The Role of Stock-Flow Adjustment during the Global Financial Crisis *

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Abstract

While the recent contraction of current account imbalances that followed the Global Financial Crisis is well documented, we analyse the increasing divergence of the net international investment position in the post-crisis period. Decomposing the change in the net international investment position into capital flows and valuation effects we find that the increasing stock imbalances are driven by the former than the latter. However, valuation changes show a stabilizing pattern. Countries with the largest net foreign liabilities experienced the greatest valuation gains. Analysing this effect by different asset classes shows that this stabilising pattern was driven by a change in the value of portfolio equity. The pro-cyclical movement of the domestic stock markets during the post-crisis period improved international risk sharing through foreign portfolio equity liabilities.

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1 Introduction

In the last two decades, increasing financial integration has been of great importance in international macroeconomics. Before the crisis, rapidly increasing cross-border financial flows led to easier external financial conditions and credit booms which were accompanied by rising asset prices. While volatility as well as risk aversion was low, implications of those developments were hard to assess. In the absence of strong policy responses to these changes, foreign investment positions could grow inexorably (Lane, 2013). Consequently, the beginning of the global crisis was characterized by a reversal of financial conditions and limited external finance. Flow imbalances contracted and the crisis worked as a correction of excessive pre-crisis imbalances (Lane and Milesi-Ferretti, 2012, 2014).

However, while flow imbalances decreased sharply in the post-crisis period, stock imbalances are still increasing (Figure 1, 2). This is seen as possible systemic risk, making large debtors vulnerable to changes in the market (International Monetary Fund, 2014b). Therefore, we argue that is it necessary to shed more light on the dynamics of the increasing divergence of stock positions in the post-crisis period, i.e. accompanying the sharp flow contractions. Absent large valuation effects, for stock imbalances to reduce, a reversal and not just a contraction of flow imbalances would be required. Thus, remaining flow imbalances have contributed significantly to growing stock imbalances.

In this paper, we want to focus on the role of valuation effects of the net international investment position in the post-crisis period. Thereby, the crucial issue is whether those valuation changes were able to stabilise the net international investment position. While ignored in much of the earlier literature, Balli et al. (2011), Lane and Milesi-Ferretti (2001, 2007) show that the importance of stock-flow adjustment has grown tremendously in importance since 1980. In some cases, valuation changes dominated capital flows easily.

We find that the stock-flow adjustment moved in a stabilising direction in the post-crisis period. Countries with the lowest net international investment position experienced the most positive changes in valuation. In terms of magnitude, countries with a 1 percent of GDP lower net international investment position in 2007

experienced higher capital gains in the size of 0.23 percent of GDP on average. Therefore, the accumulation of foreign stock imbalances was significantly decelerated by the stabilising effect of changes in valuation. Analysing these effects by each asset class separately, we find that this pattern was driven by stabilising changes in the valuation of portfolio equity liabilities. This emphasizes the role of the domestic stock market for international risk sharing. We show that because stock markets moved in a pro-cyclical direction in the post-crisis period, countries with a lower output were able to generate relatively more valuation gains through their portfolio equity liabilities.

The risk of financial distress due to large net external positions is documented in the literature (see, for example, Obstfeld, 2012a, 2012b). More specifically, Catão and Milesi-Ferretti (2013) present a model including the net international investment position which - if estimated with data from 1970-2006 - would have predicted most of the 2008-2011 crisis. While external imbalances might not have triggered the recent crisis, external debt liabilities increase the probability of an external crisis. Looking further back, Milesi-Ferretti and Razin (2000) present evidence that countries with low reserves and long persistent deficits in the past are more likely to experience a sharp reduction in their current account. Calvo et al. (2004) find that the intensity and the duration of financial turmoils once a sudden stop has occurred positively depend on total debt, especially when combined with a high domestic liability dollarisation. Summing up, several surveys like the World Economic Outlook (International Monetary Fund, 2014b) and External Sector Report (International Monetary Fund, 2014a) warn that the development regarding growing stock imbalances is unlikely to reverse during the rest of this decade which imposes systemic risk to the international financial system.

Accordingly, the goal of this paper is to shed light on the dynamics behind the increasing imbalances of net international investment positions with a focus on the driving factors of the stabilising stock-flow adjustment. In Section 2, we explain the conceptual framework whereas in Section 3 we present some stylized facts. Section 4 shows an empirical analysis and Section 5 concludes.

2 Conceptual Framework

The relationship between the flow and the stock position is usually studied in the following form:[1]

$$\begin{aligned} NIIP_t - NIIP_{t-1} &= NETFLOW_t + SFA_t && (1) \\ &= CA_t + EO_t + SFA_t && (2) \\ &= FA_t + SFA_t && (3) \end{aligned}$$

where $NIIP$ refers to a country's net international investment position and SFA is the stock-flow adjustment. We measure the $NETFLOW$ with CA as the current account, FA as the financial account, and EO including errors and omissions in order to equal out these measures. Therefore, the increase in imbalances we observed can be due to flow imbalances ($CA + EO$ or FA) or the stock-flow adjustment (SFA). In more detail, the financial account can be divided by asset classes:

$$FA_t = FDI_{Nt} + PEQ_{Nt} + PD_{Nt} + OI_{Nt} + DERIV_{Nt} + RES_{At} \quad (4)$$

where FDI_{Nt} is foreign direct investment, PEQ_{Nt} and PD_{Nt} correspond to portfolio equity and portfolio debt respectively, OI_{Nt} is other investment, $DERIV_{Nt}$ measures foreign derivatives, and RES_{At} corresponds to holdings of foreign reserves on the asset side. Except for the latter, all values are net terms.
On the other hand, the stock-flow adjustment can be expressed as

$$SFA_t = VAL_t + OTH_t \quad (5)$$

where VAL_t measures changes in the valuation of the net international investment position due to changes in market prices or the exchange rate. The "residual" is captured in OTH_t which contains e.g. new measurement techniques, data revisions, or reclassifications.

In this section, we want to outline the rationale for dissecting the evolution of the net international investment position, especially in the post-crisis period.

[1] For simplicity, we ignore the capital account due to its small magnitude.

2.1 The Flow Dimension

What is casually known as Financial Globalisation was the sharp increase in cross-border financial flows that allowed exorbitant debt levels between countries accompanied by a substantial widening of global current account imbalances in the years before the crisis. This seems surprising considering that risks attached to international financial integration are widely discussed in the literature (e.g. Edwards (2004) ; Obstfeld (2012a); Freund and Warnock (2007)). Using the case of the United States, Obstfeld and Rogoff (2005, 2007) argue that the adjustment process of an excessive deficit country's current account itself would bear considerable risks to general economic stability and financial markets, especially if the adjustment is stemming from a loss of confidence by foreign investors in the U.S. economy. Not just excessive deficit levels, but also persistent surplus balances can be signs of macroeconomic distortions such as unfair competition advantages, failures in financial regulation, or the global demand in case of a liquidity trap. In addition, exceptionally low investment can be due to an inefficiency of markets such as a lack of competition. Therefore, the literature agrees that persistent excessive imbalances, regardless of the sign, should be reduced (Milesi-Ferretti and Blanchard, 2010, 2011). It was therefore crucial to observe the unravellings of flow imbalances following the recent global financial crisis. Although they were most likely not the trigger for the crisis, in 2007/2008, a sudden stop in capital flows caused a contraction of flow imbalances. With the exception of a "relapse" in 2010, current account imbalances decreased ever since the crisis started in 2008. Figure 1 shows that not just total dispersion but also configuration of flow imbalances have changed markedly. China and Japan reduced their surplus through expansionary fiscal policy, lower demand for the countries' exports and a higher demand for imports. On the other side, European deficit countries adjusted quickly, turning the euro area into a surplus area as a whole. Most importantly, the United States deficit shrank by almost two-thirds as a percentage of world GDP which represents the largest adjustment of all countries (around 400 billion USD). Consequently, the concentration of deficits also decreased dramatically.

Lane and Milesi-Ferretti (2012, 2014) show that this contraction in current account

imbalances from 2008-2012 is significantly correlated to imbalances that emerged in the pre-crisis period. Extending this analysis, we find that the peak of current account adjustment in the post-crisis period was reached in 2013 where 90 percent of the deviation from fundamental values of the current account was reversed.[2] Regarding the macroeconomic developments during the adjustments, countries with the greatest negative pre-crisis current account gap experienced slower growth of real output, a greater decline of inflation, and a stronger improvement of the structural fiscal balance. According to forecasts (International Monetary Fund, 2015), the adjustment process will slow down but resulting in levels far below pre-crisis current account imbalances. This is in line with recent literature which suggests that the current adjustment process is mostly permanent rather than solely due to cyclical factors like the exchange rates or changes in output growth (Cerra and Saxena, 2008, Cheung et al., 2013, Eichengreen, 2014).

2.2 The Stock Dimension

In the absence of dominating stabilising valuation effects, large flow imbalances before the crisis have added up to more divergence in the overall net international investment position. In theory, the key economic significance of a country's foreign stock position is that at any point in time, it represents the limit of the present value of its future net export deficits (excluding international investment income). This national constraint describes a country's feasible transactions with foreigners and can be viewed as a combination of three more basic relationships: the households's budget constraint, the government's budget constraint, and the present value of future profits generated by domestic capital (Obstfeld, 2012a).[3]

The empirical literature, however, calls for models with fully fledged optimizing behavior compatible with the data. The most evident question thereby is as to why the rest of the world would finance a persistent current account deficit country

[2]Results available upon request. This finding is also the rational for using 2008 - 2013 as the years of the adjustment of global imbalances during the post-crisis period in the empirical specification in this paper.

[3]In more detail, the theory outlined in Obstfeld (2012a) shows that for a deficit to be sustainable, expenditure has to fall or output has to rise when the net international investment position is decreasing so that the private and public sectors both remain solvent (in the absence of changes in the valuation of net foreign assets). Borrowing beyond present value of net export surplus would ultimately lead to a solvency crisis somewhere in the economy.

such as the United States (Gourinchas and Rey, 2007). In general, the empirical work has focused on countries with high deficits. The idea behind this is that excessive debtor countries face the risk of abrupt reversal of capital flows in contrast to creditor countries. The crucial issue thereby is whether and how good a net international investment position can predict any kind of crisis. Most recently, Catão and Milesi-Ferretti (2013) show that their model with net foreign liabilities as their main explanatory variable would have forecasted most of the 2008-2011 crisis. Regarding asset classes, the authors identify debt liabilities as the driving force for this effect.

If we bear in mind those risks of excessive stock imbalances, the increasing divergence of stock positions ever since the late 1990s should be alarming. With the literature mostly focusing on the contraction of flow imbalances and the accompanying macroeconomic adjustment, International Monetary Fund (2014b) warns of ignoring the growing imbalances of net international investment positions. With excessive flow imbalances in the pre-crisis period, net foreign stock imbalances increased dramatically since the beginning of the 2000s (see Figure 2). Among very few countries, European periphery countries did reverse their flow balances to surpluses which is theoretically necessary in order to reduce external debt. However, this is an exception. Most of the rest of the world reduced but did not reverse flow imbalances which - absent large changes in valuation - accumulates to a larger imbalance of a country's net international investment position (Fidora et al., 2017).

2.3 Stock-Flow Adjustment

However, not only flows determine the evolution of the stock position as shown in equation (3). The difference between the change in the net international investment position and the capital flows is recognized as the so-called stock-flow adjustment. While ignored in earlier literature, this effect has recently gained considerable attention (Balli et al., 2011, Lane and Milesi-Ferretti, 2001, 2007). In some cases, stock-flow adjustment dominated capital flows easily. The effect as a whole consists of the change in the valuation of foreign assets and liabilities and an *other* category (OTH) which absorbs remaining possible changes, e.g. data revisions or reclassification of assets. As there is no existing evidence that the latter might drive

an overall effect of stock-flow adjustment through a specific pattern, the natural interpretation of the total effect can be a change in valuation.[4] This change, in turn, can be due to changes in the price of an asset or a change in the exchange rate. Theoretically, the exchange rate channel could cushion the size of the exchange rate correction that would typically come with an adjustment of external imbalances. In the case for the United States, a dollar depreciation could generate valuation gains by boosting the dollar value of much of its foreign-currency-denominated assets (Cavallo and Tille, 2006). However, Bénétrix et al. (2015) show that there is limited evidence that the exchange rate channel by itself can contribute significantly to financial stabilization. This is in line with the large literature on the disconnection between macro fundamentals and the exchange rate (Obstfeld and Rogoff (2000), Lane and Milesi-Ferretti (2012, 2014)). Therefore, it is clearly an interaction of the exchange rate and the price channel that creates wealth effects through the stock-flow adjustments.

In addition, the composition of the net international investment position in terms of asset classes seems to have very different implications for a country (see e.g. Catão and Milesi-Ferretti (2013), Gourinchas and Rey (2007)). Not only the amount of net foreign liabilities but also its (gross) composition plays a significant role (Bénétrix, 2009). This has been much discussed for the case of the United States and its asymmetric balance sheet. After a period of deregulation of cross border flows at the end of the last century, the country has increased its net foreign debt up to 42 percent of GDP in 2014. However, up to the crisis, the United States have traditionally been able to gain excess returns of gross assets over gross liabilities having to pay foreigners less than what the country was able to gain on its foreign assets. Gourinchas and Rey (2005) show that this results from a "composition effect" created by the short borrowing and the long lending position, thereby supplying liquidity to foreign asset holders and loans to foreign enterprises. For the United States, not just asset classes but also the analysis of the currency composition of gross positions shows that the "exorbitant privilege" of the United States results from the ability to run large direct investment surpluses which were financed by the

[4] In addition, due to scarce provision of granular data, the effects can only be disentangled for the United States, Australia and for the Euro Area since 2013.

issuance of the own currency by foreign central banks. A country naturally benefits from a depreciation of its currency if it is a net creditor in assets denominated in foreign currency. In that context, Tille (2008) emphasized the important stabilising effects of a dollar depreciation for the United States where almost all debt is issued in dollars while most of the assets are denominated in foreign currency.

Overall, we want to look at the stock-flow adjustment as a device for international risk sharing. According to standard models, increasing financial integration can lead to perfect consumption risk sharing, whereby fluctuations in consumption are disconnected from idiosyncratic fluctuations in output (Obstfeld and Rogoff, 1996). However, the literature shows that this does not hold in the data (Backus et al., 1993, Lewis, 1996). More recent work has confirmed that the degree of risk sharing remains imperfect, but has increased over time. While international risk sharing was traditionally achieved through savings and factor income from international financial flows, capital gains have become increasingly and significantly important. Balli et al. (2011) show that changes in the valuation of foreign assets have outperformed gains from factor income flows for European Union countries and OECD since 1999. Overall, empirical work has been scarce and/or focused on the United States due to data availability. However, the more general question is if the change in valuation moved in a stabilising direction across countries, especially during stark current account contractions which we experienced in the post-crisis period from 2008-2013. If this is the case, stock-flow adjustment has the potential to achieve risk sharing when countries need it the most.[5]

3 Stylised Facts

For completeness, we start by shortly summarising several important characteristics of increasing financial integration in the last 25 years in Figure 3. Regarding the overall evolution of gross international investment position, we can see that for industrial as well as emerging/developing countries, the main increase happened in the decade preceding the crisis. Industrial countries subsequently experienced two sharp drops in 2008 and 2011. In addition, the graphs show differences in the

[5]We derive this potential mechanism in Appendix B.

composition of net international investment positions of industrial countries and emerging and developing countries, most importantly the much higher importance of reserve assets for emerging countries.[6] On the liabilities side, foreign direct investment liabilities represent the lion share for emerging countries. While bank loans were primary source before 2000, portfolio equity liabilities increased sharply, even throughout the crisis. This combination of an increase in liquid foreign reserves and the shift from debt to equity funding put emerging and developing countries in a relatively better position when the crisis hit in 2008. Finally, one should note the different size of balance sheets, i.e. most foreign assets (liabilities) are still held (issued) by advanced economies.

So far, we have analyzed the evolution of the value of (gross) stock position. These developments are influenced by capital flows but also by the change in the valuation of foreign assets and liabilities. As the latter is difficult to grasp directly, it is usually derived from the difference of flows and the change in the stock position. From equation (3) we can derive:

$$NIIP_t - NIIP_{t-1} = Flow_t + SFA_t \tag{6}$$

$$SFA_t = (NIIP_t - NIIP_{t-1}) - Flow_t \tag{7}$$

In Figure 4, we plotted the evolution of the net international investment position and cumulated flows for the Unites States, the United Kingdom, China, and Germany. Thereby, we use the financial account for the cumulated flows with the value of the 1996 net international investment position as a starting value.[7] Comparing the two time series we can find big discrepancies. At some points in time, the net international investment position and cumulated flows evolve in opposite directions which means that the stock-flow adjustment outweighed the direction of flows with the opposite sign. We can see that the United States represent an exeption as

[6] While those seem to play a very limited role for the developed world, they represent the biggest share for the rest of the sample. A prime example is China with reserves representing 67 percent of total assets (43 percent of GDP) before the crisis in 2008.

[7] We did the same using the current account and the graphs look almost identical which is reassuring regarding the data. In theory, the current account balance should be equal and "opposite" the capital and financial account. In practice, the balance of payments only accounts to zero through a term called net errors and omissions which contains statistical discrepancy resulting from imperfections in source data and compilation of the balance of payments accounts.

the two lines moved closer together in the post-crisis period. This is in line with Gourinchas et al. (2010) who describe the special role of the United States as a "global insurer": the country enjoys the exorbitant privilege in good times while wealth flows to the rest of the world during a crisis.

Looking closer at the mechanisms of changes in valuation, we want to analyze different asset classes separately. Thereby, we have to take into account the accounting principles regulated in the Balance of Payments (BOP) manual which serves the consistency of the reporting of the individual countries. Bank loans are reported in their nominal value while portfolio equity must be recorded in market value. Therefore, without looking at the actual values of foreign liabilities or holdings, the easiest fact to observe is the valuation of equity which is listed on the stock market. Given that a country sells its portfolio equity to foreign investors, the domestic stock market index can reflect changes in a country's liabilities towards these investors. If those changes in valuation were stabilising in the post-crisis period, a country that accumulated more net foreign liabilities during the crisis would experience a relative bigger decrease in their stock market, thus reducing liabilities to foreign investors and improving the overall net international investment position. This is what we can observe in Figure 5: surplus countries such as Germany, Japan, or Switzerland experienced an overall gain in their stock market in the post-crisis period. Thus, the value of their liabilities rose which represents a valuation loss. The contrary happened in countries with high net foreign liabilities such as Iceland and Greece where the stock market dropped relatively more in the years over the crisis.

At this point, the relative share of portfolio equity is also worth mentioning. Table 1 shows that the importance of this asset class measured as a percentage of total assets and total liabilities grew significantly. This is especially the case for emerging and developing countries where the share of portfolio equity liabilities increased by around 600% to almost a quarter of total liabilities in the 20 years proceeding the crisis. Based on findings by Catão and Milesi-Ferretti (2013) and Calvo et al. (2004) who find only foreign debt instruments to be a significant predictor for crises, we argue that this shift to equity funding put emerging and developing countries in a relatively better position when the crisis hit in 2007.

4 Empirical Analysis

In this section, we want to analyse the behavior of capital flows and stock-flow adjustment in the post-crisis period and how they contributed to the increasing divergence of the net international investment position.

4.1 Data and Sample

For this analysis, we use estimates of foreign assets and liabilities and their asset classes from an extended version of the External Wealth of Nations dataset (Lane and Milesi-Ferretti, 2001, 2007). The estimates are based on stock measures, supplemented by cumulative capital flows including appropriate valuation adjustments. Therefore, the estimated stock positions for equity and foreign direct investment based on flow data are adjusted to reflect the effect of exchange rates and changes in market prices. For flow measures, we use the Balance of Payments Statistics of the International Monetary Fund. Data on the current account are drawn from the April 2016 database of the World Economic Outlook, stock market data are drawn from the World Bank database, and Central Bank Policy Rates are obtained from Reuter's Datastream.

There are several limitations concerning data on capital flows. First, Balance of Payments data on flows are not available on the level of asset classes for all the 60 countries of our sample.[8] Another caveat is the incompleteness of sectoral data for foreign financial positions. This would be a valuable addition to this analysis as the consequences of valuation gains or losses can have different implications depending on the holding sector of the asset. While banks (or other leveraged institutions) could generate amplification effects, this is not likely to be the case for poorly connected investors. Finally, a well known problem is "round tripping" where flows from one country to another may just be part of a chain of transactions. Investors might want to channel his investment abroad through a third country or even make a domestic investment involving cross-border intermediaries (Zucman, 2013). If a transaction is only recorded by one side, this might increase the errors and omissions

[8] We run all regressions with the largest available sample. For robustness, we also re-run the regressions with the smallest available sample within different specifications of a regression but results do not change.

of the BOP.

For this analysis, we use a sample of 60 advanced and developing countries (see Appendix A). Oil exporters are excluded due to the strong dependence of their trade balance on oil. Also, very small countries are excluded as their current accounts are strongly influenced by transfer payments, debt forgiveness, and other irregularities. We exclude Iceland due to its extreme stock-flow adjustment. While the mean stock-flow adjustment of the sample is around 3 % of 2013 GDP, Iceland experienced valuation losses of over 240% of 2013 GDP in the post-crisis period.[9] As a final step, we exclude Hong Kong and Singapore as major financial centers with outlier values for their net international investment positions. Lane and Milesi-Ferretti (2014) argue that the measurement error is more likely to be a significant contributor to the stock-flow adjustment term for international financial centers considering the high ratios of gross foreign assets and liabilities to GDP.

4.2 The Driving Forces of the Divergence of the Stock Positions

While the recent contraction of flow imbalances is well documented (WEO, October 2014), we want to analyse the increasing divergence of the net international investment position (see Figure 2). The first question is the break down in equation (1): whether flow imbalances or the stock-flow adjustment was driving the growing divergence of net international investment positions in the post-crisis period. The most intuitive way to test this correlation is to see whether post-crisis flows and stock-flow adjustment are positively or negatively correlated to the pre-crisis stock position:

$$CumFlows_{i,0813} = \alpha + \beta_{Fl} NIIP_{i,07} + \epsilon \tag{8}$$

where $CumFlows_{0813}$ is the cumulated capital flows in the years 2008-2013 divided by nominal GDP in 2013 and $NIIP_{07}$ is the pre-crisis net international investment position in percent of GDP.[10] A $\beta_{Fl} > 0$ would mean that flows are causing further divergence in stock positions. This might be due to the fact that flow imbalances

[9] Due to this very extreme value, regression results are not robust to the exclusion of Iceland.

[10] As mentioned before, we use the years 2008-2013 as we find the current account adjustment in the post-crisis to peak in 2013. Results of this extension of work by Lane and Milesi-Ferretti (2012, 2014) are available upon request.

contracted but in the absence of significant stock-flow adjustment a reversal would be needed for imbalances to decrease. On the other hand, $\beta_{Fl} < 0$ would mean that capital flows reversed across countries, thereby stabilising the net international investment position.

To look at the stock-flow adjustment, we estimate

$$SFA_{i,0813} = \alpha + \beta_{SFA} NIIP_{i,07} + \epsilon \tag{9}$$

where SFA_{0813} are cumulated stock-flow adjustments from 2008 - 2013 divided by nominal GDP in 2013. While capital flows are recorded directly by the Balance of Payments Statistics, we can derive the stock-flow adjustment from equation (3):

$$SFA_{i,0813} = (NIIP_{i,13} - NIIP_{i,07}) - \sum_{08}^{13} Flows_i \tag{10}$$

Again, we want to point out that SFA hereby also captures the "residual" (see OTH in equation 5) which contains for instance new measurement techniques, data revisions, or reclassifications. A subdivision of those two components is only published for Australia and the United States which is why empirical work has been scarce so far.[11] We can find empirical work on the foreign position of the United States where the "residual adjustment" in OTH_t are analyzed separately from capital gains (Curcuru et al., 2007, Gourinchas and Rey, 2007, Lane and Milesi-Ferretti, 2009). However, we deliberately want to adopt a broader approach by examining the dynamics of the stock-flow adjustment in the post-crisis period in the cross-sectional dimension. As there is no existing evidence that the residual might drive an overall effect of stock-flow adjustment through a specific pattern, the natural interpretation of the total effect can be a change in valuation.[12]

Regarding the regression in equation (9), we can find international risk sharing through the net international investment position if $\beta_{SFA} < 0$ so that the countries with the largest net foreign liabilities experienced the largest positive stock-flow adjustment. At this point, we want to point out that this is a descriptive analysis of correlations. The risk sharing obtained through the stock-flow adjustment is

[11] The Euro Area reports data for the years after our sample period (starting in 2013).

[12] In addition, Lane and Milesi-Ferretti (2009) argue that the residual is unlikely to reflect mismeasured capital gains which is reassuring concerning our approach.

consistent with some international risk sharing from endogenous prices so we stop well short of doing any analysis of causality.

We can find the results in Table 2. Column (1) applies to the flow dimension: the positive correlations shows that countries with the highest net international investment position in the pre-crisis period also experienced the highest positive flow imbalances in the post-crisis period. This causes further divergence of international stock positions. In line with existing literature, we have used the current account as a measure for flows. However, there are also reasons to use the financial account as it is a more direct measure of capital flows, i.e. cleaned for EO. Therefore, as a robustness test, we also use the financial account as a measure for flows in column (3) and the coefficient remains highly significant. In terms of magnitude, the coefficient in column (1) means that a country with a 1 percent higher net international investment position in 2007 experienced higher capital outflows in the amount of 0.48 percent of 2013 GDP.

In column (2) we can see that stock-flow adjustment overall worked in a stabilising direction which confirms our hypothesis about international risk sharing through the net international investment position: countries with the highest net international investment position experienced the lowest capital gains. In terms of magnitude, countries with a 1 percent of GDP lower net international investment position in 2007 experienced on average a 0.22 percent of 2013 nominal GDP higher capital gains. Again, the coefficient remains significant using the financial account in column (4).[13]

The differences using the financial or the current account might let us derive a pattern for the term "errors and omissions". The effect of stock-flow adjustment is greater and more significant if we use the current account instead of the financial account. This means that "errors and omissions" might be - on average - negative for surplus countries and positive for deficit countries. Figure 6 shows that this is the case for our sample where we split surplus and deficit countries. This is in line with findings by Lane and Milesi-Ferretti (2007) and Zucman (2013) and might reflect

[13]For robustness, we also divide the flows and stock-flow adjustment by the nominal GDP of other years to make sure the result is not driven by levels of nominal GDP in 2013. However, our finding that the divergence of stock positions is driven by flow imbalances while stock-flow adjustment is stabilising remains significant.

unrecorded capital flows.

In Table 3 we want to make sure our results are not driven by specific country groups or might even be contrary for subsamples. We split into countries with floating and pegged exchange rate regimes (column 2 and 3) as the latter group is restricted in individual monetary policy on country level which could contribute to capital gains through the exchange rate channel. In addition, we have pointed out that the composition of the net international investment position of advanced and emerging countries is considerably different which is why we split the group accordingly in column (4) and (5). However, the coefficient has the expected sign for all subsamples and the effect turns out to be most significant for the entire sample (column 1).

4.2.1 Robustness

We purposely used this univariate regression as it is not the purpose of this paper to describe everything that influenced flows and stock-flow adjustment. More so, we want to establish patterns of correlations for the post-crisis period which we consider important for macroeconomic stability. However, to make sure those correlations are not purely driven by other factors, we include the real GDP growth, the change in the stock market, and the change in the central bank policy rate in our regressions as a robustness test (see Appendix A, Tab 1). However, with those controls, the significance of our coefficients remains at almost identical levels which is reassuring regarding the robustness of our correlations.

In addition, we wanted check if the composition of a country's portfolio might drive the overall valuation effect. Therefore, we look at correlations of each asset class as a ratio of the gross position. However, we can show that none of the relative shares of each asset class in 2007 are significantly related with the subsequent stock-flow adjustment.

4.3 Analysis of Individual Asset Classes

In this section, we want to see which types of assets drive the stabilising effect of the stock-flow adjustment. Again, we measure this by subtracting the flow from the change in the stock position of each asset class. This is especially important since the literature has pointed out significant differences between asset classes and

implications of their imbalances (e.g. Rogoff, 1999 and Lane and Milesi-Ferretti, 2001b). At a first glance, in Table 4, we can see that all asset classes have the expected sign except for reserves. Countries with the highest net international investment position also experienced the highest capital gains from reserve assets. This is driven by European surplus countries: above all, Switzerland, followed by Scandinavian countries and Germany. Also China, as a main creditor, has received capital gains from reserves. This effect is most likely due to the appreciation of the USD, especially in the first two years after the crisis. However, reserves show the smallest coefficient among the significant classes and the effect is outweighed by the stabilising effect the equity components the net international investment position. In the following, we describe the mechanism behind the effect of these significant asset classes.

4.4 Other Investment

We do not find a significant effect for this asset class which contains everything that does not belong to the other categories, i.e. other equity, currency and deposits, loans (including IMF credit), life and non-life insurance (reserves), trade credit and advances, SDR allocations, and other accounts receivable/payable.[14] In Figure 7, we see the composition of this asset class when the crisis hit in 2008.[15] We want to offer several explanations as to why we think that this asset class did not contribute to the stabilizing effect of the changes in valuation. First, we can see that the biggest part of this asset class are loans in the form of traditional credit (including IMF loans) and currency and deposits. Together with other accounts payable/receivable, those belong to the group of nonnegotiable instruments which means that the registered value is the nominal value of an asset, not adjusted for expected losses or for changes in interest rates.[16] This implies that the nominal value we have can only be reduced by write-offs, restructuring, or debt forgiveness which happens less frequently than changes in valuation of other asset categories, such as portfolio equity. Furthermore,

[14]SDR holdings are included in reserve assets

[15]For a reference, this asset class represented on average 30 percent (32 percent) of total assets for advanced (emerging) and 35 percent (40 percent) of total liabilities for the countries in our high quality sample (Appendix A).

[16]This method is influenced by concerns about data availability and consistency in reporting.

parts of these loans are not even subject to debt forgiveness due to regulation or bilateral agreements. For instance, some country programs during the crisis, such as the one in Greece, prohibits a write-off of loans from creditors, such as the IMF. Secondly, another factor that could influence a change in the value of non-negotiable instruments is the exchange rate. For example, if the USD appreciates and country holds bank loans in USD, e.g. most of the emerging countries in our sample, this would be a valuation loss as their liabilities increase in value. If this mechanism were at play, then we should find a significant effect for countries which can adjust their exchange rate freely. This is what we can see in Table 5. While pegged countries show a significant destabilizing effect, floating countries are in line with the overall stabilizing role of stock-flow adjustments.

4.5 Portfolio Equity

Portfolio equity includes cross-border equity securities other than foreign direct investment or reserves. In contrast to other investment, the valuation of those securities is at market and not at nominal value. This is straight forward for listed portfolio equity securities where market prices can be obtained from the stock market. When the security is not listed, an estimation has to be made. This can be e.g. the recent transaction price, a discount of future profits, or a derivation from the company's net asset value at market price. Intuitively, it seems clear that changes in the valuation of securities can influence the value of stocks considerably. The crucial question therefore is whether these dynamics contribute to international risk sharing. The significant coefficient for portfolio equity in Table 4 shows that this is the case for the post-crisis period. Therefore, stock-flow adjustment moved in a stabilising direction: countries with the lowest net international investment position experienced the greatest valuation gains from portfolio equity.

Due to its potential for international risk sharing, we want to look at this pattern more closely. The first question is whether this effect comes from gross assets or gross liabilities. This is especially interesting in the case of portfolio equity as liabilities are issued on the domestic stock market while assets can be bought abroad. Therefore, assets could contribute to the stabilising effect through the exchange rate mechanism. If the domestic currency depreciates in a crisis, assets denominated

in foreign currency will appreciate relatively. On the other hand, if a crisis comes with a significant decrease in the stock market, the risk can be shared with foreign creditors through a decrease in the value of liabilities. Table 6 shows that the latter was the case in the recent crisis: liabilities significantly contributed to the stabilising stock-flow adjustment of portfolio equity overall, e.g. countries with the highest (lowest) net international investment position experienced the greatest valuation losses (gains) from portfolio equity liabilities.

However, this effect can come from two facts: (1) portfolio equity experienced a relatively homogeneous overall decrease in its value and countries with larger deficits simply issued relatively more liabilities or (2) countries with lower net international investment position experienced a greater decrease in their domestic stock market. In Figure 9, we can see that the latter is the case. The left graph shows that the absolute amount of portfolio equity liabilities (as a ratio of nominal GDP) seems to be unrelated to valuation gains in the post-crisis period. This indicates heterogeneous stock market movements during this period. The graph on the right confirms that the stabilising stock-flow adjustment from portfolio equity liabilities was driven by movements in prices of portfolio equity securities on the domestic stock market.

Summing up those findings, we show that the stabilising effect from stock-flow adjustment from portfolio equity overall came from a relatively greater decrease of the stock market in the post-crisis period in countries with bigger net foreign liabilities. This indicates that portfolio equities, especially liabilities, can contribute significantly to international risk sharing which is in line with findings by Schmitz (2010).

With these facts in mind, we want to proceed by having a closer look at the stock market. The literature suggests that portfolio equity (alongside with foreign direct investment) is the main asset category through which cross-country risk sharing takes place (Kose et al., 2007).[17] For this analysis whether international equity holdings acted as a (consumption) risk sharing device during the crisis, we want to follow the approach of Schmitz (2010) and Bracke and Schmitz (2011). Therefore, as a first step, we test if capital gains on the domestic stock market moved in a

[17]Data on portfolio equity are rather reliable and robust which was also an essential reason for the literature to focus on this category.

pro-cyclical direction in the post-crisis period. This is the prerequisite for foreign portfolio equity liabilities to provide the potential for hedging against domestic output and wealth fluctuations, i.e. the value of foreign liabilities would decrease in times of an economic downturn. For our high-quality sample, we estimate

$$\Delta StockMarket_{i,0813} = \alpha + \beta \Delta realGDP_{i,0813} + \epsilon \tag{11}$$

where $StockMarket_{i,0813}$ is the log change of the domestic stock market index and $\Delta realGDP_{i,0813}$ is the log change of the domestic real GDP, both over the period from 2008 to 2013. We can see in Table 7 that those variables are highly positively correlated, i.e. capital gains on the stock market are significantly pro-cyclical. In the first two columns, real GDP growth in USD is used while in column 3 and 4 we used the growth of real GDP in domestic currency to make sure the effect is not driven by the bilateral exchange rate with the USD. This is in line with the findings by Schmitz (2010) who tested this relation up to 2006. While it did not hold for the short-term (using yearly data), it was significant for the medium term.[18] As we find this pattern also for the post-crisis period 2008-2013, the necessary cyclical properties of the stock market are satisfied in order to generate economic or wealth stabilization through foreign positions as described above.[19]

As a second step, we now want to test how much stock-flow adjustment from foreign portfolio equity contributed to international risk sharing within this pattern. In this case, stock-flow adjustment should be significantly negatively correlated with real GDP growth relative to the world average. Following Bracke and Schmitz (2011), we look at the following correlation[20]:

$$SFA^{PEQ}_{i,0813} = \alpha + \beta \Delta realGDP_{i,0813} + \epsilon \tag{12}$$

where $SFA^{PEQ}_{i,0813}$ is the stock-flow adjustment of portfolio equity and $\Delta realGDP_{i,0813}$ is the log change of the domestic real GDP in USD. In Table 8, we can see that

[18] Cumulative 5-year rates of financial market capital gains and real GDP growth.

[19] To make sure results are not driven by extreme values of real GDP growth, we exclude China from the regression but results remain unchanged.

[20] Schmitz used annual real rate of capital gains on the respective domestic stock whereas we us the (log) change in the actual stock market index from International Financial Statistics (International Monetary Fund)

overall, stock-flow adjustment from foreign net portfolio equity holdings improved international risk sharing as countries with the relatively smallest real GDP growth experienced the greatest positive valuation gains. We can also see that this is driven by the portfolio liabilities (i.e. the domestic stock market) rather than by assets which is in line with our findings above.[21]

Running this regressions for specific country groups, we find that the risk sharing through foreign portfolio equity is not significant for emerging and developing countries. This is in line with Bracke and Schmitz (2011) and also with Kose et al. (2007) who finds that emerging countries were completely shut out of the benefit of risk sharing through foreign positions up to the crisis.[22] Within this group, even countries that experienced large increases in international capital flows have been unable to enjoy the risk sharing benefits of financial globalisation. The authors suggest that this is due to the relatively stronger effect of portfolio debt for those countries which cannot be shown to be stabilising. On the other hand, risk sharing through the portfolio equity market in the euro area shows to be the strongest. We argue that international risk sharing is especially important for the functioning of the currency union because monetary policy is unable to address asymmetric shocks.[23]

4.6 Foreign Direct Investment

This asset class is often analyzed in combination with portfolio equity securities as they together form the equity share in a country's net foreign assets. Equity investment is considered direct investment if ownership of 10 percent or more of the voting power in an enterprise is obtained by a foreign investor. From a macroeconomic point of view, it should therefore create more stable and long-lasting links between economies than portfolio equity. However, it is also the most problematic series from the point of view of measurement as some countries report it at book value while

[21] In 9 we can see that Switzerland and Finland are outliers in terms of stock-flow adjustment from portfolio equity. However, excluding those observations from the regressions above we obtain almost identical results in terms of size of the coefficient as well as level of significance.

[22] They find a stabilising pattern for portfolio equity for 1970 - 2005 but significantly weaker for emerging and developing countries.

[23] These results are robust when we use the real GDP growth in national currency.

others report it at market value (International Monetary Fund, 2003).[24] As most securities are not traded at the domestic stock market, the link of the valuation of foreign direct investment and the domestic stock market index is not as direct as for portfolio equity.[25] In addition, Blanchard and Acalin (2016) add concerns based on counterintuitive stylized facts looking at FDI data from the BOP. Most importantly, inflows and outflows are highly correlated, even at high frequencies. This raises the question why a domestic investors would want to invest more abroad while their own country is perceived as relatively more attractive by foreign investors. Combining this finding with data on existing tax treaties, the authors suggest that "measured" FDI flows may merely reflect flows through rather than to the country in some cases. This has crucial implications for policy makers. In addition, it makes findings based on BOP measured FDI hard to interpret.

However, despite those caveats, we still believe that a substantial part of FDI is intended to serve as a final investment where decisions are based on economic long-run factors. When we split the net position in gross assets and liabilities, we can see that the stabilising effect is again driven by gross liabilities (see table 6). However, the mechanisms behind the stock-flow adjustment from direct investment liabilities seem to be different from portfolio equity. Again, the effect can come from two factors: (1) direct investment experienced a relatively homogeneous overall decrease in its value and deficit countries issued relatively more liabilities or (2) the value of direct investment decreased relatively more in deficit countries. While the latter is the case for portfolio equity, the first seems to be the pattern for foreign direct investment. The mean as well as the median of stock-flow adjustment of liabilities is significantly negative which means that on average, the value of direct investment decreased across countries. This is stabilising for countries with larger liabilities which means that deficit countries can generate relatively more valuation gains simply by issuing relatively more direct investment equity. The left graph in Figure 10 shows that the the amount of stabilising stock-flow adjustment from

[24] As for every category, we use data from the extended version of the External Wealth of Nations (Lane and Milesi-Ferretti, 2007) Thereby, existing stock estimates are complemented with cumulative flows, with valuation changes designed to capture shifts in relative prices across countries.

[25] For instance, an increasingly important component is foreign property investment (Lane and Milesi-Ferretti, 2007)

foreign direct investment liabilities is significantly related to the amount of liabilities held in relation to GDP. Although this hints more to a "magnitude effect" more than a pro cyclical valuation effect from prices of foreign direct investment, it still contributes to consumption risk sharing (see right graph in Figure 10, regression output see Table 9).

Summing up our analysis of the different asset classes, we conclude that our findings about the post-crisis period are clearly in line with the literature. We show that the stabilising stock-flow adjustment was driven by equity component of net invernational positions. Thereby, pro-cyclical movements of domestic stock markets enabled stabilising valuation movements through portfolio equity liabilities. This means that countries with lower growth in output experience a relatively greater devaluation of their debt towards foreign creditors. Our findings therefore emphasize the potential of the domestic stock market to contribute to international risk sharing through foreign investors.

On the other hand, we do not find a stabilising valuation effects of the debt components. This is intuitive as most values, such as bank loans, are non-negotiable which implies that only write-offs and restructuring can cause a significant change in the prices of this asset class. Therefore, we go on and look at potential role of the exchange rate for this asset class. We find our insignificant finding is caused by countries with an exchange rate peg which even show a destabilising pattern for valuation effects of debt. This calls for more attention of policy makers to possible limitations of a pegged exchange rate regime.

4.7 Magnitude of the Effect

As a last step of our empirical analysis, we want to show how big effects were for each individual country. We first calculate a "counterfactual" net international investment position for 2013 which should reflect the value if there had not been any stock-flow adjustment in the post-crisis period:

$$\text{NIIP } Counterfactual_{i,13} = (NIIP_{07} + \sum_{08}^{13} Flows_i) \tag{13}$$

where $\sum_{08}^{13} Flows_i$ is the sum of the current accounts of the years 2008-2013.[26] From this, we take the difference to the actual net international investment position to calculate the stock-flow adjustment:

$$SFA_{i,0813} = NIIP_{i,13} - \text{NIIP}Counterfactual_{i,13} \tag{14}$$

Table 10 shows our results. Going straight to the magnitude of stock-flow adjustment in column (3) and (4), we can see that absolute effects as well as values in percent of GDP are economically significant. For instance, Greece experienced the highest valuation gains in terms of GDP of almost 60% whereas in absolute terms, Canada experienced the largest valuation gains of USD 450 billion. On the other hand, Germany experienced valuation losses of almost USD 700 billion (over 18.5 % of GDP) from 2008 - 2013. As Greece and Canada are debtor countries while Germany is a creditor country, we argue that a stock-flow adjustment of this size helped to stabilize the net international investment position significantly.

With the equations above, we can also look at the "Counterfactual $NIIP_{2013}$" which we construct with equation 13. In column (2), we can see the values as a percentage of 2013 GDP. The European Commission Macroeconomic Imbalances Procedure considers net international investment positions above 35% of GDP as a major source of macroeconomic imbalances. We note that without valuation gains, Italy would be far above the threshold of the European Commission Macroeconomic Imbalances Procedure. In the same manner, Germany would have experienced a NIIP of 51% of GDP as opposed to 34.6% which would have also activated the monitoring by the European Commission.[27]

Therefore, we suggest that the accumulation of net foreign imbalances was significantly decelerated by the stabilising effect of changes in valuation while the continuing divergence in stock positions was driven by cross-border capital flows. Absent stock-flow adjustment, some countries would have (more) alarming levels of their net international investment positions.

[26] We do the same with the financial account but non of the results change significantly.

[27] Macroeconomic Imbalances Scoreboard of the European commission: https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/macroeconomic-imbalance-procedure/scoreboard_en

5 Concluding Remarks

In this paper, we have analysed the divergence of the net international investment position accompanying the stark current account adjustment in the post-crisis period. As a first step, we find that the increasing divergence is driven by remaining flow imbalances. Although current accounts are below pre-crisis levels, only very few countries have reversed their current account so that external debt or credit could have been reduced.

We also find a significant effect of changes in valuation. In contrast to flow imbalances, these went into a stabilising direction: countries with the lowest net international investment position experienced the highest valuation gains. On the other hand, creditor countries such as Germany experienced significant losses through the valuation of their foreign assets. We suggest that without these capital gains and losses, stock imbalances would be at significantly higher levels.

Anlaysing this effect of valuation further, we look at asset classes separately. We find that the stabilising effect of changes in valuation was exclusively driven by the equity component of net international investment positions. We do not find a stabilising effect from portfolio debt or other investment as those are registered at nonnegotiable nominal values. Our insignificant finding is caused by countries with an exchange rate which suggests that the exchange rate could contribute to a stabilising effect for the rest of our sample.

In contrast to the debt components, portfolio equity is recorded at the market price of a security where values can change significantly. Within this asset class, we find that the stabilising effect comes from gross liabilities, i.e. the domestic stock market. A relatively greater decrease of the stock market in countries with a more negative net international investment position significantly contributed to international risk sharing. For foreign direct investment, its value decreased across countries so that countries with a greater absolute amount of gross liabilities experienced relatively more gains from valuation. As this is the case for countries who also experienced the smallest relative real GDP growth in the post-crisis period, portfolio equity and foreign direct investment improve consumption risk sharing.

This paper contributes to a better understanding of cross country links that emerged

with increasing financial integration in the last two decades. With changes in valuation moving in an overall stabilising direction during the recent global financial crisis, the question remains whether countries can "engineer" capital gains and hence actively improve international risk sharing through their foreign stock positions.
Our findings are relevant for policy makers as a more interconnected financial system calls for improved risk sharing. We find two contrary mechanisms for countries with an exchange rate peg, such as Euro Area countries: while non-negotiable debt instruments such as bank loans caused destabilising valuation effects, risk sharing through portfolio equity was more significant than for any other country group in our sample. In the absence of a banking union and without independent monetary policy or a floating exchange rate, these mechanisms could represent an efficient way of risk sharing and should therefore be observed more closely.

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Figures

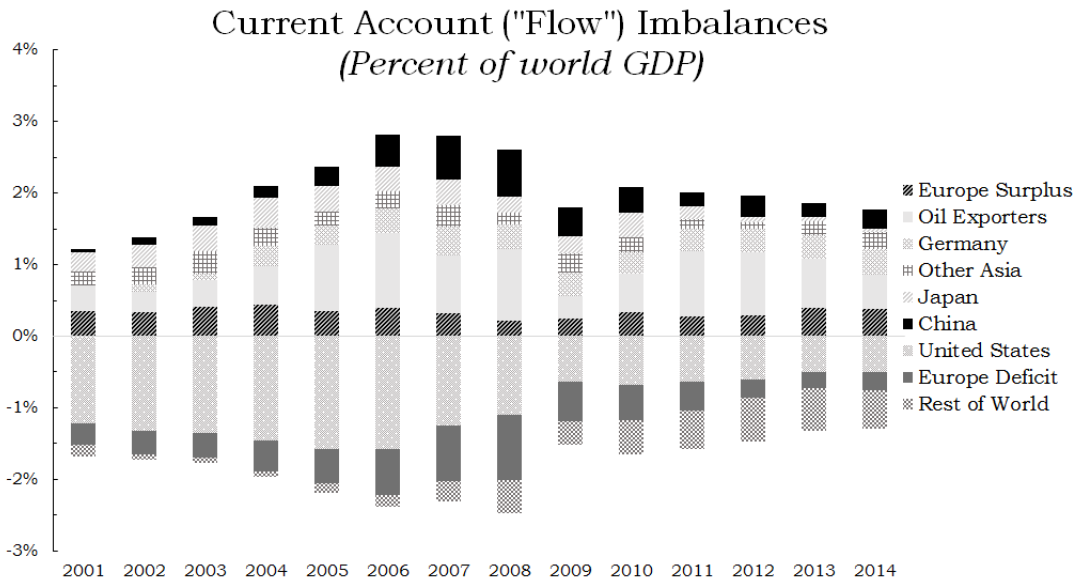

Figure 1: Evolution of current account imbalances (Percent of World GDP) *Author's calculations; Data Source: WEO April 16 database* Note: Oil exporters = Algeria, Angola, Azerbaijan, Bahrain, Bolivia, Brunei, Darussalam, Chad, Republic of Congo, Ecuador, Equatorial Guinea, Gabon, Iran, Kazakhstan, Kuwait, Libya, Nigeria, Norway, Oman, Qatar, Russia, Saudi, Arabia, Trinidad and Tobago, Turkmenistan, United, Arab Emirates, Venezuela, Yemen; Other Asia = Hong Kong SAR, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan Province of China, Thailand. European economies (excluding Germany and Norway) are sorted into surplus or deïňĄcit each year by the signs (positive or negative, respectively) of their current account balances.

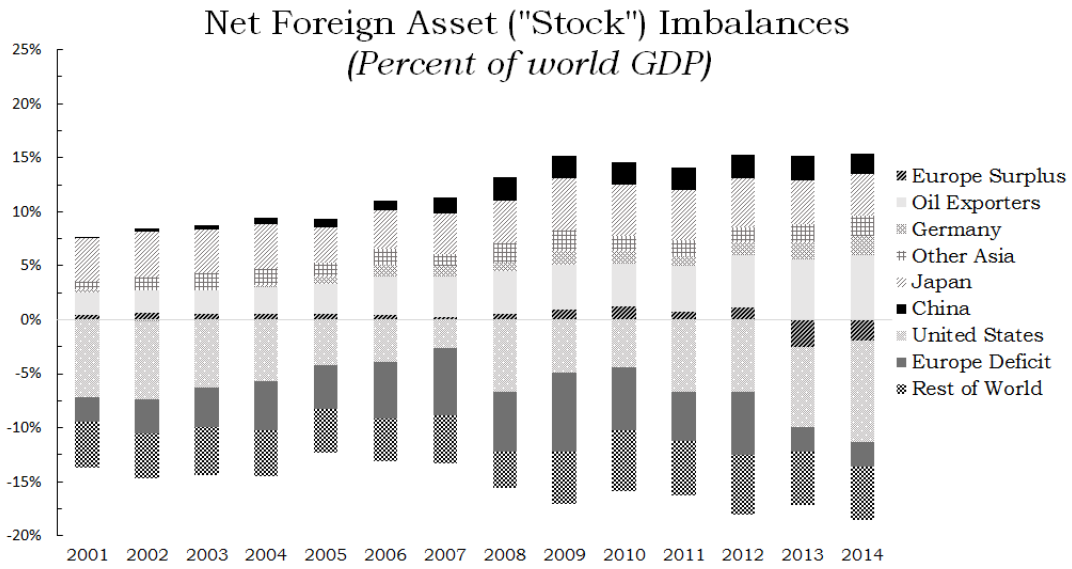

Figure 2: Evolution of current account imbalances (Percent of World GDP) *Author's calculations; Data Source: EWN (Lane and Milesi-Ferretti, 2007)* Note: Country groups as in Figure 1

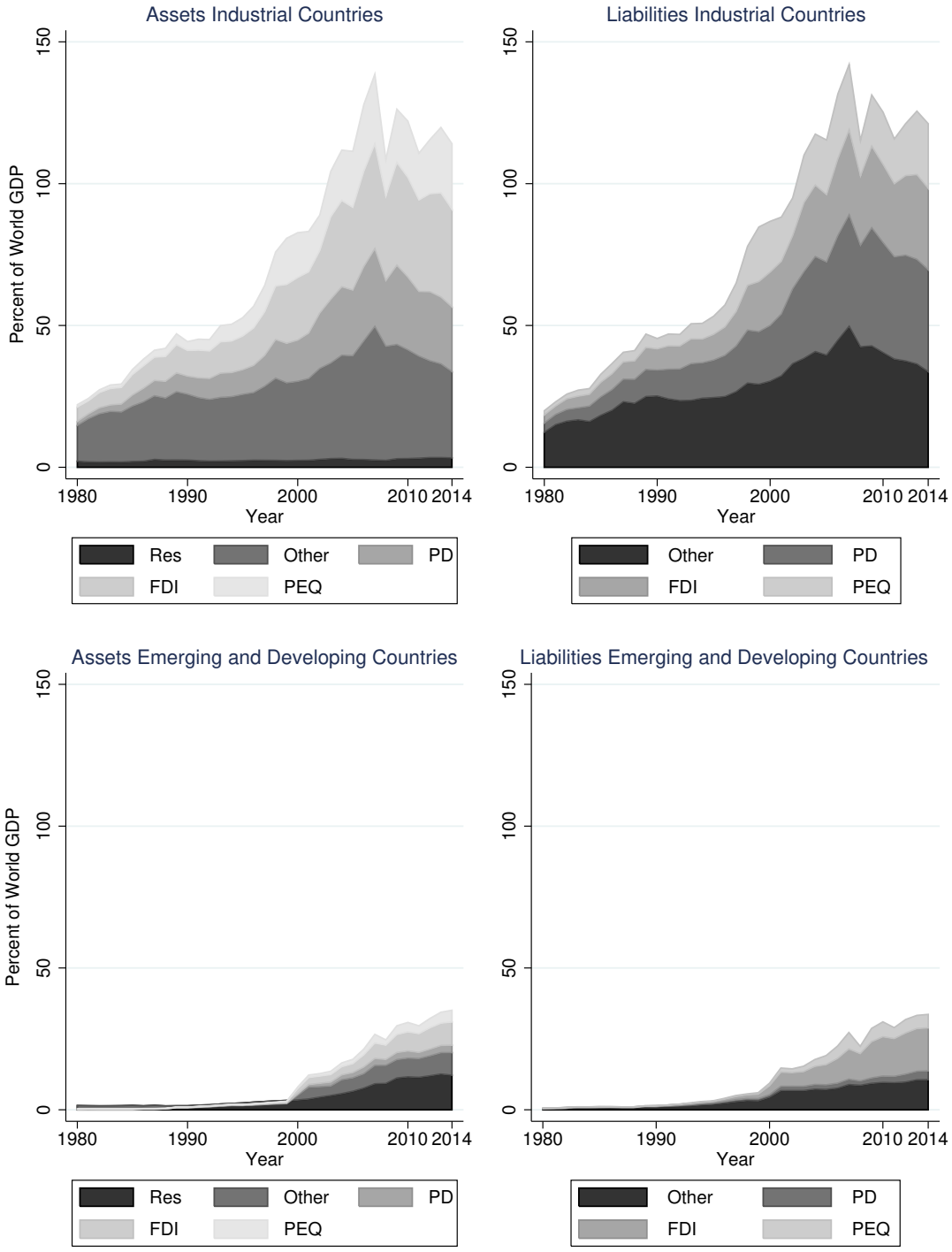

Figure 3: Evolution of Gross International Investment Positions by Asset Class in Percent of World GDP.
Author's calculations; Data Source: External Wealth of Nations Sample see Appendix B. Abbreviations are as follows: *Other*: Other Investment;*PD*: Portfolio Debt; *PEQ*: Portfolio Equity; *FDI*: Foreign Direct Investment; *Res*: Reserves;

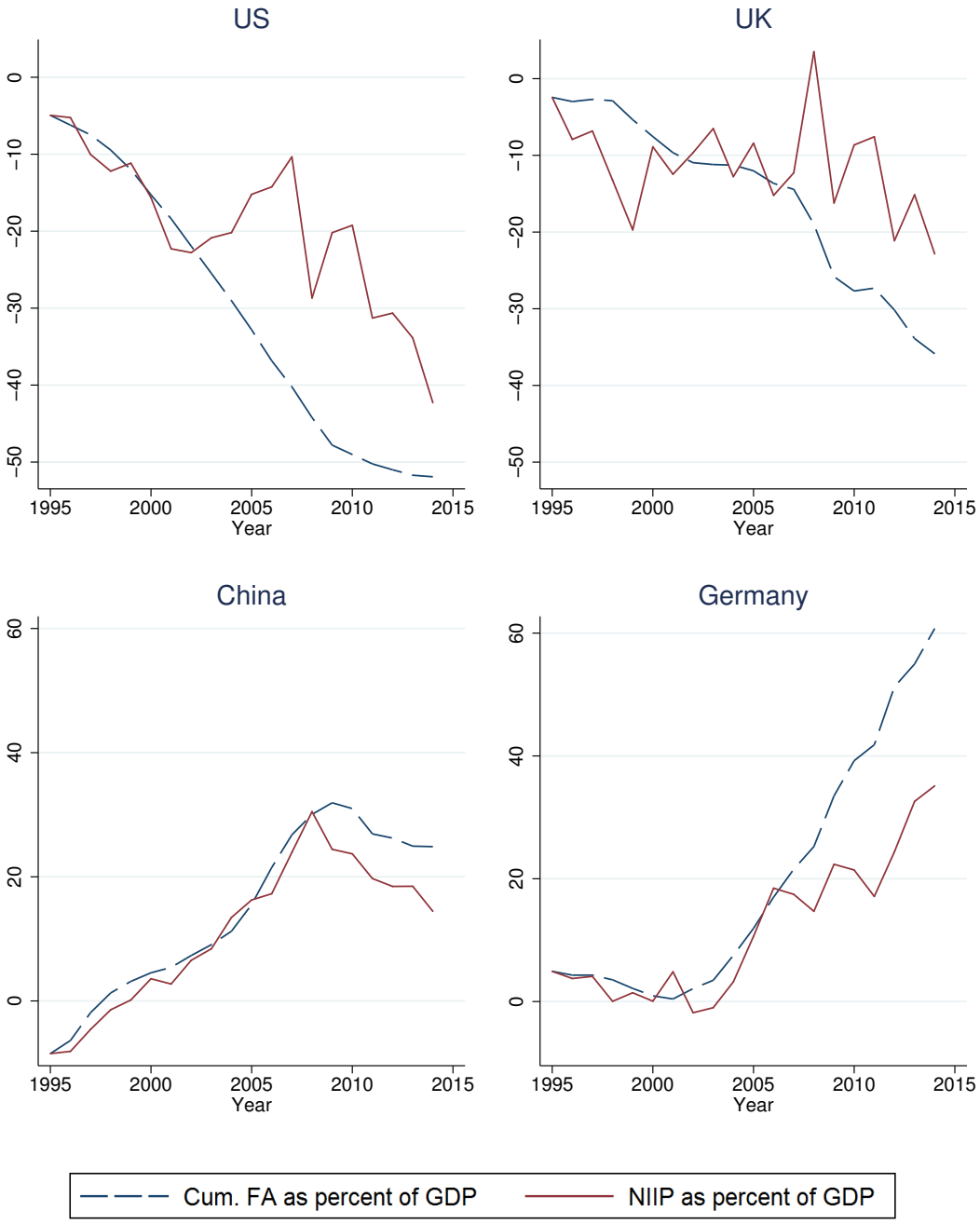

Figure 4: Net International Investment Position vs. Cumulative Financial Account in Percent of GDP.
Author's calculations; Data Source: External Wealth of Nations The cumulative flow positions are calculated as the net international investment position in 1995 plus the financial account in the years following up to 2014.

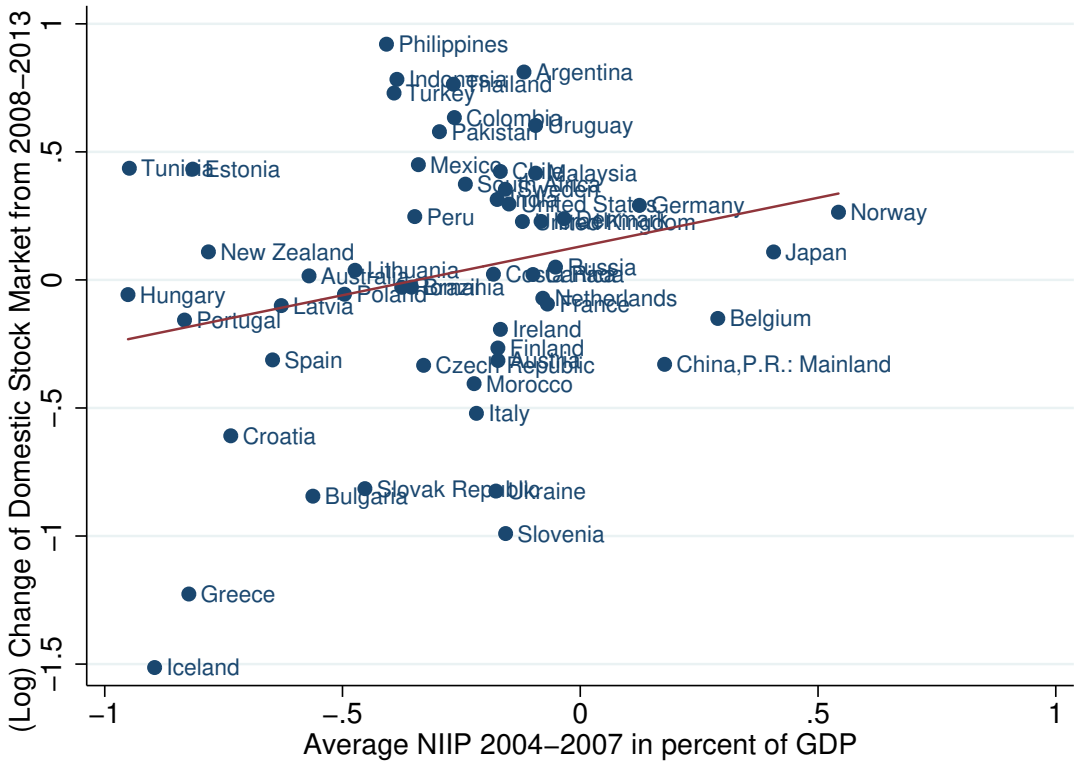

Figure 5: Net International Investment Position and the Change in the domestic Stock Market.
Author's calculations; Data Source: External Wealth of Nations, Reuter's Datastream. The cumulative flow positions are calculated as the net international investment position in 1995 plus the cumulative flows in the years following up to 2014.

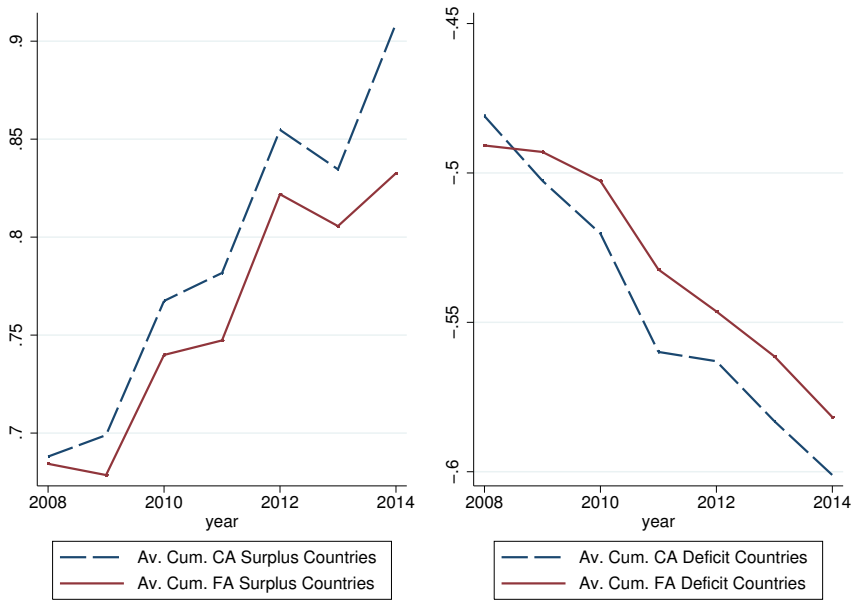

Figure 6: Average cumulated Current Account and Financial Account for Surplus and Deficit Countries.
Author's calculations; Data Source: External Wealth of Nations, Balance of Payments Statistics Sample see Appendix A. Surplus (Deficit) countries are countries with a positive (negative) net international investment position in the corresponding year. Average is unweighted.

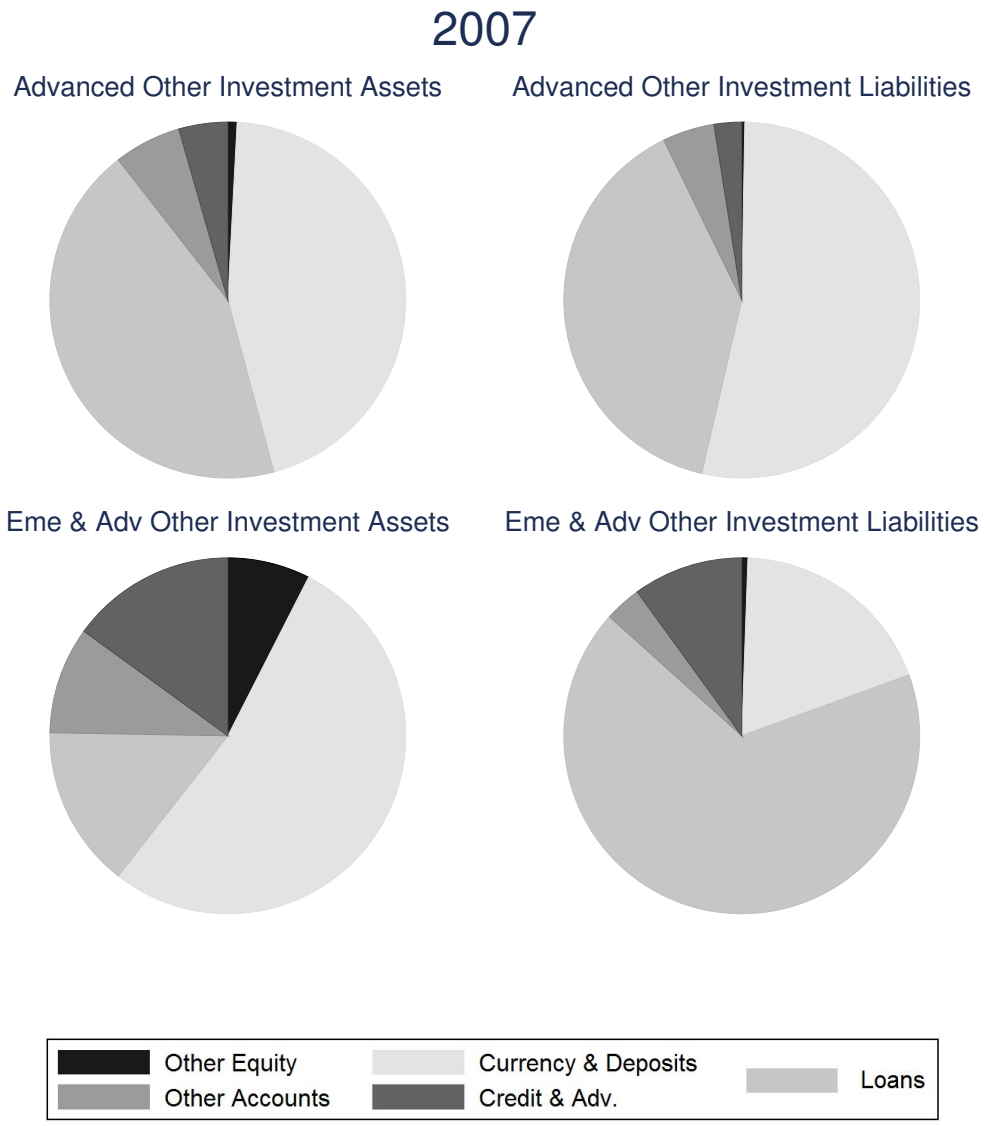

Figure 7: Composition of Other Investment Position in 2008.
Author's calculations; Data Source: External Wealth of Nations, Balance of Payment Statistics Sample see Appendix A.

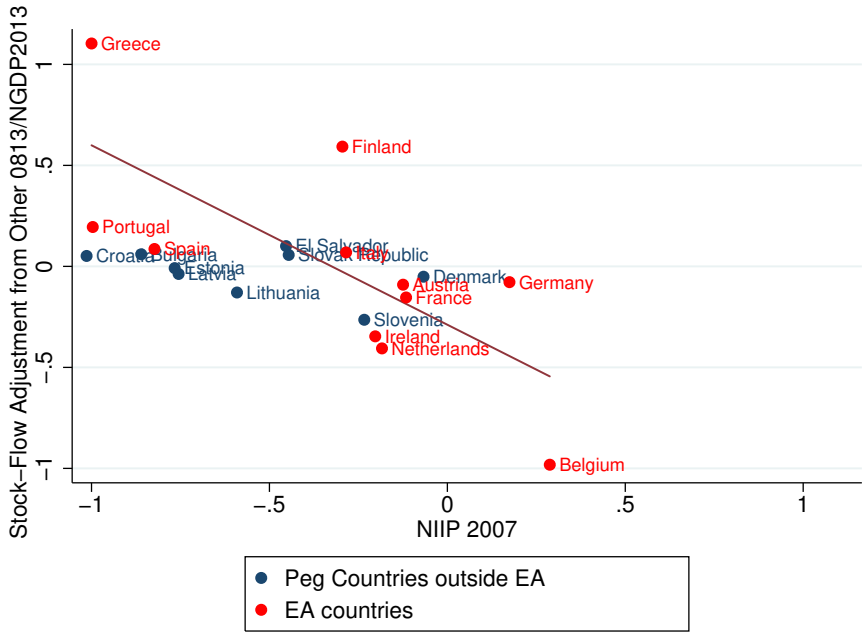

Figure 8: Stock-Flow Adjustment from Other Investment in Countries with an Exchange Rate Peg.
Author's calculations; Data Source: External Wealth of Nations Sample see Appendix A.

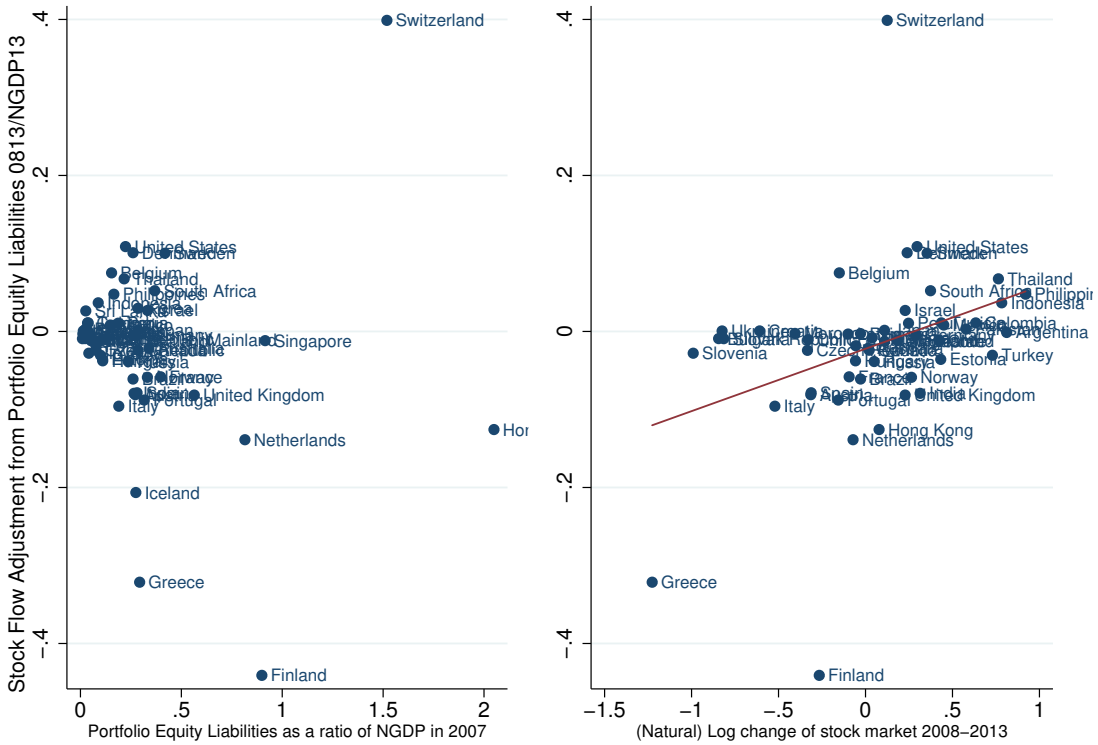

Figure 9: Stock-Flow Adjustment from Portfolio Equity Liabilities.
Author's calculations; Data Source: External Wealth of Nations, World Bank Database Sample see Appendix A.

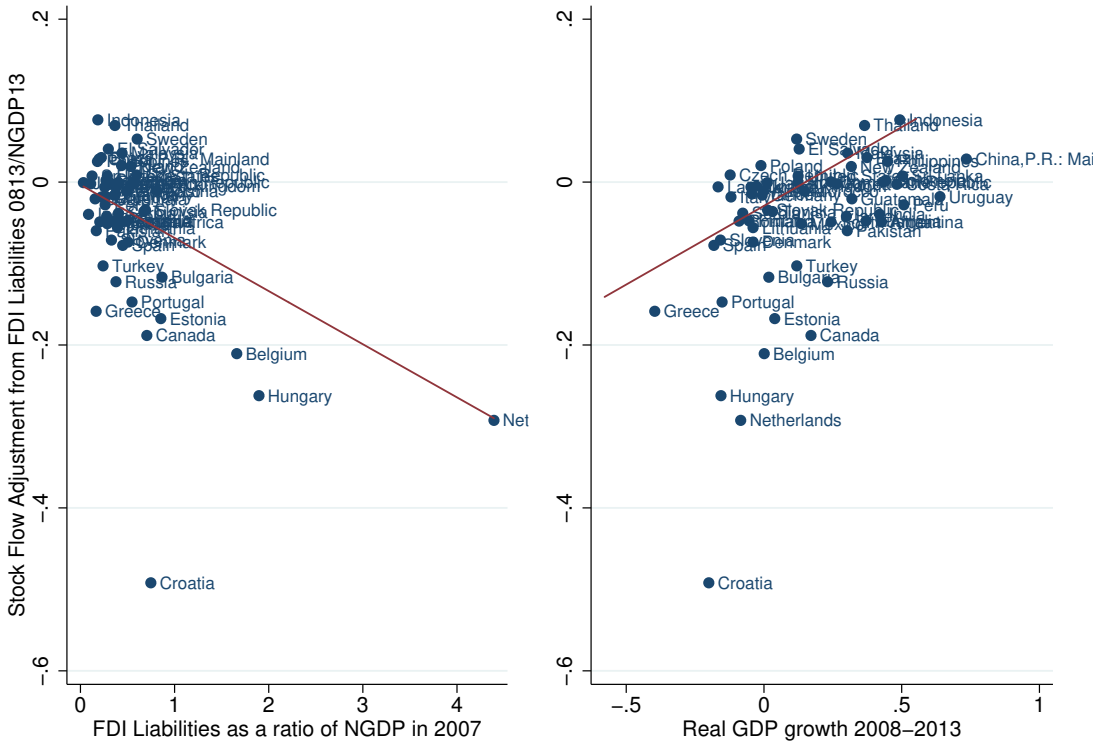

Figure 10: Stock-flow Adjustment from Foreign Direct Investment Liabilities. *Author's calculations; Data Source: External Wealth of Nations* Sample see Appendix A.

Tables

Table 1: Share of Portfolio Equity

	Year	PEQ Assets % of Total Assets	PEQ Liabilities % of Total Liabilities
Advanced	1987	6.11 %	7.56%
Advanced	1997	14.73 %	14.56%
Advanced	2007	16.69 %	14.59%
Emerging and Developing	1987	2.45%	4.64%
Emerging and Developing	1997	4.76%	12.01%
Emerging and Developing	2007	7.01%	26.98%

Weighted Average of Country Sample see Appendix B (High Quality Sample)
Data Source: External Wealth of Nations .

Table 2: Flows and Stock-Flow Adjustment 08-13 as a ratio of NGDP13

	(1) CA	(2) SFA CA	(3) FA	(4) SFA FA
NIIP 2007	0.43***	-0.23***	0.37***	-0.17**
	(6.97)	(-3.64)	(6.31)	(-2.57)
Constant	0.06*	-0.04	0.03	-0.02
	(1.74)	(-1.24)	(1.16)	(-0.70)
Observations	60	60	60	60
Adjusted R^2	0.45	0.16	0.39	0.12

FA and CA are the cumulated Financial Account and Current Account from 2008-2013 as a ratio of 2013 NGDP.
$SFA\ FA$ and $SFA\ CA$ correspond to the change in the NIIP minus the cumulated FA and CA from 2008-2013 as a ratio of 2013 NGDP.
t statistics in parentheses
Estimated with robust standard errors
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: SFA 0813/NGDP 13

	(1) All	(2) PEG	(3) FLOAT	(4) Adv	(5) EmDev
NIIP 2007	-0.23***	-0.32*	-0.16***	-0.25**	-0.23***
	(-3.64)	(-1.98)	(-2.71)	(-2.75)	(-2.86)
Constant	-0.04	-0.06	-0.04	-0.01	-0.06
	(-1.24)	(-0.60)	(-1.14)	(-0.18)	(-1.46)
Observations	60	20	40	22	38
Adjusted R^2	0.16	0.15	0.11	0.15	0.17

SFA correspond to the change in the NIIP minus the cumulated CA from 2008-2013 as a ratio of 2013 NGDP.
t statistics in parentheses
Estimated with robust standard errors
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: SFA NET 0813/NGDP 13

	(1) PI	(2) PEQ	(3) PD	(4) FDI	(5) Other	(6) Res
NIIP 2007	-0.107*	-0.102*	-0.042	-0.085**	-0.381	0.025***
	(-1.69)	(-2.00)	(-1.15)	(-2.16)	(-0.63)	(3.76)
Constant	-0.002	-0.018	-0.004	0.005	0.349	-0.002
	(-0.09)	(-0.79)	(-0.38)	(0.28)	(0.65)	(-1.00)
Observations	57	45	52	59	61	60
Adjusted R^2	0.092	0.210	0.044	0.102	-0.015	0.127

SFA NET of each asset class correspond to the change in the stock position minus the respective flow position from 2008-2013 as a ratio of 2013 NGDP
t statistics in parentheses
Estimated with robust standard errors
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Net SFA from Other 0813/NGDP 13

	(1) Peg	(2) Floating
NIIP 2007	0.875**	-1.906*
	(2.60)	(-1.78)
Constant	-0.013	0.451
	(-0.08)	(0.58)
Observations	21	40
Adjusted R^2	0.222	0.00

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: SFA Gross Positions 0813/NGDP 13

	(1)	(2)	(3)	(4)
	Portfolio Equity		Foreign Direct Investment	
	Assets	Liabilities	Assets	Liabilities
NIIP 2007	0.03**	0.13***	0.11	0.20**
	(2.32)	(2.81)	(1.48)	(2.60)
Constant	0.02*	0.03	0.02	0.02
	(1.68)	(1.68)	(0.76)	(0.60)
Observations	45	45	58	58
Adjusted R^2	0.07	0.36	0.18	0.34

SFA Gross Position of each asset class correspond to the change in the gross stock position (assets and liabilities) minus the respective flow position from 2008-2013 as a ratio of 2013 NGDP

t statistics in parentheses

Estimated with robust standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Log Change of the Stock Market 08-13

	(1)	(2)
Δ rGDP USD	1.23***	
	(4.41)	
Δ rGDP NatCur		1.15***
		(5.44)
Constant	-0.14**	-0.24***
	(-2.11)	(-3.18)
Observations	57	57
Adjusted R^2	0.35	0.28

Δ rGDP USD is the (log) change
in the real GDP 2008-2013 in USD.
Δ rGDP NatCur is the (log) change in the
real GDP 2008-2013 in National Currency.
Estimated with robust standard errors
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Stock-Flow Adjustment PEQ 08-13

	(1)	(2)	(3)
	Net	Assets	Liabilities
ALL (g_i)	-0.12**	0.033	0.15**
EUR (g_i)	-0.58**	0.01	0.58**
ADV (g_i)	-0.36**	0.11**	0.47***
EM & DEV (g_i)	-0.01	0.01	0.03

(g_i) is the real GDP growth
Country Samples see Appendix A
t statistics in parentheses
Estimated with robust standard errors
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Stock-Flow Adjustment FDI 08-13

	(1) SFA Liabilities	(2) SFA Net	(3) SFA Assets	(4) SFA Liabilities
$FDI\ LIAB/GDP$ 2007	-0.07**			
	(-2.64)			
(g_i)		-0.12**	0.07**	0.19***
		(-2.32)	(2.47)	(3.54)
Constant	0.00	0.05**	-0.02	-0.06***
	(-0.34)	(2.55)	(-1.37)	(-3.31)
Observations	59	59	58	59
Adjusted R^2	0.08	0.07	0.02	0.11

$SFA\ NET$ is the stock-flow Adjustment from the net FDI position

$SFA\ Assets$ and $SFA\ Liabilities$ is the stock-flow adjustment from gross FDI positions

$FDI\ LIAB/GDP$ 2007 are FDI Liabilities in 2007 as a ratio of 2007 NGDP

(g_i) is the real GDP growth

t statistics in parentheses

Estimated with robust standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Valuation Effects 08-13

Country	$NIIP_{2013}$ % of GDP	Counterfactual $NIIP_{2013}$ % of GDP	SFA_{08-13} % of GDP	SFA_{08-13} USD million
Argentina	4.8	1.9	2.9	18350
Australia	-50.4	-58.1	7.6	114469
Austria	-1.2	3.3	-4.5	-19315
Belgium	52.2	24.5	27.7	144625
Brazil	-30.3	-34.1	3.8	94392
Bulgaria	-87.1	-95.1	8.0	4343
Canada	1.2	-23.3	24.5	449376
Chile	-13.8	-6.6	-7.2	-19839
China	18.5	23.6	-5.2	-490468
Colombia	-25.8	-27.4	1.6	6121
Costa Rica	-38.0	-31.1	-6.9	-3378
Croatia	-94.4	-123.4	29.0	16742
Czech Republic	-41.1	-50.3	9.2	19074
Denmark	38.9	23.7	15.2	51446
Dominican Republic	-59.4	-59.3	-0.1	-67
El Salvador	-61.4	-63.3	1.9	465
Estonia	-48.7	-74.0	25.3	6395
Finland	4.9	-28.0	32.9	88585
France	-21.5	-16.6	-4.9	-138011
Germany	32.6	51.1	-18.5	-694109
Greece	-129.6	-198.7	69.1	165619
Guatemala	-20.3	-19.9	-0.4	-190
Hong Kong	274.9	216.6	58.3	160703
Hungary	-87.3	-100.5	13.1	17540
Iceland	-427.6	-185.0	-242.6	-37298
India	-24.9	-33.4	8.5	159446
Indonesia	-40.9	-22.7	-18.2	-165717
Ireland	-93.7	-19.4	-74.3	-177025
Israel	21.4	12.7	8.7	25494
Italy	-34.6	-40.9	6.2	133224
Japan	62.4	59.5	2.9	142645
Korea	-3.2	2.2	-5.4	-70785
Latvia	-70.4	-91.1	20.7	6267
Lithuania	-49.4	-66.0	16.6	7702

Country	$NIIP_{2013}$ % of GDP	Counterfactual $NIIP_{2013}$ % of GDP	SFA_{08-13} % of GDP	SFA_{08-13} USD million
Malaysia	-4.8	46.8	-51.6	-166874
Mexico	-36.2	-36.3	0.1	1256
Morocco	-63.2	-56.9	-6.3	-6806
Netherlands	41.5	30.3	11.1	96327
New Zealand	-64.9	-75.3	10.4	19227
Norway	123.2	110.2	13.0	67783
Pakistan	-31.6	-35.7	4.1	9456
Peru	-27.2	-29.2	2.0	4030
Philippines	-15.4	-3.4	-11.9	-32404
Poland	-72.7	-71.6	-1.1	-6012
Portugal	-127.2	-149.1	21.9	49497
Romania	-66.1	-75.1	9.0	17276
Russia	4.7	12.8	-8.1	-168250
Serbia	-98.2	-111.1	12.9	5864
Singapore	217.7	235.3	-17.5	-53016
Slovak Republic	-67.2	-50.9	-16.3	-16028
Slovenia	-48.2	-22.1	-26.0	-12414
South Africa	-5.3	-48.4	43.1	157706
Spain	-100.7	-111.1	10.4	142875
Sri Lanka	-57.0	-46.0	-11.0	-7452
Sweden	-16.1	34.7	-50.8	-294622
Switzerland	102.0	140.8	-38.8	-265564
Taiwan	170.5	138.8	31.7	162402
Thailand	-17.6	-5.5	-12.1	-50722
Tunisia	-109.8	-113.0	3.2	1515
Turkey	-50.1	-72.9	22.8	187687
Ukraine	-43.7	-47.9	4.2	7531
United Kingdom	-15.1	-31.5	16.4	444497
United States	-33.9	-25.8	-8.1	-1341558
Uruguay	-14.3	-20.9	6.5	3756

Stock-Flow Adjustment calculated as the difference of the net international investment position and the cumulated flows of 2008-2013:
$SFA_{i,0813} = NIIP_{i,13} - (NIIP_{07} + \sum_{08}^{13} Flows_i)$.
We use the current account as the flow variable.

Appendix

Appendix A

Tab 1

Table 11: Flows and Stock-Flow Adjustment 0813/NGDP 13

	(1) Flows	(2) SFA	(3) Flows	(4) SFA	(5) Flows	(6) SFA
NIIP 2007	0.45***	-0.20***	0.43***	-0.21***	0.41***	-0.19***
	(6.77)	(-3.15)	(6.88)	(-3.21)	(6.33)	(-2.95)
Δ Real GDP 0813	-0.08	-0.13	-0.24*	-0.09	-0.25*	-0.09
	(-0.78)	(-1.04)	(-1.93)	(-0.73)	(-1.95)	(-0.68)
Δ StkMarket 0813			0.14**	-0.02	0.14**	-0.01
			(2.10)	(-0.22)	(2.14)	(-0.18)
Δ PolRate CB 0813					0.01	-0.01
					(1.21)	(-1.12)
Constant	0.07*	-0.02	0.09**	-0.02	0.12**	-0.05
	(1.68)	(-0.34)	(2.26)	(-0.38)	(2.47)	(-0.74)
Observations	60	60	54	54	54	54
Adjusted R^2	0.44	0.16	0.49	0.14	0.50	0.13

t statistics in parentheses

Estimated with robust standard errors

Δ Real GDP 0813 is the (log) change of real GDP 2008 - 2013 (in USD)

Δ StkMarket 0813 is the (log) change of the domestic Stock Market Index 2008-2013

Δ PolRate CB 0813 is the change of the Policy Rate of the Central Bank 2008-2013

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Tab 2

Table 12: Stock Flow Adjustment 0813/NGDP 13

PEQa07	0.06								
	(0.20)								
FDIa07		0.15							
		(0.92)							
PDa07			-0.09						
			(-0.21)						
OTHa07				0.04					
				(0.27)					
RESa07					-0.06				
					(-0.48)				
PEQl07						-0.27			
						(-1.08)			
FDIl07							0.10		
							(0.45)		
PDl07								0.17	
								(0.54)	
OTHl07									0.00
									(0.00)
Constant	0.02	0.00	0.04	0.01	0.04	0.06**	-0.01	0.00	0.02
	(0.56)	(-0.07)	(0.74)	(0.25)	(0.70)	(2.02)	(-0.12)	(-0.07)	(0.29)
Observations	60	60	58	58	60	60	60	58	58

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

All asset classes are ratios of the respective gross position in 2007,

i.e. PEQa07 is the share of portfolio equity assets / total assets in 2007

Appendix B

We define

$$SFA_t = NIIP_t - NIIP_{t-1} - CA_t$$

In this paper, we are essentially interested in the correlation of $NIIP_{t-1}$ and SFA_t. The potential for SFA to move in a stabilising direction is given as we can show the following:

$$\begin{aligned}
\sigma(SFA_t, NIIP_{t-1}) &= E((NIIP_t - NIIP_{t-1} - CA_t - (E(NIIP_t) - E(NIIP_{t-1}) - E(CA_t))) \\
&* \quad (NIIP_{t-1} - E(NIIP_{t-1})) \\
&= E((NIIP_t - E(NIIP_t)) - (NIIP_{t-1} - E(NIIP_{t-1})) - (CA_t - E(CA_t)) \\
&* \quad (NIIP_{t-1} - E(NIIP_{t-1})) \\
&= \sigma(NIIP_t, NIIP_{t-1}) - \sigma(CA_t, NIIP_{t-1}) - \sigma^2(NIIP_{t-1})
\end{aligned}$$

Deviding everything by the $\sigma^2(NIIP_{t-1})$ gives

$$\frac{\sigma(SFA_t, NIIP_{t-1})}{\sigma^2 NIIP_{t-1}} = \frac{\sigma(NIIP_t, NIIP_{t-1})}{\sigma^2 NIIP_{t-1}} - \frac{\sigma(CA_t, NIIP_{t-1})}{\sigma^2 NIIP_{t-1}} - 1$$

Now we can assume that $\frac{\sigma(NIIP_t, NIIP_{t-1})}{\sigma^2 NIIP_{t-1}}$ is equal to 1.[28]
This leaves us with two possible values for the $\sigma(SFA_t, NIIP_{t-1})$:

1. if $\sigma(CA_t, NIIP_{t-1}) > 0 \Rightarrow \sigma(SFA_t, NIIP_{t-1}) < 0$
2. if $\sigma(CA_t, NIIP_{t-1}) < 0 \Rightarrow \sigma(SFA_t, NIIP_{t-1}) > 0$

As explained in the paper, international capital flows contracted but did not reverse in the post-crisis period. Therefore, we assume $\sigma(CA_t, NIIP_{t-1}) > 0$ which means that creditor countries experienced net capital outflows and most debtor countries still experienced net capital inflows in the post-crisis period. Therefore, SFA can help stabilize the NIIP through $\sigma(SFA_t, NIIP_{t-1}) < 0$ so that countries with large net foreign liabilities (assets) in $t-1$ can earn positive (negative) SFA in t.

[28] For our 64 country high-quality sample where $NIIP_{t-1}$ is NIIP in 2007 a $NIIP_{t-1}$ is NIIP in 2013 this value is 1.18.

Appendix C

Country Samples

A. 64 High Quality Sample

Argentina; Australia; Austria; Belgium; Brazil; Bulgaria; Canada; Chile; China, People's Rep. of; Hong Kong, China; Colombia; Costa Rica; Croatia; Czech Republic; Denmark; Dominican Republic; El Salvador; Estonia; Finland; France; Germany; Greece; Guatemala; Hungary; Iceland; India; Indonesia; Ireland; Israel; Italy; Japan; Korea, Republic of; Latvia; Lithuania; Malaysia; Mexico; Morocco; Netherlands; New Zealand; Norway; Pakistan; Peru; Philippines; Poland; Portugal; Romania; Russian Federation; Serbia, Republic of; Singapore; Slovak Republic; Slovenia; South Africa; Spain; Sri Lanka; Sweden; Switzerland; Taiwan Prov. of China; Thailand; Tunisia; Turkey; Ukraine; United Kingdom; United States; and Uruguay.

Subsamples

Euro Countries: Austria; Belgium; Finland; France; Germany; Greece; Ireland; Italy; Netherlands; Portugal; Spain.

Pegged Countries: All Euro countries; Bulgaria; China, P.R.: Hong Kong; Croatia; Denmark; El Salvador; Estonia; Latvia; Lithuania; Slovac Republic; Slovenia; Taiwan.

No Peg Countries: Argentina; Australia; Brazil; Canada; Chile; China, P.R.:Mainland; Columbia; Costa Rica; Czech Republic; Dominican Republic; Guatemala; Hungary; Iceland; India; Indonesia; Israel; Japan; Korea; Malaysia; Mexico; Morocco; New Zealand; Norway; Pakistan; Peru; Philippines; Poland; Romania; Russian Federation; Serbia; Singapore; South Africa; Sri Lanka; Sweden; Switzerland; Thailand; Tunisia; Turkey; Ukraine; United Kingdom; United States; Uruguay.

Advanced Countries: Australia; Austria; Belgium; Canada; Denmark; Finland; France; Germany; Greece; Iceland; Ireland; Israel; Italy; Japan; Netherlands; New Zealand; Norway; Portugal; Singapore; Spain; Sweden; Switzerland; United Kingdom; United States.

Emerging Countries: Argentina; Brazil; Bulgaria; Chile; China, P.R.: Hong

Kong; China, P.R.: Mainland; Colombia; Costa Rica; Croatia; Czech Republic; Dominican Republic; El Salvador; Estonia; Guatemala; Hungary; India; Indonesia; Korea; Latvia; Lithuania; Malaysia; Mexico; Morocco; Pakistan; Peru; Philippines; Poland; Romania; Russian Federation; Serbia; Slovak Republic; Slovenia; South Africa; Sri Lanka; Taiwan; Thailand; Tunisia; Turkey; Ukraine; Uruguay.

B. World sample

Industrial countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

Other countries: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Cambodia, Cameroon, Chad, Chile, China, Colombia, Dem. Rep. of Congo, Rep. of Congo, Costa Rica, CÃŧte d'Ivoire, Croatia, Cyprus, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Estonia, Ethiopia, Fiji, Gabon, Georgia, Ghana, Guatemala, Guinea, Haiti, Honduras, Hong Kong S.A.R., Hungary, India, Indonesia, Iran, Islamic Republic of, Israel, Jamaica, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Kyrgyz Republic, Laos, Latvia, Lebanon, Libya, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritius, Mexico, Moldova, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia and Montenegro, Singapore, Slovak Republic, Slovenia, South Africa, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Taiwan Province of China, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Venezuela, Rep. Bol., Vietnam, Yemen, Zambia, Zimbabwe.

Appendix D

Data

- Data on flow positions are obtained from the Balance of Payments Statistics (International Monetary Fund)
- Data on stock positions are obtained from an extended version of the External Wealth of Nations dataset (Lane and Milesi-Ferretti, 2007).
- The current account data is collected from the World Economic Outlook April 2016 database
- The real GDP is collected from the (International Financial Statistics (International Monetary Fund)
- Domestic Stock Market indices are obtained from the World Bank database
- Central Bank Policy Rates are collected from the Monetary and Financial Statistics (International Monetary Fund) and Reuter's Datastream

Appendix E

Abbreviations

CA	Current Account
EO	Errors and Omissions
FA	Financial Account
NIIP	Net International Investment Position
OTH	Other
GDP	Gross Domestic Product
OECD	Organisation of Economic Co-operation and Development
EUR	Euro
SFA	Stock-Flow Adjustment
USD	United States Dollar
VAL	Valuation