The Euro and the Geography of International Debt Flows

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Abstract

Greater financial integration between core and peripheral EMU members had an effect on both sets of countries. Lower interest rates allowed peripheral countries to run bigger deficits, which inflated their economies by allowing credit booms. Core EMU countries took on extra foreign leverage to expose themselves to the peripherals. The result has been asset-price bubbles and collapses in the periphery, area-wide banking crisis, and sovereign debt problems. We analyze the geography of international debt flows using multiple data sources and provide evidence that Core EMU countries increased their borrowing from outside of EMU and their lending to the EMU periphery.

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1 Introduction

European Monetary Union had a large impact on financial flows within the EMU area. It is well documented that gross debt and equity flows between EMU members increased dramatically as a result of both the single currency and regulatory harmonization within the EU.[1] Individual EMU members began to record larger net financial inflows too in the form of current account deficits, but until the sovereign debt crisis in the EMU periphery, few observers regarded these as particularly problematic. Only recently has attention turned to the factors behind there current account deficits as well as the mode in which they were financed by EMU partners and by countries outside the single currency.[2] Evidence on these questions is still relatively limited, and studies of the euro's effect on portfolio positions has tended to focus on intra-EMU effects. Here we look more broadly and also consider the impact of EMU on the *global* pattern of gross international financial flows. It is important to understand the worldwide gross portfolio positions built up in the decade after 1999 because these set the stage for the euro area crisis.

One mechanism generating the big current account deficits of the European periphery could be as follows: after EMU (and even in the immediately preceding years), compression of bond spreads in the euro area periphery encouraged excessive borrowing by these countries, domestic lending booms, and asset price inflation. We further argue that a substantial portion of the financial capital flowing into the European periphery was intermediated by the countries in the center (core) of the euro area, inflating both sides of the balance sheet of the large financial institutions in the euro area core. These gross positions took the form of debt instruments, often issued and held by banks. Thus, EMU contributed not only to the big net deficits of the peripheral countries, but to inflated gross

[1] See Lane (2006), Blank and Buch (2007), Lane and Milesi-Ferretti (2007), Spiegel (2009a), and Pels (2010) for the evidence on increased gross flows within the euro area and De Santis et al. (2003), Coeurdacier and Martin (2009), De Santis and Gerard (2009), Spiegel (2009b), and Kalemli-Ozcan et al. (2010) for the mechanisms underlying this development.

[2] Trade imbalances of euro area members and their financing are discussed by Chen et al. (2013), who draw on the bilateral international investment position data documented in Waysand et al. (2010).

foreign liability and asset positions for nonperipheral countries such as Belgium, France, Germany, and the Netherlands — countries that all experienced systemic banking crises after 2007.[3] The tendency for systemically important banks to increase leverage in line with balance sheet size (see Miranda-Agrippino and Rey (2013)) implied a substantial increase in financial fragility for these countries' financial sectors.

Four main factors contributed to the suppression of bond yields in the European periphery after the introduction of the euro. First, the risk of investing in European periphery declined with the advent of the euro due to investor assumptions (perhaps erroneous) about future political risks, including the possibility of official bailouts. Second, transaction costs declined and currency risk disappeared for euro area investors investing in the periphery countries.[4] Third, the ECB's policy of applying an identical collateral haircut to all euro area sovereigns, notwithstanding their varied credit ratings, encouraged additional demand for periphery sovereign debt by euro area financial institutions (Buiter and Sibert, 2005), which were able to apply zero risk weights to these assets for computing regulatory capital.[5] Fourth, financial regulations in the EU were harmonized (Kalemli-Ozcan et al., 2010) and the euro infrastructure implied a more efficient payment system though its TARGET settlement mechanism. All four factors seem likely to have given core euro area financial institutions a perceived comparative advantage in terms of lending to the periphery, and this would also likely have affected financial flows from outside to both regions of the euro area. While the preceding considerations apply to debt flows, including bank loans, they seem less applicable to equity flows, especially portfolio flows, where the portfolio diversification motive is a major driver.

We distinguish our work from earlier studies of the effect of EMU on financial flows by disaggregating and differentiating the effects of EMU for core and periphery euro area countries. In particular, we examine how EMU changed patterns both of external lending to core and periphery

[3]See Laeven and Valencia (2013).

[4]Hale and Spiegel (2012) show that the decline in transaction costs and currency risk due to the advent of the euro increased international bond issuance in euro relative to dollar.

[5]For documentation of the carry trade behavior after 2007, see Acharya and Steffen (2013).

countries, as well as between core and periphery countries.

The paper begins by documenting the large increases between 1999 and 2007 in the net foreign liabilities of the five euro area periphery countries, Greece, Italy, Ireland, Portugal, and Spain (the "GIIPS"), vis-à-vis the rest of the euro area (the "Core"). As is well known, increasing current account deficits of these heavily borrowing countries were accompanied by a marked suppression in their government bond spreads relative to the Core. We then describe and analyze the geography of capital flows and their evolution during the pre-crisis EMU period up to 2007.

We exploit multiple data sets in our analysis, including data on debt asset positions from CPIS, on bank claims from the bilateral BIS data, as well as the Loan Analytics data on syndicated bank loans extended by individual banks to all types of borrowers. We analyze the patterns of cross-border financial flows in the cross-section setting as well as in the panel with country pair fixed effects.

We find strong evidence of the increase in the financial flows, both through debt markets and through bank lending, from core EMU countries to the EMU periphery. We also find that financial flows from financial centers to core EMU countries increased, but predominantly due to increased bank lending and not portfolio debt flows. In addition, we look at evidence from the syndicated loan market that is broadly consistent with the core EMU lenders having a comparative advantage in lending to the GIIPS. The concentration of peripheral risks on core EMU lenders' balance sheets helped to set the stage for the diabolical loop between banks and sovereigns that has been at the heart of the euro crisis.[6]

The paper is organized as follows. In section 2 we give a simplified stylized model of how the introduction of the euro could have altered the geography of global debt flows. Next, in section 3 we describe the data that we use. In section 4 we describe general trends in the data and also

[6]See Acharya et al. (2011), Brunnermeier et al. (2011), De Grauwe (2012), and Obstfeld (2013) for the description and the discussion of this diabolical or "doom" loop.

explore the empirical regularities through regression analysis. Section 5 concludes.

2 Trading costs and asset flow diversion

To illustrate potential general equilibrium effects following a reduction in peripheral euro zone borrowing costs, we give an example of a stylized mechanism the essence of which might drive changes in the global geography of international debt flows.

We can think of the world as consisting of three regions — the Core euro area countries (C), the Peripheral euro area countries (P), and the rest of the world (R). Because the C and the R regions include large financial centers with large trading volumes, transaction costs of investing between these two regions were always low. If we assume these costs were zero and the capital can flow freely between the regions, they will face the same global interest rate r.

The transaction costs of lending from C and R to the P region, however, were high prior to the EMU because these countries were less integrated into the global capital markets. Thus, borrowers in P faced a higher interest rate when borrowing from the outside of the region than the interest rate prevailing between C and R region. We can denote this difference as τ. Figure 1 illustrates global imbalances prior to EMU. Given the prevailing interest rates prior to the EMU, global imbalances were moderate, with the P region facing a higher interest rate, $r + \tau$.

Assume that with the introduction of the euro, transaction costs for Core EMU to lend to the EMU periphery declined, but remained unchanged (or at least declined by less) for the rest of the world. Thus, Core EMU countries, and their banks, could benefit from intermediating financial flows from outside of EMU to the periphery. As illustrated in Figure 2, this led to an increase in the interest rate and current account surpluses in both the C and R regions which together were financing the higher current account deficits in P. Because transaction costs for R to invest in P are higher than for C, financial institutions in C borrow from R to lend to P. All lending from R

to P must pass through C, which contributes an increase in both the *gross* foreign liabilities and assets of C that can be as high as R's current account surplus.

Perceptive observers have noted similar dynamics:

> "German banks could get money at the lower rates in the euro zone and invest it for a decade in higher yielding assets: for much of the 2000s, those were not only American toxic assets but the sovereign bonds of Greece, Ireland, Portugal, Spain, and Italy. For ten years this German version of the carry trade brought substantial profits to the German banks — on the order of hundreds of billions of euros ... The German advantage, relative to all other countries in terms of cost of funding, has developed into an exorbitant privilege. French banks exploited a similar advantage, given their major role as financial intermediaries between AAA-rated countries and higher yielding debtors in the euro area." (From Carlo Bastasin, "Saving Europe: How National Politics Nearly Destroyed the Euro," Washington, D.C.: Brookings, 2012, page 10.)

Of course, other outcomes are possible. For example, it could be that the cost peripheral borrowing falls enough for EMU and outside creditors alike that lending of outside creditor to the GIIPS rises nonetheless.[7] Even though it seems plausible that a number of the financial market changes caused by the EMU affected intra-EMU transaction costs and costs of external trades somewhat differently, the effect of EMU on external flows to the core and the periphery is an empirical matter.

Some aspects of aggregate data on financial flows are broadly consistent with the mechanism described on Figures 1 and 2. Figure 3 shows that EMU led to the compression of government bond spreads between the Core and Periphery from 1999 to 2008.[8] Figure 4 shows that net foreign liabilities of GIIPS were increasing mostly vis-à-vis Core EMU, while Figure 5 shows that net

[7] Coeurdacier and Martin (2009) argue that for some asset classes EMU resulted in significant transaction cost savings for investors in countries outside and inside EMU alike.

[8] Econometric analyses of the pre-crisis convergence of euro area sovereign yields include Ehrmann et al. (2011) and Gerlach et al. (2010).

foreign assets of Core were mostly vis-à-vis GIIPS and were closely matched by the liabilities of Core vis-à-vis the rest of the world. (See also Chen et al. (2013).) However, the overall picture one derives from gross asset position data is more complex than our simple example.

In the remainder of the paper, after describing our data, we will provide more direct evidence on the effect of EMU on global financial flows.

3 Data

An ideal data set for our analysis would consist of all gross debt flows between each country pair, classified by the nationality of the entity extending funds to a borrower. Unfortunately, such data do not exist. The BIS collects data on bank claims at the country-pair level, but these are reported as stocks and are limited to banking-sector debt holdings.[9] The IMF reports portfolio debt and equity holdings for selected countries in its CPIS data set, but like the BIS data, these also are reported as stocks. Moreover, the data on national asset holdings (unlike the BIS consolidated banking data) are based on the residence principle, and continuous data coverage starts only in 2001 (although the CPIS data set includes a pilot survey from 1997). Loan-level data are available for syndicated bank loans through Dealogic's Loan Analytics, but these cover only a subset of total debt flows. In addition, banks from several different countries may participate in a syndicate, complicating the attribution of loans to national lenders; and the data report loan origination, and not actual drawdown or repayment information. In order to piece together the most accurate picture possible, we make use of all three data sources, with the understanding that each of them is at best a noisy proxy for actual gross debt flows between countries.

For our empirical analysis, we divide the world into four regions. Two regions are GIIPS and the rest of the euro area, which we label Core (Austria, Belgium, Finland, France, Germany,

[9] In fact, the BIS data are limited to debt holdings of BIS-reporting banks, with a changing coverage of individual banks over time (Cerutti, 2013).

Netherlands, Luxembourg).[10] We separate the rest of the world into two groups. The first group includes the rest of the EU and large financial centers (Fin): Canada, Denmark, Japan, Sweden, Switzerland, UK, and US. The second group consists o2f all remaining countries (ROW).

The CPIS database provides gross portfolio equity and debt positions by country-pair for 1997 and 2001-2011. For the purpose of this paper, we focus on the data on debt positions. Unfortunately, information on currency breakdown is very limited, which prevents us from estimating valuation-adjusted flows. As a result, we use the data in gross positions in real U.S. dollars, which we compute by dividing nominal U.S. dollar positions by the U.S. CPI. Because of many gaps in the data, we compute the total for each country's positions vis-à-vis ROW by subtracting its positions vis-à-vis all countries from the other three regions from its position vis-à-vis the entire world. We do the same for ROW lending to each country. Because CPIS data for Luxembourg are particularly noisy, we exclude Luxembourg from the analysis of CPIS data.

The BIS has recently declassified its bilateral data on banking sector claims, both on locational and consolidated bases. Consolidated data are more appropriate for our analysis because we want to trace debt flows to the headquarters of each financial institution.[11] Consolidated data, however have two major shortcomings: first, complete bilateral data are unavailable for euro area countries, except Greece and Portugal, prior to 1999; second, the consolidated data do not include currency breakdown and so do not allow us to compute valuation-adjusted flows. BIS Locational statistics, on the other hand, have much more complete historical coverage and the BIS provides valuation-adjusted flows using the currency breakdown of claims. Therefore, we also investigate the locational data, even though it is not ideal.[12]

[10] We do not have Cyprus and Malta in our data set. Slovenia and the Slovak Republic are coded as the ROW, because they joined EMU in 2007 and 2009, respectively.

[11] For the importance of intra-institutional transfers, see Cetorelli and Goldberg (2011) and Bruno and Shin (2013).

[12] Among previous studies, Blank and Buch (2007) and Kalemli-Ozcan et al. (2010) use BIS locational data, while Spiegel (2009a) uses the consolidated data. The CPIS data, used, for example, by Lane (2006) are based on the residence principle, similar to the BIS locational banking statistics.

We use all BIS reporting countries and for symmetry, we limit the vis-à-vis countries to the same set of BIS reporting countries. We use both data sets and analyze stocks and changes in stocks of total cross-border claims on all sectors. We deflate all data, reported in U.S. dollars, by the U.S. CPI.

We complement these data sources with individual tranche-level data on syndicated international and domestic bank loans from Dealogic's Loan Analytics database (also known as Loanware). We classify the nationality of each loan based on the nationality of lender parent and borrower parent, i.e. on consolidated basis. Since the loans are syndicated, they have many lenders, frequently from different countries. We split each tranche into individual records so that there is only one borrower and one lender per record. As individual participation amounts are not provided for each lender, we divided the total tranche amount by the total number of lenders. We divide all the amounts by the U.S. CPI. For some of the analysis, we aggregate all loan tranches for each lender parent, borrower parent, and year to match the structure of the data to that of the CPIS and BIS data sets.

Some banks appear as both borrower and lender parents in Loan Analytics. We isolate 51 banks (global large banks and banks included in EBA stress tests that are active on the syndicated loan market), which account for about 84 percent of total syndicated lending. Of these banks, 23 are in the Core EMU. This allows bank-level analysis of borrowing and lending patterns.

4 Geography of international debt flows

We first present our analysis of country-pair level data to evaluate the effect of EMU on patterns of global financial flows. We then discuss some evidence supporting the hypothesis of a comparative advantage of CORE lending to GIIPS after 1999.

4.1 Bilateral lending dynamics

We first examine how the geographical composition of international lending and borrowing changed over time. Figure 6 shows portfolio debt holding and banking claims using CPIS and consolidated BIS data, respectively, across four regions: financial centers (FIN), core Euro area (CORE), GIIPS, and the rest of the world (ROW). These claims are shown in the beginning of the EMU period on the left-hand-side of the chart, and as a change from the beginning of the EMU period until the end of 2007 on the right-hand side of the chart. The thickness of the lines reflects holdings, measured in the USD, of each regions vis-à-vis another, scaled by global gross positions in the USD for the charts on the left-hand side and by changes in global gross positions in real USD for the charts on the right-hand side. In interpreting these charts we view the stocks of claims at the beginning of EMU period as reflection of flows that occurred prior to the EMU.

The top panel maps portfolio debt holdings. We observe an increase in portfolio debt claims of CORE on GIIPS and other CORE countries after the euro was introduced that is substantially larger than the amount of claims accumulated prior to EMU. We can also see a smaller increase in the portfolio debt claims of FIN on GIIPS relative to the accumulation of these claims prior to the EMU period.[13] These observations are consistent with some comparative advantage of CORE in lending to GIIPS.

The bottom panel shows the claims of the banking system. Here we see very clearly a large increase in flows from FIN to CORE relative to what we observed prior to EMU. We also see an increase in banking flows from CORE to GIIPS. In addition, we find that there is a decline in bank flows from CORE to FIN after the euro was introduced, showing that not only did CORE banks increase their borrowing from financial centers, they also reduced their lending to financial centers in order to divert the funds toward the GIIPS. In terms of the net foreign asset positions shown in Figure 5, both of these factors contribute to the negative NFA positions of CORE vis-à-vis

[13]There are no outflows from ROW, because the data are not available.

countries outside the euro area. Lending from financial centers to the GIIPS also goes up after 1999, indicating an overall increase in the attractiveness of GIIPS assets even for countries outside of EMU. Other data suggest that much of this lending went to the housing boom countries, Spain and Ireland.

To see whether the regional patterns are driven by specific countries, we turn to Figure 7. The top panel of Figure 7 is based on the CPIS data, the middle panel on BIS consolidated data and the bottom panel on BIS locational data. We compute the share of total lending to GIIPS by individual Core countries in each country's total lending (left column), and the share of Core in total borrowing by each country from GIIPS in each country's total borrowing (right column). We find that there was an increase in lending to GIIPS through the bond market between 1997 and 2007 for all Core countries, but especially for France, while the increase in bank lending was more pronounced for both France and Germany, with France experiencing an increase earlier during the EMU period than Germany. We also observe a sharp increase in the share of CORE in market borrowing by all GIIPS countries in the first few years of the EMU period. We don't see a clear increase in the share of Core banks in total borrowing by GIIPS, with the exception of Greece, and to a lesser extent, Portugal. Locational BIS data show broadly similar patterns to those we observe with consolidated statistics.

To formalize the analysis of Figures 6-7, we present estimates for a set of cross-sectional regressions based on the gravity framework that has been used by Portes and Rey (2005), Lane (2006), Coeurdacier and Martin (2009) and other authors. For each country pair we compute a change in the log of real USD claims between 1997 and 2007 for CPIS data and 1999 and 2007 for BIS consolidated data. For the BIS locational data, we sum up the valuation-adjusted flows in 1999-2007 in real USD and control for the stocks of claims in 1999. The results are presented in Table 1, with columns (1) and (4) showing regression results for CPIS data, columns (2) and (5) showing the results for the BIS consolindated data, and columns (3) and (6) showing results for the BIS

locational data. In the first three columns we do not include any controls, while in the last three columns we control for imports of country j from country i. We focus on region pairs that drew our attention in analyzing Figure 7.

We include indicators for region pairs: CORE lending to FIN and to GIIPS, and FIN lending to CORE and to GIIPS, with the omitted category being lending between all other region pairs. We find that in terms of portfolio debt flows as well as bank flow there was an increase in lending from CORE to GIIPS and, with the exception of the BIS locational data, a decline in lending from CORE to FIN. In addition, we find an increase in bank lending from FIN to both CORE and GIIPS. These effects remain when we control for trade.

We next turn to the country-pair by year panel data analysis, similar to the approach taken by Blank and Buch (2007) and Spiegel (2009b). We test whether the flows for the pairs of regions that we discuss have changed substantially after 1999. To do so, we interact indicators of region pairs with an indicator of the pre-crisis EMU time period. We estimate regressions with country-pair and year fixed effects so that our identification comes from changes within country pairs. We also control for the total amount lent and total amount borrowed by each country in each year. Because consolidated BIS data for EMU countries are not available prior to 1999 (except for Portugal and Greece), our analysis is limited to CPIS data and BIS locational data. We supplement this analysis with syndicated loan issuance aggregated from the loan-level data using the Loan Analytics data set.

The results are presented in Table 2. We find that, following the introduction of the euro, claims of CORE on GIIPS have increased both through portfolio debt holdings and through banks. We also see an increase in syndicated lending of CORE to GIIPS. Similarly to the cross-section regressions, we find that lending from financial centers to CORE increased only through bank lending, but not through portfolio debt. We also see that direct lending of financial centers to GIIPS declined in the bond market but increased through bank lending, although by a smaller amount than their bank

lending to CORE.

To summarize the results of Tables 1 and 2, we find that during the pre-crisis EMU period there was an increase in debt flows from Core EMU to GIIPS and that increase occurred on debt markets as well as through bank lending. This increase was financed by a decline in lending of CORE to FIN, especially on on the bond market, and by an increase in borrowing by CORE from banks in financial centers.

4.2 Additional evidence

We suggested several reasons why the core EMU lenders might have had a comparative advantage over financial centers in lending to the GIIPS. This comparative advantage could have led to a reorientation of global capital flows beyond an increase in CORE lending to GIIPS. not only greater lending from the CORE to the GIIPS, but also to more lending from the financial centers to the CORE and possibly less lending

Our first piece of evidence comes from the syndicated loan data. Since syndicated loans to sovereigns did not have the same collateral advantages as sovereign bonds, to gain from a carry trade banks switched from loans to GIIPS sovereigns to lending to them through the debt market. Indeed we observe a sharp decline in syndicated bank lending from CORE to GIIPS sovereigns at the start of EMU period, as shown on Figure 8. While overall syndicated lending from CORE banks to GIIPS increased throughout this time period, lending to sovereigns dropped to nearly zero. Figure 9 shows, for example, that while overall syndicated borrowing by GIIPS sovereigns has dropped in 1999, starting 1998 bond issues by GIIPS sovereigns increased dramatically.

The only source of systematic geographical composition of borrowing and lending of banks is Loan Analytics data base. Top banks appear as both lenders and borrowers in the data, allowing us to see whether the geography of their lending is affected by the geography of their borrowing. Even though syndicated lending from CORE to GIIPS is rather limited, we examine whether there

is a correlation between banks' lending to GIIPS and these same banks' borrowing from financial centers. For at least some large banks we definitely see this link, as shown on Figure 10.

To test whether this link between Core EMU banks' borrowing from financial centers and their lending to GIIPS is a more widespread phenomenon, we isolate 51 banks–either large global banks or banks included in EBA stress tests–that are active on the syndicated loan market. These banks account for about 84 percent of total syndicated lending. Of these banks, 23 are in the Core EMU. For these banks, we collect information on syndicated lending to them from different region as well as their own participation in syndicated lending by region. We then estimate the regression of the amount lent to GIIPS as a function of the amount borrowed from different regions, and allow for the effect to change after the introduction of the euro. The results are reported in Table 3. In column 1 the sample is limited to financial center banks, in column 2 to core EMU banks, and in column 3 to periphery banks. In all regressions we control for the total amount lent and borrowed through the syndicated loan market by each bank, as well as for bank and year fixed effects.

The results in Table 3 show that, controlling for total borrowing and lending by each bank in each year, only for Core banks is there an increased link between their borrowing from financial centers and their lending to GIIPS during the pre-crisis EMU period. We do not find such a link for banks from other regions. In addition, we find that financial center banks, but not Core banks, seem to have been intermediating flows from ROW to GIIPS. This finding is expected in that the ROW lenders are likely to be facing even larger transaction costs in lending directly to GIIPS than do the financial center banks.

Finally, using the Loan Analytics data we also confirm that financial center lenders found GIIPS borrowers relatively less attractive after the introduction of the euro. To do so, we estimate linear probability regressions of the probability of having at least one bank from FIN in the syndicate for all loans, for loans in which at last one bank is from CORE, for all loans to GIIPS, for loans to GIIPS in which at least one bank in the syndicate is from CORE, and for all loans to CORE. As

controls we included deal amounts and year fixed effects.[14]

Figure 11 shows a plot of the estimated fixed effects from these regressions. We find that while there was not much change in the regional composition of loan syndicates in the deals extended to other regions, there was a sharp drop during the EMU period in the probability of a financial center bank participating in lending to GIIPS, whether or not a CORE bank is also in a syndicate.[15] There are two interpretations of these results, either FIN banks became less interested in originating loans to GIIPS after 1999, or banks originating loans to GIIPS were not inviting FIN banks to participate after 1999. Both of these are consistent with our mechanism: in the former case it indicates lowered interest in FIN lending directly to GIIPS, in the latter it is consistent with the view that lending to GIIPS became perceived as less risky, thus requiring less diversification. The second, however, is less likely because there was no systematic change in the number of banks per syndicate in lending to GIIPS.[16]

4.3 Robustness tests

Our first concern is that the UK, which we include among the financial centers, is different. For the CPIS and locational BIS data, it is especially important to note that there are many foreign-owned banks in the UK, and these happen to be the banks actively engaged in the international activity. Lending to Irish banks, in particular, is frequently channeled from core EMU banks through their London branches and will therefore be reported as lending from financial centers to GIIPS in any data that based on the residence principle. This problem is less important for the BIS consolidated data and the Loan Analytics data, which are reported on a nationality basis. Nevertheless, there are other respects in which UK is special: it participated in the first TARGET payment system

[14] In the interest of space, we do not report the regressions themselves.

[15] These dynamics are not explained by the increased number of deals to GIIPS, which did not occur until 2004.

[16] Here we only observe the syndicate composition at the time of loan origination. As Ivashina and Scharfstein (2010) stress, composition of loan syndicates can change during the life of a loan.

at the dawn of the EMU, and its regulatory system is much more harmonized with the euro zone than are those of other financial centers. In fact, when we separate lending from the UK to GIIPS in our Table 1 regressions, we find a significantly larger increase in BIS flows to GIIPS from the UK than from the rest of the financial centers.

For these reasons, we conduct a series of robustness tests with respect to the treatment of UK borrowers and lenders.[17] In our first test, we reclassify the UK as a Core EMU country. Surprisingly, our cross-section results change very little, especially for the CPIS and BIS locational data. The only coefficient that becomes substantially smaller, and no longer significant, is that on lending from financial centers to Core in column (5) of Table 1, BIS consolidated data. In the panel regressions, the coefficient on lending from Core to GIIPS becomes negative with CPIS data, column (1) of Table 2, but no other coefficients are substantially affected. Thus, it appears that the UK is better classified as a financial center than as part of core EMU. Alternatively, we drop UK as a lender or as both lender and borrower in the regressions. We find that the impact on cross-section regressions is the same as reclassifying UK as Core, but there is no effect at all in panel regressions. Thus, we conclude that our results are not driven by the specifics of the UK financial system.

Our next concern is that Norway and Iceland, which we classify as "Other" countries, are heavily involved with the euro area, to a similar degree as are Sweden and Denmark, which we classified as financial centers. To make sure our results are not driven by excluding them, we reclassify both Norway and Iceland as financial centers and re-estimate the regressions in Tables 1 and 2. We find that our results are generally unaffected, with two exceptions — the coefficient on lending from the core of EMU to the financial centers in column (2) of Table 1 becomes insignificant, and the coefficient of the interaction between the EMU time period and lending from financial centers directly to GIIPS (column (2) of Table 2) also becomes insignificant. Both coefficients retain their prior signs.

[17] In the interest of saving space, we do not report these results, but they are available from us upon request.

Finally, we are aware of an increasing exposure before the crisis of certain European banks to Central and Eastern Europe (CEE), including the Baltic countries. In particular, Austrian banks are known to be lending actively to all of CEE, while Scandinavian banks are known to be heavily involved in the Baltics. Thus, in Table 1 we isolate lending from Austria to GIIPS, from Austria to CEE apart from the Baltics, and from Austria and the Scandinavian countries to the Baltics. We find that even though lending through all of these channels increased dramatically, our main results are not substantially affected by separating these flows from the rest. The only coefficient that changes is that on lending from core EMU to the financial centers, which is no longer negative in regressions based on BIS data when we do not control for trade, or in regressions that use BIS locational data when we do control for trade.

5 Conclusion

Current account deficits of peripheral euro area countries reflected an accumulation of problems that have led to instability in the euro area. In this paper we analyze how the patterns of international debt flows facilitated the accumulation of these imbalances. Not only did peripheral countries borrow too much, but in addition, financial institutions in the core of the euro area expanded their balance sheets to facilitate peripheral deficits, thereby increasing their own fragility. This pattern set the stage for the diabolical feedback loop between banks and sovereigns that has been such a powerful driver of the euro area's recent crisis.

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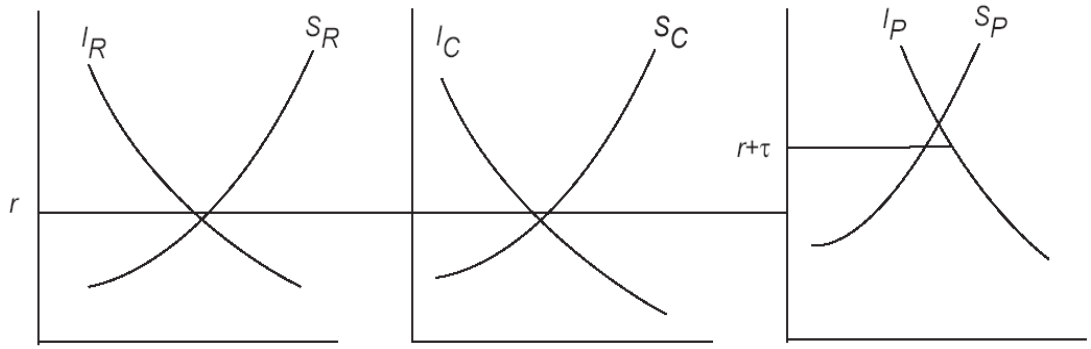
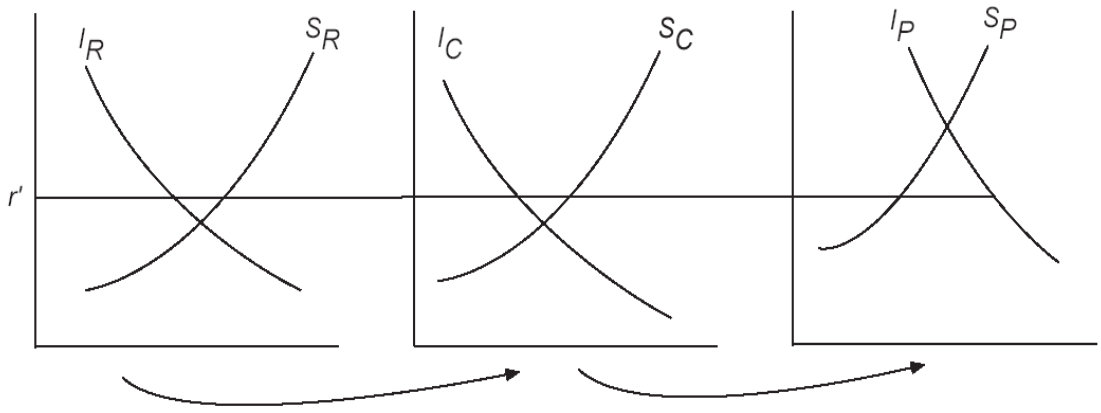
Figure 1: Global imbalances before the Euro



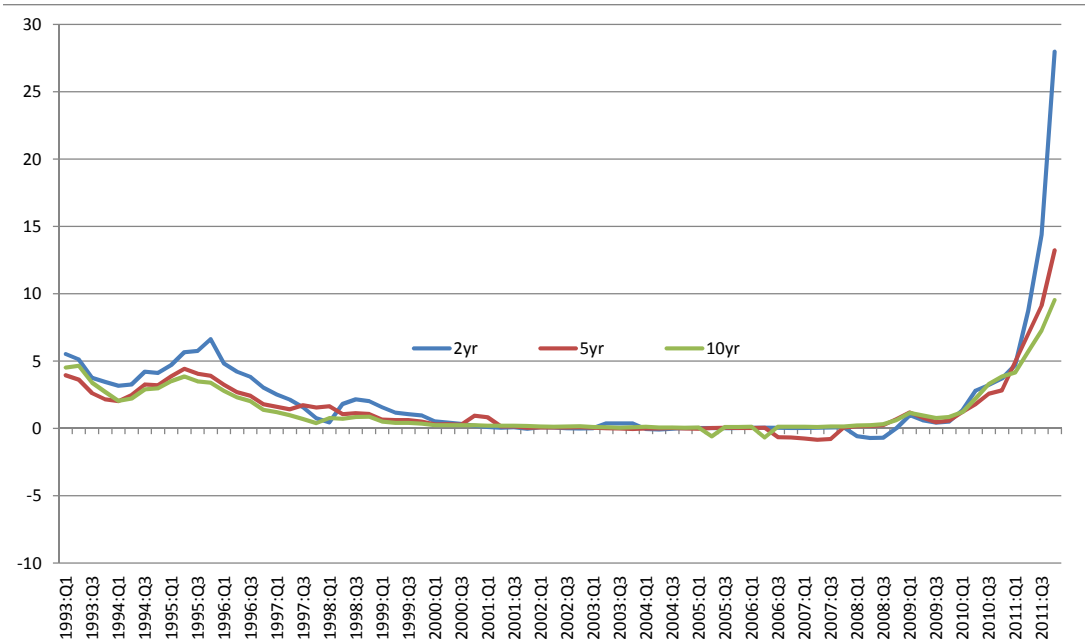
Before EMU, Rest of World *(R*) and Core euro zone countries (*C*) have very low mutual asset transaction costs, but both face a cost $\boldsymbol{\tau}$ of lending to the Peripheral euro zone (*P*). The cost $\boldsymbol{\tau}$ largely disappears for *C*, but less so for *R*, when the euro is introduced.

Figure 2: Global imbalances after the Euro



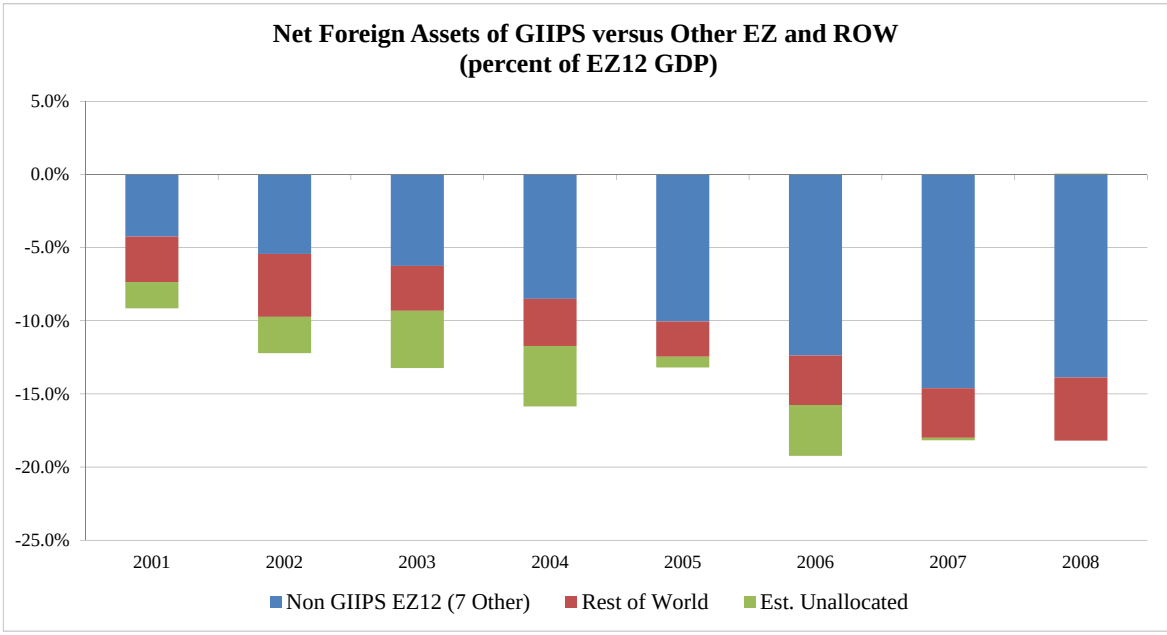
Because asset trade between *R* and *P* remains relatively costly post-EMU, all net lending from *R* to *P* is intermediated through *C*, which must raise its gross foreign assets and liabilities alike by an amount equal to the surplus savings of *R*. *P*'s deficit rises as its external borrowing cost falls.

Figure 3: Government bond spreads between GIIPS and Core



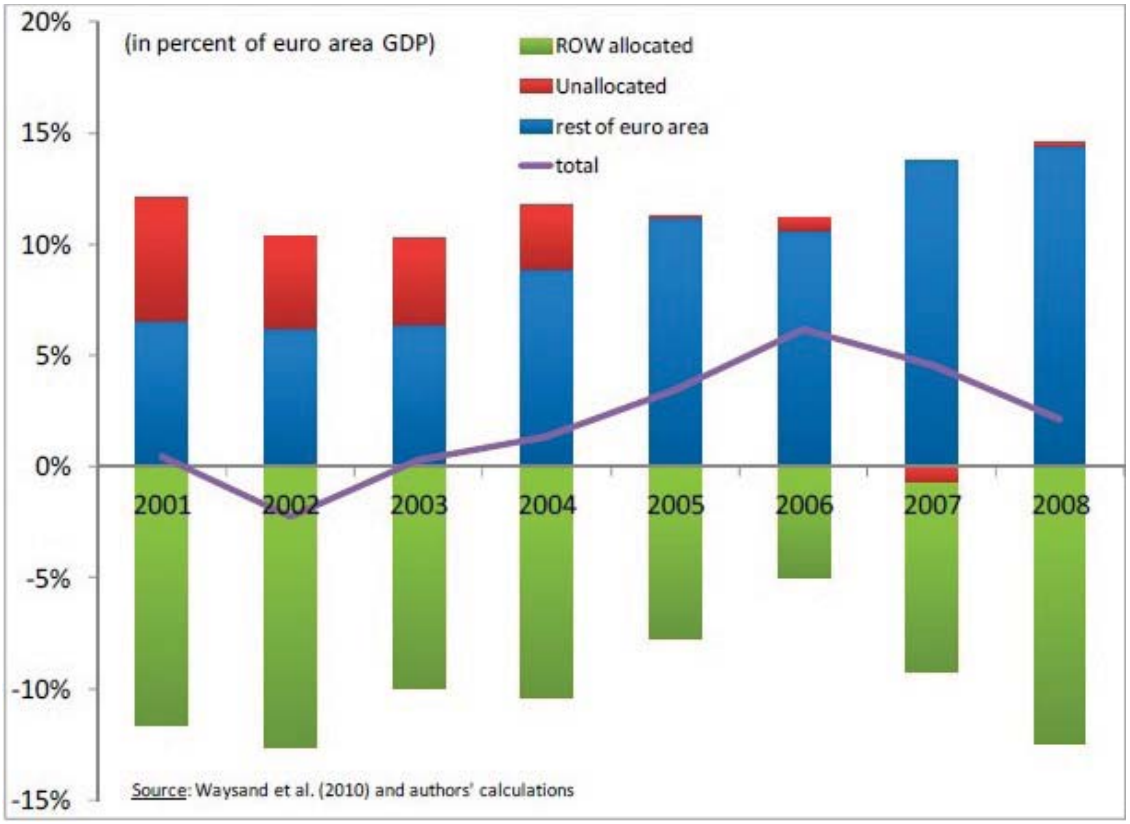
Note: Bond spreads are computed as a difference between unweighted average government bond yields in core EMU countries and in GIIPS.

Figure 4: Evidence from Position (not Flow) Data



Source: Waysand, Ross, and de Guzman (2010), following Chen, Milesi-Feretti, and Tressel (forthcoming)

Figure 5: Net Foreign Asset Positions of Euro Area Core countries



Note: Chart courtesy of F.Pappada

Figure 6: Portfolio debt (CPIS) and bank claims (BIS) by region in the beginning of EMU period and their change by 2007.

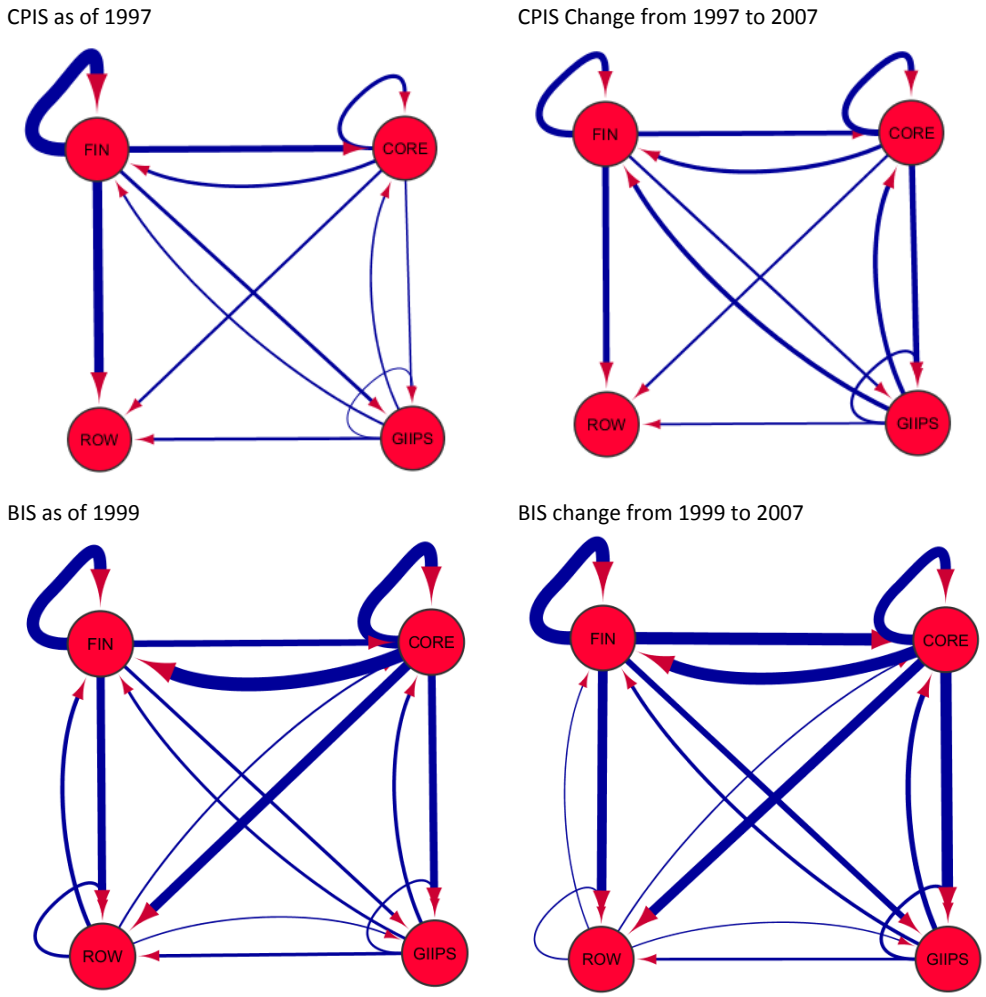


Figure 7: Geographical distribution of Core to GIIPS lending.

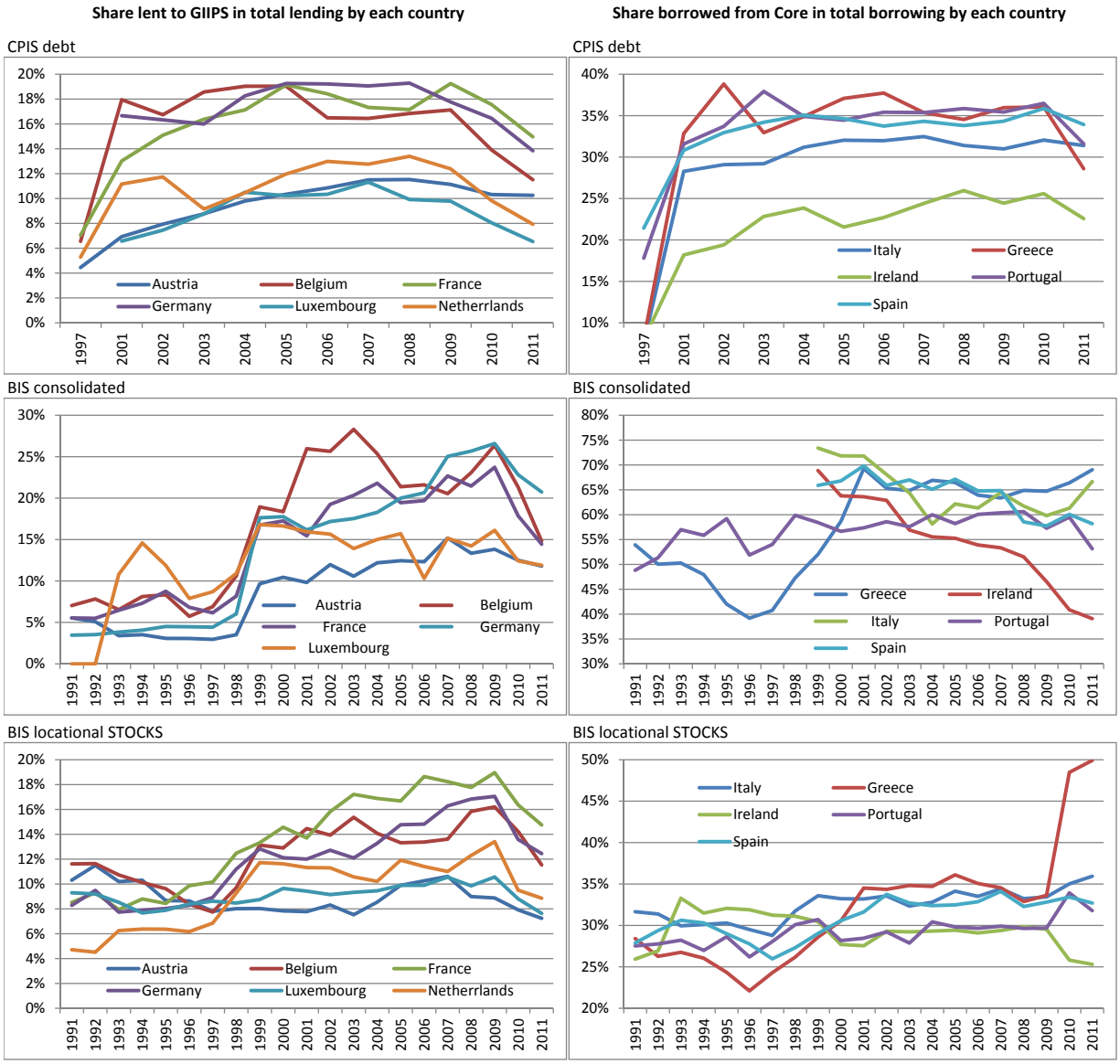


Figure 8: Syndicated lending from CORE to GIIPS by borrower's ownership (Bil. USD)

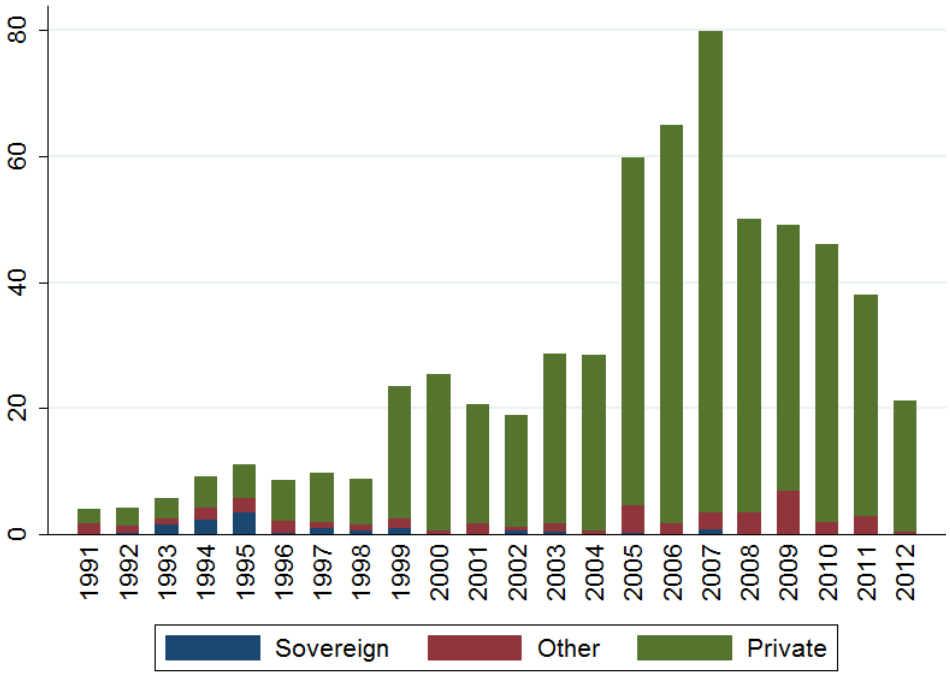
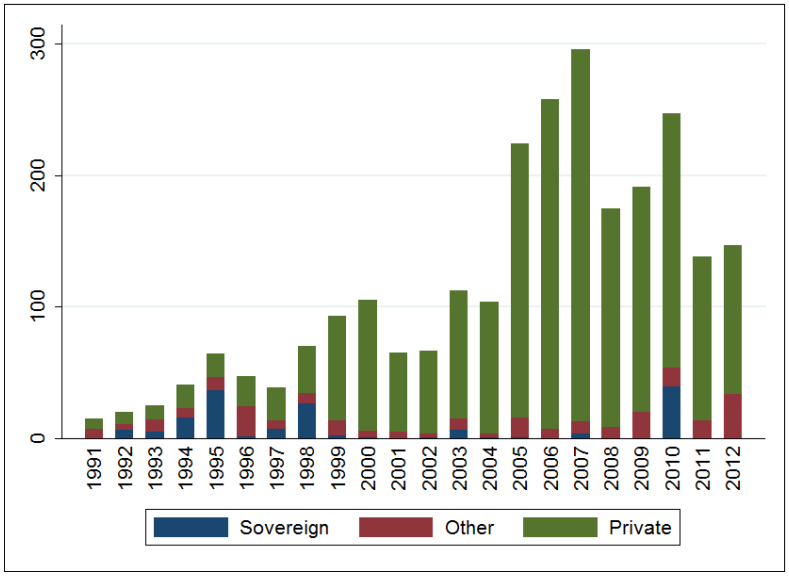


Figure 9: Borrowing through syndicated loans and on the bond market by GIIPS, by borrower's ownership

Syndicated loan borrowing by GIIPS (bil. USD)



Bond issues by GIIPS (bil. USD)

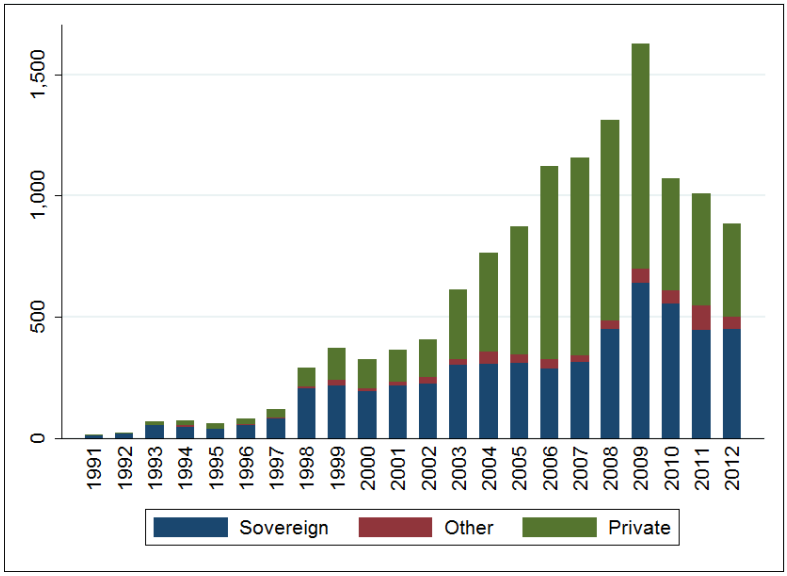


Figure 10: Borrowing from Financial Centers and lending to GIIPS of individual banks (real USD)

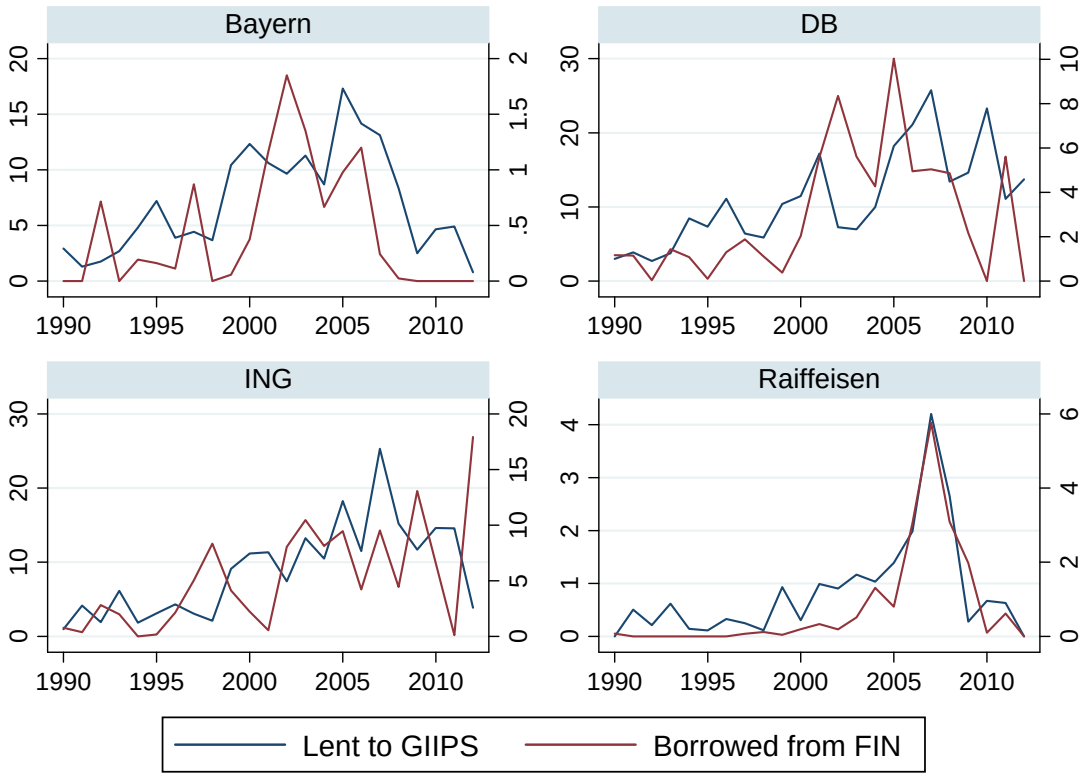


Figure 11: Probability of FIN bank participating in a loan syndicate (year fixed effects from linear probability regression)

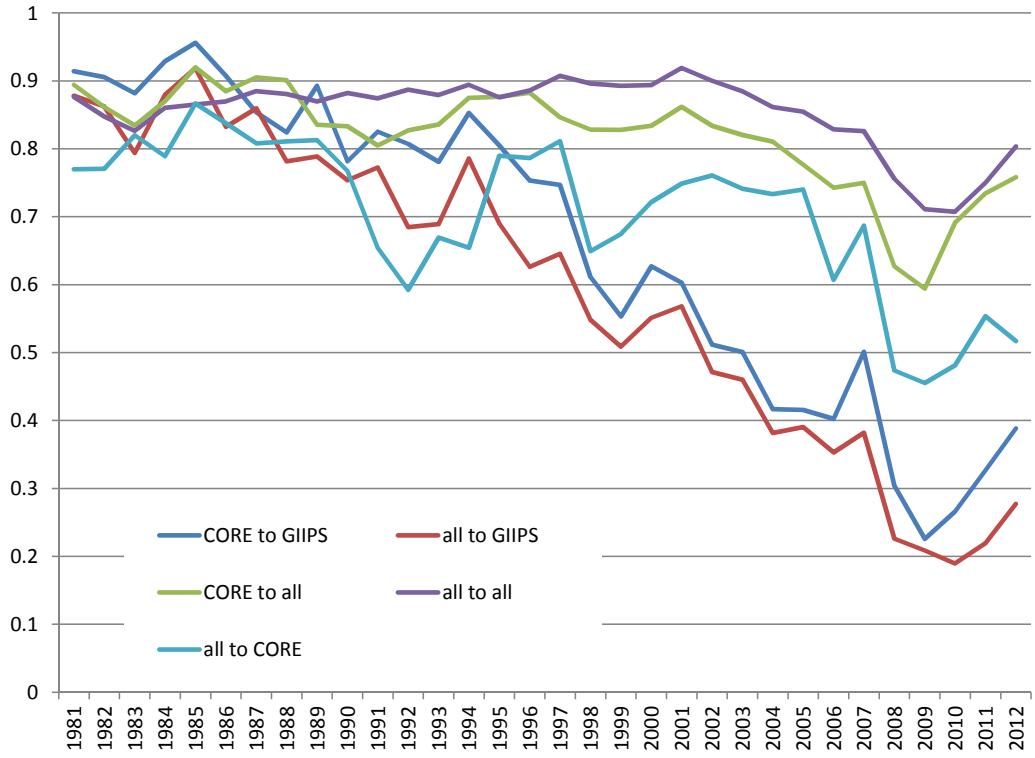


Table 1: Cross Section regressions.

Dependent variable:	Δln(CPIS) 1997-2007 (1)	Δln(BISC) 1999-2007 (2)	ln(BISL Flow) 1999-2007 (3)	Δln(CPIS) 1997-2007 (4)	Δln(BISC) 1999-2007 (5)	ln(BISL Flow) 1999-2007 (6)
CORE to FIN	-0.917**	-0.269***	0.0298	-0.903**	-0.615***	0.0507
	(0.313)	(0.0486)	(0.195)	(0.335)	(0.0620)	(0.237)
CORE to GIIPS	1.104***	0.648***	1.583***	1.112***	0.332***	1.601***
	(0.313)	(0.0486)	(0.183)	(0.325)	(0.0595)	(0.219)
FIN to CORE	-0.540	0.579***	0.767***	-0.530	0.248***	0.787***
	(0.313)	(0.0486)	(0.173)	(0.330)	(0.0607)	(0.214)
FIN to GIIPS	-0.420	0.730***	0.604***	-0.415	0.439***	0.621***
	(0.313)	(0.0486)	(0.131)	(0.320)	(0.0573)	(0.164)
ln(Trade)				-0.0128	0.0801***	-0.00931
				(0.0415)	(0.00843)	(0.0216)
ln(Stock in 1999)			0.457***			0.459***
			(0.0442)			(0.0425)
Constant	1.993***	0.408***	1.118***	2.107***	-0.0162	1.182***
	(0.313)	(0.0486)	(0.0539)	(0.353)	(0.0452)	(0.134)
Observations	284	2703	1958	284	2703	1958
Adjusted R^2	0.137	0.00276	0.386	0.134	0.0158	0.386

EMU= years 1999-2007. CPIS is stock of portfolio debt claims from CPIS data in real USD.
BISC is stock of total cross-border bank claims from consolidated BIS data in real USD.
BISL Flow is valuation-adjusted flows of total cross-border bank claims from locational BIS data in real USD.
Difference between logs of stocks in 2007 and 1997 or 1999 is computed for stock variables, as indicated.
Flows are summed up for years 1999-2007. We control for stock in 1999 using BIS locational data.
CORE includes Austria, Belgium, France, Germany, Luxembourg (except CPIS), Netherlands. GIIPS includes Greece, Ireland, Italy, Portugal, Spain. FIN includes Canada, Denmark, Japan, Sweden, Switzerland, UK, US.
Robust standard errors clustered at lender region-borrower region pair level in parentheses.
*(P< 0.10), **(P< 0.05), ***(P< 0.01).

Table 2: Panel regressions.

Dependent variable	ln(CPIS) (1)	ln(BISL Flow) (2)	ln(LW) (3)
CORE to FIN $*$ EMU	-0.397***	0.395***	0.370***
	(0.0937)	(0.0359)	(0.0459)
CORE to GIIPS $*$ EMU	0.216**	0.324***	0.238***
	(0.0863)	(0.0808)	(0.0499)
FIN to CORE $*$ EMU	-0.272***	0.396***	0.711***
	(0.0705)	(0.0338)	(0.0460)
FIN to GIIPS $*$ EMU	-1.010***	0.163**	0.266***
	(0.0889)	(0.0646)	(0.0424)
ln(Trade)	-0.00465	-0.0848**	0.0168
	(0.0217)	(0.0291)	(0.0156)
ln(Total lent)	0.866***	0.285***	0.172***
	(0.0936)	(0.0511)	(0.0538)
ln(Total borrowed)	1.238***	0.193**	0.215***
	(0.122)	(0.0862)	(0.0230)
Observations	2678	27554	23324
Adjusted R^2	0.276	0.0111	0.379

EMU= years 1999-2007. CPIS is stock of portfolio debt claims from CPIS data in real USD.
BISL Flow is valuation-adj. flows of total cross-border bank claims from loc. BIS data in real USD.
LW is the total amount of loans issued by country i to country j in year t in real USD.
CORE includes Austria, Belgium, France, Germany, Luxembourg (except CPIS), Netherlands.
GIIPS includes Greece, Ireland, Italy, Portugal, Spain.
FIN includes Canada, Denmark, Japan, Sweden, Switzerland, UK, US.
Country-pair and year fixed effects are included in all regression Robust standard errors are clustered at lender region-borrower region pair level. *(P$<$ 0.10), **(P$<$ 0.05), ***(P$<$ 0.01).

Table 3: Total lending to GIIPS. Bank-level regressions.

Dependent variable	Lent to GIIPS	Lent to GIIPS	Lent to GIIPS
Sample	Bank in Fin	Bank in Core	Bank in GIIPS
Borrowed from FIN * EMU	-0.0480	1.134**	0.0372
	(0.808)	(0.517)	(0.403)
Borrowed from ROW * EMU	2.182*	0.421	9.797**
	(1.083)	(2.898)	(3.705)
Borrowed from CORE * EMU	-0.581	-0.672**	-2.109**
	(1.651)	(0.288)	(0.944)
Borrowed from FIN	1.170	-3.524**	-2.253
	(2.910)	(1.316)	(1.921)
Borrowed from EMU	1.199	-5.060***	-2.074
	(3.258)	(1.129)	(1.712)
Borrowed from CORE	1.847	-2.205	-1.863
	(4.491)	(1.446)	(1.673)
Total lent by bank	0.085***	0.064***	0.069***
	(0.0224)	(0.0123)	(0.00721)
Total borrowed by bank	-1.163	2.329**	2.006
	(3.245)	(1.103)	(1.717)
Observations	198	396	234
Adjusted R^2	0.670	0.630	0.679

EMU= years 1999-2007. Borrowed from X is total amount of loans issued by X in real USD.
CORE includes Austria, Belgium, France, Germany, Luxembourg (except CPIS), Netherlands.
GIIPS includes Greece, Ireland, Italy, Portugal, Spain.
FIN includes Canada, Denmark, Japan, Sweden, Switzerland, UK, US.
Bank and year fixed effects in all regressions. Robust standard errors in parentheses
*(P< 0.10), **(P< 0.05), ***(P< 0.01).