next quarter portfolio weights as $\hat{w}_{t+1}^{ij} = P\hat{X}_{t+1}^{ij} / \sum_{j \in CPIS} P\hat{X}_{t+1}^{ij}$ and using these to construct the following quarter bilateral flows etc...

We recover the yearly valuation term in the fourth quarter, VX_{t+4}^{ij} , as the difference between end of year bilateral positions as recorded in the available surveys, adjusted for our constructed cumulated bilateral flows:

$$\begin{aligned} VX_{t+4}^{ij} &= PX_{t+4}^{ij} - \sum_{s=1}^4 F\hat{X}_{t+s}^{ij} - PX_t^{ij} \\ VX_{t+4}^{ij} &= PX_{t+4}^{ij} - \alpha_t^i \sum_{s=1}^4 \hat{w}_{t+s-1}^{ij} F\hat{X}_{t+s}^i - PX_t^{ij}, \end{aligned}$$

where the second line substitutes $F\hat{X}_{t+s}^{ij}$ for its empirical counterpart. We emphasize again that this approach is quite crude, given the data limitation and is likely to suffer from a number of shortcomings. However, in the absence of more detailed data, it strikes us as reasonable to assume that flows are allocated proportionally to observed positions.²⁴

Bilateral FDI

For our sample, up-to-date official data on FDI at market value is only available for the following countries: the US, Hong Kong, Japan, Australia and Sweden.²⁵ In order to obtain bilateral FDI positions at market value we rely wherever possible on official estimates of the

²³We make sure that the valuation methods for the numerator and the denominator are the same.

²⁴One simple case where our assumption would be violated is one where investors would want to maintain fixed portfolios shares. In that case, investors would rebalance fully their portfolio every period, which would require underweighting assets that outperform, so that the financial flows would not be exactly proportional to beginning of period holdings. Our rule assumes that investors do not follow such a simple, full rebalancing rule; indeed at the observed frequencies, portfolio weights are time varying.

²⁵Of those, only Australia and Hong-Kong use market value as the primary FDI valuation method in their official IIP release.

aggregate FDI positions at market value. For countries that do not report such estimates, we update an initial market value estimate by using equity price indices and aggregate FDI flows. Once we have the derived - or provided - estimate of the aggregate market value FDI stock for 2007 and 2008, we use the ratio of market value to book value of the aggregate stock to infer the bilateral FDI stocks at market value.

For the US, the BEA provides market value of the aggregate FDI stock which we use to convert the bilateral BEA FDI positions at historical cost to market value. The same method is used for Japan (where market value estimates are provided by the Bank of Japan) and Sweden (with data from the Swedish Riksbank).

For the UK, Switzerland, Denmark, Canada and China we rely on an initial estimate of the aggregate FDI positions at market value which we update by using destination country equity indices and aggregate direct investment flows. We rely on [Kubelec, Orskaug and Tanaka \(2007\)](#) for UK direct investment positions as of 2005; [Kumah, Damgaard and Elkjaer \(2009\)](#) for Denmark in 2006; [Stoffels and Tille \(2009\)](#) for Switzerland in 2005 and Statistics Canada for Canada in 2005 (see the online appendix for a more detailed discussion of our market value estimation methodology). For the remaining countries in our sample we rely on bilateral DI positions at market value derived from partner countries sources. With these estimates of yearly positions in hand, we construct bilateral FDI flows and valuations using the same approach as for portfolio debt and equity.

Bilateral Foreign exchange data

For the currency composition of foreign exchange reserves we use national sources (Canada, Russia, Switzerland and the UK) or else adopt the 2007 currency share of official reserves provided in [Milesi-Ferretti, Strobbe and Tamirisa \(2010\)](#) for 2008. For China, the currency composition of reserves is usually not disclosed. We use the 2010 weights, which have been “officially” leaked, as this is the only year for which data are available. While this strategy is by no means optimal, we believe any resulting errors to be comparatively small in view of the relative stability of foreign reserve currency shares over time.

Bilateral FX reserves valuations are computed using exchange rate movements applied to the currency composition of reserves and estimating capital gains on bonds holdings. We prefer this direct valuation method as flows are bound to be very badly observed (reserve flows are kept confidential by some countries), while exchange rate movements and currency composition are relatively accurate. During the crisis, US Treasuries in particular underwent a sizable appreciation. We assume that the bonds held in all our countries reserves have an average maturity of 5 years, whether in dollars, euro, sterling, or yen and that they are all government bonds. Under this assumption, we find, for example, that the valuation on Chinese holdings of debt (expressed in US dollars) changes as follows: China records a sizable gain of \$76.2bn on its US dollar holdings, of \$13.5bn on euro denominated holdings (we assume that those are entirely in German bonds) as the capital gains on bonds more than offset the euro depreciation vis a vis the dollar, a gain of \$2.6bn for yen holdings as the yen appreciates and a loss of \$-1.3bn for Sterling holdings due to a massive depreciation of the pound. Russia records also sizable gains on its US\$ reserves (\$16.8bn) and on its euro reserves (\$6.7bn) which more than offsets its losses on its Sterling assets (-\$0.7bn).²⁶

²⁶We also assume that coupons are distributed quarterly and that the coupon equals the yield. In that case the relation between the holding-period returns $r_{c,n,t+1}$ and the n -period coupon bond yield $y_{c,n,t}$ is

Interestingly, all the net valuations on reserves are positive for all the countries of our sample, underlining the fact that indeed reserves were safe assets during the global crisis. Table 8 (in millions of US \$) reflects those valuation gains and losses.

Treatment of offshore financial centers

The main offshore centers are in our sample.²⁷ Though the reporting is spotty (see Lane and Milesi-Ferretti (2009) for a thorough study) there are some important cross-border positions between some offshore centers (such as the Cayman Islands and the Bahamas, for example) and advanced economies. It is very unlikely that the ultimate owners of financial assets bought by offshore centers are actual residents of off-shore centers. Rather, offshore centers act as intermediaries to channel funds across the globe, reflecting, among other things, tax “optimization” and tax evasion. Zucman (2011) shows that a significant amount of rich countries wealth seem to evaporate via those channels.

Because, by design, the traceability of the geography of financial flows emanating from and going into offshore centers is limited, we make two different assumptions in the course of our analysis to explore the robustness of our results. First we simply take the offshore centers out of the bilateral financial matrices. This means that we focus only on the financial linkages across countries that are explicitly (even if imperfectly) recorded in official data. Second, we assume that the bulk of offshore financial transactions is done to go around domestic fiscal authorities, legally or illegally. Hence most of those transactions are really domestic transactions intermediated offshore. We therefore redistribute offshore centers external assets and liabilities to the other countries of our samples in the following way. Take the US-Bahamas example. We assume that part of the external assets of the US towards the Bahamas are actually US-US investments and we ventilate the rest according to the weights of the US portfolio on external assets. Specifically we use the home bias of the US equity portfolio to determine how many US-Bahamas claims are really US domestic claims. On the liability side, we do a similar breakdown: US liabilities vis-à-vis the Bahamas are assumed to be US-US liabilities (same home bias weight) and the remainder is ventilated according to the weights in the US external liability portfolio.²⁸

While these assumptions on offshore centers have some effect on the results, especially for the countries which trade most with offshore centers, such as the US, the UK and the euro area, the overall pattern of transfers does not change, whether in the aggregate or by asset classes.²⁹ We conclude that while there is no denying offshore centers introduce some degree of uncertainty in the geographical distribution of gains and losses, the relative magnitudes are such that they probably are not large enough to significantly alter our global bilateral financial matrices.

$r_{c,n,t+1} = D_{cn}y_{c,n,t} - (D_{cn} - 1)y_{c,n-1,t-1}$ where D_{cn} is the duration of the bond and is given by $D_{cn} = (1 - (1 + Y_{cnt})^{-n}) / (1 - (1 + Y_{cnt})^{-1})$.

²⁷These include Aruba, Andorra, Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Gibraltar, Guernsey, Isle of Man, Jersey, Lebanon, Liechtenstein, Macao, Mauritius, Monaco, Netherland Antilles, Panama, Samoa, San Marino, Vanuatu, Vatican, West Indies.

²⁸The home bias weights for equity and bonds are taken from Coeurdacier and Rey (2010). For FDI, we use the same home bias weights as for the equity portfolio.

²⁹Bilateral financial matrices with ventilation of offshore positions are not reported here due to lack of space. They are available upon request.

3.2. *Bilateral Financial Matrices*

Traditionally, the propensity of countries to experience a financial crisis has been linked to large current account deficits and net imbalances. As financial globalization proceeds, cross border asset positions are growing at a rapid rate, and balance sheet effects are becoming increasingly important: even countries with net balanced positions and no current account deficit can become financially illiquid. Nowadays, financial fragility has to be assessed through information on gross external asset positions, disaggregated by asset classes. Tracking the process of international transmission of financial shocks involves knowing the network of bilateral gross exposures of countries. Hence, we believe that the construction of bilateral matrices such as the ones we are presenting in this paper for the 2007-2008 crisis, can be of great interest to understand better systemic risk and the propagation of shocks at the international level. In what follows we present bilateral financial matrices on gains and losses by asset categories (portfolio debt, equity and FDI).

There are several ways of constructing valuation matrices. We can use data on bilateral assets and liabilities of reporting countries or alternatively use data based only on the asset side of reporting countries. Because data on the asset side is usually more reliable (see [Milesi-Ferretti, Strobbe and Tamirisa \(2010\)](#) for a discussion), this is what we present in this section.

Matrix of bilateral valuation gains and losses on the net equity portfolio

Each matrix presents in columns the source country and in rows the destination countries. Hence if we look at the bilateral ventilation of portfolio equity assets (table 5), in the first column and second row (Brazil- Canada), the number 4,079 means that Brazil is making a valuation gain of \$4,079 millions on its net equity asset portfolio vis-à-vis Canada (and conversely that Canada is making a valuation loss of the same amount in the first row/second column of the table).³⁰ Several facts are noteworthy. First, despite the difference in coverage and the assumptions we had to make when constructing the data, the sum of our bilateral valuations (equal to \$162,796 millions for Brazil) is usually reasonably close to the total valuations computed directly from aggregated net positions in Table 3. In principle, the two numbers should not necessarily be equal since the latter includes all countries while the bilateral coverage in Table 5 is more limited. Nevertheless, the numbers should be close if the omitted countries do not account for a significant share of cross-border equity positions. For the United States, for instance, the two numbers are strikingly close (-\$1,218 billions versus -\$1,153 billions).³¹ Second, we uncover a remarkable geographical pattern of gains and losses. As risky assets valuation plummeted during the crisis, the United States, with long equity positions vis-à-vis each of the other geographical entities in our sample, suffered across the board losses. Furthermore, after controlling for their bilateral equity portfolio gain against the US, all other advanced economies except Japan also made losses on their net equity position, reflecting their overall short equity position vis-a-vis the US and long position against the rest of the world. The case of the UK is particularly interesting. It

³⁰The numbers across the diagonal are symmetric as we used exclusively assets data.

³¹For other countries, the sum of our bilateral valuation effects can differ substantially. The discrepancy is largest for China where aggregate equity data indicate a small valuation loss of \$-12 billions, while our cumulated bilateral valuations report a gain of \$184 billions. Besides measurement issues, the difference could be due in part to valuation losses that China experienced against countries not included in our sample.

registers one of the biggest gains on its portfolio equity (\$198 billions) and is characterized by a massive short position vis-à-vis the US and a somewhat smaller short position vis-à-vis the Euro Area and Canada. Emerging markets, on the other hand, tend to be short equity vis-à-vis most of their partners, and as a result, benefited from the worldwide fall in equity markets. This is particularly clear for the BRIC countries (Brazil, Russia, India and China) who make gains on most of their bilateral net equity positions.

Matrix of bilateral valuation gains and losses on the net debt portfolio.

The data on portfolio debt presented in table 6 show bigger gaps in coverage than the equity data. In particular, the data coverage for the Euro area and the UK seems particularly limited, as revealed by the comparison between the sum of bilateral gains and losses and the aggregate figure obtained directly from the IIP in Table 3. Data coverage for the United States seems adequate since we report a valuation loss of \$-58 billions while the aggregate position indicates \$46 billions. Our matrix also does not include official reserve holdings with the data on debt (unlike Table 3 above which aggregated the two). The valuation on the debt portfolio will depend on the relative weights of US Treasuries, say, versus asset-backed mortgage securities in countries' portfolios. Unfortunately, this breakdown is not available from the CPIS data. However, we can use the US Treasury's "Portfolio Holdings" Survey to construct an estimate of the breakdown of countries' US debt portfolio into corporate debt (including corporate ABS) and Treasuries (see the online appendix for details).³² In the next section, we will use that decomposition to show that countries with the highest shares of corporate ABS in debt assets indeed also bear the more significant losses on their debt assets. Conversely, countries with a larger share of Treasuries, which provide the best insurance in times of global crisis, tend to bear smaller losses. According to [Bernanke et al. \(2011\)](#), saving glut economies such as China and Emerging Asia have concentrated their portfolio holdings into government bonds, pushing downwards their yields and inducing more advanced economies, in particular the Euro Area to invest in higher yielding securities, such as ABCP or ABS. Our data seem consistent with this narrative, as the Euro Area has a large long position in US debt in 2007, which translated in large losses during the crisis. Similarly, other advanced economies, Canada, Switzerland, who were also long in US debt and had presumably a similar portfolio structure as the Euro Area made losses on their net debt liabilities. A noticeable exception is the UK, who, despite a long position in US debt realized a massive gain, due mainly to the collapse of the value of US debt assets in the UK. The US makes gains on its net debt portfolio vis-à-vis most advanced economies (except the UK) and conversely makes losses vis-à-vis Russia and Hong Kong, which are likely to have accumulated more US government bonds than corporate debt.

Matrix of bilateral valuation gains and losses on the net FDI portfolio

Comparing the sum of our bilateral net valuations for FDI at market value presented in Table 7 with the aggregate data on valuation estimated from reported IIP, our data coverage is clearly limited for some areas.³³ The Euro area coverage in particular seems most problematic, since the sum of bilateral valuations indicates a gain of \$575 billions,

³²We thank a referee for this suggestion.

³³Note that for this matrix, we constructed market value FDI estimates wherever possible (see online appendix). Thus, the data presented here differs from the data presented in Table 3, where, e.g. for the US we used FDI at current cost to allow for better comparability across countries and, similarly, most

while the corresponding aggregate figure in Table 3 is a loss of \$-334 billions (based on FDI at book value). It seems unlikely that the discrepancy, a valuation loss in excess of \$900 billions, could be accounted for purely by the gaps in our geographic coverage, especially vis-à-vis other emerging markets. With this caveat in mind, the results on bilateral direct investment still present some interesting features. Japan has net DI assets vis-à-vis all the countries in our sample, except Switzerland. Consequently, it suffered bilateral losses against each country (except Switzerland and India). Similarly the US made large losses vis-à-vis the Euro area against which it holds a large long position. UK FDI in the US seems to have particularly underperformed and is responsible for the gain that the US makes on its net FDI portfolio vis-à-vis the UK.

Matrix of bilateral valuation gains and losses on the foreign exchange reserves

We assume that currency and residency coincide, i.e. Chinese holdings of US\$ reserves are assets of China on the US. As there are few reserve currencies (mainly dollar, euro, yen sterling and swiss franc), there are a large number of zeros in this matrix. We assume that all reserve assets are five year government bonds. The valuations on the foreign exchange reserves. reported in Table 8 depend therefore on the capital gains on those government bonds and on exchange rate movements. In particular, while the dollar and the yen appreciated during the crisis, the sterling and the euro depreciated. For example, China made gains on its foreign reserves during this period, because of the strengthening of the yen and the capital gains on government bonds, particularly the US Treasuries (to the tune of \$76bn of capital gains). China made some losses on its sterling reserves (\$-1.3bn) due to the depreciation of the pound. Russia, on the other hand suffered net losses due to its exposure to euro and sterling assets. So did the euro area, as it is heavily exposed to sterling assets.

4. Determinants of gains and losses

It is now well understood that before the crisis, a number of AAA-rated securities (mostly asset-backed mortgage securities) were perceived as perfect substitutes for US government securities. Following [Bernanke et al. \(2011\)](#), let us call them ‘private-label’ safe assets. Eventually, the safety of the private label assets proved illusory, and their price spiralled downwards during the crisis. By contrast, US Treasuries held-up remarkably well and even saw their price rise due to inflows of capital seeking safe haven protection (see [McCauley and McGuire \(2009\)](#)). [Acharya and Schnabl \(2010\)](#) estimate that banks around the world manufactured over \$1,200 billion of these ‘private-label’ safe assets by selling short-term Asset-Backed Commercial Paper (ABCP) via conduits to risk-averse investors and investing the proceeds primarily in long-term U.S. securities. As liquidity in the dollar money markets dried-up in 2007, many banks found themselves unable to roll over these ABCP and forced to reinstate the mortgages from the conduits on their balance sheet, with significant losses. Bilateral exposure data are ideal to investigate the macroeconomic impact of those investments by commercial banks, i.e. whether countries whose banks set up large asset-backed commercial paper conduits also experienced large losses on their external debt portfolios vis-a-vis the

other countries use book values to compile their aggregate FDI data. In consequence, the sum of bilateral valuations in Table 7 is not directly comparable with the aggregate figures in Table 3.

US.³⁴ Figure 5 illustrates the positive correlation between the share of ABCP conduits in countries' US debt positions as of 2007 and the rate of losses on their US debt portfolios between 2007Q4 and 2008Q4.³⁵ Though the sample is small, the correlation is strikingly positive, suggesting that setting up ABCP conduits is a major determinant of aggregate losses on external debt. Furthermore, there is a strong mapping between the geographical distributions of losses and the share of the various areas in total ABCP holdings (Figure 6). As pointed out in [Bernanke et al. \(2011\)](#), the Euro area leveraged massively to invest in those private-label safe assets ending up holding 40% of total outstanding ABCP and as a result saw massive decline in the value of its external debt to the tune of 54% of total losses. The UK, who held 16% of the total stock of ABCP bore 21% of total losses.

Reinforcing the plausibility of the mechanism described above linking the prevalence of ABCP conduits and liquidity dry-ups entailing losses on external assets, we find a strong positive correlation between measures of dollar shortage in some banking systems developed by [McGuire and von Peter \(2009\)](#) and the propensity of those systems to set up ABCP conduits. Figure 7 uses the upper limits of the dollar shortage measures developed by [McGuire and von Peter \(2009\)](#) both at the office and at the group level. Those measures are constructed by assuming that net interbank borrowing in dollar, net borrowing on the FX swap markets in dollars (which the authors back out from the balance sheet identity assuming no open positions on the forex), dollar borrowing from official monetary authorities, as well as liabilities to non banks are all short term. The difference between those short term dollar liabilities and the longer term dollar assets gives the dollar funding gap or dollar shortage of a country banking system.³⁶ With the exception of Switzerland, which did not appear to have any significant exposure to ABCPs in 2007, there is a very clear link between measures of dollar shortage and ABCP conduits.

Interestingly, many US ABCP operated primarily domestically, even when set-up and owned by foreign financial institutions. In effect, foreign banks would set-up a conduit as Delaware Corporations that would invest in US assets -most often mortgages- and issue ABCP purchased primarily by US investors. As a result, ABCP itself factors little in US *cross-border* positions. In official statistics, such securities are considered domestic US securities. Data from the CPIS suggests that this is the case globally as well: ABCP are by definition short-term securities, and cross-border holdings of all types of short-term securities are only a small fraction of the total cross-border debt portfolios reported in the CPIS. However, as [Acharya, Schnabl and Suarez \(2010\)](#) show, the ultimate liability for the conduits resided with the (foreign) sponsor bank. In other words, while official statistics

³⁴In figures 5, 6, 8, 9 and 10, we infer gains and losses on countries' US debt assets positions from bilateral US debt liabilities, as measured by the Survey on Foreign Portfolio holdings of U.S. Securities

³⁵We are very grateful to Viral Acharya and Philip Schnabl for sharing their data with us. Their dataset consists in the following countries: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, UK, USA.

³⁶We are grateful to Patrick McGuire and Goetz von Peter for providing us with their data, whose construction is described in [McGuire and von Peter \(2009\)](#). The group-level estimates are constructed by aggregating banks' global balance sheets into a consolidated whole, and then calculating funding risk on this aggregated balance sheet. The office-level estimates are constructed by calculating funding risk at the office location level, and then aggregating the series up across office locations for each banking system. By construction, the office level estimates should at least be as large as the corresponding group level.

did not record any significant overall exposure of foreign banks through holdings of short term securities, the implicit guarantee offered to the conduits did leave foreign (especially European) banks severely exposed should the conduits lose access to US money markets. When this happened in 2007, the subsequent losses did appear on European banks balance sheets as they were forced to re-intermediate these positions and absorb the subsequent debt portfolio losses. To that extent, it seems legitimate to look at the [Acharya and Schnabl \(2010\)](#) data on foreign sponsors of foreign conduits.

Foreign banks were also exposed through their holdings of longer term asset backed securities (ABS), which figure heavily in many countries' cross-border portfolios.³⁷ This provides another determinant of ex-ante exposure. To explore this connection, we use a variant of [Kamin and DeMarco \(2010\)](#)'s assignment of long-term ABS. That is, we combine direct holdings of US longer-term ABS from the Treasury "Portfolio Holdings" with indirect holdings through the Cayman Islands - inferred from debt securities in the CPIS -, to account for indirect exposure through re-securitization (see the online appendix). Figure 8 is similar to figure 5. It reports our estimated share of ABS in each country's US debt claim position in 2007 together with the rate of loss on debt claims. Similarly, figure 9 reports the estimate of ABS holdings as a fraction of total ABS holdings in 2007, as well as the share of overall losses on U.S. debt assets. Both figures indicate clearly a strong correlation between initial exposure to ABS and subsequent losses on the debt portfolio.

Finally, we report in figure 10 the total valuation losses together with the [Kaufmann, Kraay and Mastruzzi \(2010\)](#) indicator of the quality of the regulatory environment. Recent research by [Giannone, Lenza and Reichlin \(2011\)](#) finds that the severity of the crisis was strongly and robustly *positively* related to the degree of liberalization in credit markets, as measured by indicators or 'regulatory quality'.³⁸ In our sample, the correlation between losses and the [Kaufmann, Kraay and Mastruzzi \(2010\)](#) indicator of the quality of the regulatory environment is also positive (0.45) and visual inspection confirms that countries with more liberalized credit markets tended to suffer larger valuation losses on their external portfolio. One may conjecture, that the most deregulated markets were also the ones in which investors "splurged" the most and increased their loadings on (once lucrative) toxic assets.

5. Conclusion

The global crisis of 2007-2009 led to massive changes in relative asset prices. We construct a dataset that allows us to analyze the geography of wealth transfers during the crisis. The 'heatmap' we produce highlight a very diverse set of outcomes depending on the structure of countries' external portfolios. Some saw the value of their net assets plunging, others benefited from large capital gains. The countries whose net international asset positions deteriorated provided wealth transfers to the others at a time where marginal utility of consumption was very high. For that reason they can be regarded as "global insurers", as suggested in [Gourinchas, Rey and Govillot \(2010\)](#). Interestingly, we find that the United

³⁷We thank a referee for the suggestion to look at ABS exposure.

³⁸For group of countries, we assign the regulatory quality index as follows: Germany for euro area, St Kitts for offshore centers, Saudi Arabia for oil exporters, Thailand for emerging Asia, Norway for other advanced countries, and Peru for other latin-american countries.

States, the country at the centre of the international monetary system and issuer of the main reserve assets, the US Treasuries, provided most of the insurance during the crisis, as its international investment position deteriorated massively. But other countries, which may be regarded more like regional insurers joined in, such as Switzerland, the Euro area or even China. A general pattern in our data is that most countries long equity or direct investment faced losses on their net positions, as risky assets took some of the sharpest valuation falls in the crisis. For portfolio debt, the exact structure of portfolio matters, and in particular the relative weights of government bonds versus toxic corporate debt made an important difference for the outcomes. We find that some correlation of exposure to ABCP conduits -mostly in US dollars, existing dollar shortage measures, and losses on the debt portfolio. Finally our exercise, just like [Milesi-Ferretti, Stobbe and Tamirisa \(2010\)](#) underlines important data issues regarding cross country coverage of international investment positions and flows.

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	1971:3	2007:2
Gross Liabilities	11.2	130.8
Bank Loans	3.1	38.8
Debt	4.4	44.2
of which:		
Government	3.7	21.2
Corporate	0.8	23.1
Equity	2.6	22.2
Direct Investment	1.2	25.6
Gross Asset	16.9	119.1
Gold	1.1	1.2
Bank Loans	5.3	36.1
Debt	1.4	10.0
Equity	0.7	35.0
Direct Investment	8.4	36.5
Net	5.7	-11.7
Safe & Liquid/Liabilities	66.6	63.5
Risky & Illiquid/Assets	53.9	60.0

Table 1: US External Balance Sheet, percent of US GDP. FDI at market value. Source: [Gourinchas, Rey and Govillot \(2010\)](#)

Positions as of:	2007:4	2009:1	Change	
	% of GDP	% of GDP	% of GDP	bn (US dollars)
Net	-10.2	-31.4	-21.1	-2,966
of which				
cumulated current account			-5.5	-767
valuation change			-15.7	-2,199
Gross Liabilities	132.6	113.3	-21.6	-3,040
Bank Loans	38.9	34.8	-4.8	-669
Debt	46.0	48.8	2.1	288
of which:				
Government	22.3	29.7	7.0	987
Corporate	23.7	19.2	-5.0	-699
Equity	22.6	13.5	-9.5	-1,333
Direct Investment	25.2	16.2	-9.4	-1,326
Gross Asset	122.5	81.8	-42.7	-6,006
Gold	1.5	1.7	0.2	22
Bank Loans	36.2	35.4	-1.4	-200
Debt	11.1	8.8	-2.5	-353
Equity	36.7	17.0	-20.4	-2,866
Direct Investment	36.9	19.0	-18.6	-2,609

Table 2: Change in US External Balance Sheet. Percent of US GDP. 2007:4 to 2009:1. FDI at market value.
Source: [Gourinchas, Rey and Govillot \(2010\)](#)

Country	Valuation		Equity		Direct Investment		Debt		Loans				
	Claims	Liab.	Net	Claims	Liability	Net	Claims	Liab.	Net	Claims	Liab.	Net	
U.S.	-863	-2,398	-1,245	-1,153	-161	-218	56	-120	-86	-34	149	-119	268
Euro area	-185	-1,171	-1,677	506	-607	-273	-334	-461	-135	-326	-394	-363	-31
U.K.	542	-567	-851	284	-423	-337	-86	-176	-515	339	-332	-337	5
Japan	65	-244	-420	176	7	46	-39	-66	126	-193	419	298	121
Switzerland	-53	-197	-220	23	28	77	-49	-45	-6	-39	13	2	11
Canada	17	-261	-189	-71	-78	-131	53	-24	-41	18	-7	-25	18
Other advanced	-3	-434	-401	-33	-221	-234	14	-135	-142	8	-101	-111	10
Brazil	292	-2	-207	205	7	-67	74	8	-15	23	-3	7	-9
India	20	0	-18	18	0	-24	24	-25	0	-24	-1	-3	3
Russia	317	-1	-209	208	-220	-350	130	-18	-18	0	-50	-29	-21
Emerging Asia	245	-54	-246	192	-10	-67	57	-24	-8	-16	-35	-48	13
China	-158	1	13	-12	16	64	-48	-61	-2	-59	-22	17	-39
Hong Kong	101	-258	-237	-21	-300	-421	122	7	2	5	-8	-4	-4
Singapore	-56	-80	-74	-5	-27	-22	-6	-31	0	-31	-15	0	-15
Rest of the World	-282			-314			32						-329

Table 3: The Geography of Wealth Transfers, 2007:4-2008:4. Decomposition of the valuation change into a net equity, net direct investment, net debt and net bank loans components. FDI as in official figures; US FDI at current cost. Billion of US dollars.

Country	Exchange rate valuation			External valuation	Exchange/External	Wealth change	External/Wealth
	FDI	Equity	Debt & FX				
United States*	-322	-363	35	-650	-2,069	-17,352	31%
Euro area**	-243	100	17	-127	-185	-1,335	69%
United Kingdom	252	430	73	755	542	-2,714	139%
Japan	-68	-352	0	-420	65	-2,340	-647%
Switzerland	-63	-64	-16	-144	-53		271%
Canada	72	49	16	137	17	291	807%
Other advanced	113	91	21	225	-3		-7502%
Brazil	59	72	-3	129	292		44%
India	20	20	-8	33	20		164%
Russia	91	61	-22	130	317		41%
Emerging Asia	71	86	-26	130	245		53%
China	-49	-8	-31	-88	-185		55%
Hong Kong	17	-8	-6	3	101		3%
Singapore	-21	-8	-4	-33	-56		58%

Table 4: Exchange rate valuations, total external valuations and wealth changes The table shows the share of valuation changes accounted for by the exchange rate and the size of total external valuation changes relative to domestic wealth changes. * denotes FDI at market value. ** for the wealth variable, only Germany, France and Italy. Billions of US dollars.

	Brazil	Canada	China	Em. Asia	Euro	H.K.	India	Japan	Oth. adv.	Russia	SGP	Switz	U.K.	U.S.
Brazil	0	-4,079	613	-2,710	-36,836	-7	0	-3,948	-4,062	-1	-256	-1,070	-9,537	-100,903
Canada	4,079	0	1,160	7,864	41,309	2,763	1,727	7,233	3,063	1,927	1,211	707	35,989	-89,550
China	-613	-1,160	0	-13,372	-29,698	-64,464	-7	-11,264	-1,309	-7	-1,407	-623	-23,307	-36,921
Em. Asia	2,710	-7,864	13,372	0	-46,681	6,134	3,557	406	-7,059	-75	-9,175	-1,383	-22,144	-113,855
Euro	36,836	-41,309	29,698	46,681	0	22,587	46,897	52,977	-48,374	37,099	2,930	-40,352	53,355	-302,371
H.K.	7	-2,763	64,464	-6,134	-22,587	0	1,160	-7,547	-5,406	11	-5,422	-811	8,031	-53,478
India	0	-1,727	7	-3,557	-46,897	-1,160	0	-4,536	-4,156	0	-8,074	-312	-25,972	-52,801
Japan	3,948	-7,233	11,264	-406	-52,977	7,547	4,536	0	-494	3,428	4,067	-328	-29,373	-93,657
Other adv.	4,062	-3,036	1,309	7,059	48,374	5,406	4,156	494	0	6,113	-707	10,273	12,967	-23,622
Russia	1	-1,927	7	75	-37,099	-11	0	-3,428	-6,113	0	-528	-3,431	-11,482	-54,779
SGP	256	-1211	1407	9175	-2930	5422	8074	-4067	707	528	0	-355	-811	-25,941
Switz.	1,070	-707	623	1,383	40,352	811	312	328	-10,273	3,431	355	0	-14,341	-45,710
U.K.	9,537	-35,989	23,307	22,144	-53,355	-8,031	25,972	29,373	-12,967	11,482	811	14,341	0	-225,292
U.S.	100,903	89,550	36,921	113,855	302,371	53,478	52,799	93,657	23,622	52,801	25,941	45,710	225,292	0
Sum	162,796	-19,455	184,151	182,058	103,346	30,475	149,185	149,678	-72,849	118,715	9,746	22,365	198,669	-1,218,880

Table 5: Matrix of bilateral valuation gains and losses on the net equity portfolio. The table reports the bilateral valuation gain(+)/loss(-) between 2007:4 and 2008:4, for each source/partner pair. Source countries are in culomms, partner countries in rows. Millions of US dollars.

	Brazil	Canada	China	Em. Asia	Euro	H.K.	Japan	Other adv.	Russia	SGP	Switz.	U.K.	U.S.
Brazil	0	-322	0	2,293	-7,961	4	3,502	-1,089	-2	-14	195	-2,682	3,367
Canada	322	0	-2	160	2,352	-109	-3,998	2,493	36	-96	1,107	1,224	2,342
China	0	2	0	-15	7,436	3,298	-2,712	-48	5	644	1	345	-15,445
Em. Asia	-2,293	-160	15	0	-23,596	-3,135	2,637	2,694	-28	-18,134	303	-4,892	6,787
Euro	7,961	-2,352	-7,436	23,596	0	-9,263	-78,117	1,803	5,793	-6,851	-7,479	29,244	58,566
H.K.	-4	109	-3,298	3,135	9,263	0	-13,138	7,678	-86	733	360	-16,618	-3,044
Japan	-3,502	3,998	2,712	-2,637	78,117	13,138	0	-14,909	300	812	-1,828	-8,095	15,930
Other adv.	1,089	-2,493	48	-2,694	-1,803	-7,678	14,909	0	735	-5,619	-1,904	-17,100	2,347
Russia	2	-36	-5	28	-5,793	86	-300	-735	0	-93	-64	-7,411	-2,353
SGP	14	96	-644	18,134	6,851	-733	-812	5,619	93	0	27	1,787	2,355
Switz.	-195	-1,107	-1	-303	7,479	-360	1,828	1,904	64	-27	0	9,691	3,598
U.K.	2,682	-1,224	-345	4,892	-29,244	16,618	8,095	17,100	7,411	-1,787	-9,691	0	-132,915
U.S.	-3,367	-2,342	15,445	-6,787	-58,566	3,044	-15,930	-2,347	2,353	-2,355	-3,598	132,915	0
Sum	2,709	-5,829	6,489	39,802	-15,464	14,910	-84,038	20,163	16,673	-32,786	-22,573	118,409	-58,464

Table 6: Matrix of bilateral valuation gains and losses on the net debt portfolio. The table reports the bilateral valuation gain(+)/loss(-) between 2007:4 and 2008:4, for each source/partner pair. Source countries are in columns, partner countries in rows. Millions of US dollars.

	Brazil	Canada	China	Em. Asia	Euro	H.K.	India	Japan	Oth. adv.	Russia	SGP	Switz.	U.K.	U.S.
Brazil	0	10,200	-339	n.a.	n.a.	n.a.	n.a.	-5,876	-4,287	na	n.a.	-6,426	-3,623	-44,398
Canada	-10,200	0	779	2,524	-12,770	2,460	8,075	-10,354	5,723	547	1,987	-7,519	-14,077	-70,157
China	339	-779	0	-3,236	3,125	-85,816	-29	-28,202	-2,139	1,743	8,819	-1,350	-2,353	-4,089
Em. Asia	n.a.	-2,524	3,236	0	n.a.	-316	n.a.	-56,466	-6,453	n.a.	8,703	-6,452	-18,515	-47,748
Euro	n.a.	12,770	-3,125	n.a.	0	n.a.	n.a.	-143,819	25,293	n.a.	7,348	-62,018	-96,831	-315,257
H.K.	n.a.	-2,460	85,816	316	n.a.	0	n.a.	-6,970	-2,306	n.a.	1,476	-1,887	-52,641	-37,307
India	n.a.	-8,075	29	n.a.	n.a.	n.a.	0	1,197	-428	n.a.	4,522	-1,101	-5,575	-9,530
Japan	5,876	10,354	28,202	56,466	143,819	6,970	-1,197	0	22,311	117	18,526	-3,886	34,718	69,084
Other adv.	4,287	-5,723	2,139	6,453	-25,293	2,306	428	-22,311	0	2,395	369	-3,247	-30,125	2,788
Russia	n.a.	-547	-1,743	n.a.	n.a.	n.a.	n.a.	-117	-2,395	0	n.a.	-2,148	-13,027	-7,739
SGP	n.a.	-1,987	-8,819	-8,703	-7,348	-1,476	-4,522	-18,526	-369	n.a.	0	-7,624	-5,403	-90,158
Switz.	6,426	7,519	1,350	6,452	62,018	1,887	1,101	3,886	3,427	2,148	7,624	0	-2,869	-9,019
U.K.	6,323	14,077	2,353	18,515	96,831	52,641	5,575	-34,718	30,125	13,027	5,403	2,869	0	25,355
U.S.	44,398	70,157	4,089	47,748	315,257	37,307	9,530	-69,084	-2,788	7,739	90,158	9,019	-25,355	0
Sum	54,749	102,981	113,969	126,535	575,639	15,963	18,962	-391,361	65,534	27,716	154,935	-91,770	-235,677	-538,175

Table 7: Matrix of bilateral valuation gains and losses on the net FDI portfolio. The table reports the bilateral valuation gain(+)/loss(-) between 2007:4 and 2008:4, for each source/partner pair. Source countries are in columns, partner countries in rows. Source/partner pairs with bilateral direct investment positions unavailable at market value are denoted with n.a.. Millions of US dollars.

	Brazil	Canada	China	Em. Asia	Euro	H.K.	India	Japan	Other adv.	Russia	SGP	Switz.	U.K.	U.S.
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0
China	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Em. Asia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euro	1,281	729	13,530	6,530	0	545	2,633	5,702	2,983	6,730	1,529	710	999	925
H.K.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
India	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Japan	0	49	2,587	2,405	303	181	301	0	458	210	735	251	248	1,821
Other adv.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SGP	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Switz.	0	0	0	84	154	7	12	0	0	0	29	0	0	0
U.K.	0	0	-1,254	-1,400	-670	-75	-263	0	-80	-750	-187	-73	0	0
U.S.	10,862	1,644	76,221	16,620	12,687	9,860	12,869	60,161	4,730	16,810	7,118	954	1,163	0
Sum	12,144	2,423	91,084	24,061	12,474	10,517	15,552	65,863	8,091	23,001	9,224	1,843	2,410	2,746

Table 8: Matrix of bilateral valuation gains and losses on the foreign exchange reserves. The table reports the bilateral valuation gain(+)/loss(-) between 2007:4 and 2008:4, for each source/partner pair. Source countries are in columns, partner countries in rows. Millions of US dollars.

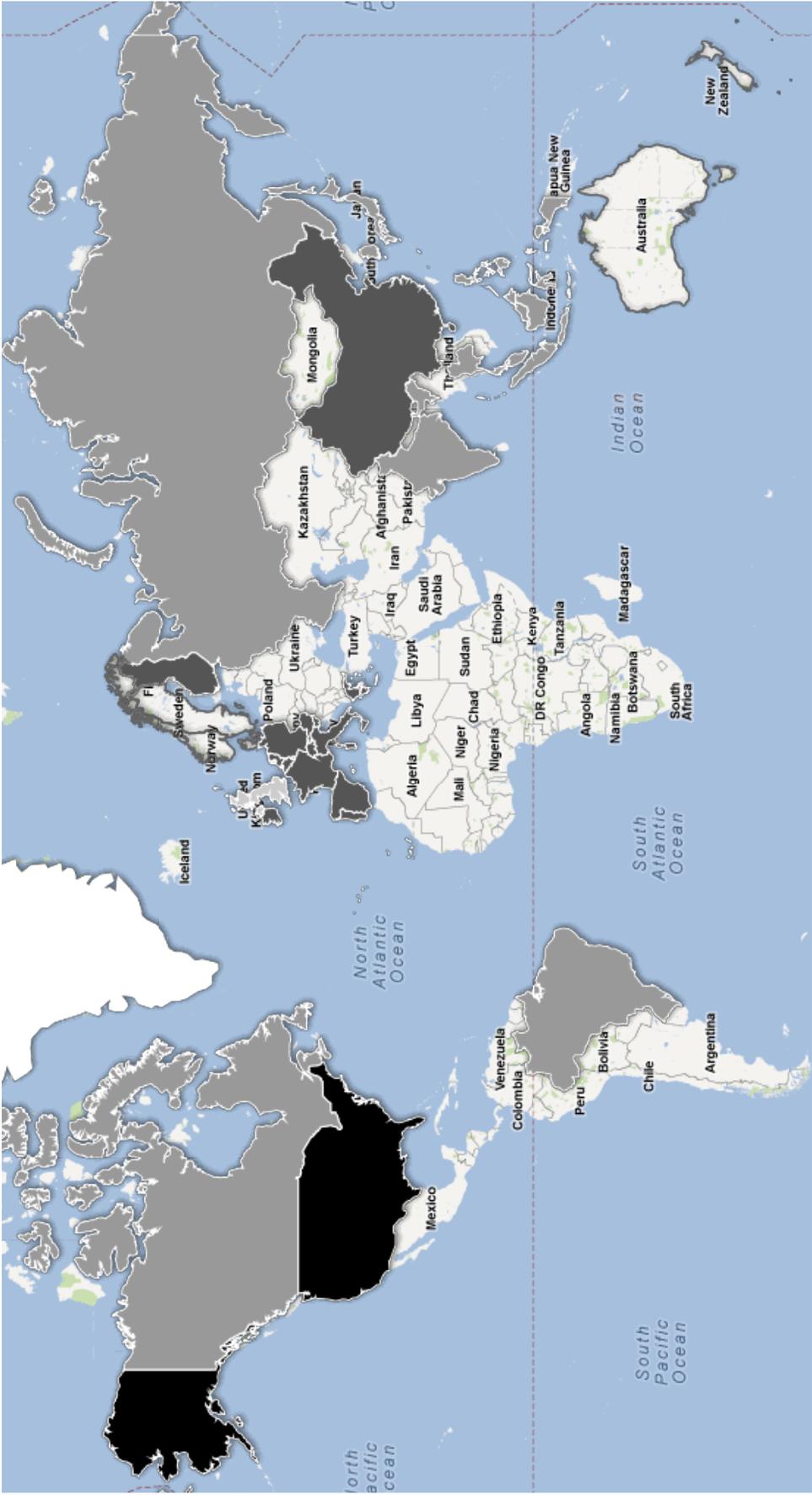
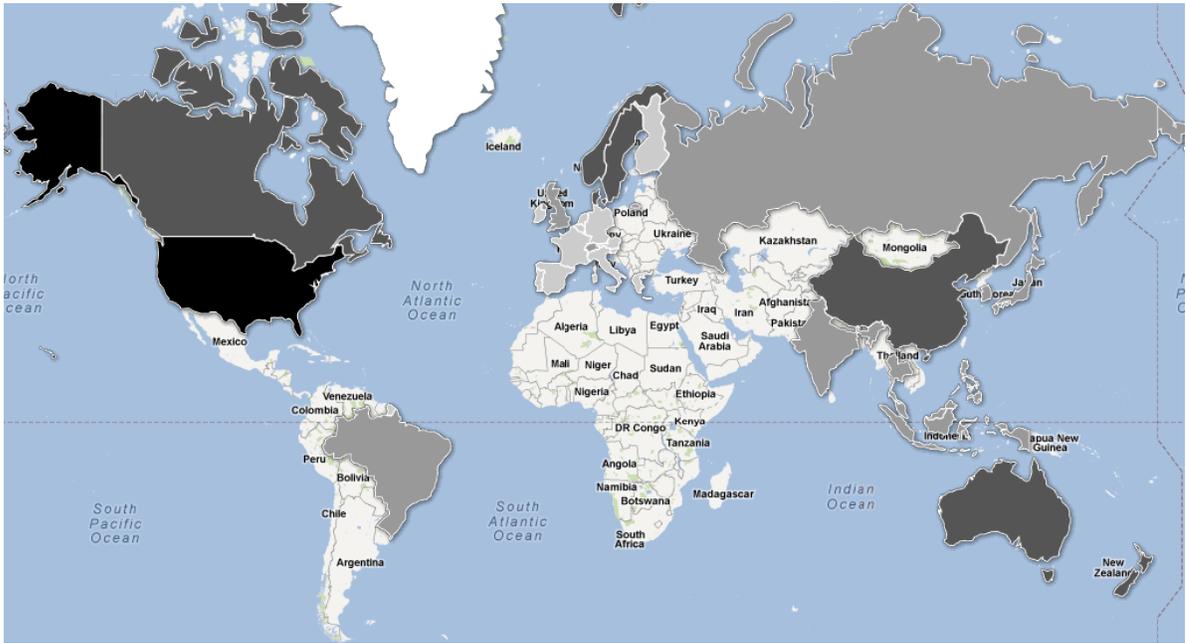


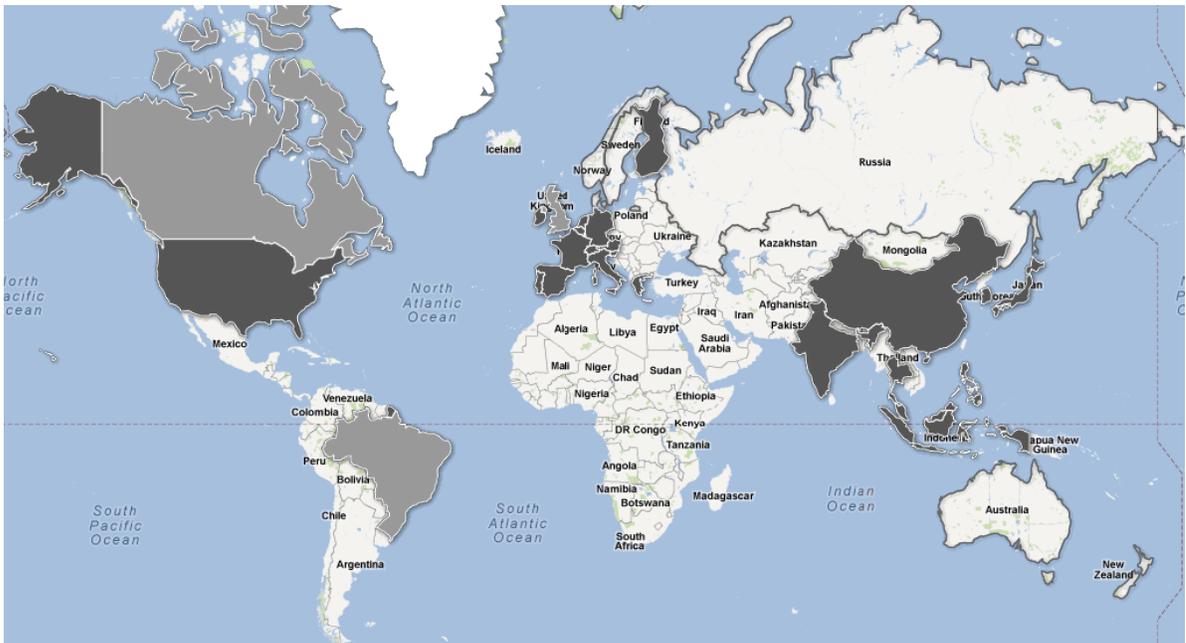
Figure 1: Heat Map of Valuation Gains and Losses

The figure reports total valuation gains/losses. ■ Losses in excess of \$400bn. ■ Losses between \$10bn and \$400bn. ■ Gains between \$10bn and \$400bn. ■ Gains in excess of \$400bn.

Figure 2: Heat Map of Valuation Gains and Losses



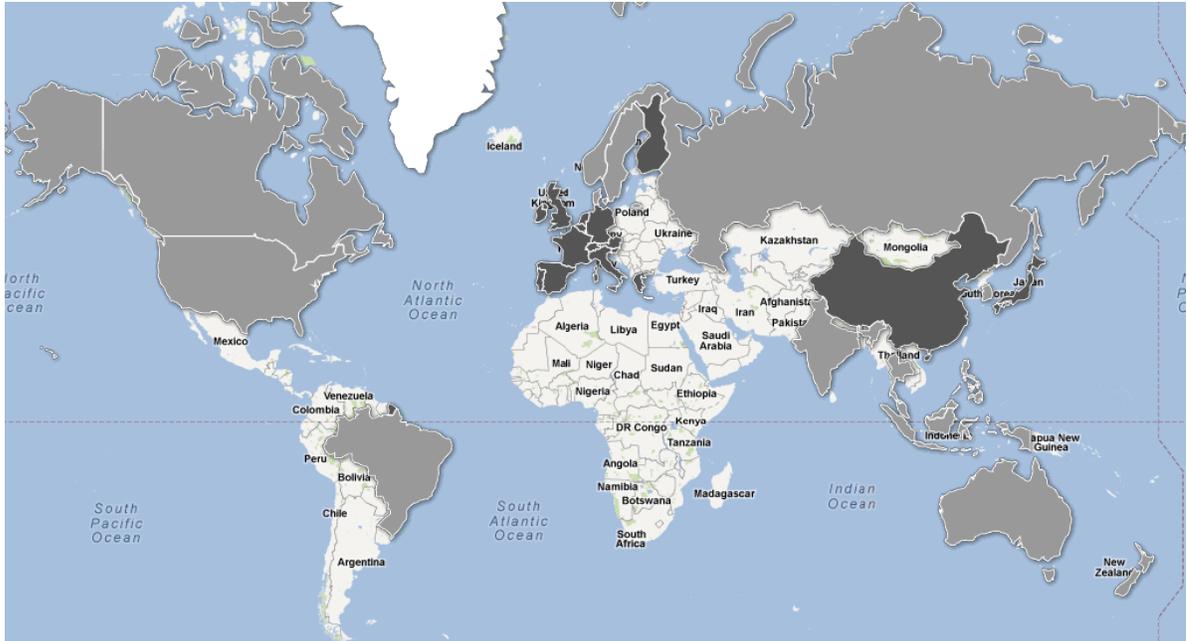
(a) Portfolio Equity



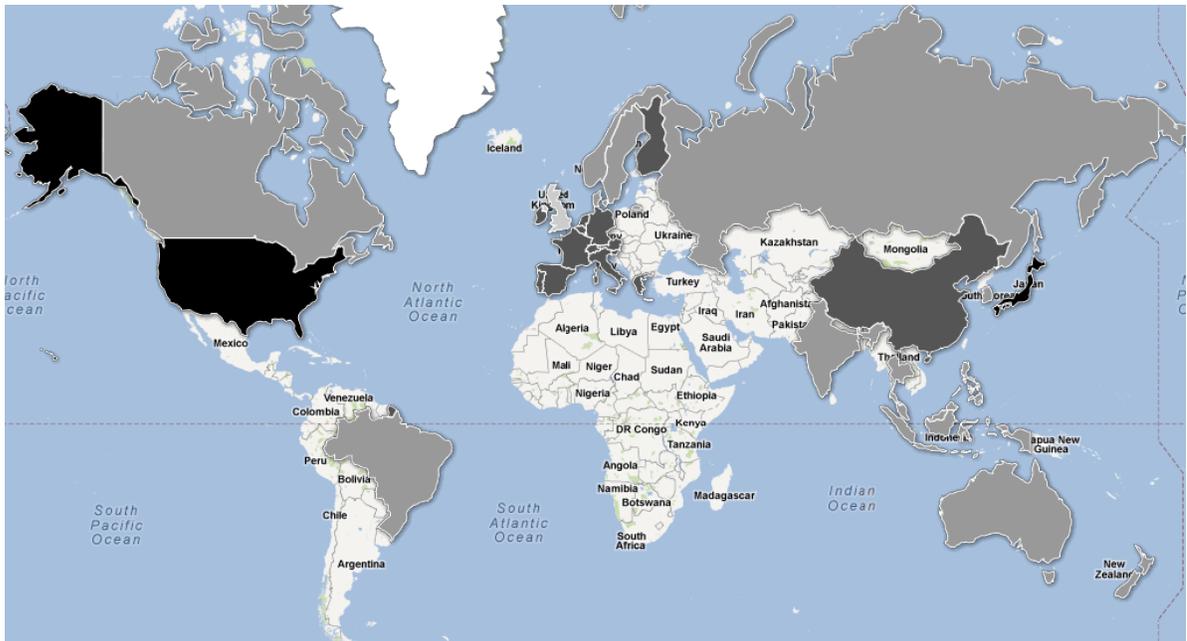
(b) Portfolio Debt

The figure reports total valuation gains/losses. Losses in excess of \$400bn. Losses between \$10bn and \$400bn. Gains between \$10bn and \$400bn. Gains in excess of \$400bn.

Figure 3: Heat Map of Valuation Gains and Losses



(a) Direct Investment



(b) Currency Gains/Losses

The figure reports total valuation gains/losses. Losses in excess of \$400bn. Losses between \$10bn and \$400bn. Gains between \$10bn and \$400bn. Gains in excess of \$400bn.

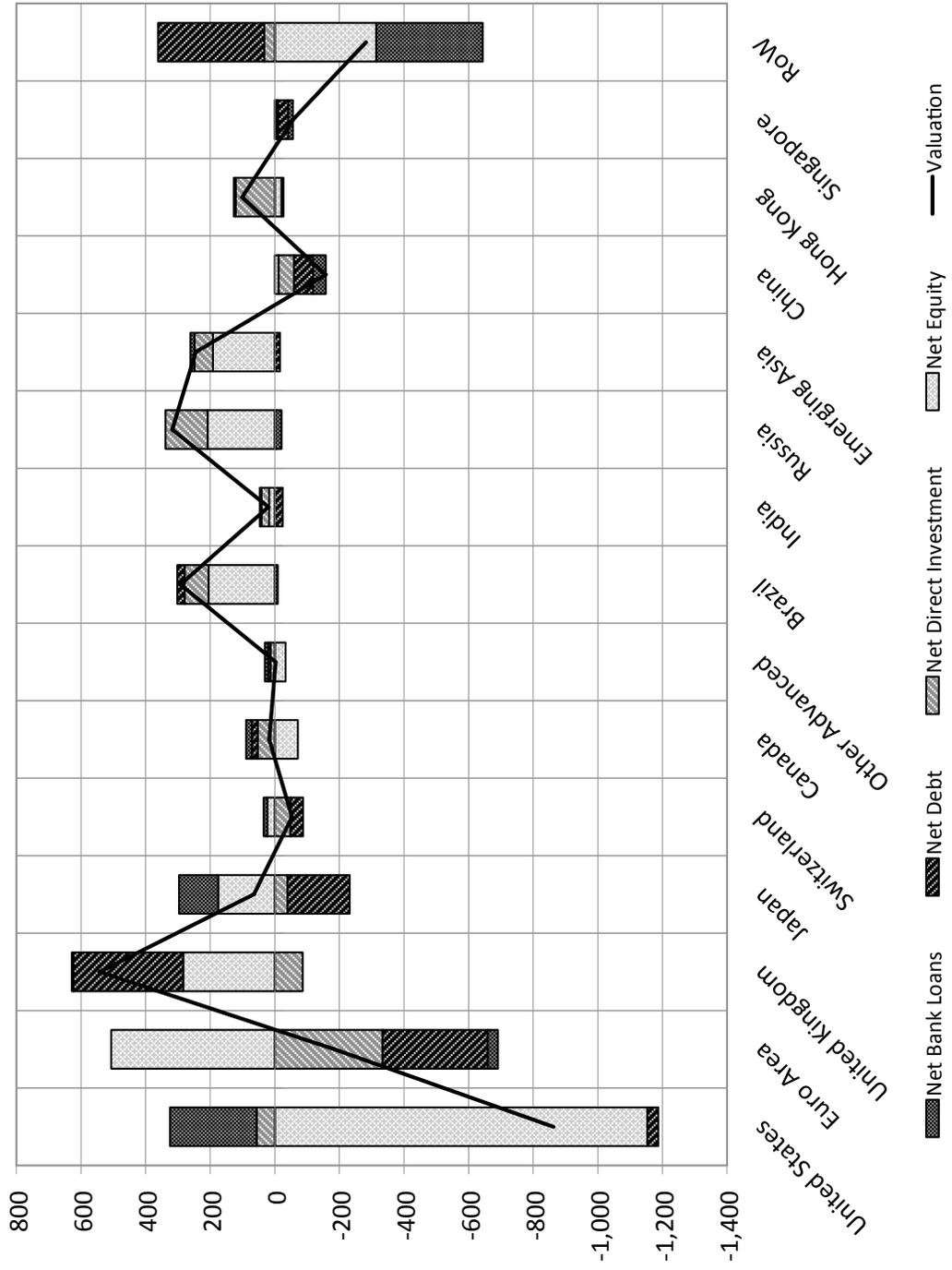
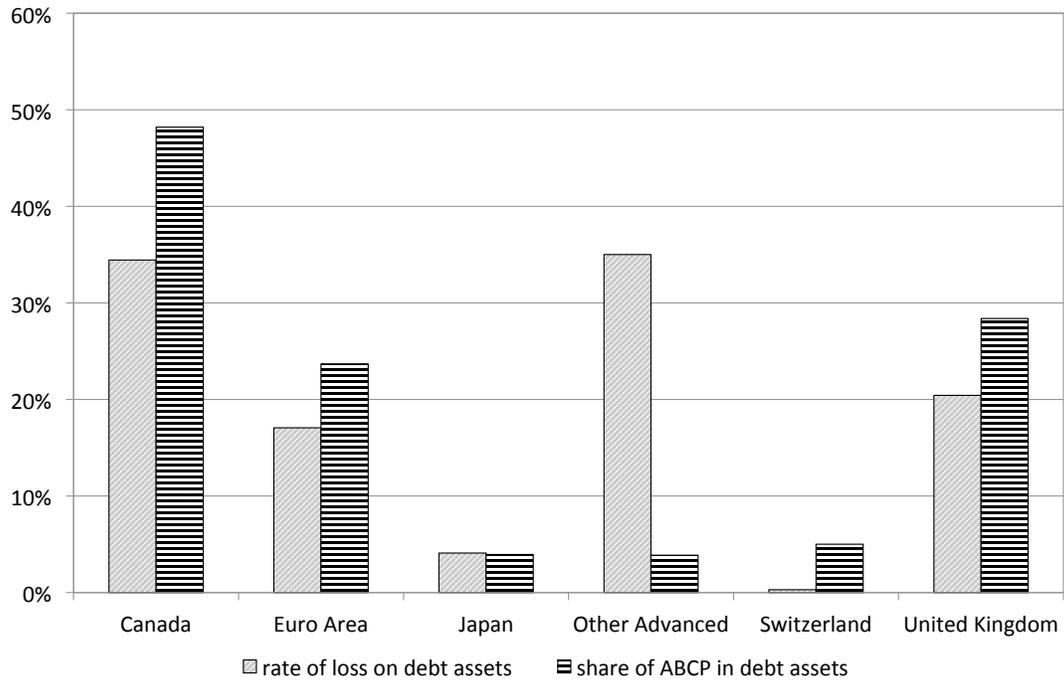


Figure 4: The Geography of Wealth Transfers

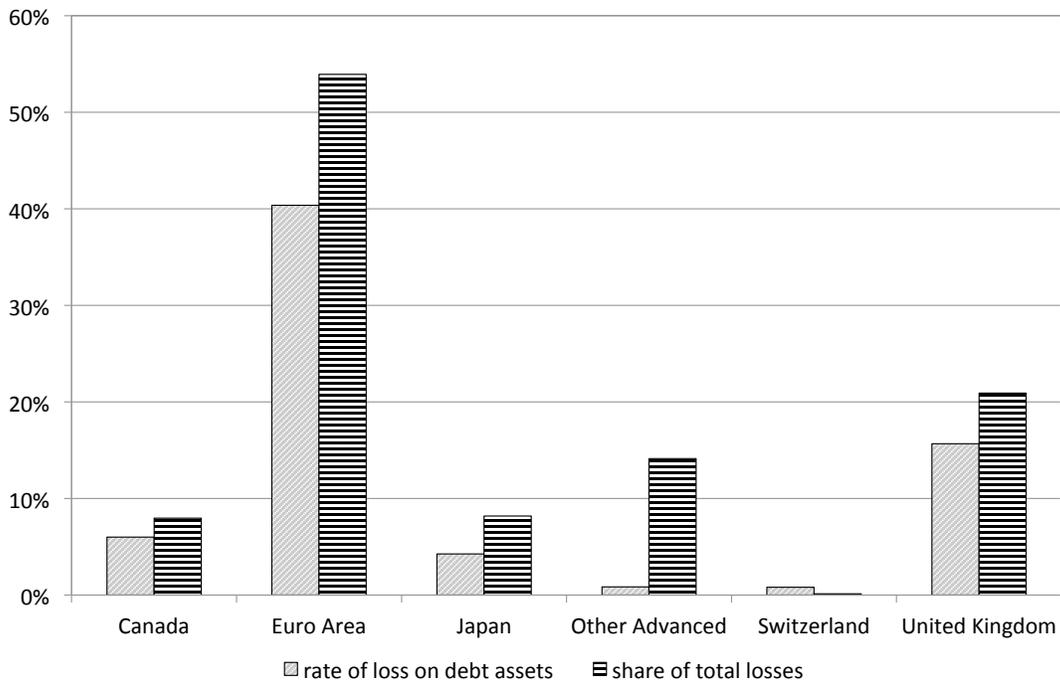
Author's Calculations. The figure reports the external valuation gain(+) /loss(-) between 2007:4 and 2008:4, broken down by asset class (equity, direct investment, debt and bank loans) and corrected for current account flows over the same period. See online appendix for data sources. Billions of US dollars.

Figure 5: Exposure to ABCP and U.S. Debt Assets Valuation Losses, by country



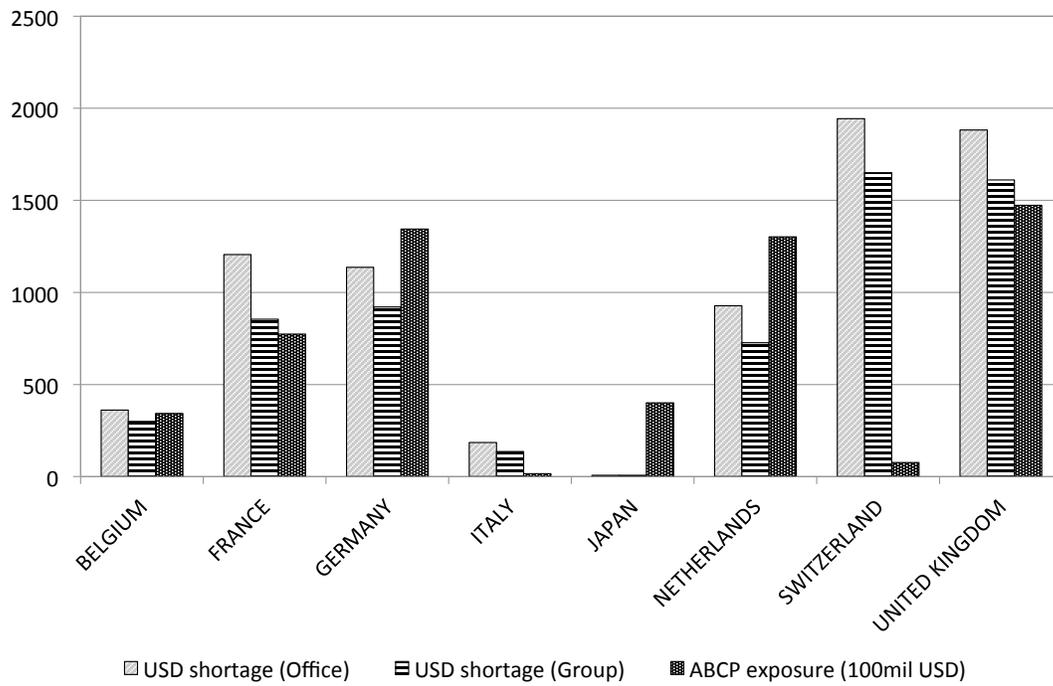
The figure reports for each country or group the share of ABCP in that country debt claims position in 2007, as well as the rate of loss on debt assets in the US between 2007Q4 and 2008Q4. Source: Authors' calculations and [Acharya and Schnabl \(2010\)](#).

Figure 6: Exposure to ABCP and U.S. Debt Assets Valuation Losses, fraction of total



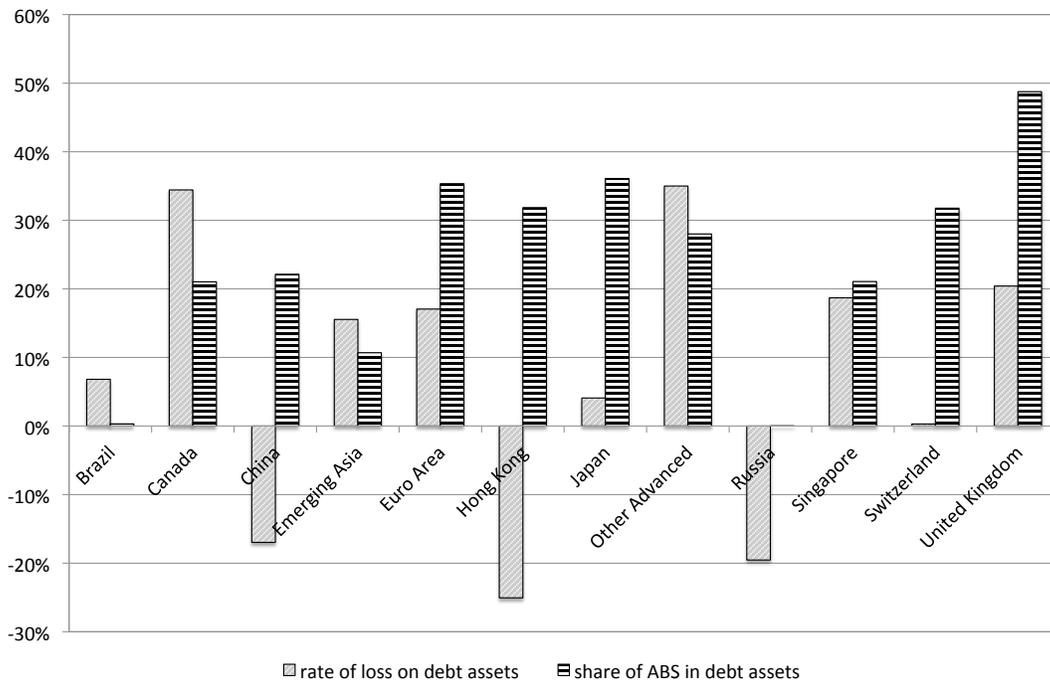
The figure reports for each country or group the share of ABCP in total ABCP holdings in 2007, as well as the share of losses on debt assets in the US between 2007Q4 and 2008Q4. Source: Authors' calculations and [Acharya and Schnabl \(2010\)](#).

Figure 7: Dollar Shortage and ABCP exposure



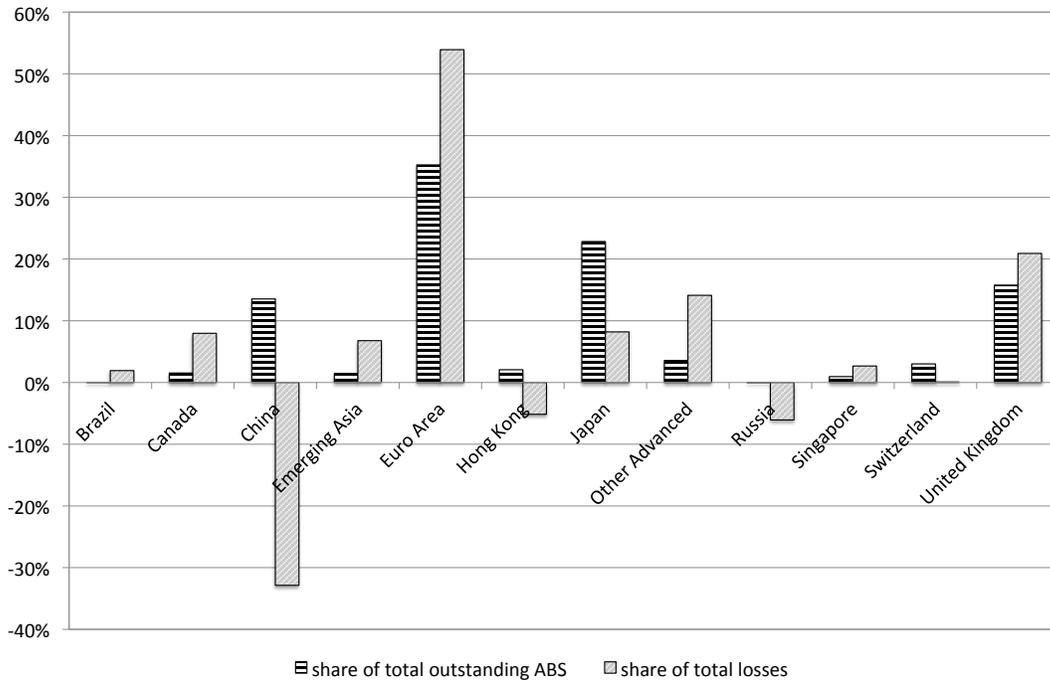
The figure reports the upper limit of the dollar shortage measures constructed at the office and group level together with ABCP exposure data at the country level. Source: [McGuire and von Peter \(2009\)](#) and [Acharya and Schnabl \(2010\)](#). Units: ABCP exposure: 100mil US dollars; US dollar shortage: billions of US dollars.

Figure 8: Exposure to ABS and U.S. Debt Assets Valuation Losses, by country



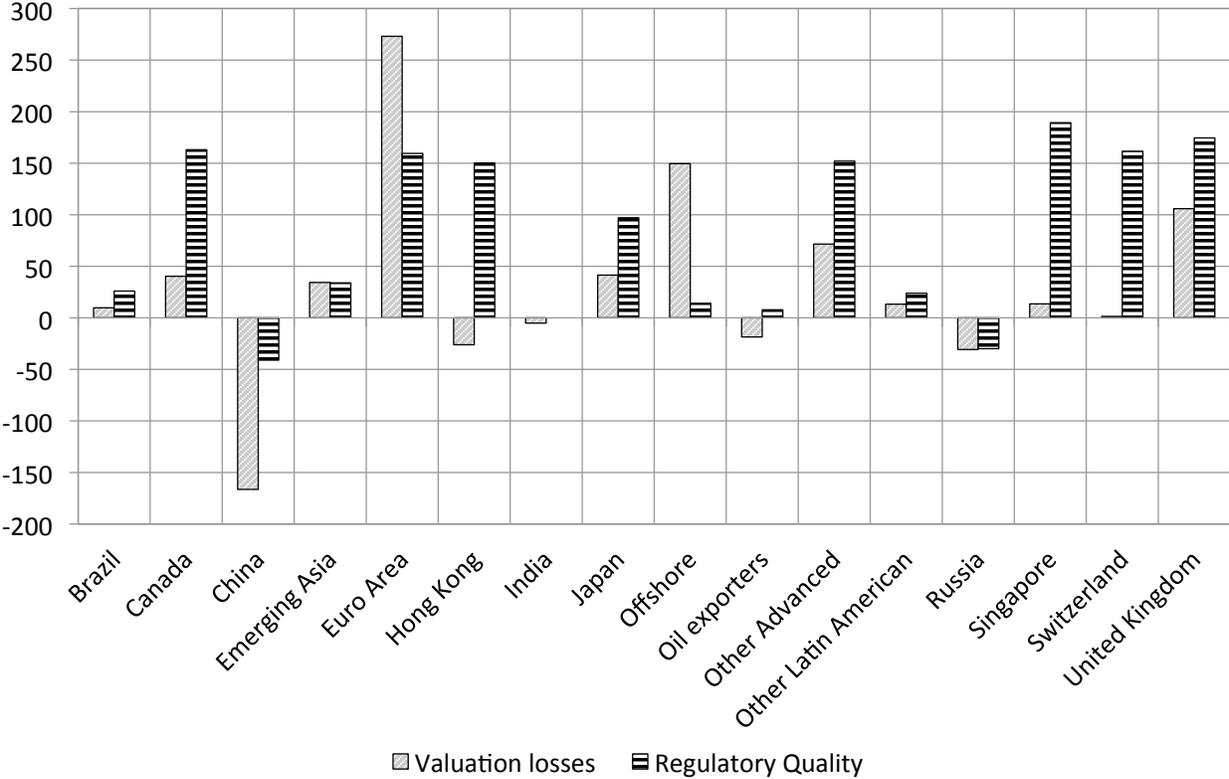
The figure reports for each country or group the share of ABS in that country's U.S. debt claims position in 2007, as well as the rate of loss on debt assets in the U.S. between 2007Q4 and 2008Q4. Source: Authors' calculations.

Figure 9: Exposure to ABS and US Debt Asset Valuation Losses, fraction of total



The figure reports for each country or group the share of ABS in total ABS holdings in 2007, as well as the share of losses on debt assets in the U.S. between 2007Q4 and 2008Q4. Source: Authors' calculations.

Figure 10: Regulatory Environment and US Debt Asset Valuation Losses, by country



The figure reports the index of regulatory quality from [Kaufmann, Kraay and Mastruzzi \(2010\)](#), together with valuation losses (+) or gains (-) on U.S. debt assets, expressed in billions of US dollars.

Appendix: Countries and Regional Groups

Individual countries:

Brazil, Canada, China, Hong Kong, India, Japan, Russia, Singapore, Switzerland, United Kingdom, United States

Regional groups:

Emerging Asia: Indonesia, Korea, Malaysia, Philippines, Thailand.

Euro area: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovenia, Spain.

Other advanced countries: Australia, Denmark, New Zealand, Norway, Sweden.

Country groups that are only included as a vis-à-vis category:

Offshore centers: Aruba, Andorra, Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Gibraltar, Guernsey, Isle of Man, Jersey, Lebanon, Liechtenstein, Macao, Mauritius, Monaco, Netherlands Antilles, Panama, Samoa, San Marino, Vanuatu, Vatican, West Indies.

Oil exporters: Algeria, Bahrain, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Oman, Qatar, Saudi Arabia, United Arab Emirates.

Other Latin American countries: Argentina, Chile, Mexico.