Can capital flows be behind the movements of a safe haven currency, the Swiss franc?[1]

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February 2013

Preliminary Draft

[1] Elisabeth Beusch and Laurence Wicht provided excellent research assistance. Many thanks to Katrin Assenmacher, Irineu de Carvalho Filho, Andreas Fischer, Christian Grisse, Daniel Heller, Christoph Meyer, Thomas Moser, and participants at the SNB Brownbag Seminar for useful comments and discussions. Any remaining errors are my own. The views expressed in this paper are those of the author and do not necessarily represent those of the Swiss National Bank.

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Abstract

This paper attempts to find a statistical link between capital flows to/from Switzerland and the movements of the Swiss franc. Being one of the major safe haven currencies, Swiss franc is known to appreciate strongly during turmoil in financial markets. Because safe haven flows are widely alleged to be behind the appreciation pressures on the Swiss franc, this paper attempts to find a link between the movements of the Swiss franc and capital flows to/from Switzerland. A simple statistical analysis reveals that net capital flows are not necessarily coincident with the movements of the Swiss franc. The statistical link between gross capital outflows from Switzerland and movements of the Swiss franc is significant, albeit rather weak. Other factors than capital inflows seem to be behind the recent appreciation of the Swiss franc. Furthermore, a simple surge identification method reveals that no sudden and strong capital flows materialized during/after the financial crisis. On the contrary, a "home-bias" effect can be observed for both Swiss and foreign investors since the financial crisis.

Keywords: Capital flows, exchange rate

JEL Classification: F3

1. Introduction

Can exchange rate movements of a safe haven currency, namely the Swiss franc, be explained by capital flows to/from Switzerland? Can the appreciation of the Swiss franc after the financial crisis be attributed to a stronger capital inflow into Switzerland? Is there a particular type of capital flow that is coincident with the movements of the Swiss franc? Were there any capital inflow surges during or after the financial crisis into Switzerland?

This paper tries to answer these questions by studying the Swiss Financial Account (FA) data between 1999:Q1 and 2012:Q2. Two different and complementary methods are employed in this analysis: simple linear specifications of exchange rate and capital flows, and identification of capital flow surges in the data.

First, simple linear models are applied to the Swiss FA data to study the statistical relationship between capital flows and exchange rates. Following the existing literature, the log real effective exchange rate (REER) is regressed on aggregate capital flows and on different types of capital flows separately. The only control variables used are the lagged dependent variable, three dummy variables to indicate the periods of the SNB's different exchange rate policies, and their interaction terms with the capital flow variables.

Both **net capital flows**, as well as **gross in- and outflows** are used in the exchange rate regressions for the sake of completeness, although the existing literature uses *only* net flows when modeling the exchange rate. This is because only net flows should matter theoretically because they indicate a possible excessive demand for the currency in question.

Even though a causal relationship between capital flows and the Swiss franc (CHF) cannot be deduced from our simple analysis, it can be seen as a first step to understand their statistical relationship. This first method helps us to identify if there has been a statistically and economically significant impact of capital flows onto the CHF.

The empirical analysis shows that the explanatory power of net capital flow variables for the CHF movements is statistically not always significant and/or is economically rather small. **This indicates that there is no strong statistical relationship between the CHF and contemporaneous net capital flows in general.**

In the aggregate, **a one percentage point increase in net private capital flows to GDP ratio is coincident with a 0.05% appreciation of the CHF in real effective terms**. Our results are robust to different specifications, sample periods, or definitions of net aggregate capital flows[3].

Among different types of net capital flows, derivatives and structured products show the strongest economically relevant relationship with the CHF. **A one percentage point increase in the net flows of derivatives and structured products to GDP ratio is coincident with a 0.44% appreciation of the CHF in real effective terms.** One shortcoming of this result is that the derivatives and structured products data start only in 2006:Q1, making the sample

[3] For robustness check, SNB and government flows are excluded from the financial account balance to calculate different definitions of private capital flows. The statistical relationship between the exchange rate and these different definitions does not change.

very short[4]. Another shortcoming is that these derivatives and structured products appear only in the financial account when they are exercised, rather than when they are contracted. Thus these flows are not necessarily linked to the volume of outstanding derivatives and structured products.

The empirical analysis using gross in- and outflows reveals that it is **mostly capital outflow variables that show a statistically significant relationship with the exchange rate**, and not the capital inflow variables. For example, a one percentage point decrease in the financial account outflows leads to a 0.07% appreciation of the CHF[5]. In other words, less capital outflows from Switzerland make the CHF appreciate, while more capital inflows do not seem to affect the CHF.

The major exception is **portfolio inflows, and in particular inflows to debt securities.** These types of inflows show a statistically significant relationship with the REER. **After controlling for the outflows, a one percentage point increase in the debt securities inflows to GDP ratio leads to a 1.06% appreciation of the REER.** Note, however, that this result might be partly driven by the coincidence that in 2010 a new safe asset, i.e. SNB Bills, was created to mop up liquidity while the CHF was appreciating. The data shows that inflows to debt securities in that period were mainly into money market instruments, i.e., SNB Bills.

Another noteworthy finding is that some types of capital in- or outflows do not show any statistical relationship with the exchange rate, such as foreign direct investment flows, other investment flows, and bank lending.

Furthermore, **our results strongly indicate that factors other than contemporaneous capital flows were behind the appreciation of the CHF between 2010:Q3 and 2011:Q2**. In almost all the specifications considered in this analysis, the dummy variable for the period 2010:Q3-2011:Q2 is statistically significant, indicating that the appreciation of the CHF during that period cannot be solely explained by higher capital flows during that period.

In the second method employed in this analysis, surges in capital flows are identified in the Swiss FA data using a simple de-trending method. Based on the definition in the existing literature, surges can be described as periods when capital flows were higher (or lower) than a certain threshold above (or below) their smoothed long-run trend. This simple method can help to identify extraordinary periods of capital flows in the data (both extremely high and extremely low).

Quarterly data on both net and gross capital flows are analyzed to identify surges. One of the main findings is that most of the capital flow variables have been quite volatile in the past, and the method can identify many surge periods in the sample. For example, net private capital flows reveal surges in 14 quarters between 1991:Q1 and 2012:Q2.

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[4] Another caveat of this finding is the difficulty in interpreting the flows of derivatives and structured products. While all positions in this asset/liability class are normally registered in the net foreign assets , only a part of these assets will be registered in the net capital flows at the end, because only some of them will be chosen to be executed to initiate a capital flow. Therefore an outflow of derivatives and structured products means, in fact, a net positive income in the financial account for Switzerland when, for example, a Swiss resident asset holder executes an option and receives income from abroad.

[5] This interpretation might be confusing. However, note that outflows are negative in the data for the majority of the sample. Thus an increase in the outflows corresponds to a less negative outflow.

Interestingly, most of the aggregate capital inflow variables show no surges since 2009:Q3. For example, **no inflow surges can be identified in private capital flows since 2009:Q1**. On the other hand, debt securities inflows indicate surges in 2010, significantly above the trend, and then in 2011, significantly below the trend. The surges in 2010 are also contemporaneous with the exchange rate appreciation. However, as mentioned before, this might be due to the creation of the SNB Bills in 2010 at the same time when the SNB stopped the exchange rate interventions. One should also note that the cumulated cross-border inflows into debt securities from 2010:Q2 until 2011:Q2 amounted to about CHF 38.7 billion, and between 2011:Q3 and 2012:Q2 to about CHF -44.4 billion, reversing, in fact, all the previous inflow.

One can make two speculative conjectures based on the findings of this study:

1. Higher capital flows are not necessarily behind CHF appreciations, thus capital controls would have, at best, little power to stop further appreciation of the CHF if the exchange rate floor is lifted.

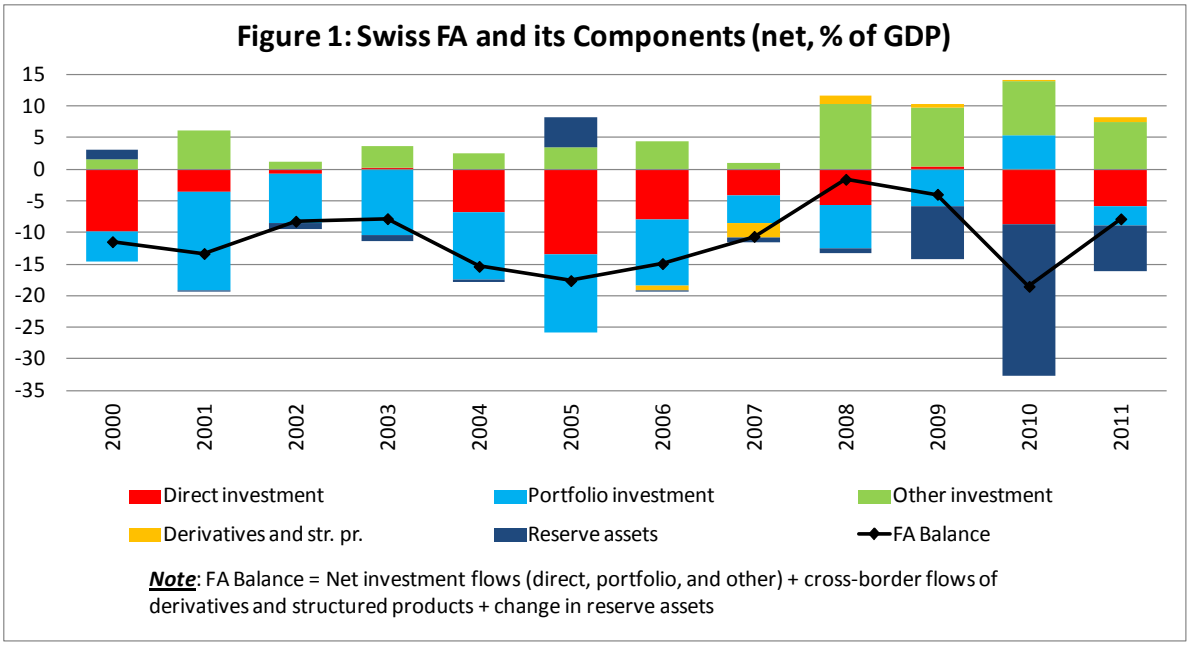
2. Higher demand for CHF-denominated assets stemming from abroad cannot be detected from the capital flows data, thus agents resident in Switzerland might be changing the currency composition of their assets.

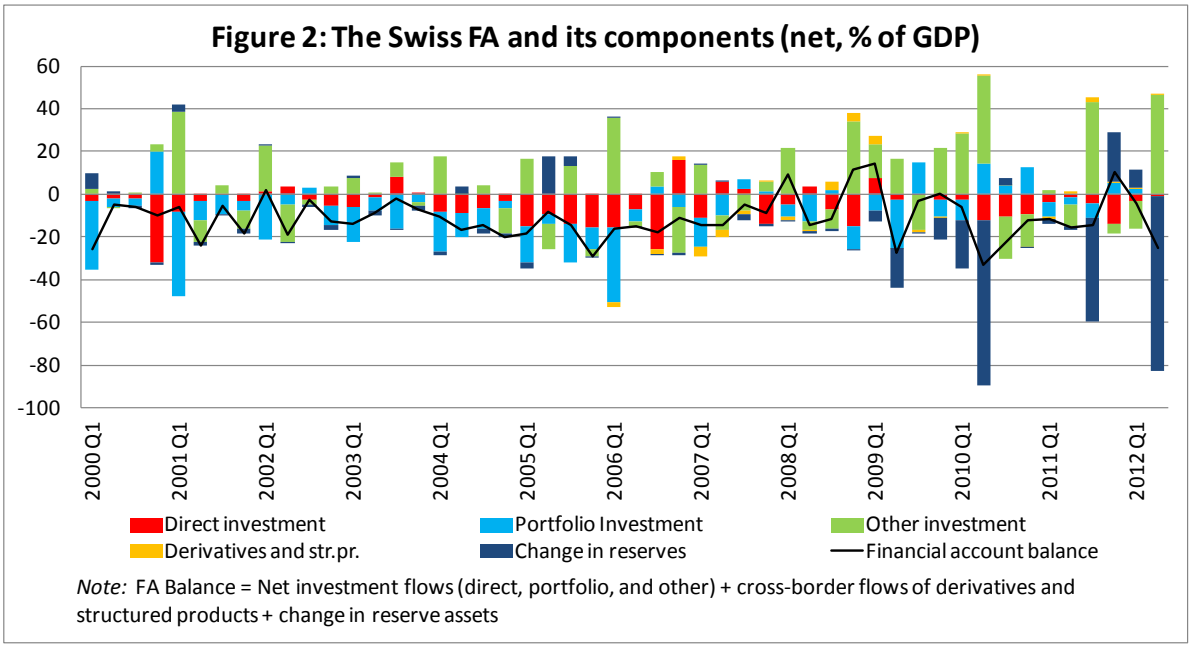
This policy paper is structured as follows: The next section reviews the recent behavior of the Swiss FA and its components in general, while section 3 summarizes the previous literature on capital flows and exchange rates. Section 4 lays out the empirical findings using the linear specification between capital flows and exchange rates. Section 5 reports on the periods of capital flow surges. Section 6 concludes.

2. The Swiss FA

For the past 29 years Switzerland has experienced net capital outflows (i.e. net investment abroad), mirroring its uninterrupted current account surpluses. Figure 1 shows that in 2011 the Swiss FA showed a net capital outflow of CHF 46 billion, equivalent to 7.8% of GDP. [6]

[6] Annually there have been only net capital outflows from Switzerland between 1983 and 2011. However, quarterly data shows also net capital inflows to Switzerland for a small number of quarters (2011:Q4, 2009:Q1, 2008:Q4, 2008:Q1, 2002:Q1 and in 1999:Q1 – note that quarterly FA data starts only in 1999).





Several observations in Figure 1 can be made about the components of the Swiss FA using annual data: Since 2000, foreign direct investment (FDI) flows and portfolio investment flows have been mostly net outflows, while other investment flows have been usually net inflows.[7] These three types of investment flows were the most important components of the Swiss FA until 2009. Starting in 2009, changes in reserves have become very significant in the Swiss FA. Until now, derivatives and structured products have not played a major role in the Swiss FA.[8] Furthermore, net portfolio outflows switched to net inflows in 2010, i.e., foreigners

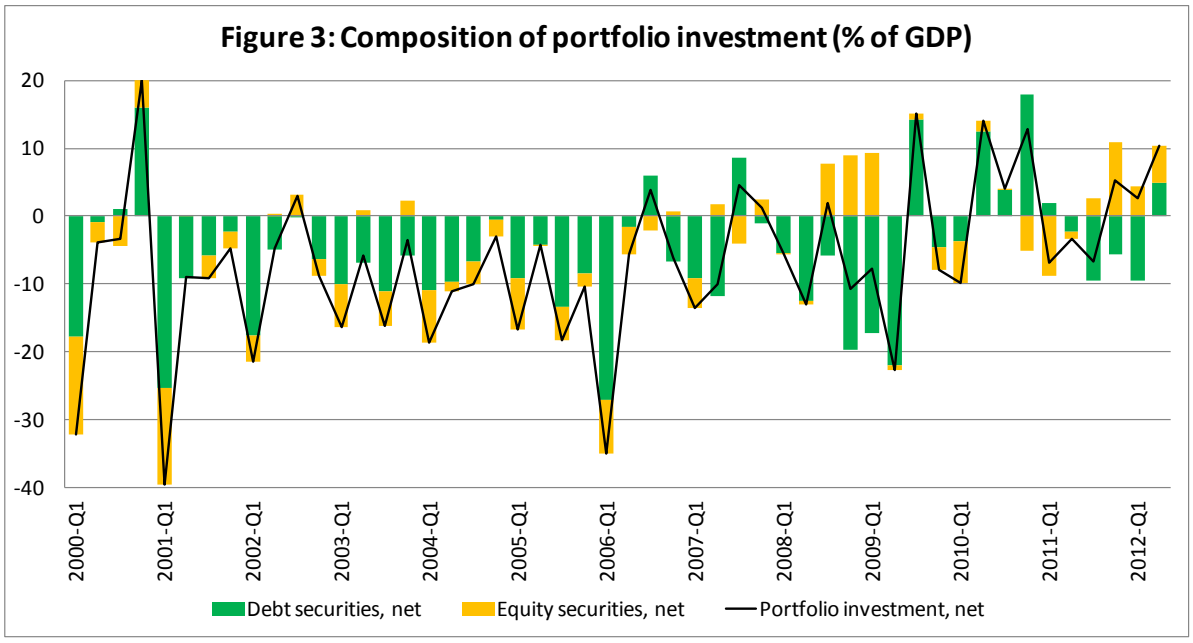
[7] Capital inflows mean higher claims of a foreign resident entity on Switzerland, whereas capital outflows mean higher claims of an entity resident in Switzerland on a foreign country. Thus net inflows mean that foreigners invest more in Switzerland than the Swiss residents invest abroad, and vice versa. Note that the Balance of Payment statistics are based on residency and not on nationality. See Appendix 1 for variables mentioned/used in this study.

[8] The derivatives and structured products data in the Swiss FA start only in 2006.

invested more in Switzerland than the Swiss residents invested abroad. Finally, net FDI outflows stopped abruptly in 2009.

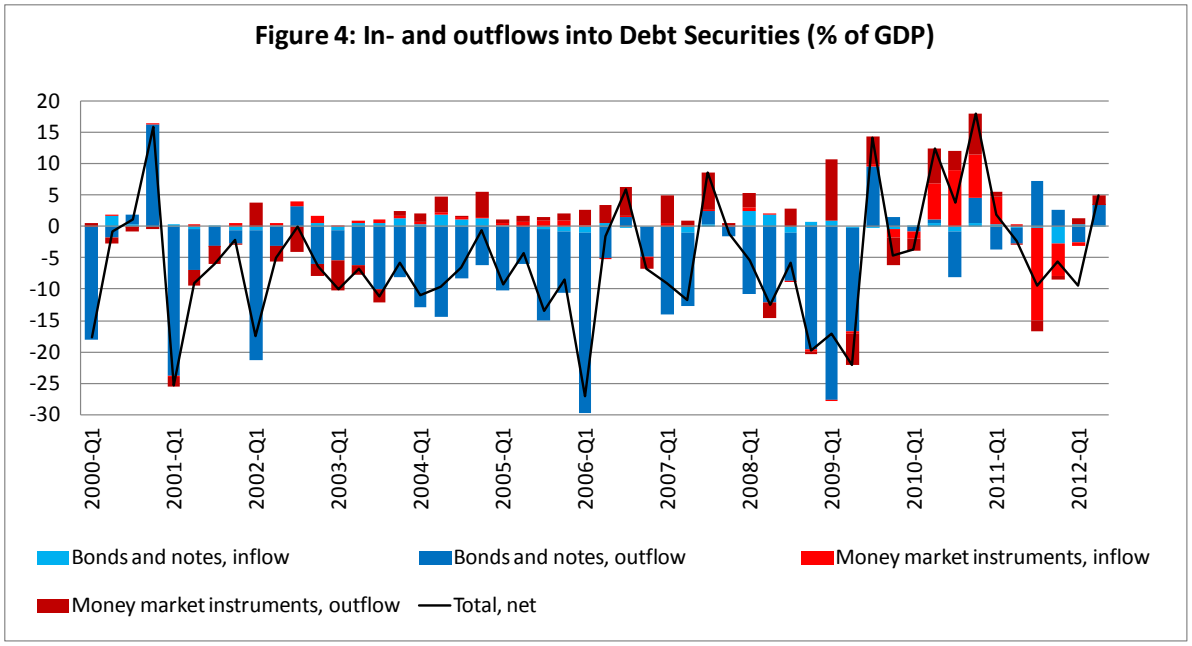
Quarterly Swiss FA data in Figure 2 records similar patterns. However, it also shows that the quarterly data has been more volatile[9] than the annual data and this seems to be more pronounced after the financial crisis.

Two of the investment flows of the Swiss FA which, according to the previous literature, might have a link to the CHF deserve further scrutiny: portfolio investment and other investment. Figure 3 shows the debt versus equity breakdown of the net portfolio investment flows, whereas Figures 4 and 5 depict the gross in- and outflows in debt and equity securities, the two subcomponents of the portfolio flows. Figure 6 shows the composition of the net other investment flows. In all these figures, flows seem to have become more volatile with the financial crisis.



In Figure 3, the composition of net portfolio investment flows shows that outflows of debt securities switched to inflows to a large extent in 2009 and 2010, whereas net equity security flows show a reversal in 2008, probably due to the financial crisis, and then again since 2011:Q3.

[9] Seasonality is an issue in general, and is to some extent due to annual dividend payments of foreign direct investments.



Debt security investment in- and outflows are shown in Figure 4. One major observation is that outflows to bonds and notes have declined significantly since 2009:Q3 (shown in light green), even becoming inflows, i.e. a **repatriation** of these "safe" investments abroad back into Switzerland, probably due to a flight to quality. Furthermore, an increase in the inflows to money market instruments can be observed in 2010, which is reversed in 2011. These were to a large extent the **SNB bills** that were bought cross-border.

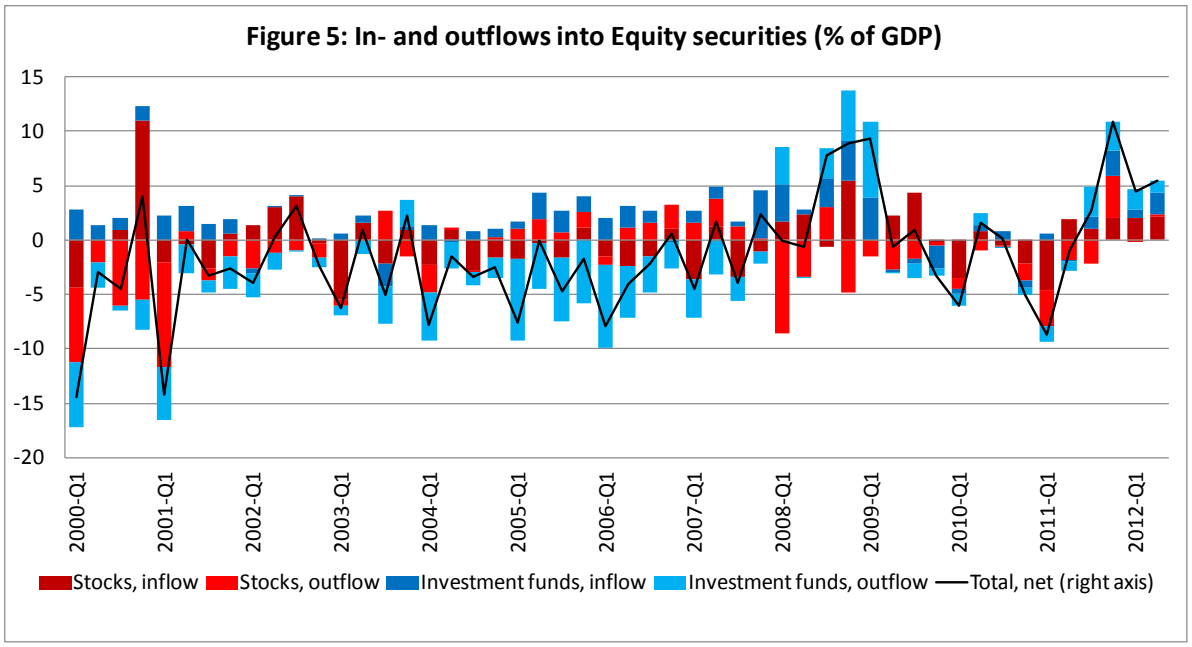
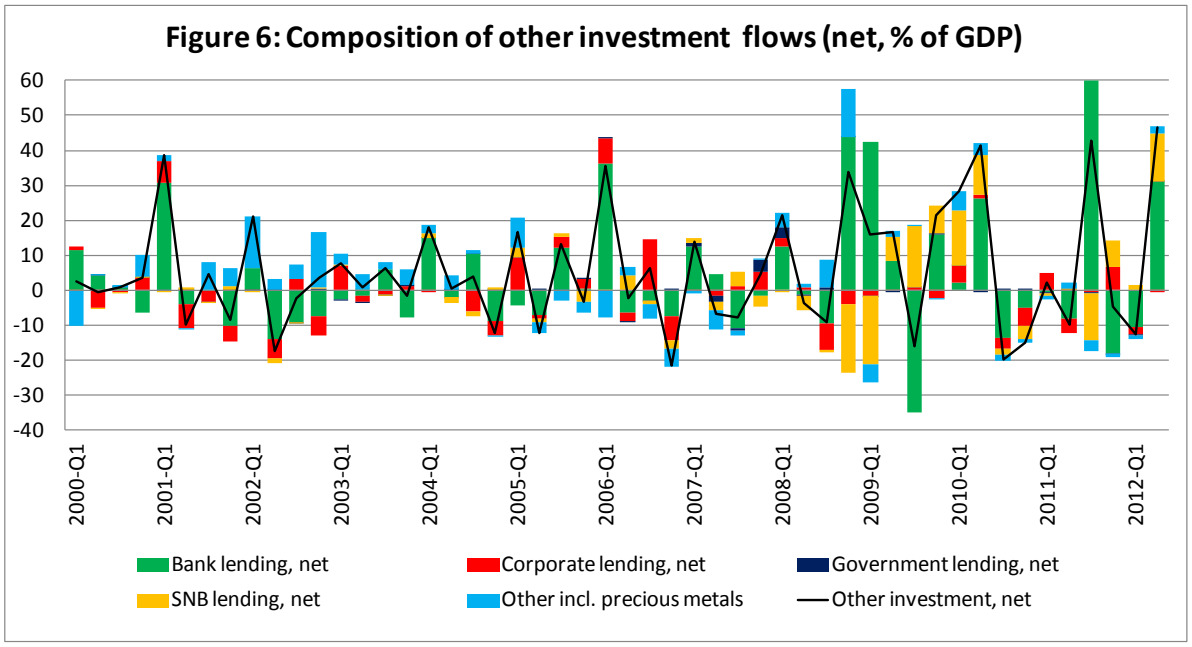


Figure 5 shows the inflows and outflows of equity securities. Until the financial crisis, a significant part of the outflows into equity securities were in the form of investment funds. There was a **repatriation** of these investments in 2008 and the start of 2009 (outflows switching sign and becoming positive). Between 2009:Q2 and 2011:Q2, they switched back to mostly outflows, albeit with a lower volume relative to before. Since 2011:Q3, there has been a repatriation of these investment funds back to Switzerland. The stocks outflows since 2011:Q4 also indicates a repatriation.

In Figure 6, the composition of other investment flows shows that bank lending has been the major component of other investment. With the financial crisis, however, the role of SNB lending has also significantly increased. [10]



3. Literature review on capital flows and exchange rates

Various theoretical and empirical papers have been written to explain and to predict the movements of exchange rates, most notably by Meese and Rogoff (1983a) and Meese and Rogoff (1983b). The consensus view in the literature is that exchange rates are determined to some extent by macroeconomic fundamentals in the long run such as interest rate differentials; but in the short run a random walk outperforms a range of structural models of exchange rates.

On the other hand, there is still no clear consensus in the literature on the relationship between capital flows and exchange rates. Theoretically, capital inflows to finance a current account deficit would allow expenditure to exceed income, therefore it would generate excess domestic demand for non-tradables. Thus the relative price of non-tradables would increase and the exchange rate would appreciate. However, different types of capital flows are invested for different purposes and in different sectors of the economy, and therefore the impact of different types of capital flows on the exchange rate could well be different. For example, foreign direct investment inflows would probably be invested in the production of tradables, and would not necessarily lead to an appreciation of the domestic currency. Therefore the question in the literature has boiled down to studying the existing data and finding empirical support to either of these hypotheses.

The primary focus in the literature so far has been on developing countries, since they are the major recipients of capital inflows[11]. Findings seem to depend on the samples considered, as

[10] To a large extent, this is due to the foreign currency swap transactions between the SNB and the FED and the ECB, as well as due to the foreign currency repo auctions that the SNB conducted with the cross-border counterparties during the financial crisis.

well as the macroeconomic environments in place. A few studies have found that net portfolio investment flows lead to real exchange rate appreciation, while net foreign direct investment flows have no effect on the real exchange rate.[12] Others, by contrast, have found that an inflow of foreign direct investment can also result in an appreciation of the exchange rate in financially open countries.[13] Others again have found that a higher level of financial development attenuates the appreciation of the exchange rate due to capital inflows. [14] The intuition behind this result is that in a financially developed economy, the upward pressure on the relative price of non-tradable goods will be smaller, because capital inflows would add to the productive capacity of the economy and reduce aggregate demand pressure. Furthermore, the exchange rate policy is found to be a further factor in play regarding the statistical link between capital flows and the exchange rate. [15]

In one of the few recent studies on major currencies, Brooks *et al.* (2004) analyze whether net portfolio and foreign direct investment inflows to the US can track movements of the euro and the yen against the dollar. The authors find that indeed net portfolio flows from the euro area into US stocks closely track movements in the euro against the dollar. Net foreign direct investment inflows into the US from the euro area, on the other hand, appear less important in explaining the euro-dollar rate. Net capital inflows from Japan into the US do not help explaining the yen-dollar rate at all.

All in all, the literature to date does not have a clear answer regarding the relationship between exchange rates and capital flows.

4. Empirical findings

In this current study, the model specifications suggested in the existing literature are used to analyze the quarterly balance of payments statistics of Switzerland between 1999:Q1 and 2012:Q2. The focus is on aggregate net flows and the real effective exchange rate (REER) of the CHF, because the Swiss FA data does not include a country or region breakdown of capital flows.[16] Variables used in the empirical analysis as well as their definitions and sources are listed in Appendix 1.

To assess the relative importance of different types of capital flows, separate statistical models are considered in this analysis. In particular, the **log REER** is regressed on its lagged

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[11] The existing literature studies net flows, rather than gross flows. The intuition behind this is that net cross-border flows should affect the exchange rate, and not the gross flows per se.

[12] For example, Bakardzhieva *et al.* (2010) find that in a sample of 57 developing countries between 1980 and 2007, portfolio investments, foreign borrowing, aid, and income lead to real exchange rate appreciation, while foreign direct investments have no effect on the real exchange rate.

[13] For example, using a sample of 109 developing and transition countries during 1990-2003, Lartey (2011) finds that an increase in inflow of foreign direct investments does result in an appreciation of the real exchange rate in financially open countries.

[14] For example, Saborowski (2009), using a panel of 85 developing and developed economies during 1997-2006, finds that the exchange rate appreciation effect of capital inflows is lower in countries with a higher level of financial development.

[15] For example, Combes et al. (2011), based on a sample of 42 developing countries during 1980-2006, find that a more flexible exchange rate helps to dampen appreciation of the real exchange rate stemming from capital inflows.

[16] Unlike in Brooks *et al.* (2004), but in line with all the panel studies such as Saborowski (2009).

value and **different types of capital flows separately**[17]. Although the approach is rather simplistic, it can be seen as a first step in shedding light on co-movements of capital flows into/from Switzerland and the movements of the CHF.

The types of capital flows taken into account in this study are financial account balance, private flows, financial account balance without the SNB reserves, financial account balance without the SNB reserves and SNB lending, FDI flows, portfolio flows, equity flows, bond flows, other investment flows, bank lending, corporate lending, change in reserves, and derivatives and structured products.

To control for the different exchange rate policies pursued by the SNB during the sample period, three different dummies are introduced into the statistical models. *Dummy1* takes the value 1 between 2009:Q2 and 2010:Q2 to control for the exchange rate interventions by the SNB during that period.[18] *Dummy2* takes the value 1 between 2010:Q3 and 2011:Q2 to control for the period of no SNB intervention and strong appreciation of the CHF. *Dummy3* takes the value 1 between 2011:Q3 and 2012:Q2 to control for the SNB's interventions to sustain the exchange rate floor of 1 euro = 1.20 CHF. Furthermore, interaction terms between the dummy variables and the various types of capital flows are considered to capture any non-linearity between capital flows and exchange rates that arose during different periods of exchange rate regimes.

Four different specifications of each statistical model are considered for the robustness check: (1) the whole sample period without any dummy variables, (2) the short sample period from 1999:Q1 until 2009:Q1, i.e., the period of the fully flexible exchange rate regime, (3) the whole sample with the dummy variables, and (4) the whole sample with the dummy variables and interaction terms.

4.1 Net capital flows and REER

First the statistical relationship between net capital flows and the REER is analyzed. The empirical findings are shown in the tables in Appendix 2.

A major result is that the explanatory power of net capital flow variables for the CHF movements is statistically not always significant and is economically rather small. This indicates that there is no strong co-movement between the CHF and net capital flows in general. In other words, net capital flows cannot track movements of the CHF well.

Among the different types of net capital flows considered in this study, direct investment, other investment, bank lending, and reserves show no statistically significant relationship with

[17] Our results are robust to regressing changes in the log REER on capital flows (i.e., they are robust to imposing the coefficient of the lagged dependent variable to be 1). Furthermore, the hypothesis that the coefficient on the lagged REER is 1 can mostly be rejected in the regressions shown in this paper.

[18] Actually, the SNB started to intervene mid March 2009, and stopped the interventions in mid June 2010. Due to the quarterly nature of the capital flow data, however, the dummies here are chosen not to match the end of quarter situation, but rather to indicate whether there were interventions in the exchange rate markets for the major part of the quarter. As the financial flow variables indicate the flows during the whole quarter, I feel this is a better approach.

the REER at all (Tables 2, 6, 7, and 10). This finding is present in all four specifications considered.

As Switzerland has a financially well-developed economy, the finding that there is no relationship between net direct investment flows and the exchange rate is in line with the previous literature.

Net FA balance shows a statistically significant link with the exchange rate in Table 1 in the specifications (2) and (4). However, the link is economically not very strong:

A one percentage point increase in the FA balance to GDP ratio is coincident with a 0.08% real effective appreciation of the CHF.

Net portfolio investment and its subcomponents, debt securities and equity securities, show some co-movement with the CHF (Tables 3, 4 and 5). Again the economic relevance is rather small:

A one percentage point increase in the net portfolio investment to GDP ratio is coincident with a 0.06% appreciation of the CHF in the long-sample without any control variables (Table 3). In the other specifications, the result does not hold.

Similarly, debt securities show a co-movement with the REER in the long sample without any dummy variables (Table 4):

A one percentage point increase in the net debt securities to GDP ratio is coincident with a 0.07% appreciation of the CHF in the long sample without any control variables. In the other specifications, the result does not hold.

The economic relevance of equity securities is slightly larger: **A one percent increase in the equity securities to GDP ratio is coincident with a 0.12% appreciation of the REER** (Table 5).

Table 8 shows a statistically slightly significant co-movement between corporate lending and the REER in the long sample without any control variables. However, the sign is negative, contrary to our priors: **A one percent increase in the corporate lending to GDP ratio is coincident with a 0.14% depreciation of the REER**.

Table 9 shows that derivatives and structured products are coincident with the CHF appreciations to a larger extent. In fact, this subcomponent of capital flows shows the economically largest co-movement with the CHF:

A one percentage point increase in the derivatives and structured products to GDP ratio can result in an appreciation of the CHF up to 0.44 percent in real effective terms. A serious drawback of this finding is that the data on derivatives and structured products start only in 2006:Q1, making the sample much shorter. Thus any results derived in the short sample might not necessarily be valid in the long run and should be considered with caution.

Note also that in all the models, Dummy2 variable turns out to be significant. This has important implications for policy. The period between 2010:Q3 and 2011:Q2 was special in that the SNB did not intervene in the exchange rate markets. Furthermore, strong appreciation of the CHF was observed. Naturally, the question arises of whether this strong appreciation was due to higher net capital flows. Our analysis suggests that this is not the case. **Dummy2**

captures the appreciation of the CHF that cannot be attributed to capital flows. The fact that it is always significant tells us that factors other than capital flows were behind the appreciation of the CHF between 2010:Q3 and 2011:Q2.

4.2 Gross in- and outflows and REER

Appendix 3 shows the regression results when gross in- and outflows instead of net capital flows are used in the regressions. These specifications do not impose the constraint that in- and outflows may not necessarily impact the REER to the same extent.

One major result is that **in most of the aggregate flow specifications, it is the gross capital outflows that show a statistically significant relationship with the exchange rate**. For example, after controlling for private inflows, a one percentage point increase in the private outflow to GDP ratio leads to a 0.04% appreciation of the REER (Table 11D). As before the economic relevance is rather small.

Some types of capital flows again show no statistically significant relationship with the REER, neither as inflows nor as outflows, such as foreign direct investment, other investment, and bank lending (Tables 12, 16, 16B and 17).

On the other hand, portfolio inflows show a statistically significant and economically relevant relationship with the REER: **A one percentage point increase in the portfolio inflow to GDP ratio leads to a 0.23% appreciation of the REER** (Table 13).

When the breakdown of portfolio investment inflows is considered, it is the inflows to debt securities that seem to drive this relationship: **A one percentage point increase in the debt securities inflow to GDP ratio leads to a 1.06% appreciation of the REER** (Table 14).

5. Capital surges

How can a capital inflow surge be defined? Existing literature first calculates some smoothed levels of capital inflows based on the observed data for the sample period, and then identifies capital inflow surges with periods of excessive inflows that exceed a certain threshold above the trend. For example, capital flow data is first de-trended using a Hodrick-Prescott filter. The threshold is then defined as the trend plus one standard deviation for the sample period. Any period when capital inflows exceed this level is defined as a capital inflow surge. The literature usually considers net capital inflows and focuses on developing economies, while a few studies have also analyzed gross capital flows[19].

For the completeness of the analysis, surges are, in this paper, identified both for net flows and for gross in- and outflows. All periods in which capital flows were either higher or lower than the "normal times" are denoted as surges. Surges in quarterly data are displayed in this paper.[20]

[19] See for example, Powell and Tavella (2012).
[20] Surges identified in the annual data are available upon request.

A rolling Hodrick-Prescott filter is used to de-trend the quarterly data with a lambda value of 1600. The rolling windows are 8 quarters long. "Normal times" are defined as plus/minus one standard deviation from the trend value. Furthermore, flows for which the absolute value is less than 1% of GDP are excluded from the definition of surges[21].

Appendix 4 shows graphs where surges in the Swiss FA are identified with red squares. For clarity purposes, the dummy variables' start dates (data?) are marked with vertical lines in all the graphs.

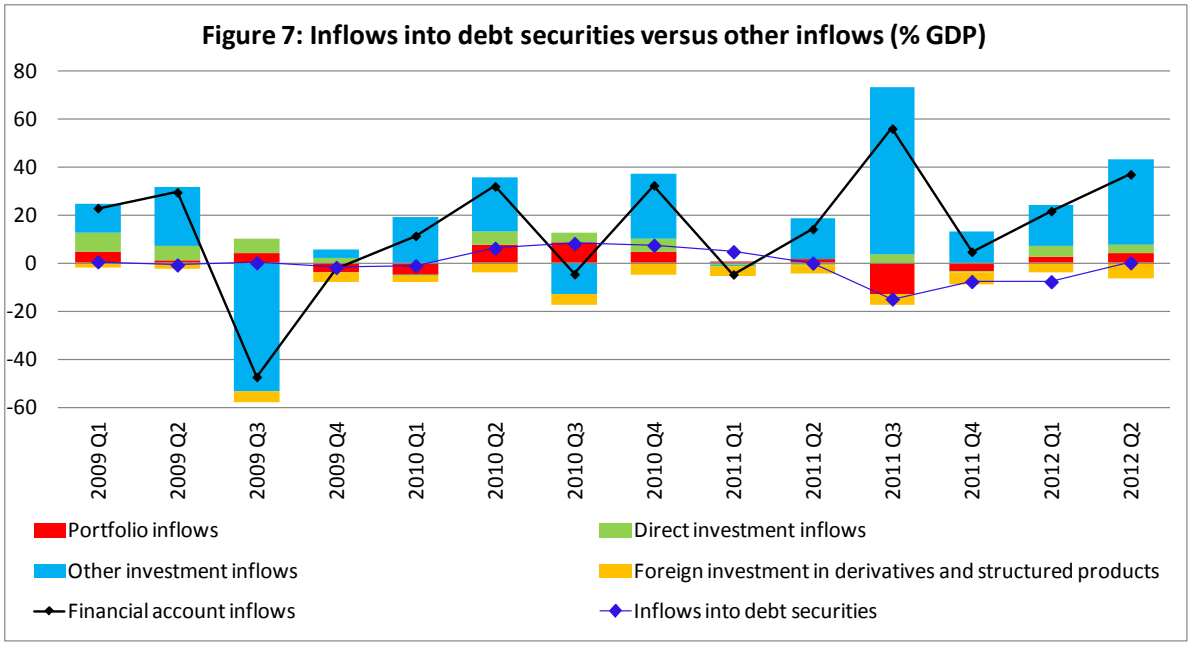
One of the main findings is that most of the capital flow variables have been quite volatile in the past, and the method can identify many surge periods in the sample. For example, net private capital flow shows surges in 14 quarters between 1991:Q1 and 2012:Q2.

Interestingly, most of the aggregate capital inflow variables reveal no surges since 2009:Q3. No inflow surges can, for example, be identified in private capital flows since 2008:Q4.

Debt securities inflows indicate surges in 2010, significantly above the trend, and then in 2011, significantly below the trend. The surges in 2010 are also contemporaneous with the exchange rate appreciation. This is another indication of appreciations being coincident with a certain type of capital flows, namely debt securities flows.

However, one should take this result with a grain of salt because the economic importance of debt securities flows is quite small in the Swiss FA. Figure 7 shows that inflows into debt securities are in fact a very minor part of the total financial account inflows into Switzerland. First of all, total inflows have been very volatile in the past, but not the portfolio or debt security inflows. Furthermore, the volatility of the total financial account inflows were not driven by portfolio inflows or inflows into debt securities. To a large extent, moreover, the inflows into debt securities in 2010 took the form of SNB Bills, a new safe asset during the sovereign debt crisis, which was withdrawn from the market in 2011 (also visible as a reversal of the inflow into outflow in Figure 7).

Figure 7: Inflows into debt securities versus other inflows (% GDP)



[21] This is not a stringent constraint for us, because capital flows in the Swiss FA are usually significantly larger than this value.

Therefore, although an inflow surge can be identified in debt securities, it cannot be the main driver of the CHF appreciation, as its volume is small with respect to all the capital inflows that Switzerland receives.

6. Conclusions and policy implications

Two complementary methods were used in this paper to analyze the relationship between capital flows and the CHF. The main finding is that net capital flows have little explanatory power to track the movements of the REER of the CHF. On the other hand, portfolio inflows, in particular inflows to debt securities, are coincident with the CHF. This finding in the empirical analysis is confirmed by the second method of identifying surges in capital flows. The surges in debt security inflows are simultaneous with the appreciation of the CHF.

One should be cautious in interpreting these results. First the analysis does not deal with the endogeneity problem that exchange rates also affect capital flows. Second, the analysis cannot conclusively show a causality relationship between the two variables. It is a mere indication that a co-movement of capital flows and exchange rates can possibly be identified. And third, capital flows nevertheless have little explanatory power to track the movements of exchange rates in general. A large part of the CHF appreciation in 2010-2011 cannot be explained by capital flows. Other factors seem to have played a significant role in the appreciation of the CHF.

With all the shortcomings of the study in mind, one can still make two speculative conjectures based on the findings:

1. Higher capital flows are not necessarily behind CHF appreciations, **thus capital controls would have, at most, little power to stop further appreciation of the CHF once the exchange rate floor is lifted.**

2. Higher demand for CHF-denominated assets stemming from abroad cannot be detected from the capital flows data, **thus agents resident in Switzerland might be changing their currency composition of their assets.**

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Appendix 1:

Variables	Source	Remarks
GDP	Seco	non-seasonally adjusted, in CHF billion
Real EER, quarterly, broad (61 countries)	BIS	Monthly real effective exchange rate (REER) published by the BIS. Weighted averages of bilateral exchange rates are adjusted by relative consumer prices. The weighting pattern is time-varying (chain-linked index). We use the exchange rate of the last month in the period considered.
Dummy1	own	takes value 1 from 2009-Q2 until 2010-Q2, else 0
Dummy2	own	takes value 1 from 2010-Q3 until 2011-Q2, else 0
Dummy3	own	takes value 1 from 2011-Q3 onwards, before 0
Financial account (FA) balance[1, 2]	SNB, BOP	Sum of exports / claims (negative), and imports / liabilities (positive). The financial account shows the creation and settlement of cross-border financial claims and liabilities. It includes changes in reserves.
Direct investment[1, 2]	SNB, BOP	Cross-border capital participation in companies.
Portfolio investment[1, 2]	SNB, BOP	Investments in securities that do not have the character of capital participation.
Debt securities[1, 2]	SNB, BOP	Bonds and notes, money market instruments. Survey of bank customers' securities turnover.
Equity securities[1, 2]	SNB, BOP	Shares, collective investment schemes. Survey of bank customers' securities turnover.
Other investment[1, 2]	SNB, BOP	Changes in other investment flows, that cannot be classified under direct investment or portfolio investment. Consists mainly of bank lending and corporate lending.
Bank lending[1, 2]	SNB, BOP	Changes in cross-border commercial bank lending to banks and non-banks.
Corporate lending[1, 2]	SNB, BOP	Corporate financial flows that are not included in direct or portfolio investment. Intragroup lending by financial companies is a significant element.
Reserves, total[1, 3]	SNB, BOP	Net changes in foreign exchange reserves
Derivatives and structured products[1, 2]	SNB, BOP	Net payments made and received for derivatives as well as purchases and sales of structured products. Data collection starts only in 2006:Q1.
Private Capital[1, 2]	own, SNB	Only private flows, i.e. excluding SNB reserves, SNB lending, and government lending
FA balance, without SNB reserves[1, 2]	SNB, BOP	Financial account balance excluding SNB reserves
FA balance, without SNB [1, 2]	own, SNB	Financial account balance excluding SNB reserves and SNB lending
Other investment (without SNB & government)[1, 2]	own, SNB	Other investment excluding SNB and government lending

1: In CHF billion, variables enter regression as ratio to GDP

2: In- and outflows to Switzerland, as well as net flows (inflow minus outflow).

3: Net flow only

Appendix 2: Regression analysis, net capital flows

Table 1A: Financial account balance

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.93***	0.83***	0.79***	0.81***
	[0.06]	[0.10]	[0.09]	[0.09]
Financial account balance, net	0.02	0.08**	0.03	0.08**
	[0.03]	[0.04]	[0.03]	[0.04]
Dummy1			0.01	-0.00
			[0.01]	[0.01]
Dummy1 * Financial account balance, net				-0.10
				[0.08]
Dummy2			0.06***	-0.01
			[0.01]	[0.06]
Dummy2 * Financial account balance, net				-0.37
				[0.29]
Dummy 3			0.01	-0.00
			[0.02]	[0.02]
Dummy3* Financial account balance, net				-0.11
				[0.07]
Constant	0.30	0.78*	0.95**	0.86**
	[0.29]	[0.44]	[0.41]	[0.41]
Observations	53	40	53	53
R-squared	0.818	0.666	0.872	0.884
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.640	0.0900	0.170	0.0400
p-value H0: coeff. of lag xrate = 1	0.312	0.0920	0.0252	0.0416

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Flow variables as share of GDP

Table 1B: Financial account balance without SNB reserves

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.83***	0.79***	0.83***
	[0.06]	[0.10]	[0.09]	[0.09]
	0.01	0.07**	0.03	0.07**
FA balance without SNB reserves, net	[0.02]	[0.03]	[0.02]	[0.03]
Dummy1			0.00	-0.00
			[0.01]	[0.01]
Dummy1 * FA balance without reserves, net				-0.06
				[0.06]
Dummy2			0.06***	-0.01
			[0.01]	[0.05]
Dummy2 * FA balance without reserves, net				-0.34
				[0.25]
Dummy3			0.01	-0.00
			[0.02]	[0.02]
Dummy3 * FA balance without reserves, net				-0.07
				[0.05]
Constant	0.36	0.77*	0.95**	0.79*
	[0.29]	[0.44]	[0.40]	[0.41]
Observations	53	40	53	53
R-squared	0.819	0.670	0.876	0.885
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.480	0.0500	0.0700	0.0100
p-value H0: coeff. of lag xrate = 1	0.218	0.0906	0.0224	0.0650

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 1C: Financial account balance without SNB reserves and lending

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.83***	0.80***	0.82***
	[0.06]	[0.10]	[0.09]	[0.09]
	0.02	0.05**	0.03*	0.05**
FA balance without SNB, net	[0.02]	[0.03]	[0.02]	[0.03]
Dummy1			0.01	0.00
			[0.01]	[0.01]
				-0.04
Dummy1 * FA balance without SNB, net				[0.05]
Dummy2			0.06***	0.00
			[0.01]	[0.04]
				-0.29
Dummy2 * FA balance without SNB, net				[0.20]
Dummy3			0.01	0.00
			[0.02]	[0.02]
				-0.04
Dummy3 * FA balance without SNB, net				[0.05]
Constant	0.36	0.77*	0.93**	0.81*
	[0.28]	[0.44]	[0.40]	[0.41]
Observations	53	40	53	53
R-squared	0.821	0.667	0.878	0.885
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.380	0.0700	0.0600	0.0200
p-value H0: coeff. of lag xrate = 1	0.218	0.0912	0.0239	0.0534

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 1D: Financial account - private capital

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.83***	0.79***	0.82***
	[0.06]	[0.10]	[0.09]	[0.09]
	0.02	0.05*	0.03*	0.05*
FA balance: Private capital, net	[0.02]	[0.03]	[0.02]	[0.03]
Dummy1			0.01	0.00
			[0.01]	[0.01]
				-0.03
Dummy1 * FA balance private capital, net				[0.05]
Dummy2			0.06***	0.00
			[0.01]	[0.04]
				-0.29
Dummy2 * FA balance private capital, net				[0.20]
Dummy3			0.01	0.00
			[0.02]	[0.02]
				-0.04
Dummy3 * FA balance private capital, net				[0.05]
Constant	0.36	0.80*	0.95**	0.83**
	[0.28]	[0.44]	[0.40]	[0.41]
Observations	53	40	53	53
R-squared	0.821	0.664	0.877	0.884
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.400	0.0800	0.0600	0.0200
p-value H0: coeff. of lag xrate = 1	0.216	0.0818	0.0220	0.0487

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Flow variables as share of GDP

Table 2: Direct investment

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.93***	0.79***	0.77***	0.76***
	[0.06]	[0.10]	[0.09]	[0.09]
Direct investment, net	0.01	0.01	0.02	0.01
	[0.04]	[0.04]	[0.04]	[0.04]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Direct investment, net				-0.11
				[0.24]
Dummy2			0.06***	0.13***
			[0.01]	[0.05]
Dummy2 * Direct Investment, net				0.89*
				[0.52]
Dummy3			0.02	0.03
			[0.02]	[0.02]
Dummy3 * Direct Investment, net				0.14
				[0.12]
Constant	0.33	0.98**	1.03**	1.08**
	[0.29]	[0.46]	[0.41]	[0.41]
Observations	53	40	53	53
R-squared	0.818	0.629	0.870	0.882
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.640	0.350	0.270	0.380
p-value H0: coeff. of lag xrate = 1	0.253	0.0388	0.0147	0.0111

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 3: Portfolio investment

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.90***	0.82***	0.80***	0.79***
	[0.06]	[0.10]	[0.09]	[0.09]
	0.05*	0.05	0.03	0.05
Portfolio investment, net	[0.03]	[0.03]	[0.03]	[0.03]
Dummy1			0.01	0.00
			[0.01]	[0.01]
Dummy1 * Portfolio investment, net				-0.05
				[0.07]
Dummy2			0.05***	0.05***
			[0.01]	[0.01]
Dummy2 * Portfolio Investment, net				-0.10
				[0.14]
Dummy3			0.01	0.01
			[0.02]	[0.02]
Dummy3 * Portfolio Investment, net				-0.18
				[0.14]
Constant	0.45	0.82*	0.93**	0.95**
	[0.28]	[0.45]	[0.41]	[0.42]
Observations	53	40	53	53
R-squared	0.831	0.655	0.873	0.880
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.480	0.300	0.230	0.240
p-value H0: coeff. of lag xrate = 1	0.120	0.0793	0.0280	0.0293

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 4: Debt securities

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.91***	0.80***	0.78***	0.78***
	[0.06]	[0.10]	[0.09]	[0.09]
Debt securities, net	0.06*	0.05	0.02	0.04
	[0.03]	[0.04]	[0.03]	[0.04]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Debt securities, net				-0.04
				[0.08]
Dummy2			0.05***	0.06***
			[0.01]	[0.02]
Dummy2 * Debt securities, net				-0.20
				[0.14]
Dummy3			0.01	0.01
			[0.02]	[0.02]
Dummy3 * Debt securities, net				-0.18
				[0.20]
Constant	0.43	0.90*	1.00**	1.03**
	[0.28]	[0.45]	[0.41]	[0.42]
Observations	53	40	53	53
R-squared	0.829	0.640	0.870	0.877
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.440	0.410	0.280	0.330
p-value H0: coeff. of lag xrate = 1	0.137	0.0555	0.0187	0.0180

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 5: Equity securities

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.82***	0.81***	0.83***
	[0.06]	[0.10]	[0.09]	[0.09]
Equity securities, net	0.07	0.12*	0.12*	0.12*
	[0.07]	[0.07]	[0.06]	[0.06]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Equity securities, net				-0.05
				[0.32]
Dummy2			0.05***	0.07***
			[0.01]	[0.02]
Dummy2 * Equity securities, net				0.47
				[0.31]
Dummy3			0.00	0.03
			[0.02]	[0.03]
Dummy3 * Equity securities, net				-0.56
				[0.34]
Constant	0.38	0.81*	0.87**	0.76*
	[0.28]	[0.45]	[0.40]	[0.40]
Observations	53	40	53	53
R-squared	0.822	0.657	0.879	0.892
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.760	0.240	0.150	0.150
p-value H0: coeff. of lag xrate = 1	0.191	0.0785	0.0365	0.0614

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 6A: Other investment

	(1)	(2)	(3)	(4)
		Log REER broad		
L.ln_reer_broad	0.93***	0.79***	0.77***	0.79***
	[0.06]	[0.10]	[0.09]	[0.09]
	-0.02	-0.00	-0.00	-0.00
Other investment, net	[0.02]	[0.03]	[0.02]	[0.03]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Other investment, net				0.02
				[0.06]
Dummy2			0.06***	0.04
			[0.01]	[0.02]
Dummy2 * Other Investment, net				-0.13
				[0.15]
Dummy3			0.02	0.01
			[0.02]	[0.02]
Dummy3 * Other Investment, net				0.00
				[0.05]
Constant	0.34	0.97**	1.03**	0.97**
	[0.28]	[0.46]	[0.41]	[0.42]
Observations	53	40	53	53
R-squared	0.821	0.629	0.869	0.872
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.810	0.350	0.250	0.230
p-value H0: coeff. of lag xrate = 1	0.235	0.0389	0.0150	0.0278

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 6B: Other investment without SNB and government lending

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.93***	0.79***	0.77***	0.79***
	[0.06]	[0.10]	[0.09]	[0.09]
Other investment (without SNB & government), net	-0.01	0.00	0.01	0.00
	[0.02]	[0.02]	[0.02]	[0.02]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Other investment (without SNB & government), net				0.01
				[0.05]
Dummy2			0.06***	0.03
			[0.01]	[0.02]
Dummy2 * Other Investment (without SNB & government), net				-0.20
				[0.16]
Dummy3			0.02	0.01
			[0.02]	[0.02]
Dummy3 * Other Investment (without SNB & government), net				0.01
				[0.05]
Constant	0.35	0.97**	1.03**	0.94**
	[0.28]	[0.46]	[0.41]	[0.42]
Observations	53	40	53	53
R-squared	0.819	0.629	0.870	0.874
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.760	0.290	0.200	0.180
p-value H0: coeff. of lag xrate = 1	0.232	0.0400	0.0148	0.0299

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 7: Bank lending

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.93***	0.78***	0.77***	0.79***
	[0.06]	[0.10]	[0.09]	[0.09]
Bank lending, net	-0.01	-0.01	0.00	-0.01
	[0.02]	[0.03]	[0.02]	[0.02]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Bank lending, net				0.03
				[0.05]
Dummy2			0.06***	0.04
			[0.01]	[0.02]
Dummy2 * Bank lending, net				-0.20
				[0.29]
Dummy3			0.02	0.01
			[0.02]	[0.02]
Dummy3 * Bank lending, net				0.04
				[0.06]
Constant	0.34	1.01**	1.03**	0.97**
	[0.28]	[0.46]	[0.41]	[0.43]
Observations	53	40	53	53
R-squared	0.818	0.631	0.869	0.873
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.710	0.420	0.250	0.220
p-value H0: coeff. of lag xrate = 1	0.234	0.0352	0.0155	0.0301

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 8: Corporate lending

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.93***	0.79***	0.79***	0.80***
	[0.06]	[0.10]	[0.09]	[0.09]
Corporate lending, net	-0.14*	-0.08	-0.10	-0.08
	[0.07]	[0.07]	[0.07]	[0.07]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Corporate lending, net				0.01
				[0.40]
Dummy2			0.05***	0.04***
			[0.01]	[0.02]
Dummy2 * Corporate lending, net				-0.26
				[0.32]
Dummy3			0.01	0.01
			[0.02]	[0.02]
Dummy3 * Corporate lending, net				-0.59
				[0.48]
Constant	0.35	0.95**	0.98**	0.92**
	[0.27]	[0.45]	[0.40]	[0.41]
Observations	53	40	53	53
R-squared	0.830	0.639	0.875	0.881
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.610	0.310	0.250	0.250
p-value H0: coeff. of lag xrate = 1	0.216	0.0415	0.0177	0.0281

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 9: Derivatives and structured products

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.93***	0.43	0.53***	0.50***
	[0.08]	[0.27]	[0.16]	[0.17]
Derivatives and structured Products, net	0.32	0.38	0.44**	0.37*
	[0.26]	[0.23]	[0.19]	[0.19]
Dummy1			0.03**	0.03**
			[0.01]	[0.01]
Dummy1 * Derivatives and struct. products, net				0.15
				[1.20]
Dummy2			0.09***	0.09***
			[0.02]	[0.02]
Dummy2 * Derivatives and struct. products, net				2.37*
				[1.21]
Dummy3			0.06*	0.06*
			[0.03]	[0.03]
Dummy3 * Derivatives and struct. products, net				0.93
				[1.27]
Constant	0.31	2.58*	2.15***	2.25***
	[0.35]	[1.21]	[0.75]	[0.76]
Observations	26	13	26	26
R-squared	0.880	0.386	0.945	0.956
Dickey-Fuller p-value	0	0.450	0	0
Breusch-Godfrey prob>chi2	0.970	0.490	0.260	0.300
p-value H0: coeff. of lag xrate = 1	0.391	0.0598	0.00943	0.00841

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 10: Reserves

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.79***	0.77***	0.78***
	[0.06]	[0.10]	[0.09]	[0.09]
Reserves	-0.01	-0.08	-0.01	-0.08
	[0.02]	[0.10]	[0.02]	[0.10]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Reserves				0.06
				[0.10]
Dummy2			0.06***	0.05***
			[0.01]	[0.01]
Dummy2 * Reserves				0.23
				[0.51]
Dummy3			0.01	0.01
			[0.02]	[0.02]
Dummy3 * Reserves				0.07
				[0.10]
Constant	0.36	0.96**	1.03**	0.99**
	[0.29]	[0.45]	[0.41]	[0.43]
Observations	53	40	53	53
R-squared	0.818	0.635	0.871	0.872
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.540	0.150	0.190	0.0600
p-value H0: coeff. of lag xrate = 1	0.226	0.0400	0.0143	0.0275

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Appendix 3: Regression analysis, gross in- and outflows

Table 11A: Financial account balance

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.82***	0.78***	0.81***
	[0.06]	[0.09]	[0.09]	[0.09]
Financial account balance, inflow	-0.01	0.06	0.01	0.06
	[0.03]	[0.04]	[0.03]	[0.04]
Financial account balance, outflow	0.01	0.07*	0.02	0.07*
	[0.03]	[0.04]	[0.03]	[0.04]
Dummy1			0.01	-0.00
			[0.01]	[0.02]
Dummy1 * Financial account balance, inflow				-0.07
				[0.14]
Dummy1 * Financial account balance, outflow				-0.08
				[0.11]
Dummy2			0.05***	-0.07
			[0.01]	[0.06]
Dummy2 * Financial account balance, inflow				-0.40
				[0.28]
Dummy2 * Financial account balance, outflow				-0.62*
				[0.31]
Dummy3			0.02	-0.03
			[0.02]	[0.03]
Dummy3 * Financial account balance, inflow				0.32
				[0.37]
Dummy3 * Financial account balance, outflow				0.09
				[0.18]
Constant	0.36	0.82*	0.99**	0.89**
	[0.29]	[0.43]	[0.40]	[0.40]
Observations	53	40	53	53
R-squared	0.831	0.695	0.880	0.904
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.530	0.100	0.160	0.0900
p-value H0: coeff. of lag xrate = 1	0.227	0.0675	0.0184	0.0337

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 11B: Financial account balance without SNB reserves

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.82***	0.79***	0.81***
	[0.06]	[0.09]	[0.09]	[0.09]
FA balance without SNB reserves, inflow	-0.00	0.05	0.02	0.05
	[0.02]	[0.04]	[0.02]	[0.03]
FA balance without SNB reserves, outflow	0.01	0.06*	0.03	0.06*
	[0.02]	[0.03]	[0.02]	[0.03]
Dummy1			0.00	-0.00
			[0.01]	[0.01]
Dummy1 * FA balance without SNB reserves, inflow				-0.03
				[0.06]
Dummy1 * FA balance without SNB reserves, outflow				-0.05
				[0.06]
Dummy2			0.05***	-0.06
			[0.01]	[0.05]
Dummy2 * FA balance without SNB reserves, inflow				-0.34
				[0.24]
Dummy2 * FA balance without SNB reserves, outflow				-0.57**
				[0.27]
Dummy3			0.01	-0.02
			[0.02]	[0.03]
Dummy3 * FA balance without SNB reserves, inflow				0.03
				[0.08]
Dummy3 * FA balance without SNB reserves, outflow				-0.10
				[0.06]
Constant	0.39	0.83*	0.97**	0.88**
	[0.28]	[0.43]	[0.39]	[0.39]
Observations	53	40	53	53
R-squared	0.832	0.694	0.884	0.905
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.420	0.0700	0.0600	0.0500
p-value H0: coeff. of lag xrate = 1	0.177	0.0659	0.0176	0.0334

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 11C: Financial account balance without SNB reserves and lending

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.82***	0.79***	0.81***
	[0.06]	[0.10]	[0.09]	[0.09]
FA balance without SNB, inflow	0.01	0.04	0.02	0.04
	[0.02]	[0.03]	[0.02]	[0.03]
FA balance without SNB, outflow	0.02	0.04*	0.03	0.04*
	[0.02]	[0.03]	[0.02]	[0.03]
Dummy1			0.00	0.00
			[0.01]	[0.01]
Dummy1 * FA balance without SNB, inflow				-0.02
				[0.05]
Dummy1 * FA balance without SNB, outflow				-0.03
				[0.06]
Dummy2			0.05***	-0.03
			[0.01]	[0.04]
Dummy2 *FA balance without SNB, inflow				-0.27
				[0.19]
Dummy2 * FA balance without SNB, outflow				-0.45**
				[0.21]
Dummy3			0.01	-0.03
			[0.02]	[0.03]
Dummy3 * FA balance without SNB, inflow				0.07
				[0.09]
Dummy3 * FA balance without SNB, outflow				-0.11
				[0.08]
Constant	0.38	0.82*	0.95**	0.89**
	[0.28]	[0.44]	[0.39]	[0.39]
Observations	53	40	53	53
R-squared	0.832	0.687	0.884	0.904
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.360	0.0900	0.0600	0.0900
p-value H0: coeff. of lag xrate = 1	0.181	0.0695	0.0198	0.0299

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 11D: Financial account - private capital

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.82***	0.79***	0.80***
	[0.06]	[0.10]	[0.09]	[0.09]
Private capital, inflow	0.00	0.03	0.02	0.03
	[0.02]	[0.03]	[0.02]	[0.03]
Private capital, outflow	0.02	0.04	0.03	0.04
	[0.02]	[0.03]	[0.02]	[0.03]
Dummy1			0.00	0.00
			[0.01]	[0.01]
Dummy1 * Private capital, inflow				-0.01
				[0.05]
Dummy1 * Private capital, outflow				-0.03
				[0.06]
Dummy2			0.05***	-0.03
			[0.01]	[0.04]
Dummy2 * Private capital, inflow				-0.26
				[0.19]
Dummy2 * Private capital, outflow				-0.44**
				[0.21]
Dummy3			0.01	-0.03
			[0.02]	[0.03]
Dummy3 * Private capital, inflow				0.08
				[0.09]
Dummy3 * Private capital, outflow				-0.11
				[0.08]
Constant	0.38	0.85*	0.97**	0.90**
	[0.28]	[0.44]	[0.39]	[0.39]
Observations	53	40	53	53
R-squared	0.832	0.684	0.884	0.903
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.380	0.100	0.0600	0.0900
p-value H0: coeff. of lag xrate = 1	0.181	0.0623	0.0183	0.0275

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 12: Direct investment

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.74***	0.75***	0.71***
	[0.07]	[0.11]	[0.10]	[0.11]
Direct investment, inflow	0.00	-0.05	-0.01	-0.05
	[0.07]	[0.07]	[0.06]	[0.07]
Direct investment, outflow	0.01	0.02	0.03	0.03
	[0.05]	[0.04]	[0.04]	[0.04]
Dummy1			0.01	0.00
			[0.01]	[0.02]
Dummy1 * Direct investment, inflow				-0.05
				[0.51]
Dummy1 * Direct investment, outflow				-0.14
				[0.26]
Dummy2			0.06***	0.14***
			[0.01]	[0.05]
Dummy2 * Direct investment, inflow				1.05
				[0.64]
Dummy2 * Direct investment, outflow				0.91*
				[0.54]
Dummy3			0.02	0.02
			[0.02]	[0.03]
Dummy3 * Direct investment, inflow				0.28
				[0.25]
Dummy3 * Direct investment, outflow				0.01
				[0.27]
Constant	0.35	1.18**	1.15**	1.32**
	[0.31]	[0.52]	[0.46]	[0.49]
Observations	53	40	53	53
R-squared	0.818	0.637	0.871	0.886
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.610	0.190	0.180	0.150
p-value H0: coeff. of lag xrate = 1	0.266	0.0276	0.0149	0.0101

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 13: Portfolio investment

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.96***	0.86***	0.83***	0.87***
	[0.06]	[0.10]	[0.09]	[0.10]
Portfolio investment, inflow	0.22**	0.23**	0.14*	0.23**
	[0.08]	[0.10]	[0.08]	[0.10]
Portfolio investment, outflow	0.02	0.03	0.01	0.03
	[0.03]	[0.03]	[0.03]	[0.03]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Portfolio investment, inflow				-0.17
				[0.23]
Dummy1 * Portfolio investment, outflow				-0.04
				[0.09]
Dummy2			0.05***	0.04
			[0.01]	[0.02]
Dummy2 * Portfolio investment, inflow				0.03
				[0.37]
Dummy2 * Portfolio investment, outflow				-0.16
				[0.18]
Dummy3			0.01	0.02
			[0.02]	[0.02]
Dummy3 * Portfolio investment, inflow				-0.26
				[0.18]
Dummy3 * Portfolio investment, outflow				-0.36
				[0.22]
Constant	0.19	0.66	0.76*	0.61
	[0.30]	[0.45]	[0.42]	[0.44]
Observations	53	40	53	53
R-squared	0.844	0.682	0.879	0.893
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.260	0.140	0.110	0.0400
p-value H0: coeff. of lag xrate = 1	0.526	0.149	0.0775	0.179

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 14: Debt securities

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.95***	0.77***	0.79***	0.74***
	[0.06]	[0.09]	[0.09]	[0.09]
Debt securities, inflow	0.27**	1.07***	0.07	1.08***
	[0.11]	[0.37]	[0.13]	[0.37]
Debt securities, outflow	0.04	0.02	0.01	0.02
	[0.04]	[0.04]	[0.04]	[0.04]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Debt securities, inflow				-0.93*
				[0.50]
Dummy1 * Debt securities, outflow				-0.04
				[0.09]
Dummy2			0.05***	0.08***
			[0.02]	[0.02]
Dummy2 * Debt securities, inflow				-1.46***
				[0.50]
Dummy2 * Debt securities, outflow				-0.08
				[0.18]
Dummy3			0.02	0.04*
			[0.02]	[0.02]
Dummy3 * Debt securities, inflow				-1.21***
				[0.42]
Dummy3 * Debt securities, outflow				-0.46
				[0.34]
Constant	0.24	1.06**	0.98**	1.18***
	[0.29]	[0.42]	[0.42]	[0.41]
Observations	53	40	53	53
R-squared	0.842	0.703	0.871	0.902
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.260	0.990	0.260	0.950
p-value H0: coeff. of lag xrate = 1	0.421	0.0162	0.0244	0.00670

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 15: Equity securities

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.84***	0.83***	0.83***
	[0.06]	[0.10]	[0.09]	[0.09]
Equity securities, inflow	0.10	0.18	0.19*	0.18
	[0.11]	[0.11]	[0.10]	[0.11]
Equity securities, outflow	0.05	0.09	0.07	0.08
	[0.09]	[0.09]	[0.08]	[0.08]
Dummy1			0.01	0.01
			[0.01]	[0.02]
Dummy1 * Equity securities, inflow				-0.12
				[0.34]
Dummy1 * Equity securities, outflow				0.24
				[0.78]
Dummy2			0.05***	0.06***
			[0.01]	[0.02]
Dummy2 * Equity securities, inflow				0.82
				[0.52]
Dummy2 * Equity securities, outflow				-0.26
				[0.84]
Dummy3			0.00	0.03
			[0.02]	[0.05]
Dummy3 * Equity securities, inflow				-0.64
				[1.54]
Dummy3 * Equity securities, outflow				-0.51
				[0.61]
Constant	0.35	0.73	0.79*	0.80*
	[0.30]	[0.46]	[0.41]	[0.43]
Observations	53	40	53	53
R-squared	0.822	0.662	0.881	0.896
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.770	0.170	0.100	0.140
p-value H0: coeff. of lag xrate = 1	0.248	0.122	0.0625	0.0741

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Flow variables as share of GDP

Table 16A: Other investment

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.93***	0.79***	0.78***	0.76***
	[0.06]	[0.10]	[0.09]	[0.09]
Other investment, inflow	-0.02	0.00	0.00	0.00
	[0.02]	[0.02]	[0.02]	[0.03]
Other investment, outflow	-0.01	0.02	0.01	0.02
	[0.02]	[0.03]	[0.02]	[0.03]
Dummy1			0.01	0.00
			[0.01]	[0.02]
Dummy1 * Other investment, inflow				0.02
				[0.06]
Dummy1 * Other investment, outflow				0.01
				[0.11]
Dummy2			0.06***	0.04
			[0.01]	[0.02]
Dummy2 * Other investment, inflow				-0.05
				[0.18]
Dummy2 * Other investment, outflow				-0.16
				[0.15]
Dummy3			0.02	-0.00
			[0.02]	[0.03]
Dummy3 * Other investment, inflow				0.04
				[0.08]
Dummy3 * Other investment, outflow				-0.05
				[0.07]
Constant	0.34	0.97**	1.02**	1.09**
	[0.28]	[0.44]	[0.40]	[0.43]
Observations	53	40	53	53
R-squared	0.832	0.667	0.879	0.888
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.570	0.170	0.120	0.140
p-value H0: coeff. of lag xrate = 1	0.230	0.0324	0.0132	0.0157

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 16B: Other investment (without SNB & government)

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.93***	0.79***	0.78***	0.77***
	[0.06]	[0.10]	[0.09]	[0.09]
Other investment (without SNB & government), inflow	-0.02	0.00	0.00	0.00
	[0.02]	[0.02]	[0.02]	[0.02]
Other investment (without SNB & government), outflow	-0.00	0.01	0.01	0.01
	[0.02]	[0.02]	[0.02]	[0.02]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Other investment (without SNB & government), inflow				0.02
				[0.05]
Dummy1 * Other investment (without SNB & government), outflow				0.02
				[0.10]
Dummy2			0.06***	0.03
			[0.01]	[0.02]
Dummy2 * Other investment (without SNB & government), inflow				-0.10
				[0.20]
Dummy2 * Other investment (without SNB & government), outflow				-0.19
				[0.16]
Dummy3			0.02	-0.01
			[0.02]	[0.04]
Dummy3 * Other investment (without SNB & government), inflow				0.06
				[0.10]
Dummy3 * Other investment (without SNB & government), outflow				-0.06
				[0.12]
Constant	0.34	0.96**	1.02**	1.04**
	[0.28]	[0.44]	[0.40]	[0.43]
Observations	53	40	53	53
R-squared	0.830	0.664	0.879	0.888
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.550	0.190	0.120	0.140
p-value H0: coeff. of lag xrate = 1	0.234	0.0361	0.0139	0.0201

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 17: Bank lending

	(1)	(2)	(3)	(4)
		Log REER broad		
L.ln_reer_broad	0.92***	0.79***	0.79***	0.80***
	[0.06]	[0.10]	[0.09]	[0.09]
Bank lending, total inflow	-0.01	-0.01	-0.00	-0.01
	[0.02]	[0.02]	[0.02]	[0.02]
Bank lending, total outflow	-0.00	-0.00	0.01	-0.00
	[0.02]	[0.03]	[0.02]	[0.02]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Bank lending, total inflow				0.03
				[0.05]
Dummy1 * Bank lending, total outflow				0.02
				[0.07]
Dummy2			0.05***	0.05*
			[0.01]	[0.03]
Dummy2 * Bank lending, total inflow				-0.10
				[0.28]
Dummy2 * Bank lending, total outflow				-0.24
				[0.28]
Dummy3			0.01	0.01
			[0.02]	[0.02]
Dummy3 * Bank lending, total inflow				0.01
				[0.07]
Dummy3 * Bank lending, total outflow				0.13
				[0.12]
Constant	0.35	0.95**	0.98**	0.92**
	[0.28]	[0.45]	[0.40]	[0.43]
Observations	53	40	53	53
R-squared	0.830	0.660	0.877	0.893
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.550	0.320	0.200	0.200
p-value H0: coeff. of lag xrate = 1	0.214	0.0415	0.0194	0.0399

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 18: Corporate lending

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.92***	0.78***	0.78***	0.80***
	[0.06]	[0.10]	[0.09]	[0.09]
Corporate lending, inflow	-0.16**	-0.10	-0.13*	-0.10
	[0.08]	[0.08]	[0.07]	[0.07]
Corporate lending, outflow	-0.12	-0.05	-0.06	-0.05
	[0.08]	[0.08]	[0.07]	[0.08]
Dummy1			0.01	0.01
			[0.01]	[0.01]
Dummy1 * Corporate lending, inflow				0.06
				[0.61]
Dummy1 * Corporate lending, outflow				-0.01
				[0.44]
Dummy2			0.05***	0.06***
			[0.01]	[0.02]
Dummy2 * Corporate lending, inflow				-0.28
				[0.33]
Dummy2 * Corporate lending, outflow				-0.02
				[0.36]
Dummy3			0.01	0.01
			[0.02]	[0.02]
Dummy3 * Corporate lending, inflow				-0.50
				[1.02]
Dummy3 * Corporate lending, outflow				-0.60
				[0.53]
Constant	0.36	1.00**	1.03**	0.91**
	[0.28]	[0.45]	[0.40]	[0.41]
Observations	53	40	53	53
R-squared	0.832	0.646	0.879	0.891
Dickey-Fuller p-value	0	0	0	0
Breusch-Godfrey prob>chi2	0.620	0.220	0.140	0.130
p-value H0: coeff. of lag xrate = 1	0.201	0.0350	0.0133	0.0343

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1
Flow variables as share of GDP

Table 19: Derivatives and structured products

	(1)	(2)	(3)	(4)
	Log REER broad			
L.ln_reer_broad	0.94***	0.58**	0.60***	0.52***
	[0.07]	[0.24]	[0.15]	[0.17]
Derivatives and structured products, inflow	0.10	0.16	0.25	0.17
	[0.27]	[0.22]	[0.19]	[0.19]
Derivatives and structured products, outflow	0.31	0.35	0.43**	0.36*
	[0.25]	[0.20]	[0.17]	[0.17]
Dummy1			0.03**	0.02
			[0.01]	[0.03]
Dummy1 * Derivatives and structured products, inflow				0.17
				[1.17]
Dummy1 * Derivatives and structured products, outflow				0.37
				[1.22]
Dummy2			0.08***	0.19*
			[0.02]	[0.10]
Dummy2 * Derivatives and structured products, inflow				4.32*
				[2.04]
Dummy2 * Derivatives and structured products, outflow				1.84
				[1.22]
Dummy3			0.05	0.08*
			[0.03]	[0.04]
Dummy3 * Derivatives and structured products, inflow				1.53
				[1.28]
Dummy3 * Derivatives and structured products, outflow				0.84
				[1.15]
Constant	0.27	1.91	1.80**	2.17**
	[0.33]	[1.08]	[0.69]	[0.76]
Observations	26	13	26	26
R-squared	0.897	0.596	0.958	0.973
Dickey-Fuller p-value	0	0.280	0	0
Breusch-Godfrey prob>chi2	0.680	0.810	0.550	0.580
p-value H0: coeff. of lag xrate = 1	0.414	0.111	0.0169	0.0137

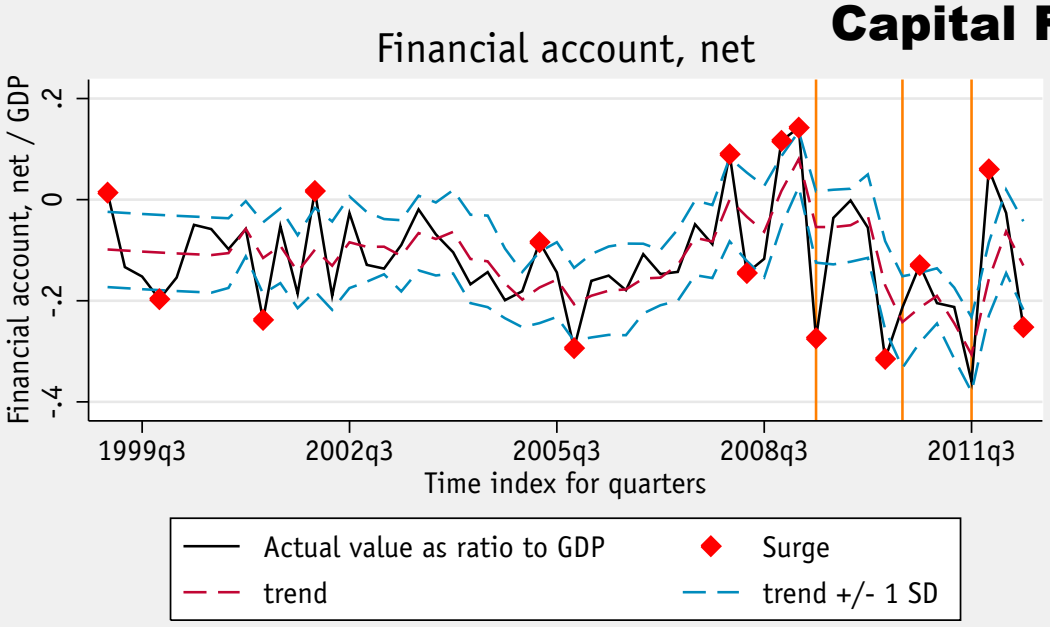
Standard errors in brackets

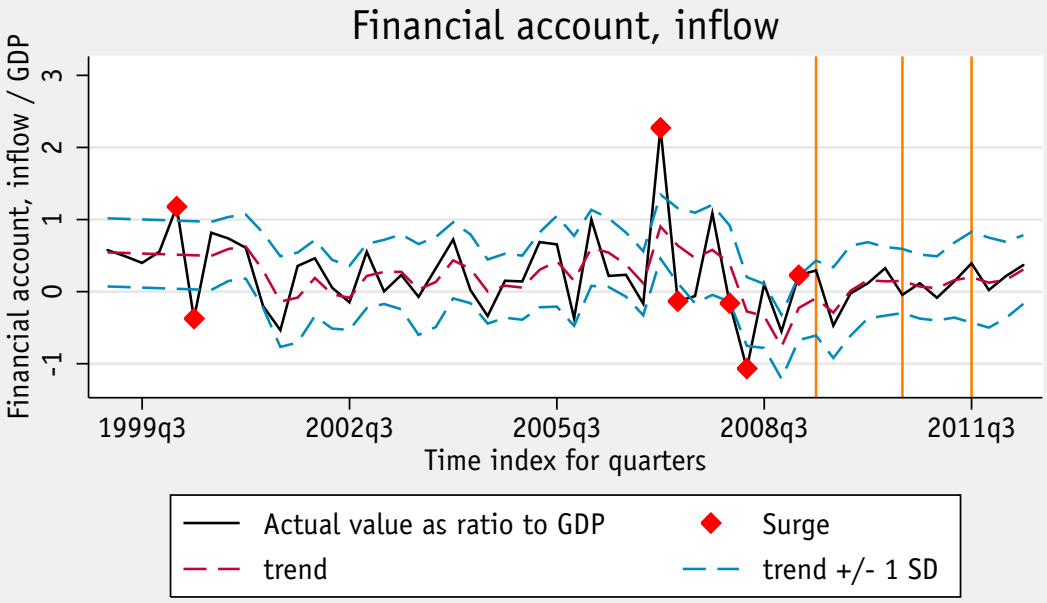
*** p<0.01, ** p<0.05, * p<0.1

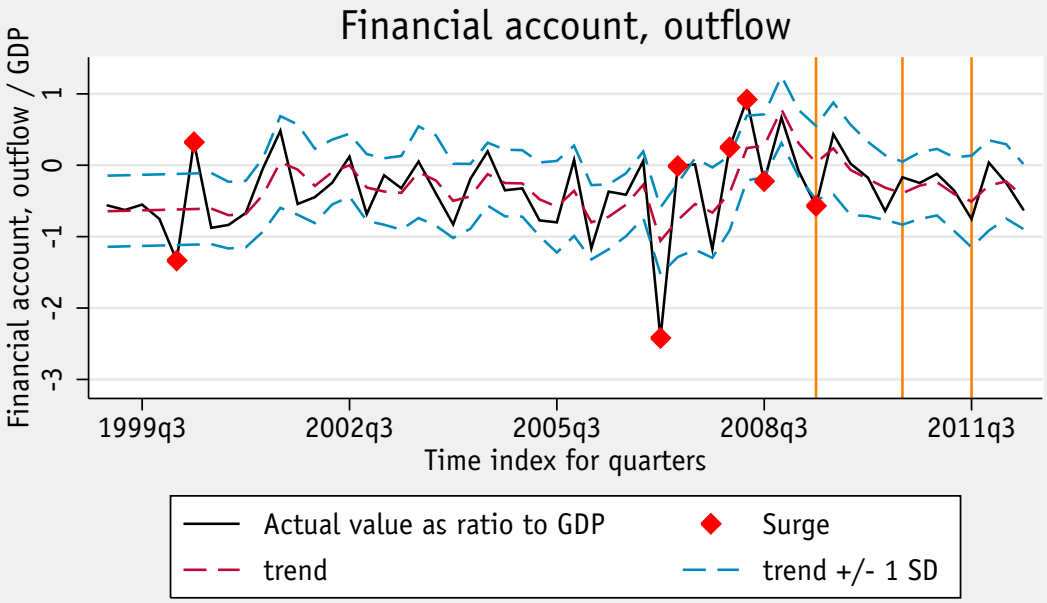
Flow variables as share of GDP

Appendix 4: Capital Flow Surges

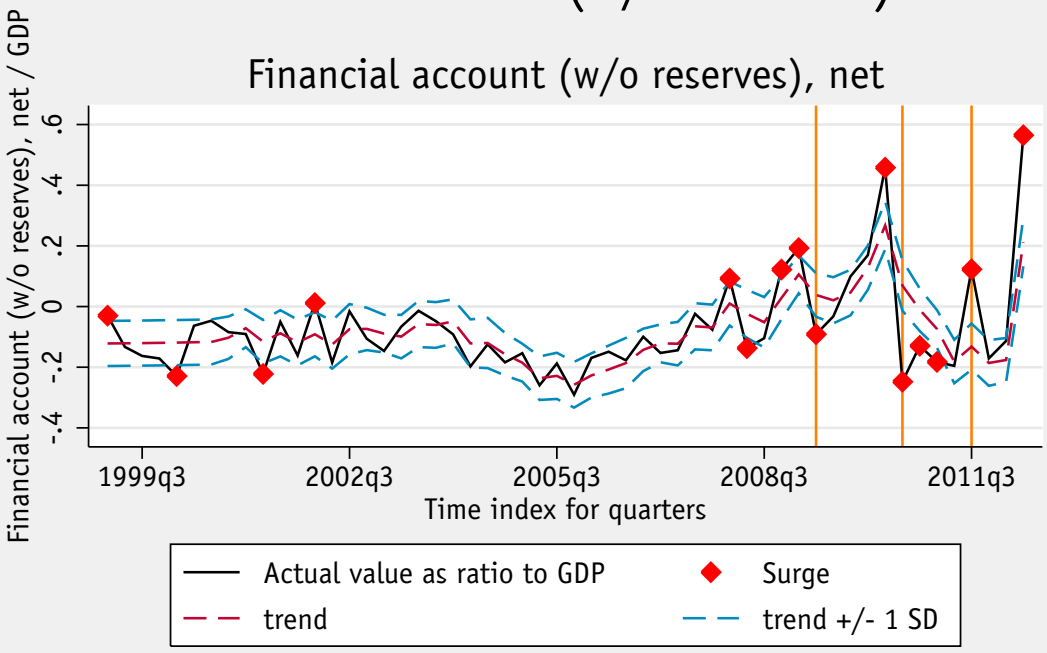
Financial account

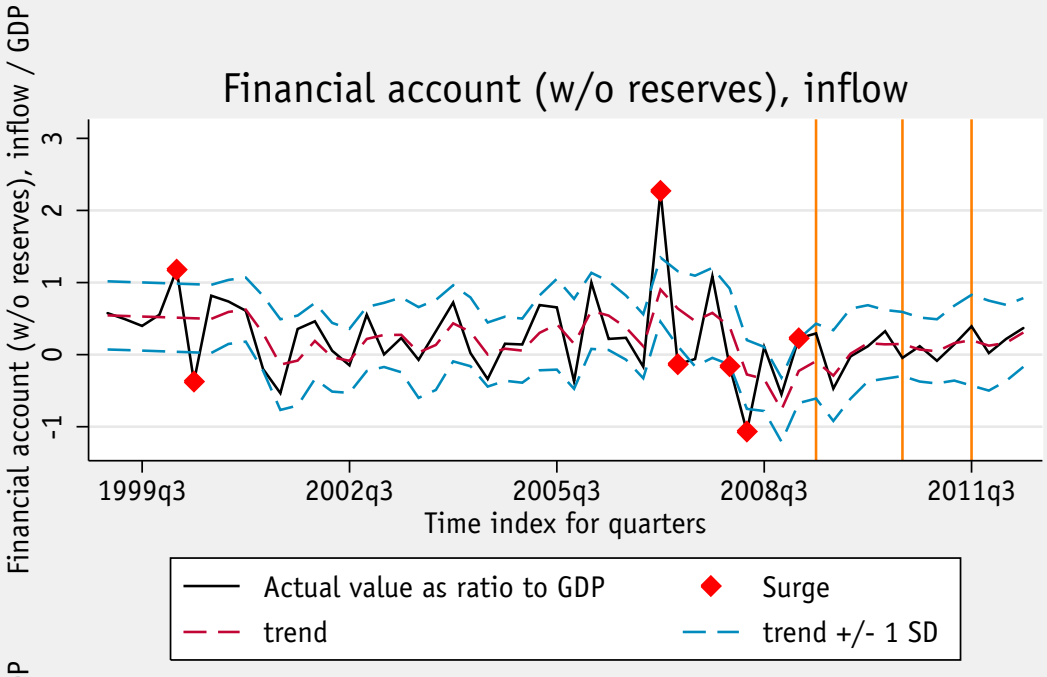


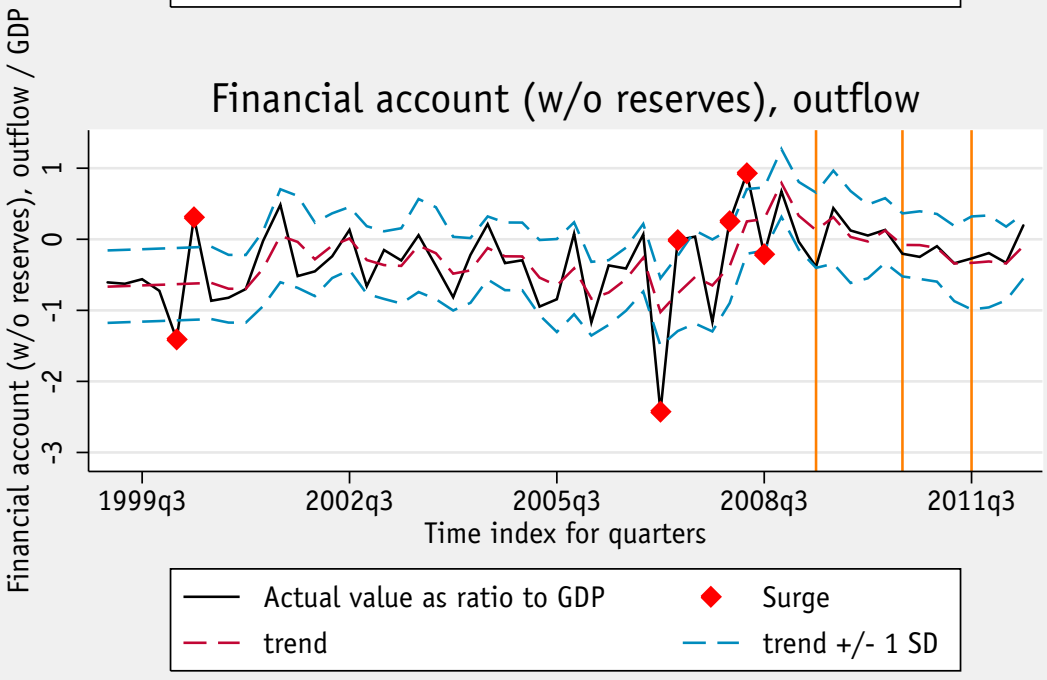




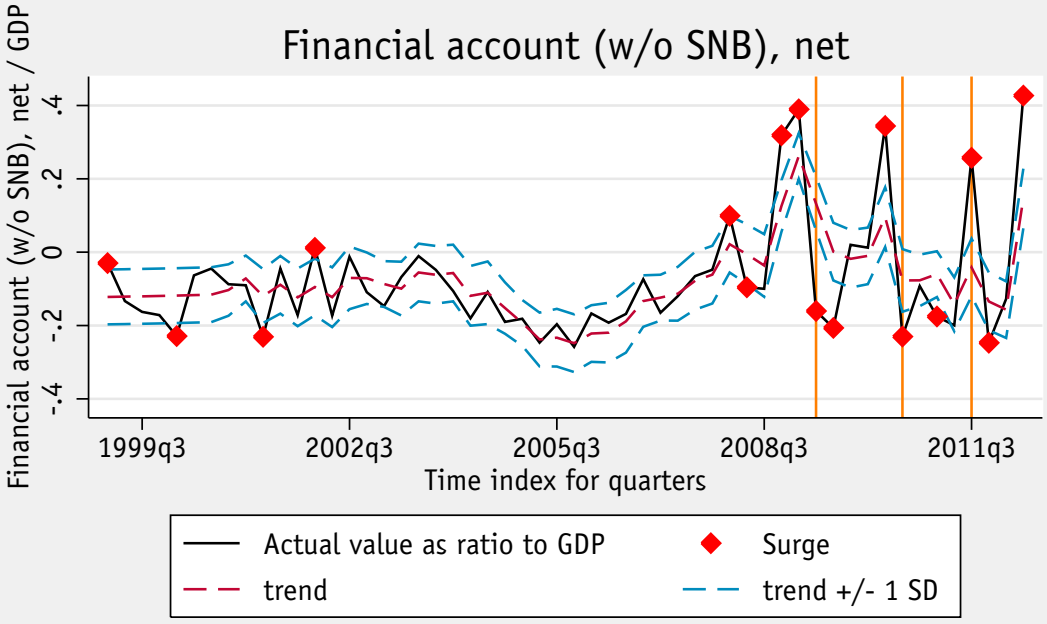
Financial account (w/o reserves)

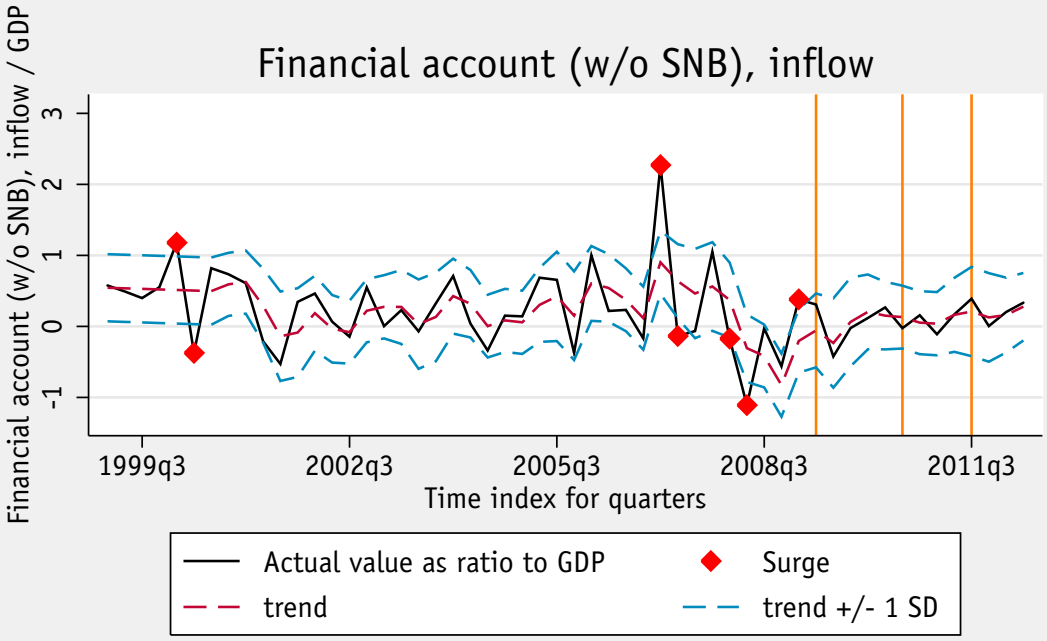


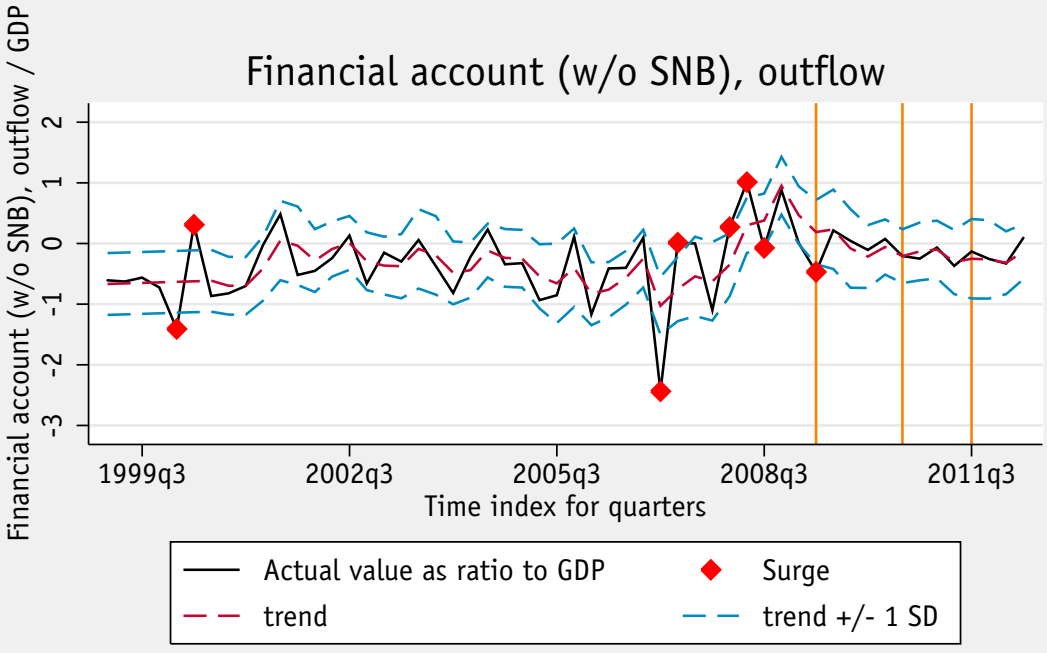




Financial account (w/o SNB)

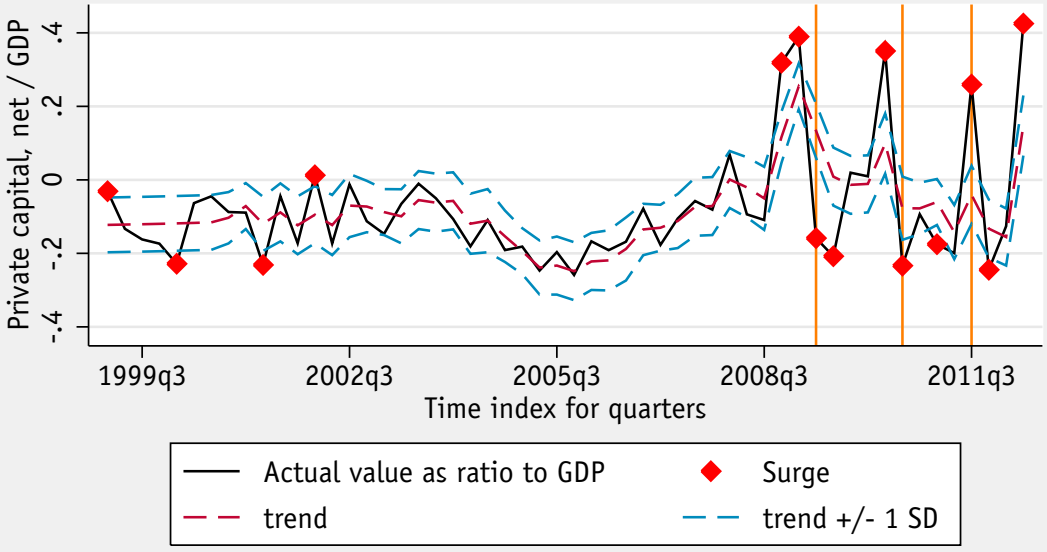




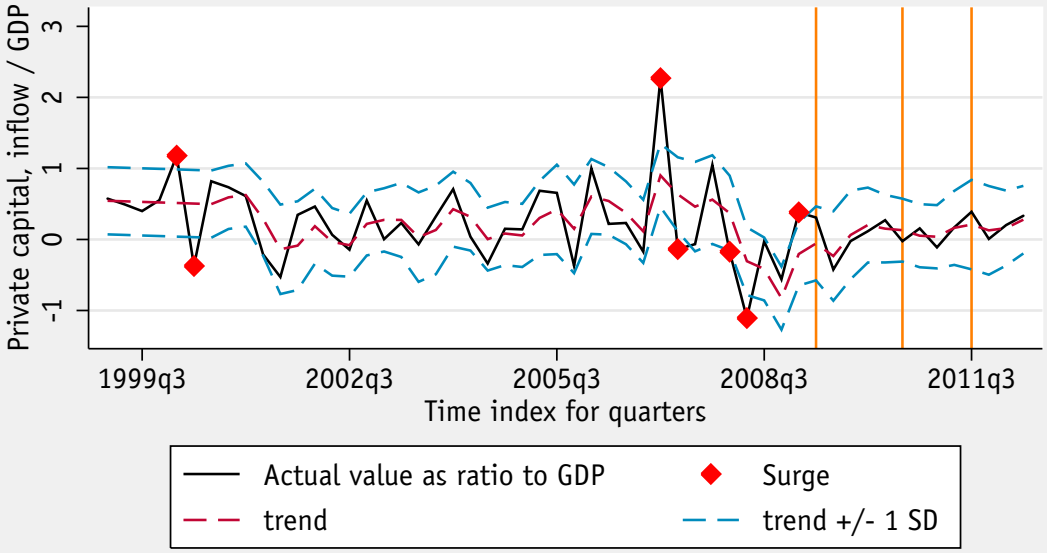


Private capital

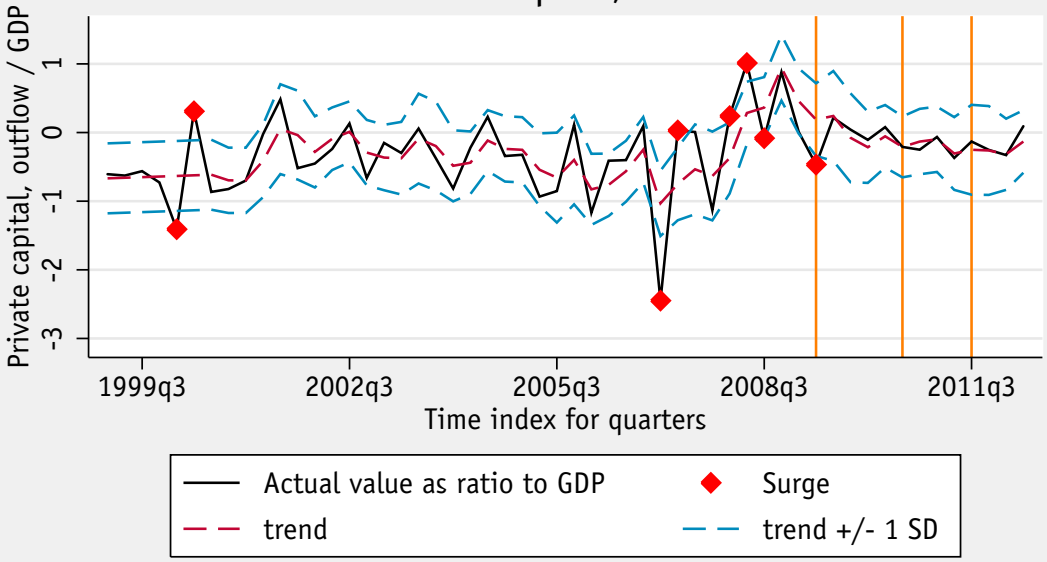
Private capital, net



Private capital, inflow

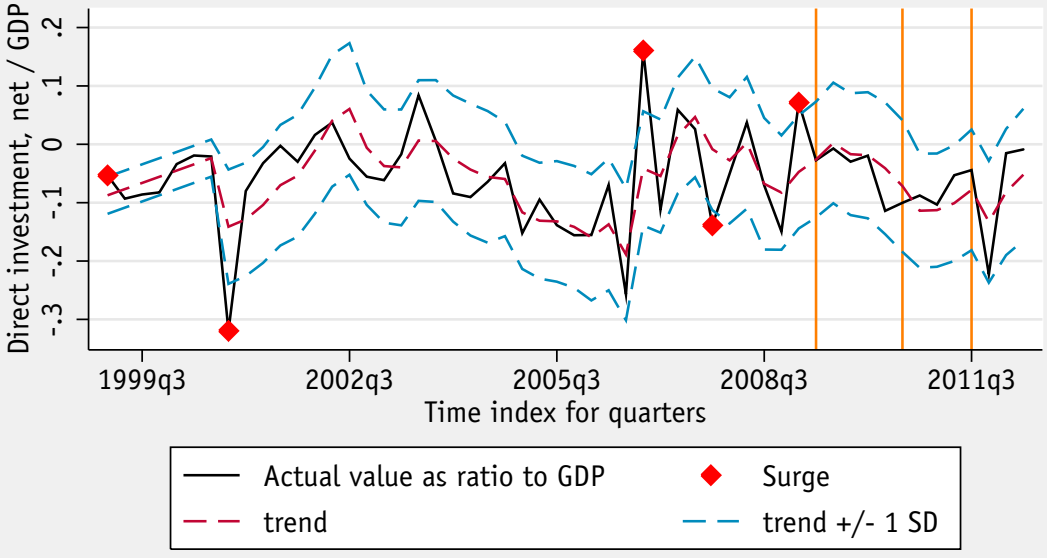


Private capital, outflow

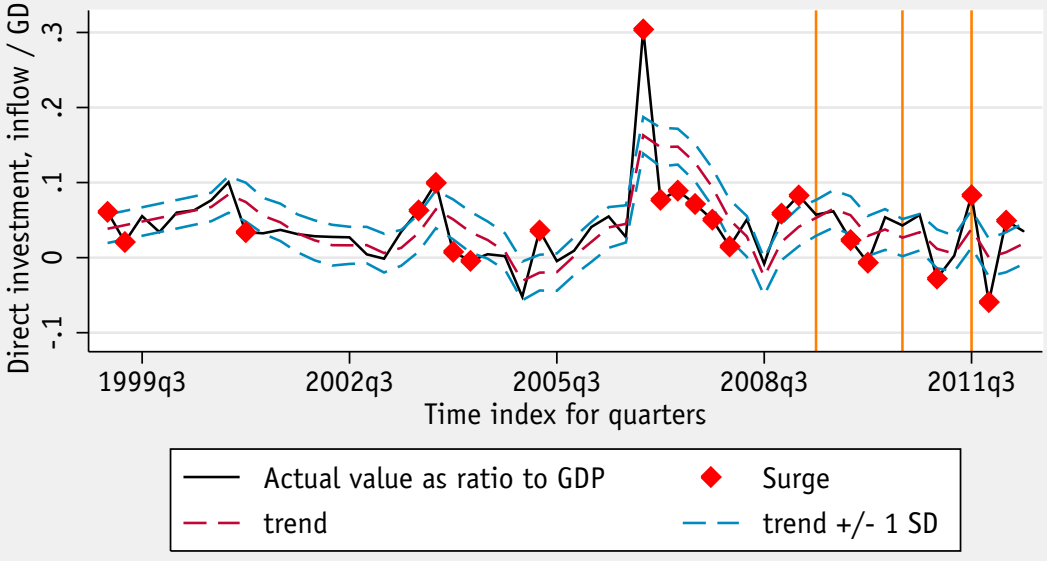


Direct investment

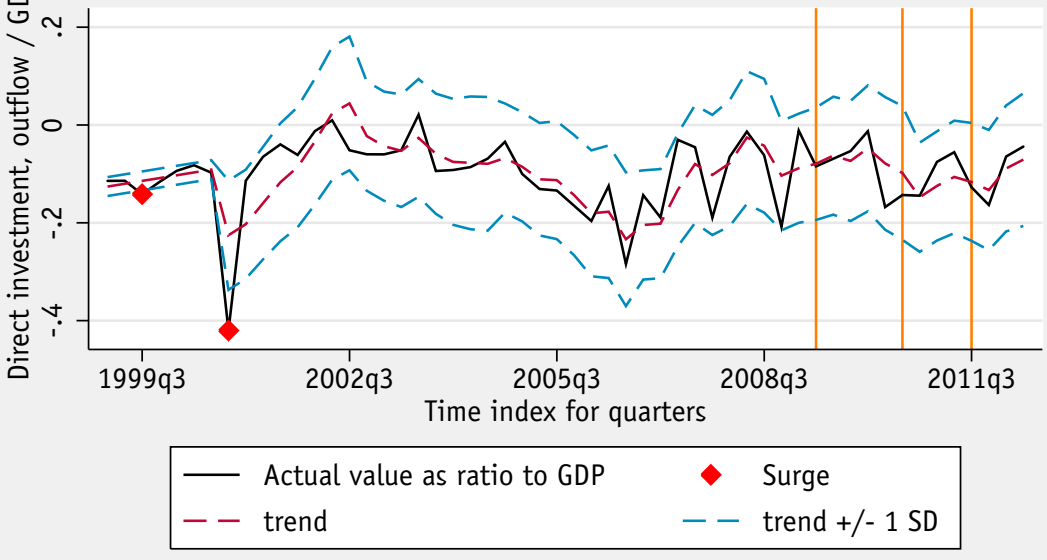
Direct investment, net



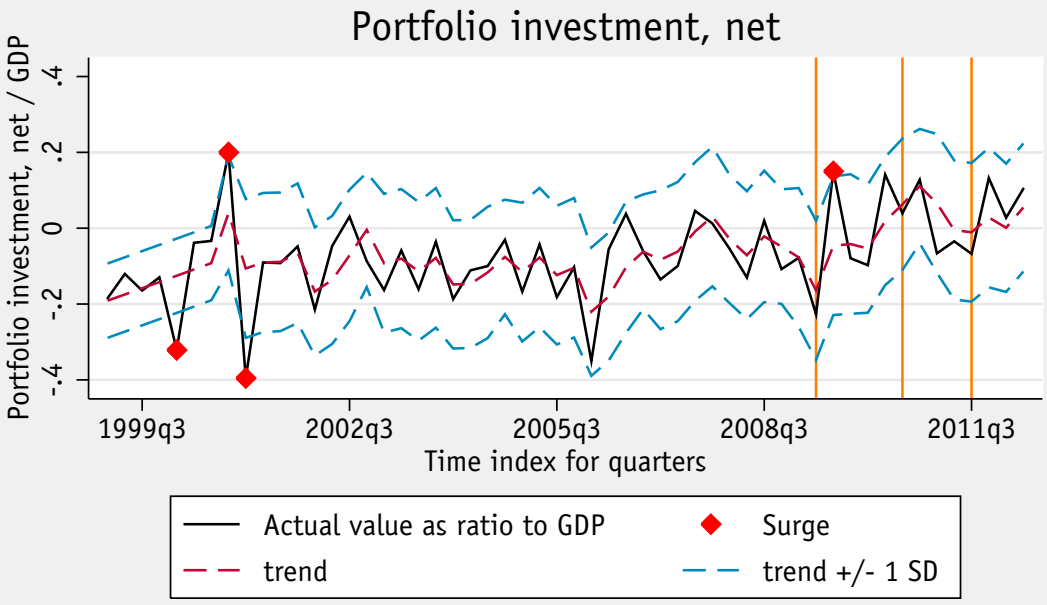
Direct investment, inflow

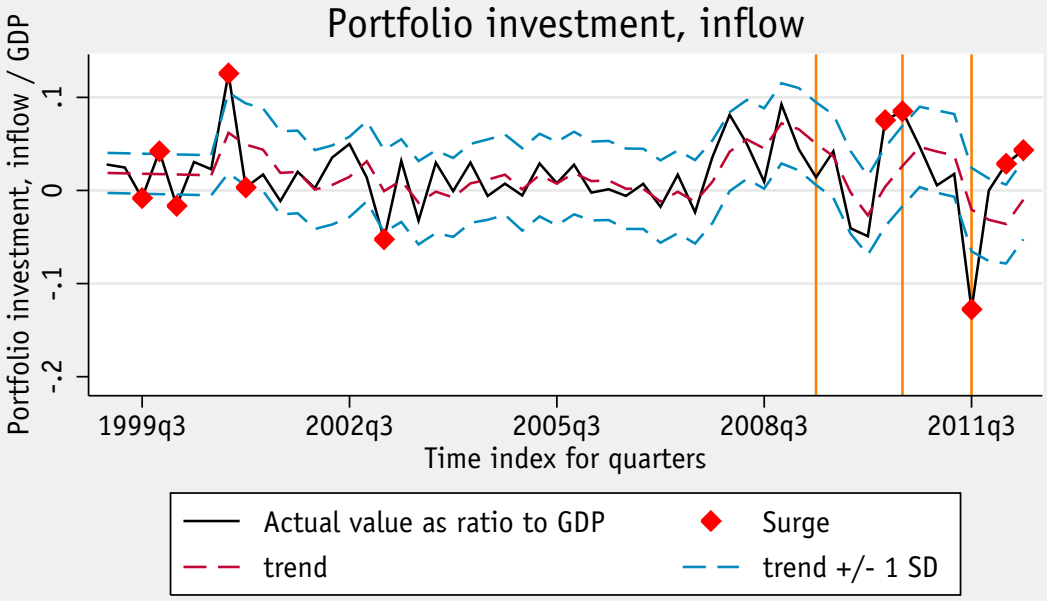


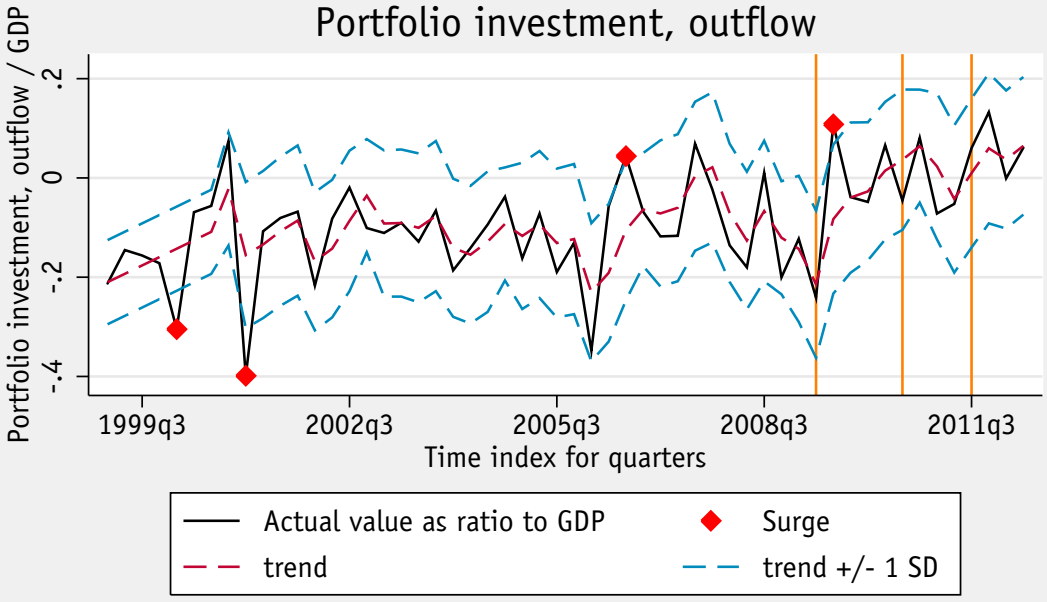
Direct investment, outflow



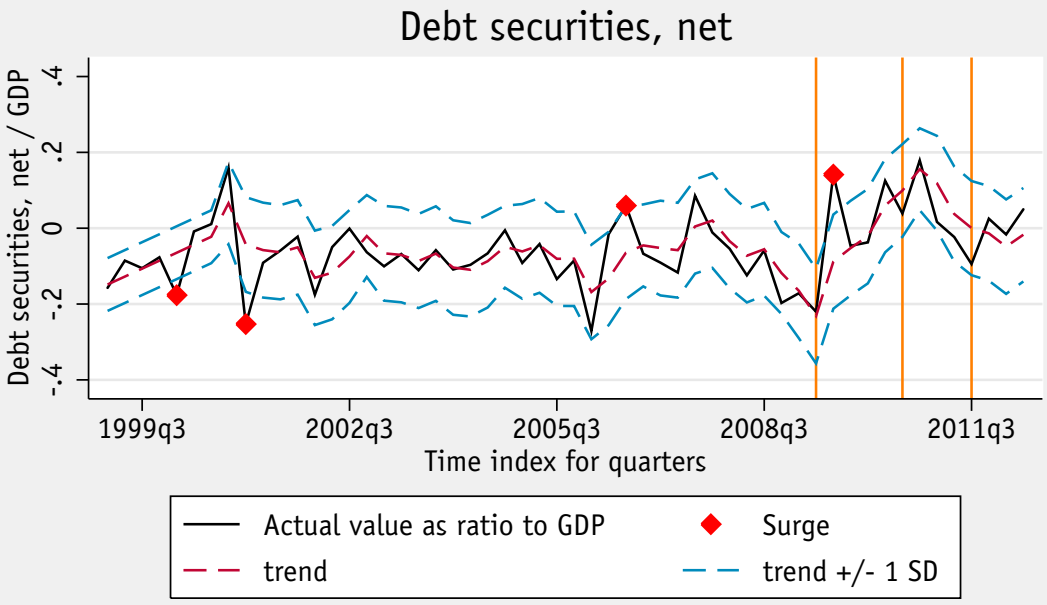
Portfolio investment

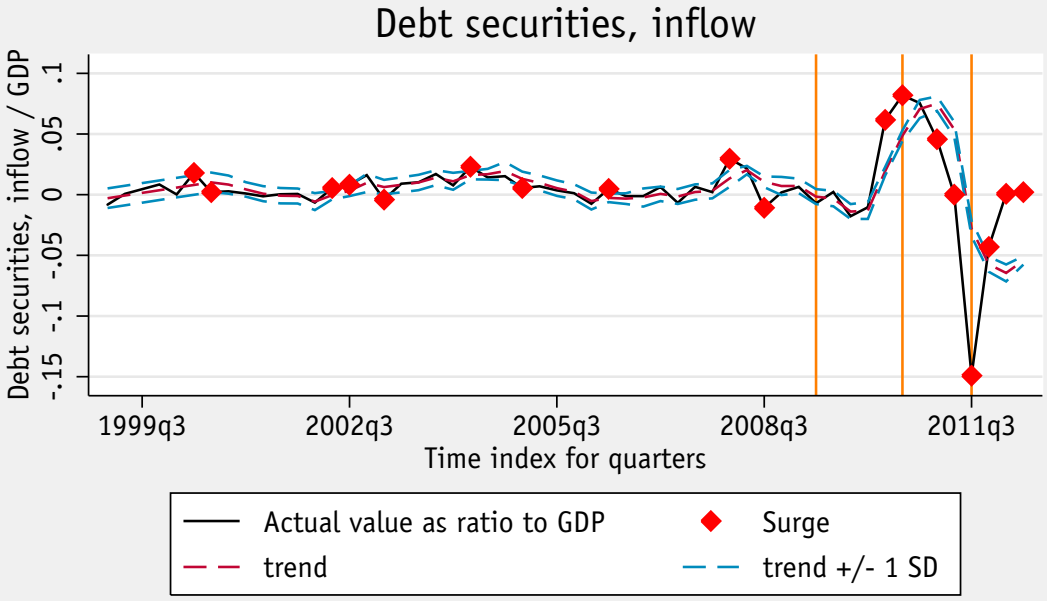


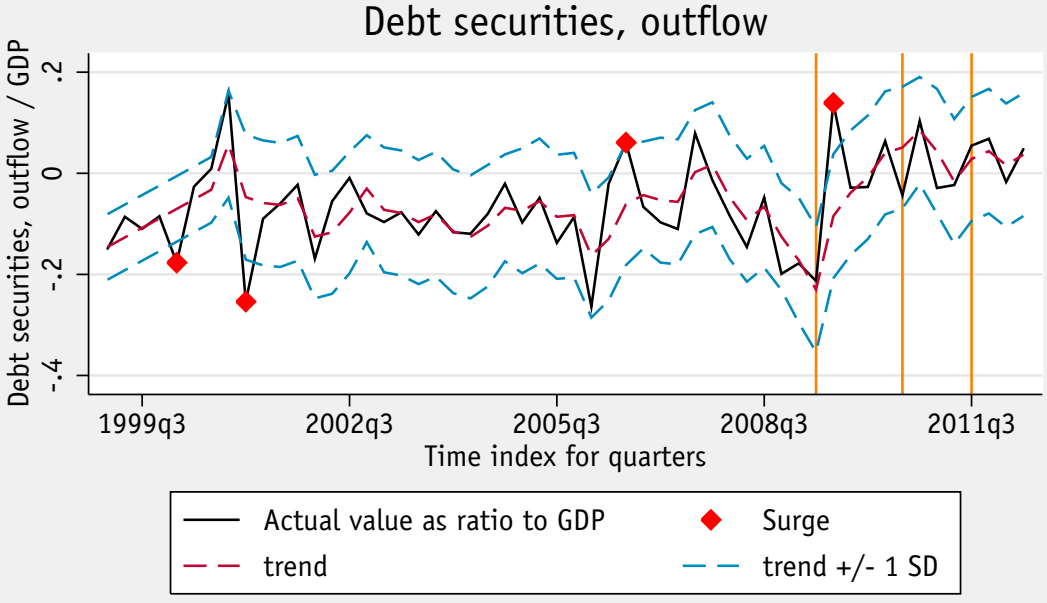




Debt securities

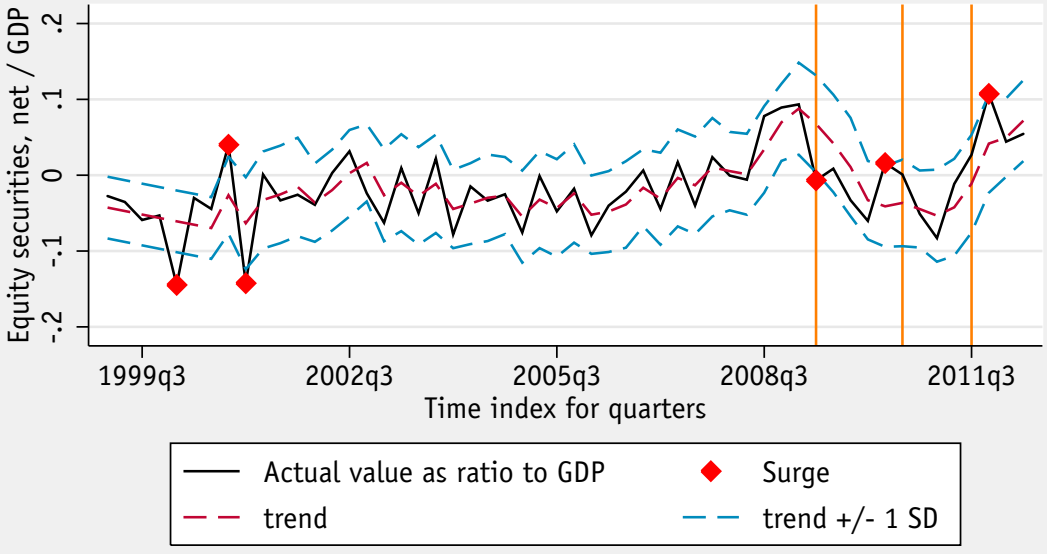




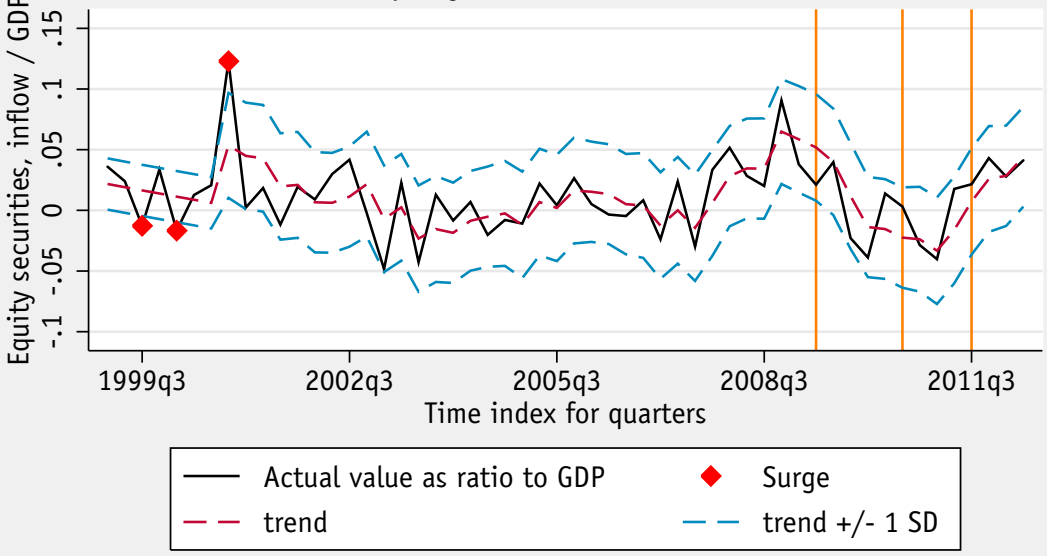


Equity securities

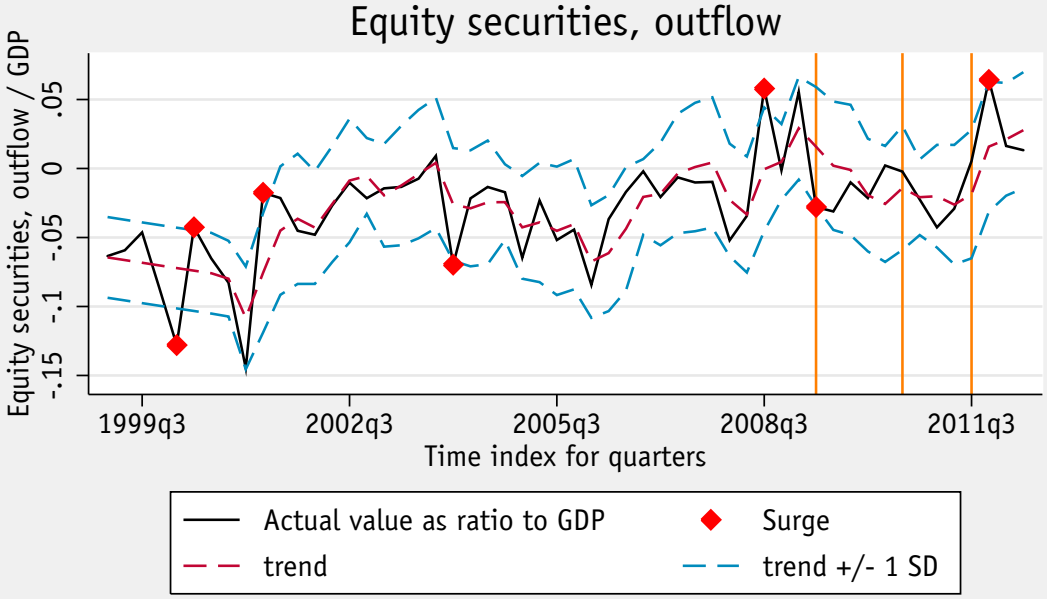
Equity securities, net



Equity securities, inflow

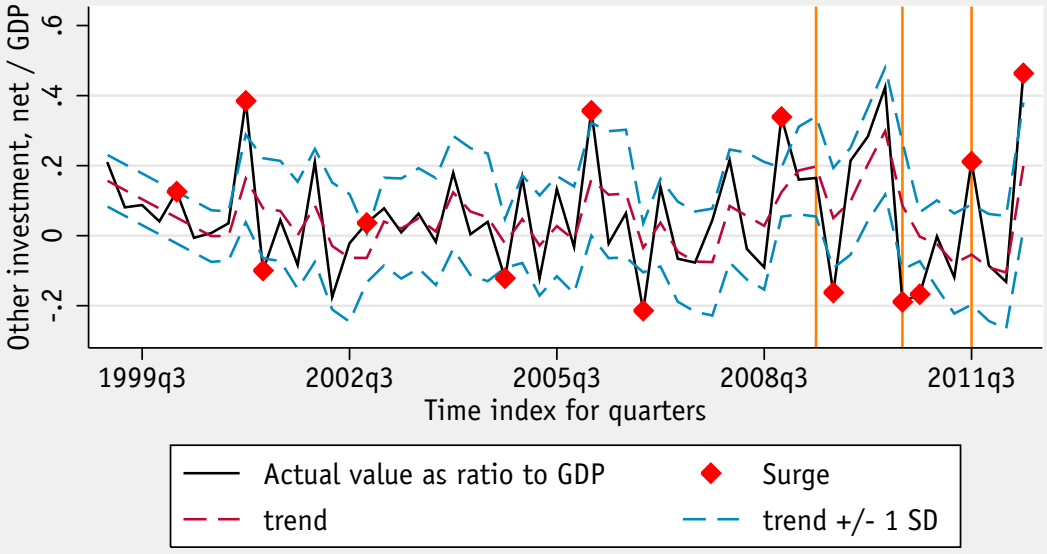


Equity securities, outflow

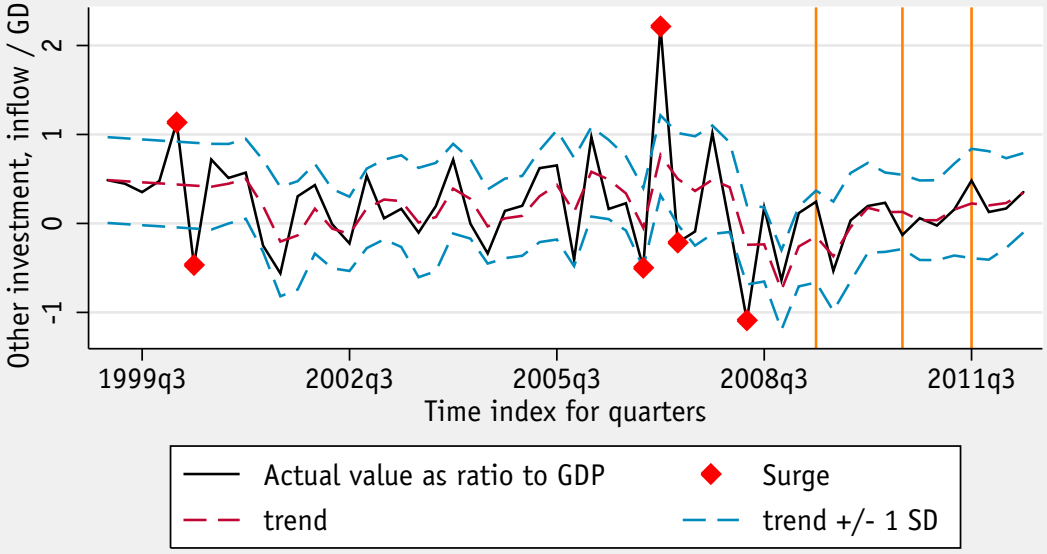


Other investment

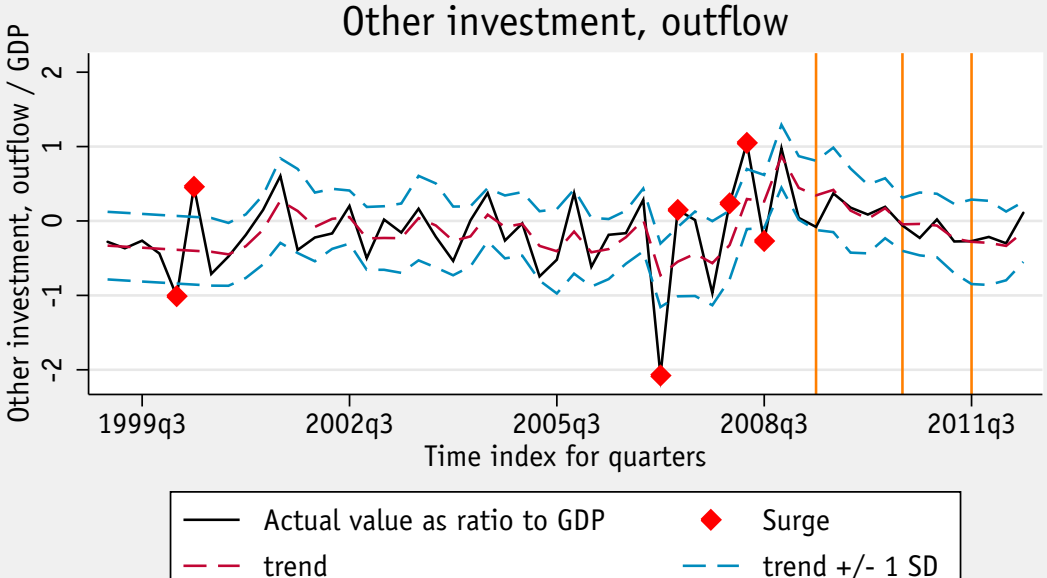
Other investment, net



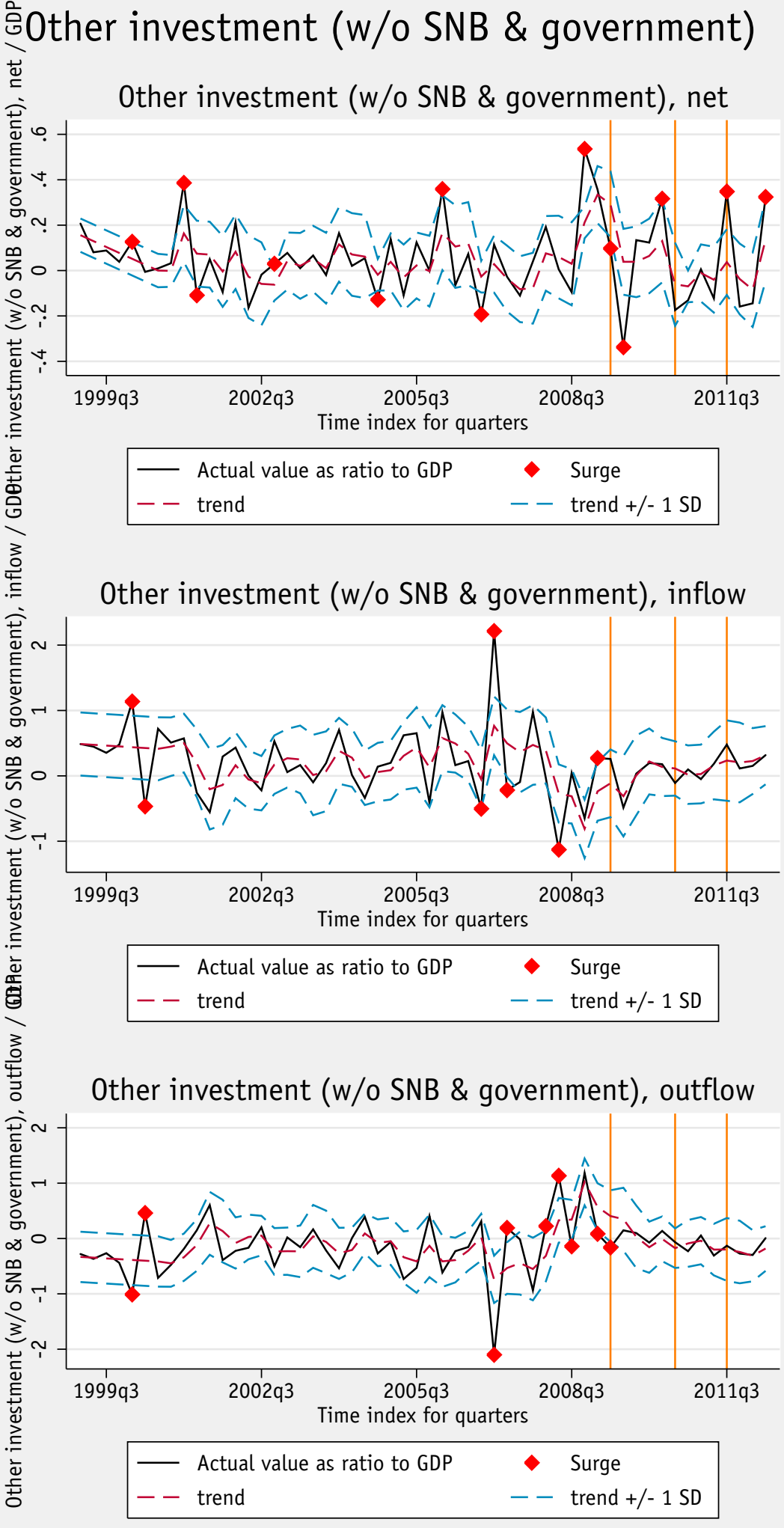
Other investment, inflow



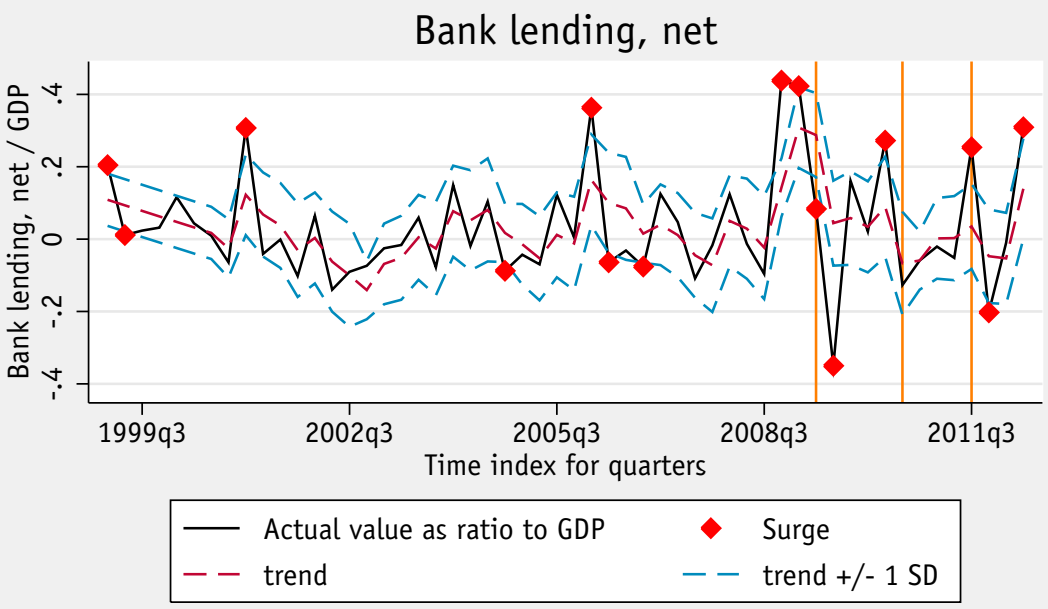
Other investment, outflow

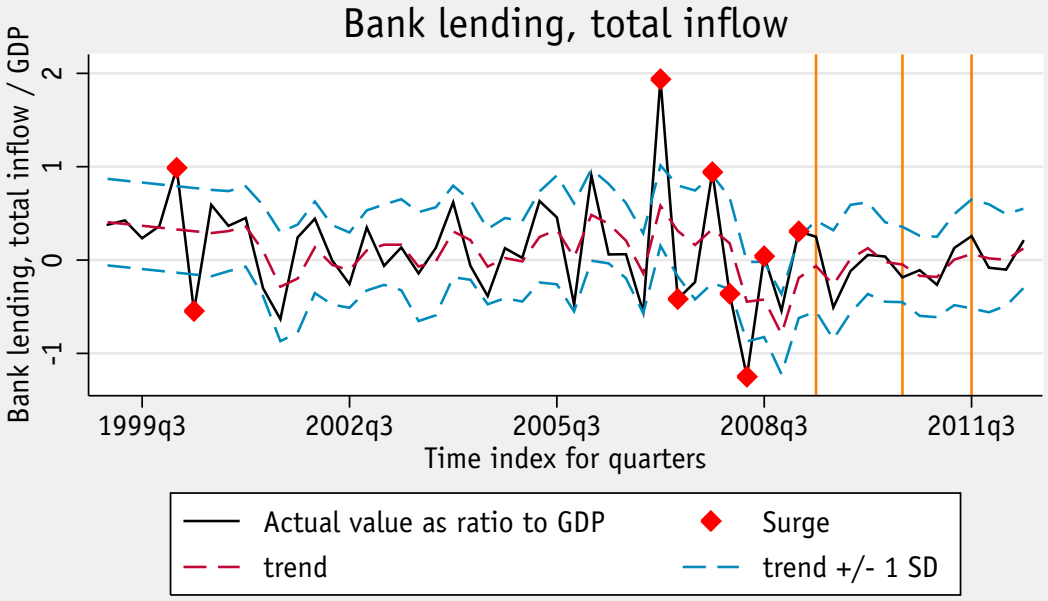


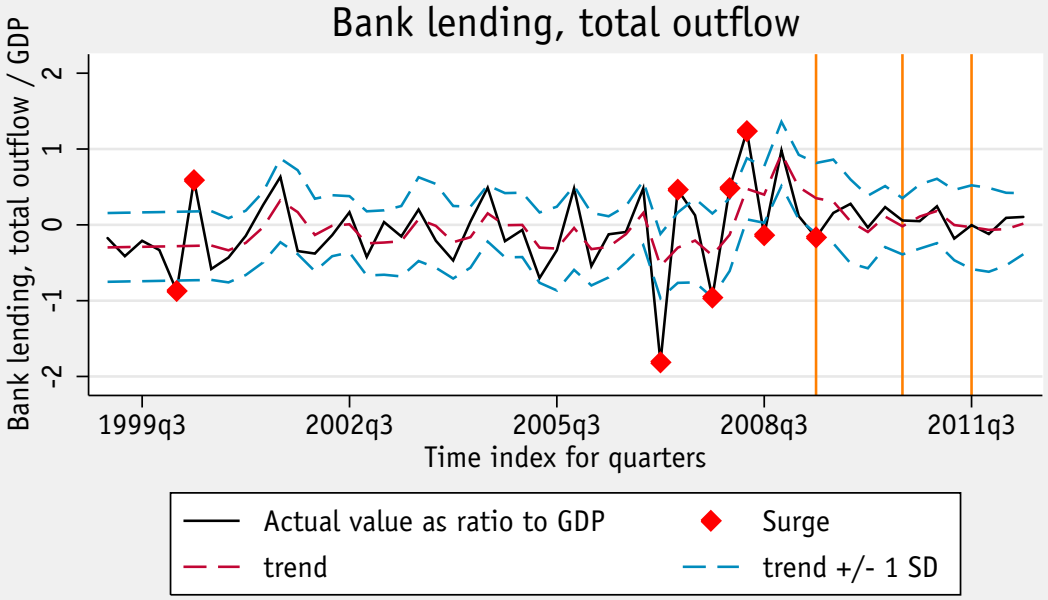
Other investment (w/o SNB & government)



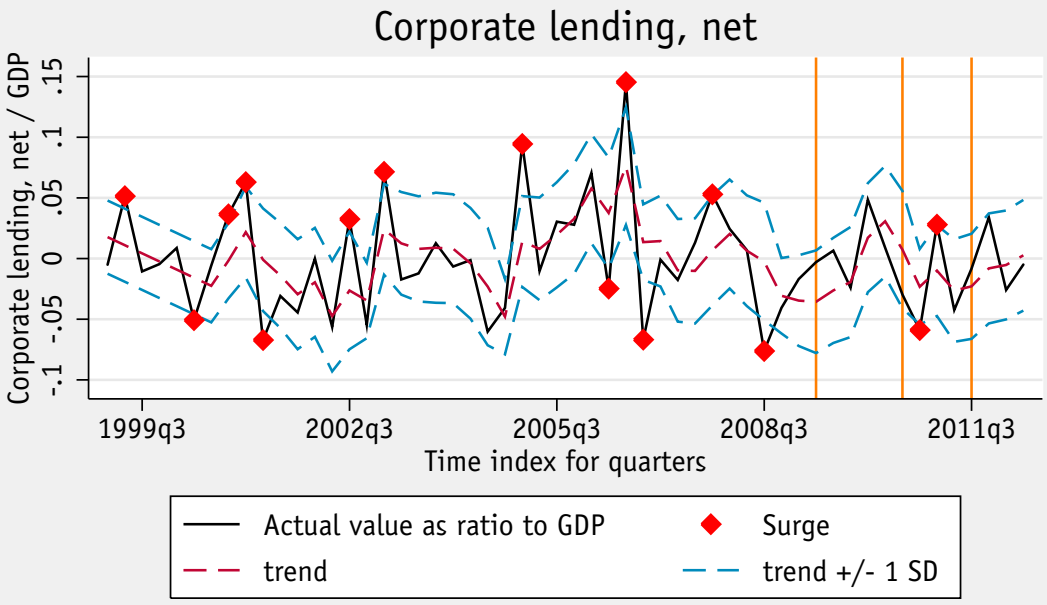
Bank lending

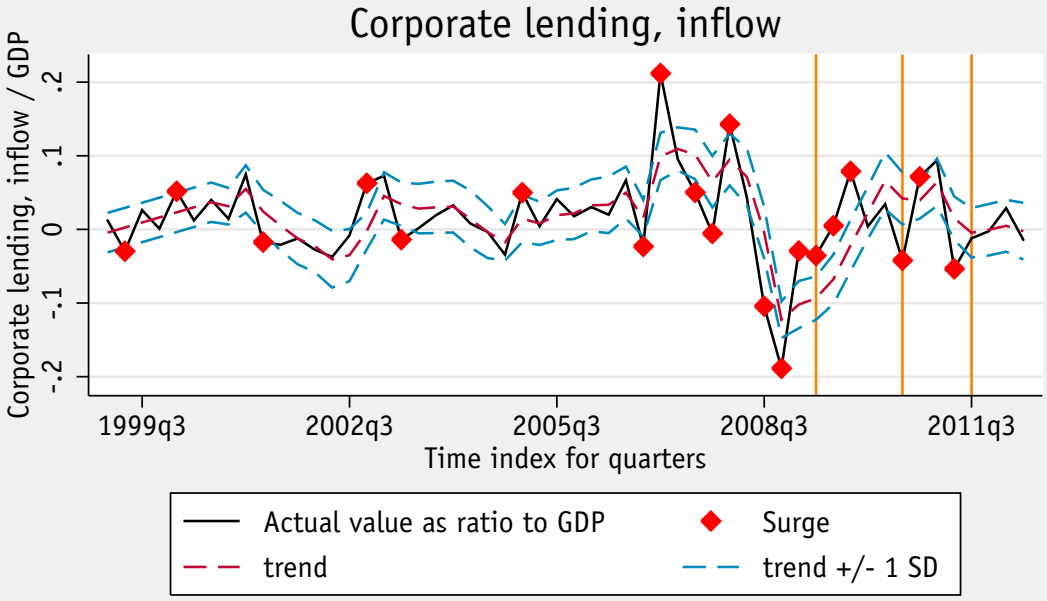


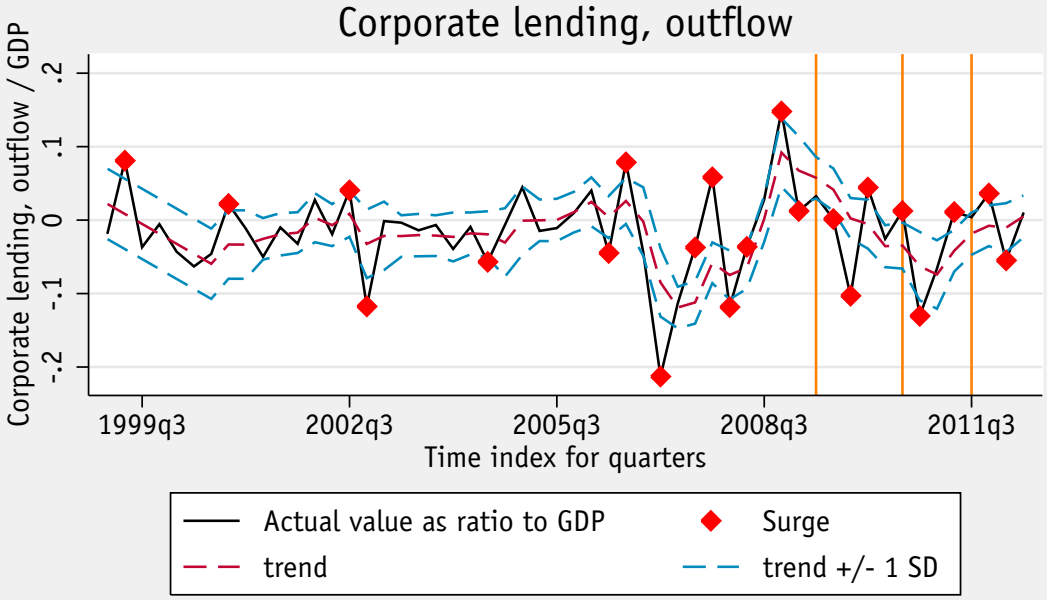




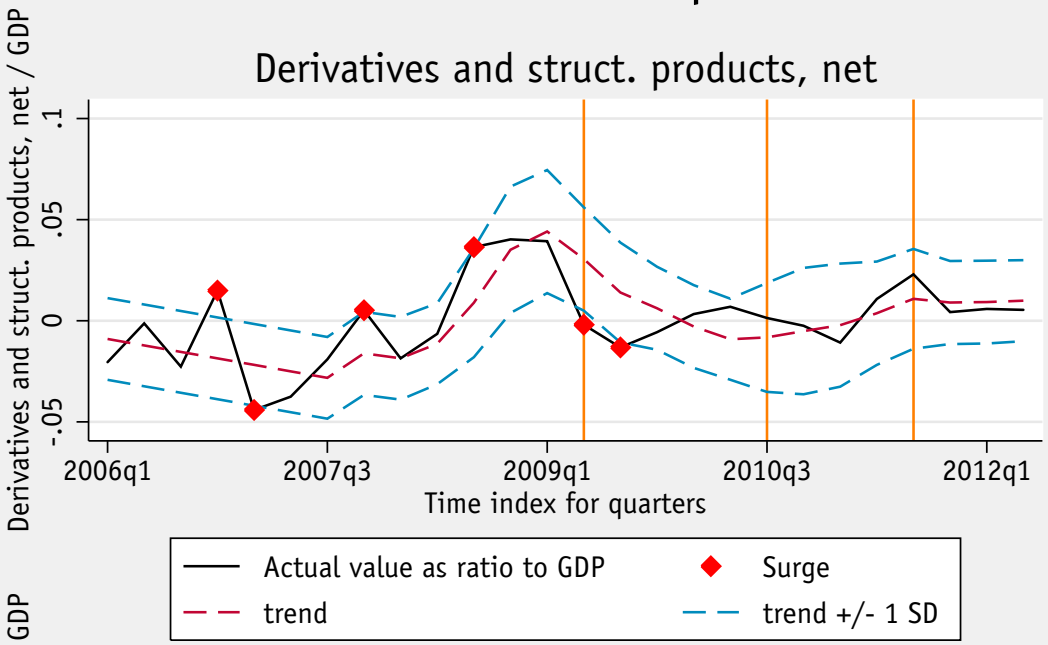
Corporate lending

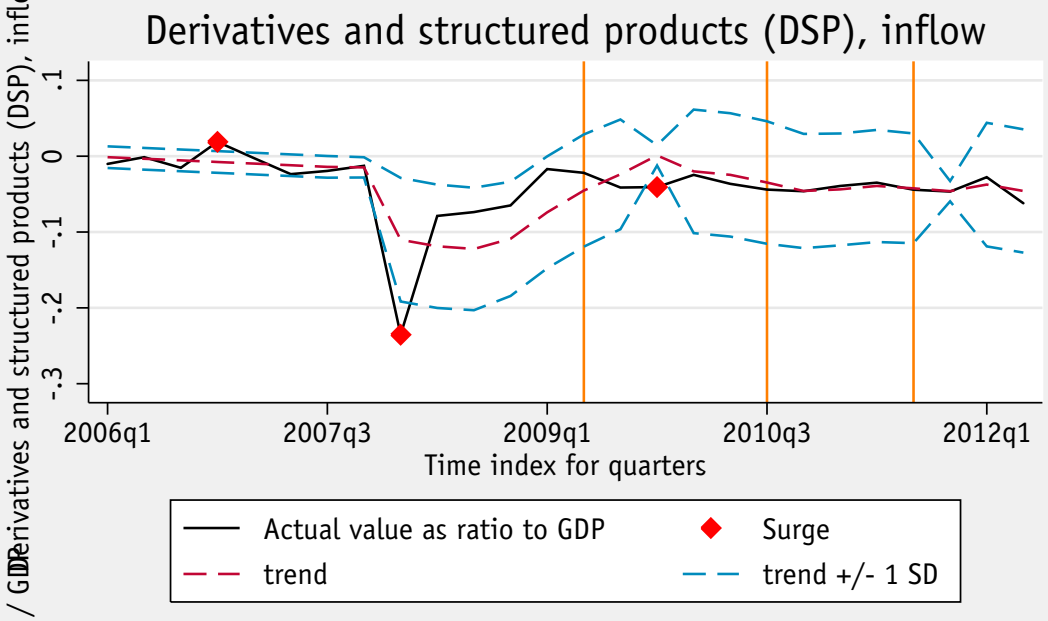


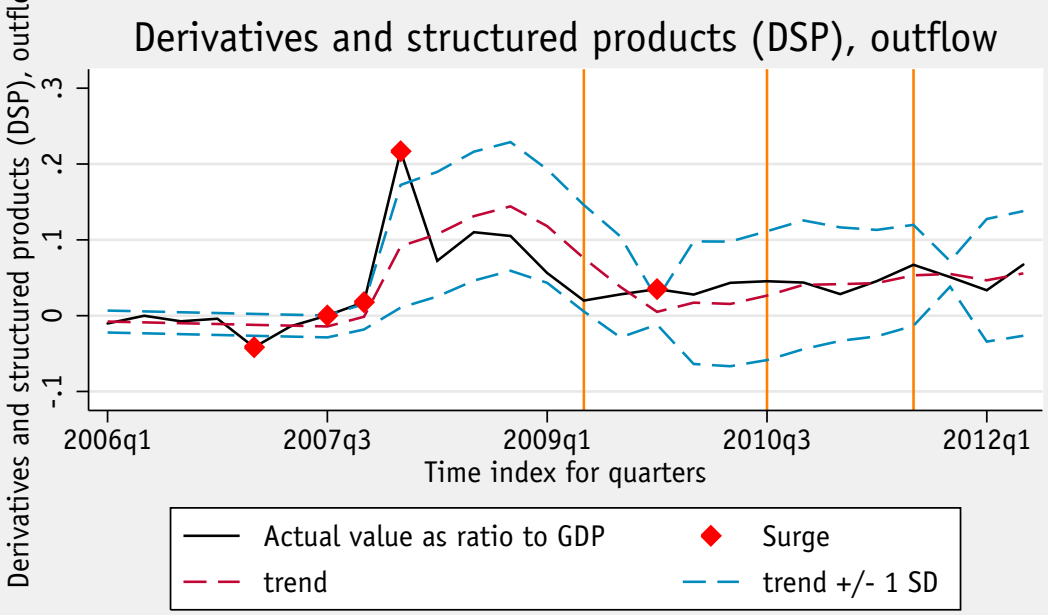




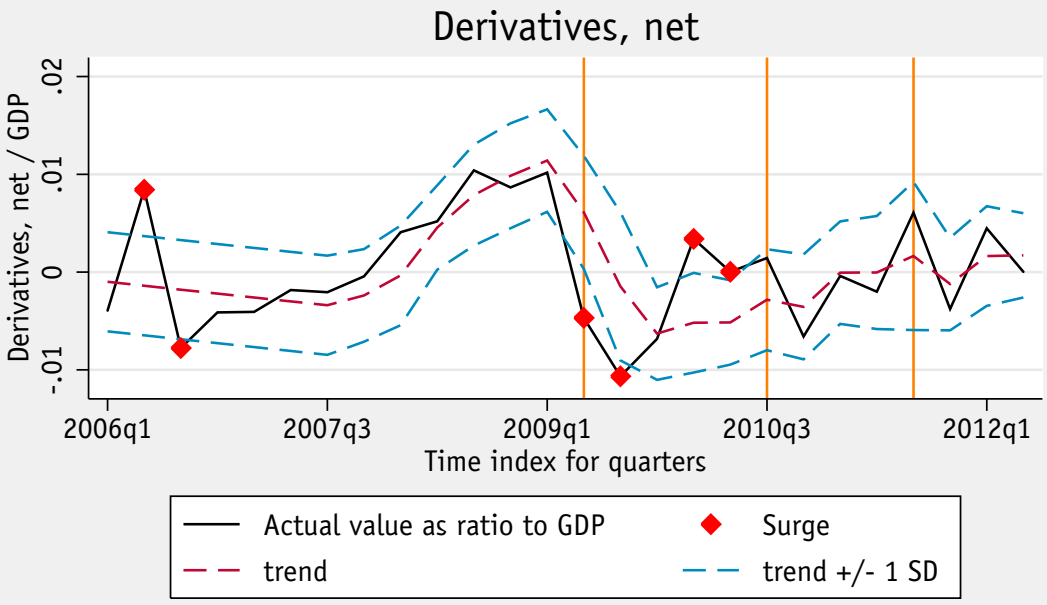
Derivatives and struct. products

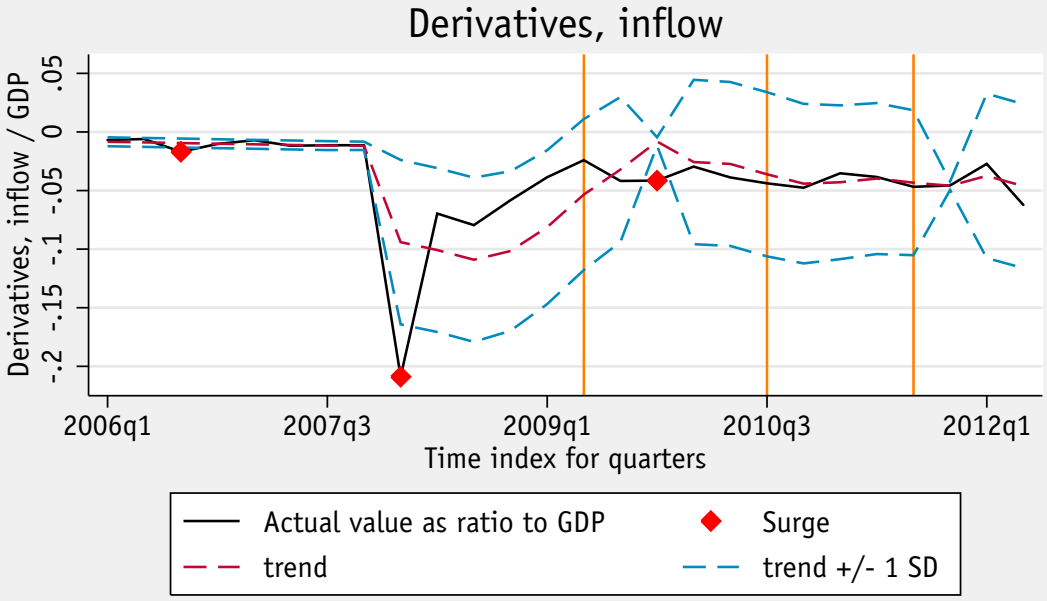


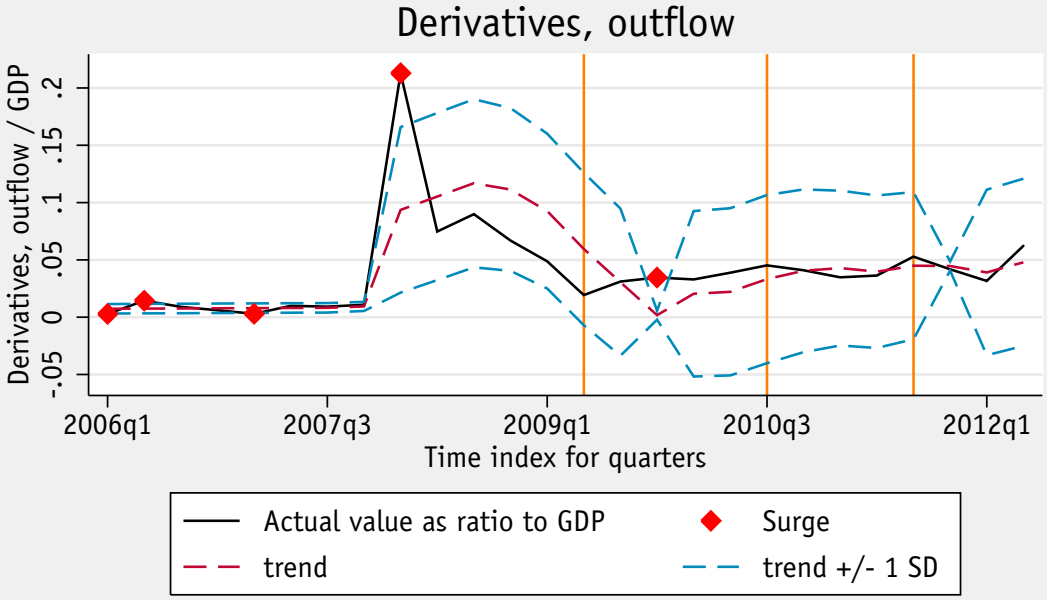


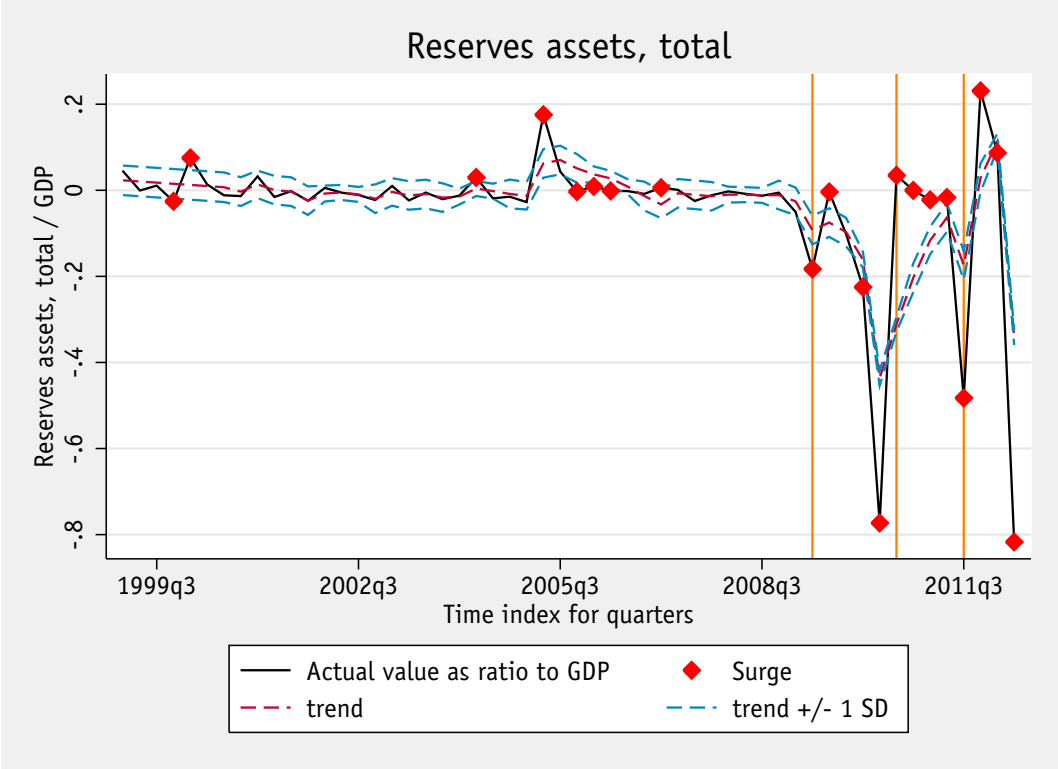


Derivatives








Reserves assets, total
Reserves assets, total / GDP
.2
0
-.2
-.4
-.6
-.8
1999q3
2002q3
2005q3
2008q3
2011q3
Time index for quarters
Actual value as ratio to GDP
Surge
trend
trend +/- 1 SD