Intra Euro Area Capital Flows and the Current Account Balance

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Abstract

We examine the hypothesis that one of the fundamental factors behind the Euro Area (EA) crisis is the reversal of intra-EA capital flows between the 'core' and 'periphery' economies. We compile a data set on aggregate and disaggregate gross and net intra-EA flows between Germany and Greece, Ireland, Italy, Portugal and Spain (EA-5) during 1999Q1-2016Q1. We find evidence of a reversal of intra-EA gross capital inflows to the EA-5 after the crisis that can be explained by surges/stops in gross capital inflows and general economic and financial conditions in the EA-5. We estimate a panel VAR model of the joint determination between the current account balance of the EA-5 and foreign capital flows distinguishing between intra-EA capital flows and from the rest of the world. The impulse response functions reveal an important role for capital flows from Germany to the EA-5 in financing the current account balance of the EA-5.

Keywords: Foreign capital flows, Euro Area, Current Account
JEL Classification: F32, G15, O52

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1. Introduction

A great deal has been written about the role played by cross-country capital flows during the Euro Area (EA) financial crisis. A recurring theme of the literature is the impact of cross-country flows on the process of current account adjustment of what has been termed the EA 'periphery'.[1] The majority of academic contributions have focused on total capital flows to the EA periphery irrespective of where these flows originate, lumping capital flows to the EA periphery from all countries together.[2]

Policy discussions and papers, however, have tended to emphasize the role played by capital flows between 'core' and 'periphery' EA economies and the possibility that reversals of these flows after the global financial crisis have hindered the process of external adjustment and exacerbated the EA crisis. For example, *The Economist* (2016) argues that "Europe's economic crisis was a stew of many ingredients" but the key one (our emphasis) *"(…) consisted of big imbalances in trade and capital flows. Economic integration encouraged (…) northern economies to ship their money to the periphery(…) When northern Europeans began to pull their money out in the aftermath of the global financial crisis, the periphery had to make an abrupt adjustment."* Baldwin *et al.* (2015) argue that the fundamental cause of the EA crisis was the *"unwinding of imbalances… From the euro's launch till the Crisis, there were big capital flows from EZ [Eurozone] core nations like Germany France and the Netherland (sic) to EZ periphery nations like Ireland, Portugal, Spain and Greece."*

[1] The EA 'periphery' refers to Greece, Ireland, Italy, Portugal and Spain while the 'core' has come to mean the northern EA economies that include Germany, the Netherlands, Belgium and Austria.
[2] A discussion of the relevant literature is provided in the next section.

They claim that the origin of the EA crisis is not the build-up of sovereign debt but *"... the large intra-EZ capital flows that emerged in the decade before the Crisis…. When the EZ Crisis started, there was a 'sudden stop' in cross-border lending."* Despite the heavy emphasis placed by policy discussions on the contribution of intra-EA capital flows to the Eurozone crisis, this issue has received little systematic analysis in the literature. The purpose of this paper is to investigate the behaviour of intra-EA capital flows between core and periphery EA economies. Specifically we look at flows of financial capital between Germany (core) and what have been variously classified as the PIIGS economies or periphery: Greece, Ireland, Italy, Portugal and Spain.[3]

Bilateral (or intra EA) capital flows can be measured in gross terms (gross inflows or gross outflows separately) or in net terms (gross inflows plus gross outflows).[4] As previous researchers have pointed out, gross and net capital flows may behave quite differently (Broner *et al.*, 2013) and it is important to investigate both separately. Thus, in this paper we look at gross inflows and gross outflows between Germany and the five Euro Area (EA-5) economies separately, as well as net flows between Germany and the EA-5. A second issue relevant to intra-EA capital flows is that aggregate (total) capital flows consist of three components: foreign direct investment, portfolio investment, and other investment. In this study we look at aggregate as well as disaggregate flows separately in order to gain additional insights into the form intra EA capital flows have taken and their behaviour over time.

[3] As mentioned, the core of the Eurozone has come to mean the northern EA economies, namely Germany, the Netherlands, Belgium and Austria. The central banks of these countries, other than Germany, do not provide data on intra-EA capital flows and, thus, our discussion is confined to flows between Germany and the five periphery economies. Moreover, as is widely acknowledged, Germany is the dominant Eurozone economy.

[4] Gross capital inflows from Germany to the periphery are the result of actions by German residents in periphery economies. Gross capital outflows from the periphery to Germany represent actions by periphery residents in Germany. Details on the definition of intra-EA capital flows are in Section 3.

To motivate our analysis and provide an overview, Figures 1 and 2 present quarterly data on aggregate capital flows between Germany and the EA-5 during 1999Q1-2016Q1. Figure 1 shows aggregate gross capital inflows from Germany to the EA-5, gross capital outflows from the EA-5 to Germany, and net capital flows (sum of gross inflows and outflows) between Germany and the EA-5.[5] Capital inflows and outflows display substantial quarterly variability. Gross capital inflows are generally positive (i.e. inflows from Germany to the periphery) until 2008QI but decline thereafter and, during some quarters, turn negative (capital flows out of the EA-5 to Germany). Gross capital outflows from the periphery to Germany are negative (representing outflows from the periphery to Germany) until 2008QIII and turn positive in some quarters thereafter. Net capital flows are generally positive during 2001-2009, i.e. there was a net export of capital from Germany to the periphery during this period. After 2009, net capital flows turn negative in most quarters, indicating export of capital from the periphery to Germany.

Figure 2 shows cumulative gross inflows, gross outflows and net capital flows between Germany and the EA-5. Cumulative gross inflows increase steadily from 1999 until 2008, level off between 2009 and 2011, whereupon they decline slowly. Cumulative gross outflows increase (in absolute value) until 2007 and remain relatively constant thereafter. Cumulative net capital flows are positive and increase continually until 2010. After that a decline is evident from €387bn in 2010 to about €250bn in 2016 i.e. capital was withdrawn from the EA-5 economies and directed towards Germany.

[5] The data are compiled by the Bundesbank and will be described in detail in Section 3. We follow Balance-of-Payments accounting convention and denote inflows from Germany to the EA-5 with a positive sign and outflows from the EA-5 to Germany with a negative sign.

Intra EA capital flows assume three forms: foreign direct investment (FDI), portfolio investment (PI) and other investment (OI).[6] Figure 3 presents cumulative net intra-EA capital flows for these three flows. Cumulative net FDI flows are generally negative (indicating an outflow from the EA-5), increase (in absolute amount) until 2008, and decrease towards zero thereafter. It is evident that the two main forms of bilateral capital flows are portfolio and other investment. Cumulative flows of both PI and OI are positive and increase steadily in the years prior to the global financial crisis indicating net flows of PI and OI capital from Germany to the EA-5. It is noteworthy that during the years before the global financial crisis, PI flows increase more rapidly and are higher than OI flows. Cumulative portfolio flows peak in early 2008 and decline thereafter, especially after 2011. By contrast, net flows of OI capital continue to increase after 2008 and surpass portfolio investment after 2008Q1 peaking in early 2010. After an abrupt decline in 2010 they resume their increase and remain higher than portfolio investment after 2011.

As suggested earlier, these capital flows have been the focus of much policy discussion but have not been studied in the literature. This paper provides evidence on the determinants of these flows and their consequences for the on-going debate on the Eurozone crisis, investigating several issues related to intra-EA capital flows and the current account of the EA-5. First, we examine the time series behaviour of bilateral capital flows between Germany and the EA-5 economies and test for reversals in flows (previously referred to by Baldwin *et al.* as a 'sudden stop'). Second, we present a methodology to identify periods of surges and stops in capital inflows and flights and

[6] The three main forms of capital flows discussed here correspond to the balance-of-payments definition of these concepts. The Bundesbank data do not make a distinction between portfolio equity and portfolio bond flows but include both in portfolio investment (PI). Other investments (OI) include mainly cross border loans and deposits. Further discussion of the data is provided in Section 3.

retrenchments in capital outflows. Third, we test how capital flows behave during such episodes and for possible reversals following the outbreak of the Eurozone sovereign debt crisis. Fourth, we estimate empirically the general economic and financial determinants of disaggregate intra-EA capital flows to gain an appreciation of the factors that have shaped them. Fifth, we model the joint determination of foreign aggregate capital flows and the current account balance (CAB) of the EA-5 via panel vector autoregression (VAR) techniques. In our modelling, we pay particular attention to distinguish between capital flows from Germany to the EA-5 and flows from the rest of the world to the EA-5. Estimation of the panel VAR model allows us to draw some conclusions on the direction of causation and the responsiveness of the CAB to shocks to capital inflows from both sources (Germany and the rest of the world).

The remainder of this paper discusses and analyses intra-EA capital flows in greater detail. After a brief discussion of the background literature in Section 2, Section 3 provides a description of the data. Section 4 distinguishes between various episodes of capital flows (surges vs. stops and retrenchments vs. flights) and examines various hypotheses about the behaviour of intra-EA capital flows. Section 5 examines the determinants of intra-EA capital flows. Section 6 models the joint determination of capital flows and the CAB of the EA-5. The final section concludes.

2. Background Literature

The literature on intra-EA capital flows is sparse. Studies on EA capital flows examine mainly total capital flows to the periphery economies (from all countries and of all types) and their evolution following the financial crisis but make no distinction between intra-EA and other international capital flows. Merler and Pisani-Ferry (2012) investigate the reversal in the financial account of periphery economies (i.e. large

inflows followed by large outflows after 2007-2009) and show that these qualify as 'sudden stops'. The sudden stops were clustered in three periods: the global financial crisis of 2007/8, agreement on the first Greek programme in early 2010 and the summer of 2011. The authors find that after 2010 private capital flows were substituted with public flows, and the major share of these flows was in the form of ECB refinancing to periphery commercial banks[7]

Lane (2013) reviews the literature on EA capital flows and studies the behaviour of gross and net capital flows after 2003. He finds that the reversal of net flows during the crisis has been very costly in terms of macroeconomic and financial outcomes for the high-deficit countries. His conclusions are shared by Hobza and Zeugner (2014) who find a dominant role for core countries in financing the periphery's current account deficits prior to the financial crisis, mainly in the form of debt instruments. After the withdrawal of these flows, ECB and other official flows played an important role in helping the periphery refinance its liabilities.

Tressel *et al.* (2014) also support the sudden stop view. Their conclusions suggest that large capital inflows, aided by domestic demand booms in several EA economies resulted in large accumulated net foreign liabilities prior to the crisis. When the crisis hit, capital inflows stopped. De Santis and Cesaroni (2016) attribute these dynamics to the negative impact of financial integration on the current account of the periphery, with the business cycle also having an important role. Hale and Obstfeld (2016) provide additional evidence that indicates that core EA countries increased their

[7] This refinancing takes place through the oft-discussed TARGET2 balances. Our data is based on the Balance-of-Payments classification that does not make a distinction between TARGET2 and other types of flows. TARGET2 flows are included in the Other Investment (OI) category.

borrowing from outside the EA and their lending to the EA periphery following the crisis.

Brutti and Sauré (2016) are also concerned with sudden stops in relation to the EA crisis. They find evidence of debt repatriation following the crisis: investors decreased their holdings of cross-border debt and increased holdings of locally issued debt. They suggest that this is associated with the accumulation of public debt by the crisis countries. In addition, they find that repatriated debt which was not invested domestically in the crisis countries flowed back to the core countries. The portfolio rebalancing view is examined further by Beck *et al*. (2016), who document that the financial crisis resulted in what they term stressed EA economies reducing disproportionately their holdings of debt securities of non-stressed EA economies, while investors in core countries did not disproportionately reduce debt capital inflows to stressed countries.

In sum, the literature on EA capital flows looks at either capital flows to periphery economies from all countries, both within and outside the EA, without making a distinction (e.g. De Santis and Cesaroni, 2016, Broner *et al.*, 2013) or looks at intra-EA flows of certain types of financial capital (e.g. Beck *et al*., 2016; Hale and Obstfeld, 2016). The literature lacks a unifying framework that considers bilateral intra-EA capital flows either in the aggregate or of different types. Examining the determinants of intra-EA capital flows is important in order to determine whether there has been an extraordinary outflow of capital following the EA crisis and the implications of such a possible reversal. This paper addresses these issues beginning with a description of the data on intra-EA capital flows.

3. Data Overview

The source of data on bilateral intra-EA capital flows is the *Balance of Payments* statistics of the Deutsche Bundesbank.[8] Specifically, our data set includes bilateral data on aggregate gross capital inflows from Germany to each of the EA-5 and aggregate gross capital outflows from each of the EA-5 to Germany. From the perspective of the periphery economies, gross inflows of capital from Germany to the EA-5 are denoted with a positive sign and outflows from the EA-5 to Germany with a negative sign.[9] In addition to gross inflows/outflows, the data set includes net capital flows computed as the sum of gross inflows and gross outflows (a positive sign indicates a net capital inflow into each periphery economy and a negative sign an outflow). Furthermore, the Bundesbank provides a breakdown of gross and net aggregate capital inflows and outflows into three main categories outlined previously: FDI, PI and OI flows. We study the three disaggregate types of capital flows separately to test additional hypotheses on intra-EA capital flows. The data are available quarterly and cover the period 1999Q1 (introduction of the euro) to 2016Q1.

Table 1 presents average gross inflows/outflows and net intra-EA flows for each of the EA-5 during 1999Q1 - 2016Q1, both in aggregate and disaggregate form. All data are normalized by the GDP of each of the EA-5 to account for county size. Looking at disaggregate gross inflows and outflows, FDI makes up the lowest of the three components. This has potentially important implications given the emphasis placed by many commentators both on the stability of these flows (compared to PI and OI flows)

[8] The data are available from the Bundesbank at: https://www.bundesbank.de/Navigation/EN/Statistics/Time_series_databases/External_sector/external_sector_node.html

[9] It should be noted that gross inflows/outflows are themselves the outcome (sum) of two types of transactions. Gross inflows from Germany to the EA-5 represent the foreign (German) acquisitions of domestic (EA-5) assets minus foreign (German) sales of domestic (EA-5) assets. Gross outflows from the EA-5 to Germany represent domestic (EA-5) acquisitions of foreign (German) assets minus domestic (EA-5) sales of foreign (German) assets. Therefore, gross inflows/outflows can be either positive or negative.

and their growth enhancing potential. Portfolio flows are generally the largest of the three categories. Gross FDI inflows are positive for all EA-5 and Ireland registers the largest. Ireland also records the largest gross inflow of portfolio investment. The largest gross inflow of OI is experienced by Greece. With few exceptions, gross outflows are smaller in (absolute) magnitude than gross inflows. For Ireland, the relatively large FDI inflows (0.44% of GDP) are counterbalanced by substantial FDI outflows (0.83% of GDP) such that average net flows were negative; the same is true for Italy. For Greece, gross portfolio inflows and outflows are of the same magnitude so net PI flows were negligible. Total net capital flows are positive and fairly substantial for Greece and Ireland, less so for Portugal and Spain. For three countries (Greece, Spain and Portugal), OI is the major source of net capital flows while for Ireland the major source is PI. In Italy's case, net inflows of PI and OI are counterbalanced by net outflows of FDI so total net flows were negligible.

In order to look at intra-EA capital flows over time more closely, we divide the sample period into two subperiods: the first from 1999Q1 to the outbreak of global financial crisis (Table 2) and the second from 2008Q1 onwards (Table 3). Table 2 shows that prior to the global financial crisis (GFC) there were substantial positive gross inflows to all EA-5 (except for FDI in Italy) and negative outflows from the EA-5 to Germany. Gross outflows were lower in (absolute) magnitude than gross inflows. The largest gross inflows and outflows prior to the crisis were to Ireland. In Ireland's case, FDI gross outflows were greater than inflows resulting in net negative FDI flows. For Italy, both gross FDI inflows and outflows are negative implying export of FDI capital from Italy to Germany. These are the only two cases of negative net flows prior to the crisis. The general conclusion that emerges is that prior to the crisis net inflows were

positive for all EA-5 and substantial (greater than 1% of GDP with the exception of Italy).

During the post-crisis period (Table 3), both gross and net capital flows are smaller in (absolute) magnitude than the pre-crisis period. Gross inflows (especially portfolio and other investment) show a substantially different pattern after the crisis. In the case of gross inflows of OI, they are negative for Ireland, Portugal and Italy implying that on balance foreign (German) investors liquidated assets abroad (liquidations of EA-5 assets were greater than acquisitions) and repatriated capital. Partially compensating for these, gross outflows of OI were positive (except for Greece) indicating repatriation of funds by domestic (EA) investors (liquidations of German assets were greater than acquisitions). Greece recorded substantial gross inflows of OI capital (3.18% of GDP), most likely related to Target2 balances. Looking at portfolio investment, gross inflows are negative for Spain, Greece and Portugal: on balance there is flow of capital from these three to Germany reflecting net sale of portfolio assets by German investors. This is further magnified as gross capital outflow of PI from all EA-5 to Germany was negative reflecting flow of PI capital from the EA-5 to Germany. As a result, the EA-5 (except Italy) experienced negative net PI flows during the post crisis period. This was also true for net OI flows so the EA-5 (except Greece) experienced net negative capital flows during the post crisis period.

The overall conclusion that emerges is that net inflows of capital from Germany to the EA-5 in the period prior to the GFC were followed by net capital outflows from the EA-5 to Germany in the post-GFC years. This is mainly because of negative net flows of PI in the post GFC period (four of the five) and, to a lesser extent, OI (three of the five). The only country to experience net inflows of capital in the post-crisis period is Greece, the result of large gross inflows of OI capital. In general, total gross outflows

from the EA-5 to Germany post crisis were either low or (in three cases) positive, i.e. EA-5 residents repatriated capital. Total gross inflows from Germany to the EA-5 rather than contributing to an inflow of capital to the EA-5 had the opposite effect: in four of the five German residents repatriated capital. The result, as mentioned previously, has been (with the exception of Greece) a net capital outflow from the EA-5 to Germany after the crisis.

In order to analyse the time series behaviour and test formally for a potential reversal of capital flows following the crisis, a procedure for identifying the existence and the date of such reversals is necessary. The next section outlines such a procedure that is subsequently used to evaluate empirically the role of various economic determinants of intra-EA capital flows.

4. Capital Surges, Stops, Flights and Retrenchments

In this section we identify and discuss what has been termed capital flow episodes or sudden reversals. There is a lengthy literature on this topic and our intention is not to review it here.[10] We adopt the methodology of Forbes and Warnock (2012) who argue that identification of capital flow episodes must look at both gross and net capital flows. This is because looking solely at net flows (as previous research had done) may mask some important developments in gross flows. When analysing gross inflows and outflows, four types of episodes can be defined:

1. Surges: a sharp increase in gross capital inflows
2. Stops: a sharp decrease in gross capital inflows
3. Flight: a sharp increase in gross capital outflows
4. Retrenchment: a sharp decrease in gross capital outflows

[10] An overview of the literature can be found in Forbes and Warnock (2012) and the references therein.

The first two, surges and stops, reflect changes in the behaviour of German investors regarding their asset holdings (purchases and sales) in the EA-5, while flights and retrenchments concerns the German asset holdings of EA-5 investors.

To define capital flow episodes, for each of the EA-5 we calculate a measure, C_t, defined as the 4-quarter moving sum of capital flows ($CAPFLOW$) from quarter t-3 to t. Second, we compute the annual year-on-year change in C_t (ΔC_t) as follows:

$$C_t = \sum_{s=0}^{3} CAPFLOW_{t-s} \qquad t = 1, 2, \ldots, N \tag{1}$$

$$\Delta C_t = C_t - C_{t-4} \qquad t = 5, 6, \ldots, N \tag{2}$$

where *CAPFLOW* refers to the flow between Germany and each of the EA-5 in monetary terms (billion euros) and N is the total number of observations. Third, we compute rolling means and standard deviations of ΔC_t over the previous 5 years. To identify a surge or stop episode, $CAPFLOW$ in (1) refers to gross capital inflows. A surge is defined as the first quarter in which ΔC_t increases more than one standard deviation above its rolling mean and ends once ΔC_t falls below one standard deviation above the mean, provided during this time period ΔC_t is higher than two standard deviations above the mean for at least two quarters.[11] A stop episode is defined symmetrically: it starts when ΔC_t falls below one standard deviation below the mean and ends when it is no longer below (mean minus) one standard deviation, provided that ΔC_t is below (mean minus) two standard deviations for at least two quarters during the episode. The same procedure is used to determine episodes of flight and retrenchment. In this case, $CAPFLOW$ in (1) refers to gross capital outflows and C_t and ΔC_t in (1) and (2) are calculated similarly. Flights and retrenchments are defined in the

[11] Forbes and Warnock (2012) use one quarter above two standard deviations as the minimum duration of an episode. However, given the large variability of capital flows (especially the other investment category) we believe the two quarter minimum duration more appropriate to identify episodes.

same manner as stops and surges. In addition to identifying surges, stops, flights and retrenchments for total (aggregate) flows, we also identify such episodes for the three disaggregate components of capital inflows/outflows discussed in the previous section.[12]

As an example to illustrate this procedure, Figure 4 shows ΔC_t and the mean ± one and two standard deviations in the case of total gross capital inflows for Spain. Gross inflows fall below one standard deviation in 2007Q3 and remain below this level until 2008Q2 and during two quarters (2007Q4 and 2008Q1) capital inflows are below (minus) two standard deviations, rendering the period 2007Q3-2008Q2 a stop episode. Gross inflows rise above (mean plus) one standard deviation in 2013Q2, remain above until 2013Q4 and are also higher than two standard deviations (above the mean) during at least two quarters; consequently the period 2013Q2-2013Q4 is classified as surge.

Table 4 reports the start and end dates for surges, flights, stops and retrenchments. The frequency of episodes is country-specific: Ireland records the highest number (11) and Portugal the lowest (3). Stops outnumber surges by a factor of two-to-one (14 vs. 7) while flights and retrenchments are evenly distributed (7 each). The question that arises is whether reversals of capital flows (stops or capital flight) can be detected around the start of the Eurozone sovereign debt crisis (the first Greek bailout in 2010Q2). For Greece we observe surges in FDI and OI during 2008 but these are not followed by stops. There is flight of FDI capital after the bailout but that is followed shortly by a retrenchment. The surge in OI capital to Greece in 2011-12 is a reflection of loans granted as part of the bailout programs. In sum, looking at capital flow episodes there is no general pattern either of sustained capital inflow stops or flight of capital

[12] In all, $CAPFLOW_t$, C_t and ΔC_t in (1) and (2) refer to either gross inflows or outflows of FDI or PI or OI or total.

following the onset of the Eurozone crisis. The two exceptions are a stop and a flight (both for total flows) for Ireland and flight of PI capital from Spain following the first Greek bailout (both lasting until the end of 2011).

Next, we investigate several questions regarding the behaviour of gross capital inflows and outflows around stop/surges and the onset of the Eurozone debt crisis. First, are intra-EA capital inflows and outflows stabilizing or destabilizing? In the former case, movements in capital outflows offset movements in capital inflows during periods of stops or surges. To test these hypotheses we estimate the following models:[13]

$$CAPINF_{it}^{k} = \alpha_{1i} + \beta_{1t} + \gamma_1 \, SURGE_{it} + \varepsilon_{it} \quad (3)$$

$$CAPOUT_{it}^{k} = \alpha_{2i} + \beta_{2t} + \gamma_2 \, SURGE_{it} + \varepsilon_{it} \quad (4)$$

where $CAPINF_{it}^{k}$ refers to gross capital inflow of type *k* (*k* = FDI, PI, OI) into country i as a percentage of GDP during period *t*, $CAPOUT_{it}^{k}$ to gross capital outflows of type *k* (as a percentage of GDP), and $SURGE_{it}$ is a dummy variable that equals 1 during quarters identified as a surge for country i in Table 4 and zero otherwise.[14] As an additional test we estimate models (3) and (4) replacing $SURGE$ with a dummy variable ($STOP$) that equals 1 during periods of capital inflow stops.[15]

The results are in Tables 5 (for $SURGE$) and 6 (for $STOP$). FDI and OI inflows are significantly higher during surges. In particular, during surges gross FDI inflows are approximately 1% (of GDP) higher and OI flows 13.85% higher. Gross capital outflows, however, are not significantly different during periods of surges, so capital

[13] For a similar approach to testing whether capital flows are stabilizing or destabilizing see Eichengreen *et al.* (2018).
[14] The models include country-specific (α_{1i}, α_{2i}) and time-specific (β_{1i}, β_{2i}) fixed effects and are estimated with heteroscedasticity- and autocorrelation-consistent standard errors. If capital inflows/outflows are stabilizing then it is expected that $\gamma_1 > 0$ and $\gamma_2 > 0$.
[15] If capital inflows/outflows are stabilizing in this case it is expected that $\gamma_1 < 0$ and $\gamma_2 < 0$.

outflows neither reinforce nor offset gross capital inflows. Table 6 shows that gross inflows of PI and OI are significantly lower during stops. There is no evidence, however, that gross capital outflows compensate for the reduced inflows during stops. In sum, we find the role of gross capital outflows to be neither stabilizing nor destabilizing during periods of capital inflow surges or stops.

Second, how did intra-EA capital flows behave around the Eurozone crisis? We test whether there was a systematic and significant reduction in capital flows following the onset of the Eurozone crisis and whether a reversal of flows can be detected around the crisis. As to the initial date of the crisis, most commentators acknowledge the first Greek bailout (2010Q2) as a milestone in the ensuing Eurozone crisis. To test the reversal hypothesis we estimate the following model:

$$CAPINF_{it}^{k} = \alpha_i + \beta_{PRE}\, TPRE_t + \beta_{POST}\, TPOST_t + \gamma_{PRE}\, PRECRISIS_t + \gamma_{POST}\, POSTCRISIS_t + \varepsilon_{it} \quad (5)$$

where *PRECRISIS* is a dummy variable that equals 1 in each of the eight quarters before 2010Q2 and 0 otherwise, *POSTCRISIS* is 1 for each of eight quarters after 2010Q2 and 0 otherwise, *TPRE* is a time trend before the global financial crisis and *TPOST* is a time trend after the crisis.[16] One important hypothesis is whether there was a reversal in gross capital inflows following the onset of the Eurozone crisis. This hypothesis is tantamount to testing $\gamma_{PRE} > 0$, $\gamma_{POST} < 0$ and $(\gamma_{POST} - \gamma_{PRE}) < 0$. The model in (5) refers to gross capital inflows. We also estimate (5) for gross capital outflows and $CAPOUT$ replaces $CAPINF$.[17] The results are in Table 7.

[16] Given the definition of *PRECRISIS* and *POSTCRISIS* in (5), it is not possible to include time-specific fixed effects.

[17] In this case, the hypotheses tests are: $\gamma_{PRE} < 0$, $\gamma_{POST} > 0$ and $(\gamma_{POST} - \gamma_{PRE}) > 0$.

We detect a significant reversal of gross inflows of OI capital: the estimate of $\gamma_{POST} - \gamma_{PRE}$ is negative and significant indicating a reversal of approximately 6.2 % of GDP. PI inflows were 2.7% (significantly) lower during the 8-quarters post crisis (compared to the average for the rest of the period) but were also 1.5% (significantly) lower during 8-quarters pre crisis; the hypothesis of PI capital inflows reversal is not supported. Gross capital outflows display no significant changes or reversals during the period surrounding the first Greek bailout.

Third, to examine further the reversal hypothesis, we estimate the model in (5) for total gross capital inflows, total gross capital outflows and net capital inflows. The results are in Table 8. Total gross inflows and total net flows are significantly lower during the post crisis period. There is a significant reversal in gross capital inflows that is relatively large in magnitude (7.1% of GDP). There is also a reversal in net capital flows of 4.6% but it is (marginally) insignificant. In sum, we find a substantial (in magnitude and significance) reversal in total gross capital inflows and to a lesser extent net capital flows to the EA-5 economies following the first Greek bailout, a result consistent with the findings of Hale and Obstfeld (2016).

While identifying stops, surges and reversals in gross capital inflows after the onset of the Eurozone crisis and the first Greek bailout is important and instructive, it is equally important to investigate whether economic factors can explain the behaviour of gross capital inflows and possible reversals around the crisis. The identification of capital flow episodes (stops and surges) assists in specifying an appropriate methodology to investigate the determinants of gross capital inflows. Since these episodes can be viewed as out-of-the-ordinary events, accounting for these should assist in reducing the variance of the estimates and allow for a better characterisation of the determinants of capital inflows. In this regard, the next section specifies a methodology

and tests the economic significance of various determinants of intra-EA gross capital inflows.

5. Can macroeconomic variables explain intra-EA capital flows?

This section investigates the economic determinants of intra-EA gross capital inflows. Specifically, we look into the role played by sovereign credit ratings and macroeconomic conditions in determining intra-EA capital inflows allowing for episodes of foreign capital surges/stops. We estimate the following model for disaggregate capital flows:

$$\begin{aligned} CAPINF_{i,t}^{k} &= \alpha^{k} + \beta^{k} RATING_{i,t} + \gamma_{1}^{k} SURGE_{i,t}^{k} + \gamma_{2}^{k} STOP_{i,t}^{k} \\ &\quad + \boldsymbol{\delta^{k} V_{i,t}^{k}} + \boldsymbol{\theta^{k} D_{i,t}^{k}} + \varepsilon_{i,t}^{k} \\ E\left(\varepsilon_{i,t}^{k} \varepsilon_{i,s}^{l}\right) &= \sigma_{kl} \text{ for } t = s \quad \forall \; k, l = FDI, PI, OI \\ &= 0 \text{ otherwise} \end{aligned} \tag{6}$$

where $RATING$ is an indicator of sovereign credit risk, $\boldsymbol{V}$ is a vector of macroeconomic determinants and $\boldsymbol{D}$ is a vector of binary variables related to the financial crisis. The model in (6) is estimated via seemingly unrelated regressions (SUR). The advantage of SUR estimation is that it allows (and tests for) contemporaneous correlation of shocks to different types of capital inflows such that a shock to one type of capital inflow is contemporaneously transmitted to other types of inflows.[18]

The indicator of sovereign risk ($RATING$) is the grade assigned by Standard & Poor's (S&P) to the long-term foreign currency sovereign debt of each of the EA-5. We use the sovereign credit assessment provided by S&P because it has been shown to be lead agency amongst the three major rating agencies. S&P provide a letter grade to

[18] We test the hypothesis of cross equation error independence or $E\left(\varepsilon_{i,t}^{k} \varepsilon_{i,s}^{l}\right) = 0$ for $t = s$. The Breusch-Pagan Lagrange multiplier tests (available on request) reject the null of error independence for all estimated specifications.

reflect sovereign credit rating which we have transformed into a numerical scale that ranges from 21 (AAA rating) to 0 (default). [19] Data on S&P ratings are obtained from the publication *S&P Sovereign Rating and Country T&C Assessment Histories.*

The vector $\boldsymbol{V}$ includes several macroeconomic variables suggested by the previous literature on the determinants of the three disaggregate forms of foreign capital inflows. Our aim is draw on this literature to highlight the main factors identified as important determinants, using mostly country-specific factors and drawing on the findings of Förster *et al.* (2014). Data macroeconomic variables in $\boldsymbol{V}$ are from Eurostat.

First, the voluminous literature on the cross-country determinants of FDI assigns primary importance to economic factors that are long-term in nature and that measure fundamental and structural economic parameters. We proxy these by the rate of growth of GDP, the differential in unit labour costs between each of the EA-5 and Germany and the growth of domestic credit. Differences in unit labour costs are one of the most frequently-cited measures of international competitiveness while GDP growth is a general indicator of the growth of domestic demand. Growth of domestic credit is a measure of the availability of domestic funds on which foreign firms can draw to finance FDI.[20]

Portfolio investment is shorter term in nature and more closely related to short-term financial conditions and investors' portfolio decisions. We hypothesize that portfolio inflows depend on four variables: domestic stock market returns, a country's debt burden, the change in yield on 10-year government bonds and global market

[19] See Gande and Parsley (2005, 2014). These studies employ a transformation of letter grades to a numerical scale (from 0 to 21) which we have adopted here.
[20] Given the long-term nature of decisions to invest in real capital abroad and to capture the effect of the economic determinants of FDI over time, we measure the explanatory variables as 4-quarter moving averages.

volatility. Higher domestic stock market returns should attract higher portfolio flows whereas greater financial market uncertainty (measured by the volatility index VIX) should reduce inflows. Stock market return is measured as the rate of return of the domestic stock market index during each quarter and VIX as the average value of the index during the quarter. An increase in a country's long-term government bond yield has frequently been cited by investors as an indication of reduced confidence in the economic policies of the issuing government. This is measured by the change in the average yield of 10-year government bonds. Finally, it has been argued that the accumulation of significant amounts of debt by Eurozone periphery governments and the ensuing debt overhang has acted as a factor inhibiting portfolio inflows. We include the stock of general government debt (public debt/GDP measured at the end of the previous quarter) as an indicator of the extent of debt overhang.

Other investment (OI) consists mainly of bank loans and deposits. We hypothesize that changes in interest rates on deposits and the growth of domestic credit to be the main determinants. The first captures the attractiveness of domestic bank deposits to German investors (measured as the change - in basis points - of the domestic deposit rate) and the second the argument (see Lane and McQuade, 2014) that domestic credit expansion is accompanied by increased supply of foreign loans.

Following the discussion in the previous sections on the behaviour of gross capital inflows around the onset of the GFC and the Eurozone crisis, the model in (6) includes two dummy variables (the elements of $\boldsymbol{D}$). The first (*GFC2008/9*) is equal to 1 during 2008Q1-2009Q4 and is 0 otherwise. This variable tests whether there were significant changes to mean capital inflows during the 8-quarter period between the onset of the GFC and the first Greek bailout. The second (*EURO2010*) equals 1 from 2010Q1 onwards and is 0 otherwise. Its inclusion tests for significant changes

(reversals) in capital inflows after the onset of the Eurozone crisis. The inclusion of these two variables allows us to test separately whether capital flows were significantly lower/higher during the immediate aftermath of the GFC (2008 and 2009) compared to the rest of the period and for significant changes (reversals) to mean capital inflows following the Eurozone crisis compared to the period before.

To begin with, we estimate the model in (6) without the variables in $\boldsymbol{V}$ and $\boldsymbol{D}$ in order to test the partial effect of credit ratings on capital inflows alone (in addition to surges/stops in capital inflows). The results are in Table 9. Sovereign credit ratings have a significant influence on portfolio and other investment inflows: an upgrade by one letter grade is associated with an increase of about 0.3% of GDP in portfolio and other inflows. By contrast, credit ratings do not affect FDI flows significantly. FDI represents flows that are longer-term in nature and the result of decisions over longer time horizons compared to PI and OI flows and are unlikely to be responsive to changes in credit ratings. The coefficient estimates for surges/stops are positive/negative and significant indicating the importance of allowing for these episodes in our estimated model.[21]

Next we estimate the model in (6) including the various macroeconomic determinants and time effects in $\boldsymbol{V}$ and $\boldsymbol{D}$. The estimation results are in Table 10. We note that unit labour cost differentials and the growth of GDP are economically and statistically significant determinants of FDI inflows: on average, a 1% increase in a country's unit labour cost relative to that of Germany's would decrease FDI flows by approximately 0.9% of GDP while a 1% increase in the growth rate of GDP increases FDI flows by 0.5% of GDP. The estimate for the growth of domestic credit is insignificant. Second, PI capital inflows by German investors are higher when stock

[21] Because only one country (Portugal) experienced a surge in PI for 4 quarters, a dummy variable for surges in PI could not be estimated.

returns increase. There is a negative and significant relationship between the accumulation of government debt and portfolio capital inflows: an increase in the debt/GDP ratio by 10% is associated with a 0.6% decrease in portfolio capital inflows. An increase in stock market volatility (VIX or 'the fear index') has a negative and significant impact on portfolio capital inflows. The effect of changes in government bond yields (the proxy for investor confidence in domestic economic policies) is not a significant determinant. Third, changes in deposit rates and domestic credit growth have a positive and significant influence on other capital inflows. The result on domestic credit growth is consistent with Lane and McQuade (2014) who argue that domestic credit expansion can lead to higher inflows of foreign loans.

Two results from Table 10 are noteworthy. First, after accounting for general financial and macroeconomic conditions, the estimate for sovereign credit risk is no longer significant either for PI or OI (remains insignificant for FDI as before). This can be interpreted as an argument that the information contained in sovereign credit ratings is subsumed by macroeconomic variables and that sovereign credit ratings may in large part reflect general changes in economic conditions and do not provide additional information. While changes in sovereign ratings can be of use to foreign investors, monitoring macroeconomic developments is crucial.

Second, following the discussion in previous sections on the reduction in capital inflows post-2008, we investigate whether changes in capital inflows after the GFC or the onset of the Eurozone sovereign debt crisis can be attributed to unique factors and not the general economic developments in periphery economies. The results in Table 10 show that there are no significant changes (reversals) in capital inflows after the first Greek bailout: the estimated coefficient of *EURO2010* is insignificant in all cases. We can surmise that the reduction and reversal in aggregate gross capital inflows following

the Greek bailout of 2010 (described in previous sections) can be attributed to general economic conditions: once these are accounted for, a significant reduction can no longer be detected. When it comes to the immediate aftermath of the GFC during 2008-9, the results for FDI and PI capital inflows are conflicting (there is no significant change in OI during 2008-9). FDI inflows were in fact higher during 2008-9 than expected based on macroeconomic conditions. Even though GDP growth decreased and unit labour costs increased during 2008-9, the (associated) reduction in FDI flows was less than would be expected; this is revealed by a positive and significant estimate of *GFC2008/9*. On the other hand, the reduction in PI inflows was greater than would be expected based on macroeconomic changes, so that investors responded to the onset of the GFC by withdrawing portfolio capital in greater amounts than that predicted by economic conditions.

Overall, the findings suggest that intra-EA capital inflows were more related to macroeconomic developments in the periphery economies than unique events related to the behaviour of German investors and firms. Even though there has been a reversal of capital inflows, this can be explained by macroeconomic developments in the periphery economies, a finding also implicit in the work of Beck *et al*. (2016). This general conclusion is subject to two exceptions during the period immediately following the GFC (2008-9): the reduction in FDI(PI) inflows was lower(higher) than would be expected based on changes in general macroeconomic conditions.

6. Foreign capital inflows and the current account balance of the EA-5

Previous sections have looked at intra-EA capital flows and whether there was a reversal following the onset of Eurozone sovereign debt crisis. It has been argued by

several commentators that prior to the Eurozone crisis foreign capital inflows were able to sustain the substantial current account deficits experienced by the periphery economies. Likewise, the drying up of foreign funds following the crisis forced periphery economies to reduce the current account deficits and eventually deliver a current account surplus. In this section we investigate the interconnection between international capital flows and the current accounts of the Eurozone periphery.

As is well known, international capital flows and the current account are jointly determined. Balance of payments models highlight that the counterpart to a current account deficit is a surplus in the financial account though foreign capital inflows. An appropriate framework is necessary to model the interconnection between the current account balance and foreign capital flows. In this paper we employ a panel vector autoregressive (VAR) framework. The panel VAR model is especially suitable because it allows the current account balance and foreign capital flows to be endogenously determined and for economic shocks to be transmitted between economies. In particular, we model the current account balance of each of the EA-5 and foreign capital inflows from both Germany and the rest of the world. This allows us to evaluate the role played by capital inflows from Germany (intra-EA flows) relative to those from elsewhere in the process of current account adjustment of the EA-5. Estimation of the model will assist our understanding of whether the sharp decreases in current account deficits during the period following the onset of the Eurozone crisis could be related to changes in capital inflows from Germany to the EA-5.

Before estimating the panel VAR model each data series was tested for the presence of a unit root. Panel unit root tests (results available on request) rejected the presence of a unit root for all data series. Subsequently we proceed to model the relationship between the current account balance and foreign capital inflows with a *m*-variate

homogeneous panel VAR with panel-specific fixed effects. The model can be expressed by the following system of linear equations (Canova and Ciccarelli, 2013):

$$Y_{m,t} = A_{0m} + A_m(l)Y_{m,t-s} + F_m W_t + u_{mt} \quad (7)$$

where $Y_{m,t}$ is a vector of m endogenous variables, W_t a vector of exogenous variables, A_{0m} is a vector of constants, and $A_m(l)$ is a polynomial in the lag operator (assumed to be homogeneous) and F_m coefficient estimates for the exogenous variables.

The vector of endogenous variables ($Y_{m,t}$) includes the variables that are central to our analysis: the current account balance of each of the EA-5 as a percentage of GDP (*CAB*), net capital flows from Germany to each EA-5 relative to GDP (*FLOW*) and net capital flows from the rest of the world relative to GDP (*ROWFLOW*).[22] In addition, $Y_{m,t}$ includes several endogenous variables that have traditionally been considered central to the joint determination between foreign capital flows and the current account balance: domestic GDP growth (Δ*GDP*), the change in unit labour costs (Δ*ULC*), and growth in private sector loans (Δ*LOANS*). Modelling of the long-run evolution of the current account balance emphasizes the growth in domestic income (Δ*GDP*), changes to an economy's international competiveness (Δ*ULC*), and the availability of domestic funds to support investment (Δ*LOANS*).[23] The model also includes the growth in foreign demand as an exogenous variable: it is proxied by the rate of growth of global GDP. The source of data for the current account balance of the EA-5 (*CAB*) and total net capital flows to each EA-5 is Eurostat. Net capital flows from Germany to the EA-5 (*FLOW*) were described in previous sections. Capital flows from the rest of the world to the EA-5 (*ROWFLOW*) are total net capital flows minus flows

[22] In this paper we will use the term rest of the world (ROW) to describe all countries with the exception of Germany.

[23] The textbook model of the current account highlights the accounting identity between the current account balance and the difference between income and spending or domestic saving and investment.

from Germany. The growth rate of global GDP is from the *International Financial Statistics* of the IMF. The sample ranges from 2002Q1 to 2015Q3.[24]

Before estimating the model in (7) we test for the presence of Granger causality between the endogenous variables. In particular we are interested in the causal nature of the relationship between net capital flows and the current account balance. We test causality via the panel VAR framework employing the GMM estimator suggested by Abrigo and Love (2016). Given the quarterly nature of our data, the lag length for each endogenous variable is 4, a choice supported by Hansen's (1982) J-criterion. The results are in Table 11. There is no evidence in favour of a direct causal relationship between net capital flows (from Germany or from the rest of the world) and the current account balance in either direction. There is, however, evidence that real GDP growth Granger-causes the current account balance, a finding consistent with popular models of the current account balance. There is no evidence (result not shown) of a direct causal relationship from the current account balance to GDP growth. Indeed there is no significant causal relationship from the current account balance to any of the other endogenous variables.

While the findings of Table 11 indicate no causal relationship between capital flows and the current account balance (i.e. there is no improvement in the ability to forecast the current account balance when lags of capital flows are employed), the Granger-causality framework does not allow for dynamic linkages among the endogenous variables. It may be the case that capital flows have an indirect impact on the current account via the other endogenous variables. To investigate dynamic

[24] There are no data on total capital inflows for Ireland and Greece prior to 2002Q1 as a result of methodological change in the balance of payments statistics from BPM5 to BPM6.

linkages, we estimate the model in (7) using a Bayesian panel VAR setup.[25] Bayesian analysis is preferred over GMM because it allows for some serial correlation in the error terms and for cross-sectional dependence (Comunale, 2017). Moreover, the Bayesian VAR (BVAR) methodology works well in panels where the time dimension is limited, as is our case. Four lags are used in the pooled (homogeneous) estimation of (7). Structural identification is achieved through triangular factorisation, which allows for variable-specific structural shocks in contrast to the standard Choleski decomposition which formulates shocks based on variable ordering. In this respect, the issue related to differences in results when variable ordering changes, does not apply in this setting.[26]

Figure 5 contains the BVAR impulse response functions (IRFs) that show the response of the CAB to a unit (1 percent) shock to each of the endogenous variables. The IRFs suggest that a positive shock to net capital flows either from Germany or from the rest of the world has negative short-term effects on the current account balance. The impact effect is relatively small in both cases but is larger for capital flows from Germany. The response of the current account to shocks to capital flows is consistent with the notion that capital flows finance the current account so that positive shocks to capital flows allow higher current account deficits. This effect is short lived for rest-of-the-world capital flows: it dissipates within one quarter and becomes insignificant. The effect is longer lived and (marginally) significant in the case of capital flows from Germany. [27]

[25] Bayesian panel estimation was conducted using Bayesian Estimation Analysis and Regression (BEAR) developed by Dieppe *et al.* (2016).
[26] Additional details on the panel BVAR estimation procedure are available in Dieppe *et al.* (2016). A total number of 2,000 iterations are employed for convergence of the algorithm, using a standard Gibbs sampler. As is common practice, the first 1,000 iterations reflect the burn-in sample and are discarded.
[27] Although not reported, growth in global GDP also has a statistically significant effect on domestic real GDP growth and the current account balance.

A positive shock to relative unit labour costs (reduction in competitiveness) has negative repercussions on the current account balance (deterioration of current account deficit) and the effect is significant and long lived and is the largest economically of the shocks to the endogenous variables. In contrast, a shock to GDP growth has a short-lived and insignificant effect on the current account balance. An interesting result is that the impact effect of a shock to loan growth is associated with a (significant) deterioration in the current account balance; the effect dissipates and becomes insignificant within four quarters. This can be viewed as increases in domestic lending boosting investment and deteriorating the current account. The connection between domestic loan growth and deteriorating current account balance is a result that echoes Lane and McQuade (2014) and Unger (2017) who suggest that the current account balance is negatively correlated with loan growth in Eurozone countries.[28]

Figures 6 and 7 show IRFs of the response of each of the endogenous variables to unit shocks to capital flows from the rest of the world (Figure 6) and from Germany (Figure 7). Shocks to capital flows (from Germany or from elsewhere) do not appear to have strong or lasting effects on GDP growth or unit labour costs. However, a positive shock to capital flows from Germany is associated with higher loan growth, is economically large (relative to others) and is (marginally) significant for 4-5 quarters before dissipating. This provides an indirect channel for the effect of capital flows on the current account balance: by enabling the growth of domestic loans capital flows from Germany have allowed the financing of current account deficits of the EA-5. Shocks to capital flows from the rest of the world have the opposite (negative) effect on the growth of loans (before becoming insignificant after 4 quarters). Whereas capital

[28] Domestic credit growth is also related to current account reversals, as Pancaro and Saborowski (2016) show. More specifically, the authors point out that this connection is especially strong in fixed exchange rate regimes, as is the case for members of the Eurozone.

flows from Germany provide a boost to domestic liquidity, those from elsewhere are treated by domestic financial intermediaries differently and respond by cutting back on domestic loan growth. In general, domestic loan growth is the variable that is most sensitive to shocks to the other endogenous variables. It is the variable most impacted by shocks to capital flows (on this issue see Amri *et al.* (2017), Davis (2015) and Igan and Tan, (2017)) and a channel through which shocks to capital flows are transmitted to the current account.[29]

Drawing on the above, although causality tests suggest no causal relationship between foreign capital flows from either Germany or the rest of the world and the current account balance of the EA-5, the BVAR impulse response functions point to evidence that net capital flows from Germany have contributed to funding the current account deficits of the EA-5 prior to the sovereign crisis and the shrinking of deficits after the crisis either directly or indirectly by allowing the expansion of domestic loans (before the crisis). The lower net capital inflows from Germany to the EA-5 that followed the crisis has reduced the ability of the periphery to finance the current account deficit. Indirectly, a net foreign capital inflow increases the availability of funds and commensurately bank liquidity. This, in turn, provides incentives for commercial banks to increase lending. The IRFs reveal that this effect was important for net capital inflows from Germany whereas the effect of capital inflows from elsewhere was in the opposite direction. Following the Eurozone crisis, reversal in net capital inflows left banks with lower liquidity than before. The decrease in bank lending acted as a break on the current account deficit and has been instrumental in the improving current account balance experienced by the EA-5 since the onset of the crisis.

[29] As Davis *et al.* (2016) note, credit growth fuelled by capital flows is a better predictor of banking crises than credit growth on its own.

7. Conclusions

This paper aims to understand the behaviour of bilateral capital flows between Germany and five Euro Area periphery economies. We study both gross inflows from Germany to the EA-5 and gross outflows from the EA-5 to Germany as well as net capital flows. We look at intra-EA capital flows in aggregate as well as disaggregate form. Overall, capital flows between Germany and the periphery were lower after the 2008 financial crisis. We find evidence of reversals in gross capital inflows and (to a lesser extent) net capital flows after the onset of the Eurozone crisis in 2010Q1.

We delve deeper into the issue of changes in capital flows following the crisis and estimate a model of the determinants of disaggregate capital inflows. After accounting for the general financial and economic variables that influence capital inflows, our findings suggest that capital inflows from Germany to the periphery were more related to macroeconomic developments in periphery economies than changes in behaviour brought about by the Eurozone crisis. There is evidence of capital inflow over(under) reaction during the global financial crisis for portfolio and direct investment. Finally, we examine the interrelationship between the current account balance of the EA-5 and net capital flows both from Germany and from elsewhere via the estimation of a panel VAR model. The results show that shocks to capital from Germany have facilitated the financing of the current account directly and also indirectly through the availability of private lending. The reversal of capital flows after the crisis acted as a break on bank lending with the ultimate effect a reduction in investment and the current account deficits of the EA-5.

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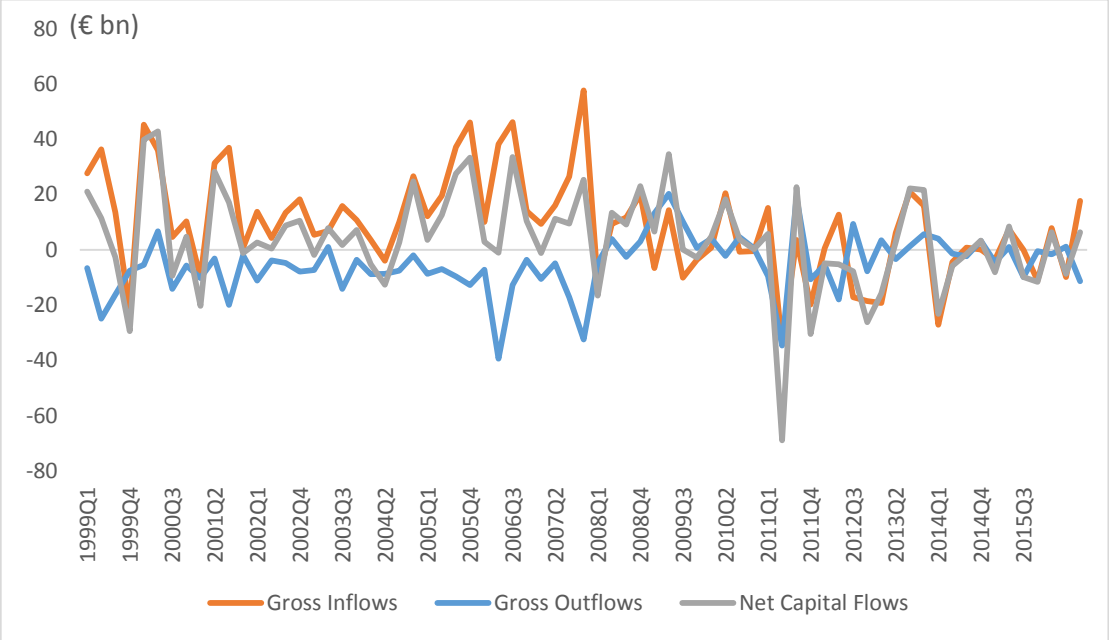
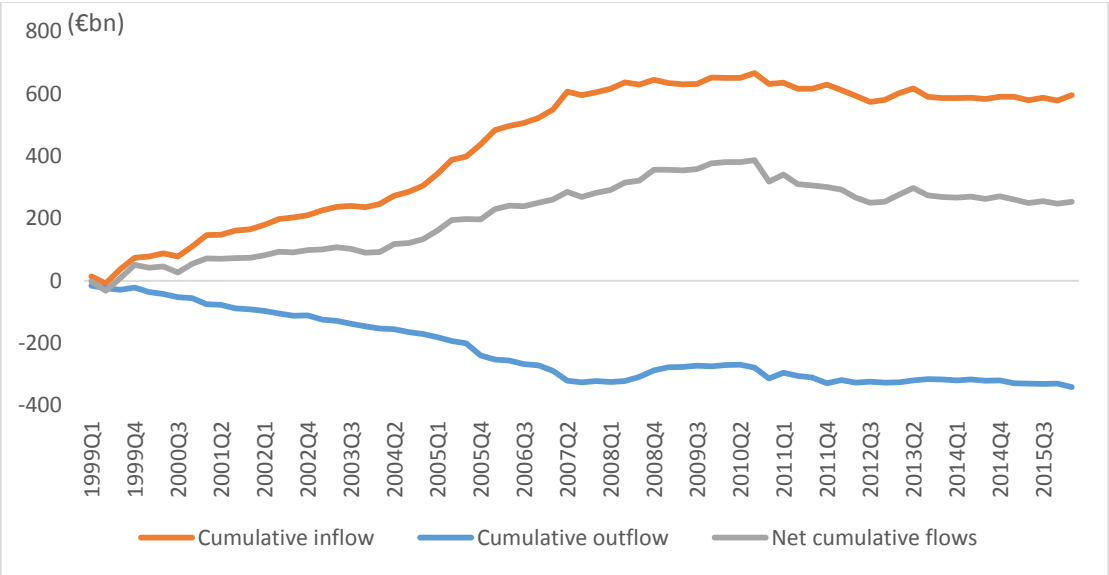
Figure 1. Aggregate gross inflows, gross outflows and net capital flows between Germany and EA-5



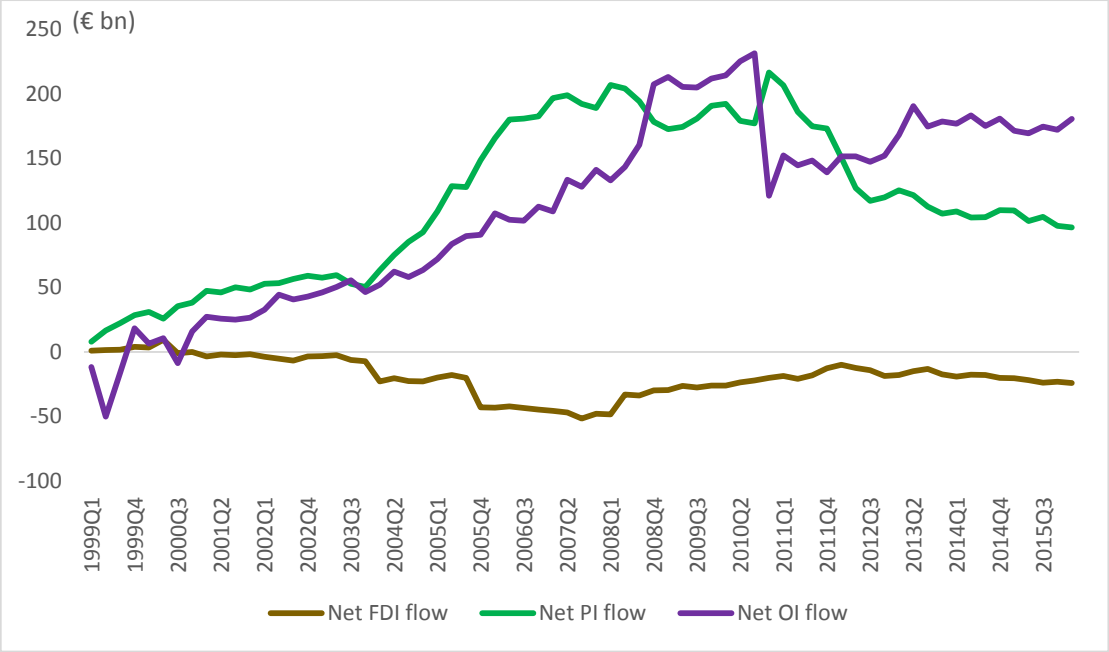
Source: Authors' calculations based on data from Deutsche Bundesbank

Figure 2. Cumulative aggregate gross inflows, gross outflows and net capital flows between Germany and EA-5



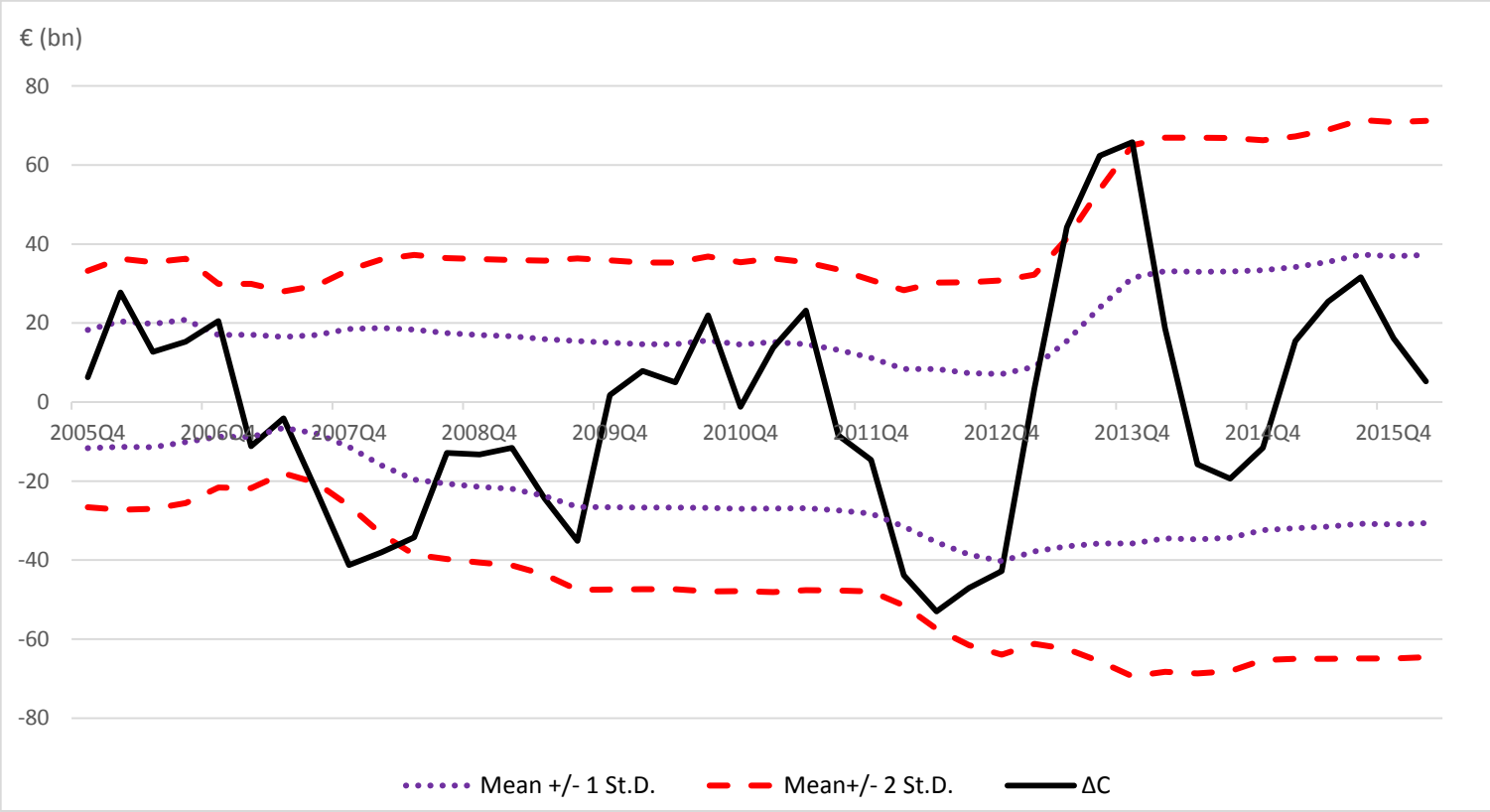
Source: Authors' calculations based on data from Deutsche Bundesbank

Figure 3. Cumulative net flows of FDI, PI and OI between Germany and EA-5



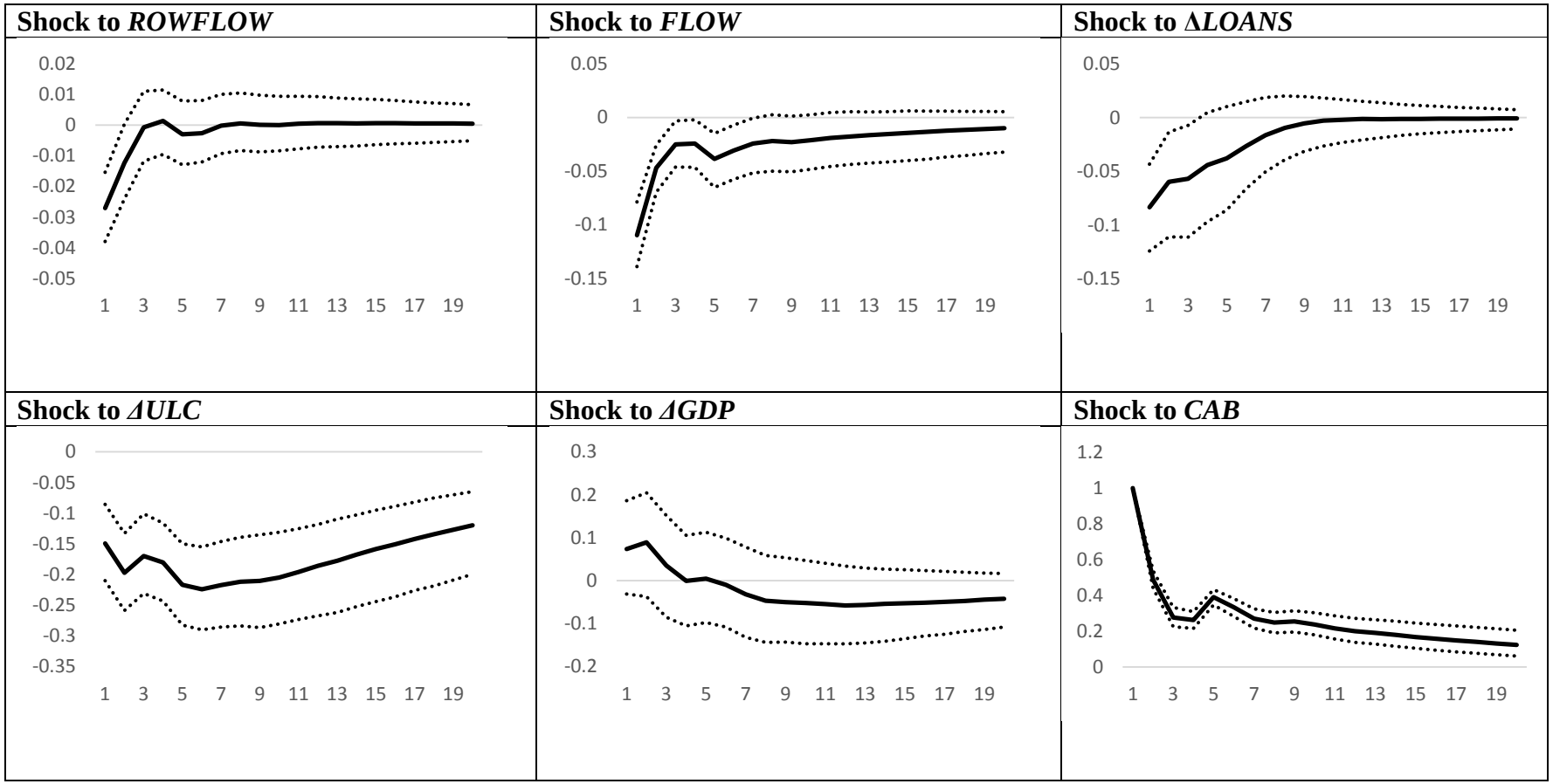
Source: Authors' calculations based on data from Deutsche Bundesbank

Figure 4. Identifying surges and stops: Spain, total gross capital inflows



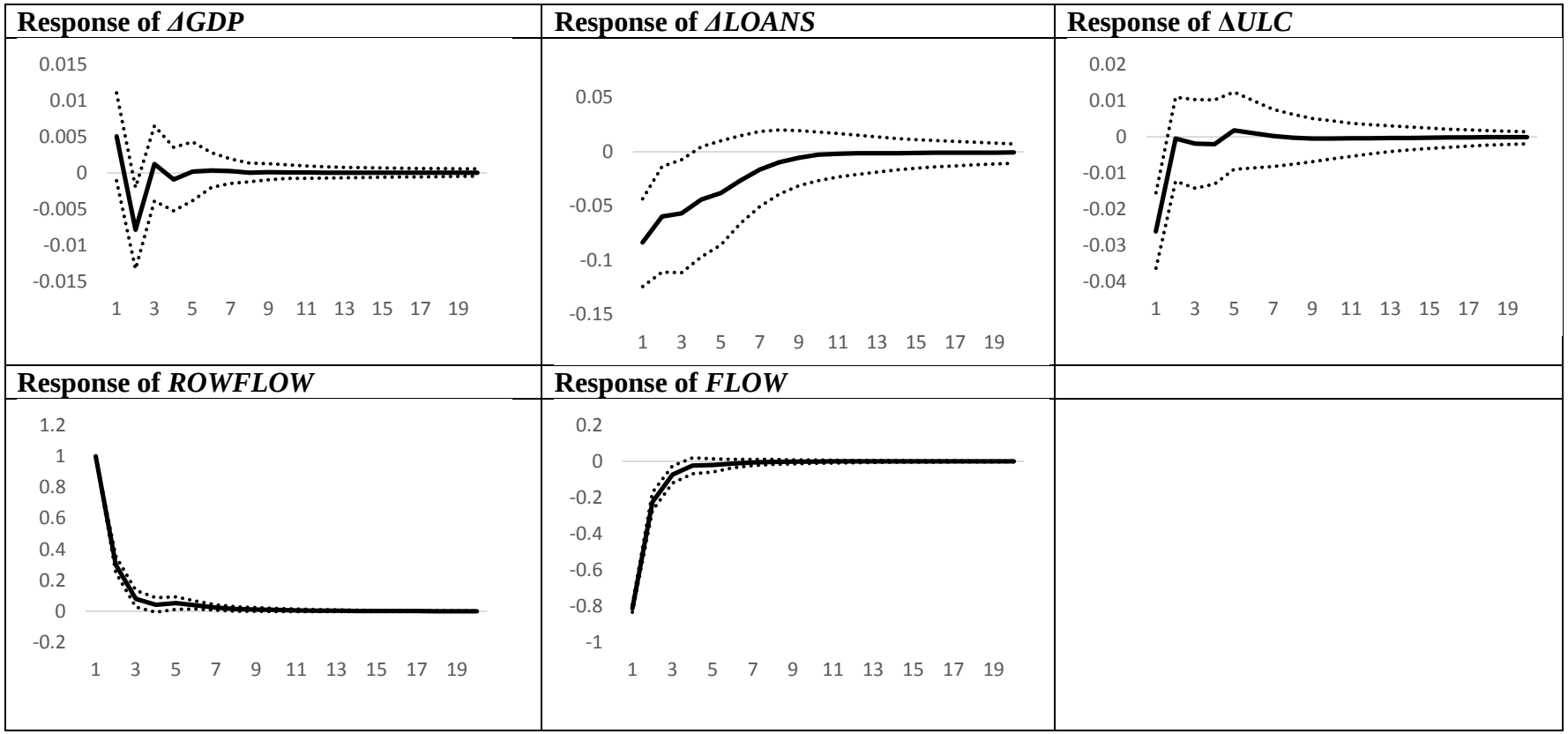
Source: Authors' calculations based on Bundesbank data

Figure 5. Impulse response functions of current account balance to a unit shock to endogenous variables



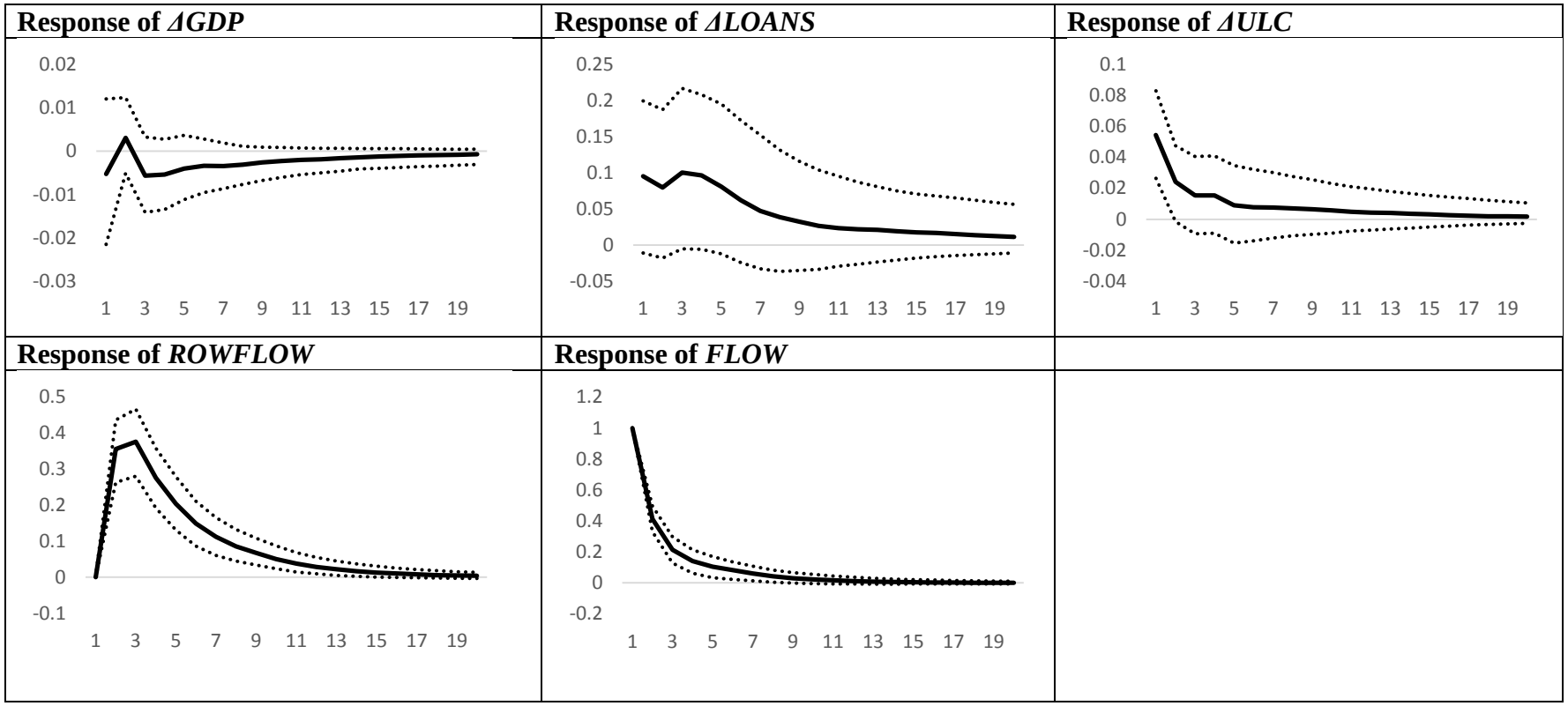
Note: The figures show the impulse response functions (IRF) of the current account balance to a unit shock to each of the endogenous variables. The dashed lines are the 67% confidence bands.

Figure 6. Impulse response function of endogenous variables to a unit shock to net capital flows from rest of the world



Note: The figures show the impulse response functions (IRF) of the endogenous variables to a unit shock to capital flows from the rest of the world. The IRF for the current account balance is in the first panel of Figure 5. The dashed lines are the 67% confidence bands.

Figure 7. Impulse response function of endogenous variables to a unit shock to net capital flows from Germany



Note: The figures show the impulse response functions (IRF) of the endogenous variables to a unit shock to capital flows from Germany. The IRF for the current account balance is in the second panel of Figure 5. The dashed lines are the 67% confidence bands.

Table 1: Intra-Euro Area Gross and Net Capital Flows (%GDP): Average 1999Q1 – 2016Q1

	Gross Capital Inflows				Gross Capital Outflows				Net Capital Flows			
	FDI	PI	OI	**Total**	FDI	PI	OI	**Total**	FDI	PI	OI	**Total**
Greece	0.14	0.49	1.85	**2.48**	-0.01	-0.49	-0.11	**-0.61**	0.13	-0.01	1.74	**1.86**
Ireland	0.44	3.90	1.35	**5.69**	-0.83	-2.38	-0.47	**-3.68**	-0.38	1.51	0.88	**2.01**
Italy	0.03	0.40	0.14	**0.57**	-0.21	-0.25	-0.03	**-0.49**	-0.18	0.15	0.11	**0.08**
Portugal	0.11	0.60	0.47	**1.18**	-0.04	-0.36	0.05	**-0.35**	0.07	0.24	0.52	**0.83**
Spain	0.20	0.78	0.37	**1.35**	-0.06	-0.61	-0.05	**-0.72**	0.15	0.17	0.32	**0.64**

Source: Authors' calculations based on Bundesbank data

Table 2: Intra-Euro Area Gross and Net Capital Flows (%GDP): Average 1999Q1 – 2007Q4

	Gross Capital Inflows				Gross Capital Outflows				Net Capital Flows			
	FDI	PI	OI	**Total**	FDI	PI	OI	**Total**	FDI	PI	OI	**Total**
Greece	0.11	1.34	0.64	**2.09**	-0.03	-0.87	-0.08	**-0.98**	0.08	0.48	0.55	**1.11**
Ireland	0.25	6.42	4.6	**11.27**	-1.32	-2.88	-2.88	**-7.08**	-1.07	3.54	1.72	**4.19**
Italy	-0.03	0.69	0.60	**1.26**	-0.33	-0.44	-0.27	**-1.04**	-0.36	0.26	0.33	**0.23**
Portugal	0.12	1.44	1.51	**3.07**	-0.04	-0.58	-0.30	**-0.92**	0.07	0.86	1.21	**2.14**
Spain	0.22	1.98	0.69	**2.89**	-0.05	-0.86	-0.10	**-1.01**	0.17	1.12	0.59	**1.88**

Source: Authors' calculations based on Bundesbank data

Table 3: Intra-Euro Area Gross and Net Capital Flows (%GDP): Average 2008Q1 – 2016Q1

	Gross Capital Inflows				Gross Capital Outflows				Net Capital Flows			
	FDI	PI	OI	**Total**	FDI	PI	OI	**Total**	FDI	PI	OI	**Total**
Greece	0.17	-0.44	3.18	**2.91**	0.02	-0.09	-0.13	**-0.20**	0.19	-0.53	3.05	**2.71**
Ireland	0.66	1.15	-2.20	**-0.39**	-0.29	-1.85	2.16	**0.02**	0.37	-0.70	-0.04	**-0.37**
Italy	0.10	0.09	-0.36	**-0.17**	-0.08	-0.05	0.23	**0.10**	0.03	0.04	-0.13	**-0.06**
Portugal	0.11	-0.31	-0.66	**-0.86**	-0.04	-0.13	0.43	**0.26**	0.06	-0.43	-0.23	**-0.60**
Spain	0.19	-0.53	0.02	**-0.32**	-0.07	-0.33	0.00	**-0.40**	0.12	-0.86	0.02	**-0.72**

Source: Authors' calculations based on Bundesbank data

Table 4. Gross Capital Inflows/Outflows Episodes: FDI, PI, OI and Total Gross Capital Inflows/Outflows

		Surges	Stops	Flights	Retrenchments
GREECE	**FDI**	2008Q2-2009Q1		2010Q4-2011Q4	2012Q1-2012Q4
	PI		2006Q2-2007Q1 2011Q2-2012Q3		
	OI	2008Q2-2008Q4 2011Q3-2012Q4			
	Total				
IRELAND	**FDI**		2006Q2-2006Q4	2005Q4-2006Q2	2006Q4-2007Q3
	PI		2009Q1-2009Q3		
	OI	2008Q4-2009Q3	2006Q1-2006Q4 2009Q4-2011Q3		2006Q1-2006Q4
	Total		2006Q1-2006Q3 2009Q4-2011Q3	2010Q3-2011Q2	
ITALY	**FDI**			2005Q4-2006Q3	
	PI				2007Q4-2009Q1
	OI		2008Q2-2009Q1		2008Q2-2009Q1
	Total			2005Q4-2006Q3	2008Q2-2009Q1
PORTUGAL	**FDI**				
	PI	2013Q1-2013Q4	2011Q4-2012Q2	2005Q4-2006Q3	
	OI				
	Total				
SPAIN	**FDI**	2008Q2-2009Q1	2009Q2-2010Q2		
	PI		2007Q2-2008Q3	2010Q2-2011Q4	
	OI		2011Q3-2012Q4		
	Total	2013Q2-2013Q4	2007Q3-2008Q2		2008Q1-2008Q4

Source: Based on authors' calculations. For a definition of surges, stops, flights and retrenchments see the text.

Table 5. Gross Capital Inflows and Outflows during Surges

	Gross Capital Inflows			**Gross Capital Outflows**		
	FDI	PI	OI	FDI	PI	OI
SURGE	0.99* (0.58)	0.35 (2.14)	13.85*** (4.60)	-0.18 (0.67)	0.09 (1.51)	-1.60 (2.71)
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.17	0.30	0.21	0.23	0.18	0.19

Note: Heteroskedasticity- and autocorrelation-consistent standard errors in parentheses. ***, **, and * indicate significance at the 0.01, 0.05 and 0.10 levels.

Table 6. Gross Capital Inflows and Outflows during Stops

	Gross Capital Inflows			**Gross Capital Outflows**		
	FDI	PI	OI	FDI	PI	OI
STOP	-0.47 (0.50)	-2.18** (0.93)	-12.95*** (3.46)	0.23 (0.58)	1.02 (0.66)	-1.12 (2.06)
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.16	0.32	0.22	0.23	0.19	0.19

Note: Heteroskedasticity- and autocorrelation-consistent standard errors in parentheses. ***, **, and * indicate significance at the 0.01, 0.05 and 0.10 levels.

Table 7. Gross Capital Inflows and Outflows and the Eurozone Crisis: FDI, PI and OI

	Gross Capital Inflows			**Gross Capital Outflows**		
	FDI	PI	OI	FDI	PI	OI
PRECRISIS	0.28	-1.55**	2.63	0.28	0.91	1.42
	(0.24)	(0.75)	(2.70)	(0.28)	(0.51)	(1.58)
POSTCRISIS	0.45**	-2.66***	-3.55	0.18	-0.00	-0.11
	(0.22)	(0.54)	(2.52)	(0.27)	(0.47)	(1.47)
TPRE	0.01	-0.00	0.04	-0.01	0.02	-0.01
	(0.01)	(0.03)	(0.09)	(0.01)	(0.02)	(0.06)
TPOST	0.00	-0.10***	-0.03	0.00	0.04	0.04
	(0.01)	(0.03)	(0.10)	(0.01)	(0.02)	(0.06)
Constant	0.01	2.50***	0.74	-0.21	-1.32	-0.52
	(0.17)	(0.54)	(1.94)	(0.20)	(0.36)	(1.13)
POSTCRISIS – PRECRISIS	0.16	-1.12	-6.19**	-0.09	-0.92	-1.53
	(0.28)	(0.89)	(3.22)	(0.34)	(0.60)	(1.88)
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.02	0.12	0.02	0.01	0.01	0.01

Note: Heteroskedasticity- and autocorrelation-consistent standard errors in parentheses. ***, **, and * indicate significance at the 0.01, 0.05 and 0.10 levels.

Table 8. Capital Flows and the Eurozone Crisis: Total Gross Inflows and Outflows and Net Capital Flows

	Gross Capital Inflows	**Gross Capital Outflows**	**Net Capital Flows**
PRECRISIS	1.37	2.61	-1.23
	(2.72)	(1.63)	(2.68)
POSTCRISIS	-5.77**	0.07	-5.83**
	(2.54)	(1.52)	(2.51)
TPRE	0.05	0.00	0.04
	(0.10)	(0.06)	(0.10)
TPOST	-0.12	0.08	-0.20**
	(0.09)	(0.05)	(0.09)
Constant	3.26*	-2.05*	5.31***
	(1.96)	(1.17)	(1.93)
POSTCRISIS – PRECRISIS	-7.14**	-2.54	-4.60
	(3.24)	(1.94)	(3.20)
Country Effects	Yes	Yes	Yes
R-squared	0.04	0.02	0.06

Note: Heteroskedasticity- and autocorrelation-consistent standard errors in parentheses. ***, **, and * indicate significance at the 0.01, 0.05 and 0.10 levels.

Table 9. Determinants of Capital Flows: S&P Sovereign Ratings

	FDI	**PI**	**OI**
SURGE	1.02**		16.04***
	(0.43)		(3.83)
STOP	-0.54	-2.22**	-10.28***
	(0.43)	(0.88)	(2.89)
RATING	0.01	0.35***	0.30*
	(0.02)	(0.05)	(0.17)
Constant	-0.01	-4.38***	-4.13
	(0.26)	(0.88)	(3.02)
R-squared	0.02	0.15	0.08

Note: SUR standard errors in parentheses. ***, **, and * indicate significance at the 0.01, 0.05 and 0.10 levels.

Table 10. Determinants of Capital Flows: Macroeconomic Variables

	FDI	**PI**	**OI**
SURGE	0.57		41.8***
	(0.63)		(6.12)
STOP	-0.39	-1.68	0.03
	(0.43)	(1.20)	(3.96)
RATING	-0.08	-0.50	0.03
	(0.08)	(0.37)	(0.65)
GFC2008/9	0.81**	-1.91**	1.59
	(0.36)	(0.88)	(2.79)
EURO2010	0.22	-0.67	0.46
	(0.52)	(1.42)	(4.37)
Unit Labour Costs	-0.89**		
	(0.45)		
Growth GDP	0.47***		
	(0.18)		
Domestic Credit Growth	0.01		0.18**
	(0.01)		(0.08)
Stock Market Return		0.07**	
		(0.03)	
(Public Debt/GDP)		-0.06***	
		(0.02)	
ΔBond Yield		0.35	
		(0.84)	
VIX		-0.02*	
		(0.01)	
ΔDeposit Rate			7.32*
			(4.44)
Constant	1.26	16.2*	-1.29
	(1.53)	(8.52)	(12.5)
R-squared	0.13	0.27	0.36

Note: SUR standard errors in parentheses. ***, **, and * indicate significance at the 0.01, 0.05 and 0.10 levels.

Table 11. Granger Causality Tests

Excluded Variable	***CAB***	***ROWFLOW***	***FLOW***
CAB		7.83	3.87
		[0.10]	[0.42]
ROWFLOW	2.35		5.94
	[0.67]		[0.20]
FLOW	2.4	5.74	
	[0.66]	[0.22]	
Δ*LOANS*	4.3	4.89	7.07
	[0.37]	[0.30]	[0.13]
Δ*ULC*	4.0	3.12	4.66
	[0.41]	[0.54]	[0.32]
Δ*GDP*	9.4	1.77	4.26
	[0.05]	[0.78]	[0.37]

Note: The table shows the value of the χ^2– test of the null hypothesis that a variable does not Granger-cause the excluded endogenous variable (listed at the top of each column). The numbers in brackets are the *p*–values associated with the χ^2– test.