The Euro and the Geography of International Debt Flows

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Abstract

Greater financial integration between core and peripheral EMU members not only had an effect on both sets of countries but also spilled over beyond the euro area. 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. We present a stylized model that illustrates possible mechanisms for these developments. We then analyze the geography of international debt flows using multiple data sources and provide evidence that after the euro's introduction, core EMU countries increased their borrowing from outside of EMU and their lending to the EMU periphery. Moreover, we present evidence that large core EMU banks' lending to periphery borrowers was linked to their borrowing from outside of the euro area.

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1 Introduction

The creation of the 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 European Union (EU).[1] Some individual EMU members also began to record larger net financial inflows 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 these current account deficits as well as the way they were financed by EMU partners and by countries outside the single currency area.[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 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 financed the euro area imbalances that ultimately led to the euro area crisis.[3] In addition, 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.[4]

One mechanism generating the big current account deficits of the European periphery could be summarized 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, domes-

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[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).

[3]Fernandez-Villaverde et al. (2013) review a host of political-economy effects in the euro zone periphery produced by the euro zone credit bubble.

[4]See Acharya et al. (2011), Brunnermeier et al. (2011), De Grauwe (2012), and Obstfeld (2013) for descriptions and discussions of this diabolical loop – also known as the "doom loop" or "lethal embrace."

tic lending booms, and asset price inflation.[5] We 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 core. These gross positions largely 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 also to inflated gross foreign debt liability and asset positions for core countries such as Belgium, France, Germany, and the Netherlands – countries that all experienced systemic banking crises after 2007.[6] The tendency for systemically important banks to increase leverage in line with balance sheet size (Miranda-Agrippino and Rey, 2013) implied a substantial increase in financial fragility for these countries' financial sectors.[7]

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 the 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.[8] Second, transaction costs declined and currency risk disappeared for euro area financial institutions investing in the periphery countries.[9] Third, the European Central Bank's (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 moreover were able to apply zero risk weights to these assets for computing regulatory capital.[10] (The EU's

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[5]Of course, the extent and form of these phenomena differed among the individual peripheral countries.

[6]See Laeven and Valencia (2013). Shin (2012) describes the role of EMU in encouraging cross-border bank lending within the euro area.

[7]Brutti and Sauré (2013) show evidence consistent with unwinding of this mechanism following the 2008-09 crisis.

[8]Broner et al. (2014) argue that expected preferential treatment of domestic holders of domestic sovereign debt led to a national home bias in debt holdings after the euro crisis broke out. Analogous expectations might have led core euro area lenders to concentrate their risks on euro area borrowers prior to the euro crisis.

[9]Martin and Rey (2000) model how this reduction in transaction costs affected global equity markets. 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 euros relative to the dollar.

[10]For documentation of similar carry trade behavior after 2007, see Acharya and Steffen (2013). Regarding ECB haircut policy, Fels (2005) noted: "[A]t its weekly refinancing operations, the ECB does not discriminate between

recent fourth Capital Requirements Directive continues to allow zero risk weights for euro area sovereign debts, even though the borrowing countries cannot print currency to pay their debts.) 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 diversification motive is a major driver. We illustrate these mechanisms in a simple stylized model.

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 peripheral euro area countries. In particular, we examine how EMU changed patterns of both external lending to core and periphery countries, and lending from core to peripheral countries.

The paper begins by documenting the large increases between 1999 and 2007 in the net foreign liabilities of the five euro area peripheral 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. It is important to emphasize global trends that act as a backdrop to our analysis — increasing globalization of financial markets during the time period of our consideration and growing global imbalances. Our

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member countries' debt ratings when accepting bonds as collateral. Therefore, the banking system has no incentive to discriminate between these bonds, either, because banks can always ship bonds of a lesser credit quality to the ECB to obtain liquidity." As the Buiter-Sibert (2005) analysis also makes clear, collateral quality matters most in states of the world where the borrower defaults on its loan, so a failure to impose borrower-specific haircuts provides a further subsidy to risk taking. For a microeconomic model of ECB refinancing operations, see Cassola et al. (2013).

paper does not add to the understanding of these phenomena discussed in the literature (Caballero et al., 2008; Mendoza et al., 2009), rather, it provides the analysis of relative patterns of gross financial flows across different regions during this time period.

We exploit two main data sets in our analysis: bank claims from the bilateral BIS data, which include bank loans as well as banks' holdings of debt securities, and the loan-level Loan Analytics data on syndicated bank loans extended by banks and other financial institutions to all types of borrowers. We analyze patterns of cross-border financial flows in the cross-section setting as well as in the panel with country pair fixed effects. For both data sets we study the dynamics of stocks of claims as well as flows.

We find strong evidence of the increase in the financial flows from core EMU countries to the EMU periphery relative to other regions. We also find that financial flows from financial centers to core EMU countries increased. In addition, we present bank-specific evidence from the syndicated loan market that shows a direct link between core EMU banks' lending to GIIPS and their borrowing from financial centers. Finally, we present two pieces of circumstantial evidence that are broadly consistent with the core EMU lenders having a comparative advantage in lending to the GIIPS.

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

2   Trading costs and asset flow diversion

To illustrate potential 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. The example is admittedly extreme, so at the end of

the section we discuss more realistic versions of the same basic mechanism.

For the purpose of our example, 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). There is no uncertainty and all lending is accomplished via safe bonds denominated in a single numeraire. 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 prior to EMU and remained so afterward. If we assume in our model that these costs are zero and that capital can flow freely between the regions, then lenders in C and R will both face the same (gross) global interest rate r^*.

The transaction costs of lending from either C or R to the P region, however, were relatively high before EMU because P countries were less integrated into the global capital market. Imperfect integration was due to a number of factors including currency, financial, and political risks. Thus, borrowers in P faced a higher interest rate when borrowing from outside the region than the interest rate prevailing between the C and R regions. We denote the difference by τ.[11]

To fix ideas, we present a simple project financing model.[12] Assume there is a continuum of risk-neutral agents indexed i in P who each receive 1 unit of endowment that they can either consume and receive payoff 1 or invest. Investment, however, requires additional 1 unit that agents have to borrow at a gross interest rate r. Lenders can verify that loaned resources have been invested, so borrowers cannot divert loans into another use. In case of success, investment brings a payoff of $2R$, $R > 1$, which occurs with agent-specific probability π_i. Lenders observe the payoff and can enforce loan repayment. Otherwise, investment pays 0 and, due to limited liability, the agent does not have to pay back the loan. Thus, the agent will choose to invest if and only if $\pi_i \geq 1/(2R - r)$.

Lenders in both C and R regions face the borrowing cost r^* and a transaction cost τ of lending to borrowers in P. They are risk-neutral and do not observe any individual borrower's π_i. Thus, they will be willing to lend if $\mathrm{E}(\pi_i)r - \tau \geq r^*$.

For simplicity, we assume that π_i is uniformly distributed on $[0, 1]$ and that lenders know this distribution and can therefore compute $\mathrm{E}(\pi_i)$ conditional on the set of borrowers that are willing to borrow. In that case, they will be willing to lend at any interest rate greater or equal to

$$r = 2(r^* + \tau)/(1 + \pi^*), \tag{1}$$

where

$$\pi^* = 1/(2R - r) \tag{2}$$

is the threshold success probability above which agents in P will choose to borrow. Competition among lenders will drive the interest rate to the level indicated by equation (1).

Solving (1) and (2), we can find equilibrium π^* and r as a function of R, r^*, τ. It is depicted as point A on Figure 1, where "Supply" denotes equation (1) and "Demand" denotes equation (2).

Assume that with the introduction of the euro, transaction costs for core EMU lending to the EMU periphery decline, but remain unchanged (or at least decline by less) for the rest of the world. In terms of our model, this would be reflected as a decline in τ for banks in C, but not in R, resulting in their ability to lend to borrowers in P at a lower equilibrium rate. The new equilibrium rate and threshold π are depicted on Figure 1 as point B. In this new equilibrium, the interest rate at which funds are available for country P borrowers is lower and more projects are financed, leading to economic and lending booms in P, just as we observed in the period between 2000 and 2007. Moreover, investment in P now has a lower average probability of success. Lenders in region R now face higher transaction costs than lenders from region C, so they no longer lend

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directly to P. Instead, core EMU countries, and their banks, can benefit from the "carry trade" of intermediating financial flows from outside of EMU to the periphery. Core EMU countries will therefore likely see increases in both their gross foreign liabilities (borrowing from R) and assets (lending to P).

Perceptive observers have noted similar dynamics:[13]

> "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, this model is very stylized and other outcomes are possible. For example, if there are increasing marginal costs for R lenders of funneling funds through C financial markets, then it could happen that the cost of lending to the periphery falls enough for EMU and outside creditors alike that direct lending of outside creditors to the GIIPS rises.[14] It seems plausible that a number of the financial market changes caused by EMU affected intra-EMU transaction costs and costs of external trades somewhat differently, so the effect of EMU on external flows to the core and the periphery is an empirical matter.

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[13]Increased net flows from Germany to EMU periphery were observed by the Bundesbank in its Monthly report as early as 2001 (Bundesbank, 2001).

[14]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. We return to this point below.

Some aspects of aggregate data on financial flows are broadly consistent with the mechanism described by the model. Figure 2 illustrates the well-known fact that EMU led to a compression of government bond spreads between the Core and Periphery.[15] Figure 3 shows that net foreign liabilities of the GIIPS were increasing mostly vis-à-vis the rest of EMU, while Figure 4 shows that by 2008 net foreign assets of the Core were mostly vis-à-vis GIIPS and were closely matched by the liabilities of the 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 in our simplified model.

This complexity is natural once one extends the conceptual framework to encompass additional uncertainty. Of course, diversification motives provide an explanation for some of the gross two-way financial flows (especially in equities) that persisted after the euro's introduction. For that reason, we focus on debt flows in our empirical analysis below. In addition, in a mean-variance framework or in a value-at-risk framework such as that of Bruno and Shin (2013), the preceding changes in expected peripheral returns for Core and rest-of-world lenders could imply portfolio-balance shifts but not corner solutions, with R lenders reducing but not eliminating their P lending while simultaneously increasing their lending to C. Indeed, as noted above, it is plausible that the peripherals' adoption of the euro somewhat lowered the perceived risks of rest-of-world lending to them – currency stability even against external currencies was more likely, and the peripherals' access to core credit and ECB facilities might have reassured external lenders as to the effective seniority of their own claims. Thus, it would not be surprising to see R claims on P actually rise, while simultaneously rising on C.

After we describe our data, the remainder of this paper provides more direct evidence on the effect of EMU on global financial flows.

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

3 Data

An ideal data set for our analysis would consist of all gross debt flows between each country pair, classified by the nationality as well as the location of the entity extending funds to a borrower. Unfortunately, such data do not exist. The best information available is for bank lending, at the country-pair level from the Bank for International Settlements (BIS), and at loan level from Dealogic.[16]

The BIS collects data from national central banks on bank claims at the country-pair level. BIS *consolidated* banking data series report bank claims by the country in which the global ultimate owner is headquartered and include all claims of foreign affiliates, while excluding interoffice positions. These data are available only as stocks for 26 reporting and over 200 vis-à-vis countries going back to 1983.[17] BIS *locational* banking data classify lenders by residence rather than ultimate ownership and include interoffice positions.[18] These series are available as stocks and as flows (actually, valuation-adjusted stocks, with only exchange rate-related valuation adjustments) for 44 reporting and over 200 vis-à-vis countries going back to 1977. Both types of BIS data omit the debt holdings of non-bank financial institutions.[19]

An important difference between BIS consolidated and locational data is how cross-border mergers and acquisitions (M&As) are reflected. M&As in principle would not affect locational data,

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[16]CPIS data from the International Monetary Fund also provides information on the country-pair holdings of debt and equity securities, but due to its locational nature and classification of mutual fund bond investments as equity (Felettigh and Monti, 2008), we find that this data source is not acceptable for our analysis. However, in a recent paper Hobza and Zeugner (2014) show that similar patterns hold in CPIS data when adjusted for bilateral valuation effects.

[17]In this paper we only use BIS consolidated data on immediate borrower basis, because ultimate risk basis data are only available starting 2005. The difference between these two data sets is in the definition of borrower nationality. In the data we use, the claims are allocated to the country of residence of the immediate borrower. In the ultimate risk data various risk transfers, such as guarantees, are taken into account and the claims are allocated to the country where the final risk lies (Bank for International Settlements, 2013).

[18]BIS locational data also include reporting by nationality, rather than by residence, but these data have limited coverage.

[19]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).

but would change the consolidated data by reassigning the claims held by the target institution to the acquirer. This change would be reflected by an increase in claims owned by the country of the acquirer and a decline in claims owned by the country of the target. Thus, changes in consolidated claims reflect not only actual changes in claims, but also changes in ownership structure of banking institutions. This is a nontrivial issue in Europe, which saw a number of banking M&As after the euro's launch.

In terms of this paper's hypothesis, M&A might be a relatively low-risk means for banks outside the euro zone to acquire claims on GIIPS: The acquired bank – even if its owner resides outside the euro area – might still benefit from cost advantages in lending to the periphery (such as access to ECB refinancing facilities). For example, a Swedish bank might find it prudent to route loans to Portugal through an acquired Finnish subsidiary. Consolidated but not locational data would in this case show financial-center claims on the GIIPS increasing even when *direct* lending from financial centers to GIIPS was relatively costly. Of course, *any* financial-center routing of loans to GIIPS through subsidiaries in core countries would appear in consolidated data as an increase in financial-center claims on GIIPS, but could be driven by cost advantages derived from the subsidiary's location under the euro area umbrella.

There is one detail of BIS consolidated data that is worth discussing. BIS consolidated data is presented as cross-border, international, or foreign positions. Cross-border claims series include only positions for which the lender and the borrower are located in different countries. International claims series include, in addition, claims by subsidiaries of foreign banks in foreign currencies on borrowers in the same country. Finally, foreign claims series include, in addition to international claims series, claims by subsidiaries of foreign banks in local currencies on borrowers in the same country. While the difference between cross-border and international series tends to be relatively small, foreign claims are substantially affected by the international bank mergers. For example, if an Italian bank is acquired by a French bank, all claims of that bank on Italian borrowers become

included in foreign claims series, which tends to be a large number because all claims of that Italian bank were previously viewed as domestic. Also, all foreign currency claims of that bank now become included in international claim series, but this tends to be a much smaller number. Because we are trying to capture as much banking flows as possible for our analysis, we do not want to limit ourselves to cross-border series only. We also want to avoid the large breaks in series in the foreign claims data that result from international bank mergers. Thus, we choose a middle road and work with international claims data.

Strictly speaking, a test of our hypothesis would ideally distinguish between lenders whose loans to the EMU periphery become more profitable after the advent of EMU and those who might benefit less. Unfortunately, neither the residence not the nationality principle captures the distinction perfectly. A subsidiary of a U.S. bank in Frankfurt with access to ECB refinancing facilities might have an advantage in lending to the EMU periphery – and in this case locational rather than consolidated BIS data would place that lender in the correct category. On the other hand, a German bank subsidiary residing in New York could likewise have a lending advantage for the EMU periphery – in which case the consolidated data would get it right. Thus it is useful, in our view, to look at both locational and consolidated BIS data.

The BIS has recently declassified some of its bilateral data on banking sector claims, both on locational (by geographical location of each institution) and consolidated (by geographical location of the headquarters) bases. However, we also have access to the entire set of locational and consolidated bilateral data through classified access. As noted earlier, consolidated data allow us to trace debt flows to the headquarters country of each financial institution.[20] 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 (as noted above) are not available in flow form and do not include currency breakdown, which would allow estimation of

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[20]For the importance of intra-institutional transfers, see Cetorelli and Goldberg (2011) and Shin (2012).

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.[21] 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.

An alternative data source is loan-level data available for syndicated bank loans through Dealogic's Loan Analytics. Syndicated lending is of course only a subset of total debt flows. In addition, banks from several different countries may participate in a syndicate, complicating the attribution of loan amounts to individual lenders; the data report loan origination, not actual drawdown or repayment information. Loan Analytics reports the universe of international syndicated loans not only by banks but also by other financial institutions.[22]

We classify the nationality of each loan in Loan Analytics based on the nationality of lender parent, i.e., on a consolidated basis. We use deal nationality to classify the nationality of the borrower. 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 divide 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 nationality, borrower nationality, and year to match the structure of the data to that of the BIS data sets. Moreover, we make use of information on loan type and loan maturity to approximate the amount of syndicated loan exposures outstanding for each country pair and year, following methodology in Cerutti et al. (2014). We compute the most conservative exposures by assuming that all loan commitments, including credit lines, are fully drawn. Thus, both on- and off-balance-sheet commitments are accounted for, in contrast with BIS data which are limited to on-balance-sheet claims.

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[21]Among previous studies, Blank and Buch (2007) and Kalemli-Ozcan et al. (2010) use BIS locational data, while Spiegel (2009a) uses the consolidated data.

[22]See Cerutti et al. (2014) for a detailed comparison of BIS and Loan Analytics data.

In order to piece together the most accurate picture possible, we make use of all of the available data sources, with the understanding that each of them is at best a noisy proxy for the type of gross debt flows that our hypothesis describes.

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, Netherlands, Luxembourg, and Finland).[23] We separate the rest of the world into two groups. The first group includes the rest of the EU and large reporting financial centers (Fin): Canada, Denmark, Japan, Sweden, Switzerland, the U.K., and the U.S. The second group consists of all remaining countries (ROW).[24]

Some banks appear as both borrower and lender parents in Loan Analytics. We isolate 51 banks (large global banks and banks included in the European Banking Authority (EBA) stress tests that are active in 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. In addition, we use information on syndicate structure for supplemental testing.

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, then we turn to bank-level regressions. We also discuss some evidence

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

[24]The sample of countries in ROW varies depending on the data source we use. It generally includes advanced economies as well as emerging markets. For BIS data sources, we limit the set of countries to the BIS-reporting countries available through confidential data access so that the same set of countries appear as borrowers and lenders. For consolidated data the 10 ROW countries are Australia, Brazil, Chile, Hong Kong, India, Mexico, Panama, Singapore, Taiwan, and Turkey. For locational data there are 31 ROW countries: Argentina, Australia, Brazil, Bulgaria, Chile, China, Czech Republic, Egypt, Hong Kong, Hungary, India, Indonesia, Malaysia, Mexico, New Zealand, Norway, Peru, Philippines, Poland, Romania, Russia, Slovak Republic, Slovenia, South Africa, South Korea, Taiwan, Thailand, Turkey, Ukraine, Venezuela, and Vietnam. Loanware data include many countries, but for consistency we limit the set of ROW countries to be the same as in locational BIS data. All panels are unbalanced.

supporting the hypothesis of a comparative advantage of Core lending to GIIPS after 1999. Given the limitations of the data, we cannot test directly for the mechanism underlying patterns of international debt flows. We do, however, present two pieces of circumstantial evidence consistent with our hypothesis.

4.1 Bilateral lending dynamics

We begin by documenting percentage changes in country-pair stocks of bank claims, in real U.S. dollars, during the EMU time period. Figure 5 is a heat map that shows these percentage changes for BIS locational and consolidated data. The figures show the matrix of bilateral positions of EMU countries, Switzerland, the U.K., and the U.S.[25] It is apparent that lending from all countries to Switzerland, the U.K. and the U.S. declined or increased much less than lending to EMU countries. Among EMU countries, Netherlands, Greece, Ireland, Portugal, and Spain experienced the biggest increases in debt inflows from most countries. Comparing the two panels, we see a few examples illustrating important differences between consolidated and locational BIS data. For example, the increase in U.K. lending to core EMU countries was very large if measured using consolidated data, but not if using locational data. This is because much U.K. lending to core EMU countries took place through British subsidiaries residing abroad.

We next examine how the geographical composition of international lending and borrowing changed relative to positions accumulated prior to EMU. Figure 6 shows banking claims using BIS (both consolidated and locational) data across four regions: financial centers (FIN), the core Euro area (CORE), the GIIPS, and the rest of the world (ROW). The left-hand-side of the chart presents each regions's stock of claims at the beginning of EMU vis-à-vis another region, with the thickness of the lines reflecting holdings, measures in real USD, as a share of global gross positions, also measured in real USD. The right-hand-side of the chart presents changes in gross positions

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[25]See Zucman (2013) for a detailed discussion of the special role of Switzerland in European finance.

from the beginning of the EMU period through the end of 2007, in real USD, scaled by the global change in gross positions in real U.S. dollars over this same time period. In interpreting these charts, we view the stocks of claims at the beginning of EMU as a reflection of flows that occurred prior to EMU.

The top panel maps the claims of the banking system using consolidated BIS data. Here we see very clearly a substantial 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. Lending from financial centers to the GIIPS also goes up noticeably after 1999, indicating an overall increase in the attractiveness of GIIPS assets even for countries outside of EMU. As we observed in Figure 5, much of this lending went to the housing boom countries, Spain and Ireland.

The bottom panel shows the claims of the banking system using locational BIS data. Here we also observe an increase in banking flows from CORE to GIIPS relative to the flows accumulated prior to EMU. We see, however, a less pronounced increase in flow from FIN to CORE, which is more than compensated by an increase in flows from CORE to FIN, indicating that the increase in lending that we observed with consolidated data was largely due to lending by foreign subsidiaries of financial center banks. This is confirmed by lower increases in FIN lending to GIIPS for locational relative to consolidated data documented in Figure 5.

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 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).[26] Looking at consolidated data we find that there was an increase in bank lending, especially for Austria, France, and Germany, with France experiencing an

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[26]In computing total lending we only include lending and borrowing countries in our sample. Excluded countries only contribute a small share of either borrowing or lending, and the charts would look virtually the same if we include all countries.

increase earlier during the EMU period than Germany. 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 patterns broadly similar to and more pronounced than those we observe with consolidated statistics. We do not observe an increase in the share of lending to GIIPS by banks residing in Austria, indicating that Austrian-owned banks increased the share of lending to GIIPS through their foreign subsidiaries.

To formalize the analysis of Figures 5 to 7, we present estimates for a set of cross-sectional regressions based on the bilateral (country-pair) 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 1999 and 2007 for BIS consolidated (BISC) and locational (BISL) data. For the BIS locational data, we also sum up the valuation-adjusted flows (BISLF) in 1999-2007 in real USD and control for the stocks of claims in 1999.[27] We also conduct this analysis for the syndicated loan market, using two representations of the Dealogic data. First, using information on loan maturity, we compute total syndicated loan exposures (SLEC) of each country i to each country j at the end of each year, a stock variable that is similar to the BIS claims variable. Since we use lender parent nationality, this is most analogous to the consolidated BIS data. We then compute the change in log of real USD syndicated loan exposures between 1999 and 2007. Alternatively, we sum up all loans extended by lenders in country i to borrowers in country j in a given year, which is a flow of loan origination (LW).[28] We sum up these flows for the years 1999-2007 and control for the exposures at the end of 1999, as with BIS locational flow regression.

The results of this analysis are presented in Table 1, with column (1) showing the results for the BIS consolidated data, columns (2) and (3) showing the results for the BIS locational data stocks

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[27]We also experimented with computing the differences between BIS locational and consolidated claims for each country to proxy for lending intermediated by affiliates but did not observe any significant patterns.

[28]We do not have information on loan repayments or drawdowns, and therefore cannot compute actual loan flows.

and flows, respectively, and columns (4) and (5) showing the results for the syndicated loan data exposures and origination flow. In the regressions with stocks, the left-hand side variable is unit-free — percentage change in stocks during indicated time period. In contrast, in regressions with flows, the left-hand side variable is unscaled accumulation of flows in real USD. Therefore, for the flow regressions, we include initial stock on the right-hand side as a control variable.[29] Given that the only explanatory variables in these regressions, with the exception of initial stocks, are indicator variables, these regressions are basically comparisons of means that demonstrate magnitudes and statistical significance of differences across region pairs. The unit of observation in these regressions is a country pair.

We focus on region pairs that drew our attention in analyzing Figure 6. 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.[30] We find that, relative to all other country pairs, there was a pronounced increase in lending from CORE to GIIPS across all measures, although for syndicated loan origination it was not statistically significant. In all cases, except for the consolidated BIS regression, we also find a substantial increase in lending from FIN to CORE. Thus, regressions provide support from the discussion of graphical evidence.[31] For BIS locational data we also observe an increase in lending from FIN to GIIPS. Interestingly, we also find that claims of CORE banks on FIN borrowers have fallen relative to other region pairs during this time period, suggesting that CORE banks likely diverted their lending from FIN to GIIPS. However, this is not true for the syndicated loan market, where CORE to FIN lending actually

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[29]We attempted to include additional control variables: housing price growth differentials, interest rate differentials, gravity-type measures such as geographical distance and common language, as well as indicators of trade blocks: EMU, NAFTA, ASEAN. These variables did not enter significantly and did not affect our results. In the robustness tests we established that controlling for trade flows also leaves our results mostly unchanged.

[30]We experimented with including lending from GIIPS to CORE and from GIIPS to FIN among region pairs. The results of these tests and of various permutations of region definitions are discussed in Section 4.4. The bottom line is that the main coefficients of interest are robust to such changes.

[31]The fact that we do not observe this increase in the consolidated BIS data suggests that some of the lending from FIN to CORE was due to lending by foreign banks located in the FIN region, potentially European banks.

increased relative to other regions. Note that within-region differences across country pairs must be large, because the explanatory power of the stock regressions is very low.

The magnitudes of the differences across regions are substantial, but plausible. In order to see this, note that the left-hand side is a change in the natural logarithm of the stock variable (with the exception of the BIS locational flows and loan origination regressions), while the variables of interest are 0/1 indicators. Thus, $100 * (e^{\beta} - 1)$ gives us a percentage difference between the region pair examined and the excluded set of region pairs. For example, we find that the increase in total stock of bank claims between 1999 and 2007 as measured by the change in BIS locational stocks (column (2)) was 93 percent for the excluded group,[32] 198 percent for claims of CORE on GIIPS, and 102 percent for claims of FIN on CORE.

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.[33] We also control for the total amount lent and total amount borrowed by each country in each year to account for all potential country-specific push and pull factors. Because consolidated BIS data for EMU countries are not available prior to 1999 (except for Portugal and Greece), our analysis is limited to BIS locational data. We supplement this analysis with syndicated loan issuance aggregated from the loan-level data using the Loan Analytics data set, with its exposure and origination versions, as before.

The results are presented in Table 2. We find that, following the introduction of the euro, claims of CORE on GIIPS have increased by about 60 percent in the case of BIS data and by 20-30 percent

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[32]Obtained as $100 * (e^{CONSTANT} - 1)$.

[33]Note that including country-pair fixed effects addresses some of the criticism raised by Okawa and Van Wincoop (2012) for gravity-type models of international capital flows.

for syndicated lending. With the exception of the BIS stock data, we also see an increase in lending from FIN to CORE after the introduction of the euro, by about 50 percent in the case of BIS flows and by 80 percent in the syndicated loan market. We continue to find evidence of an increase in direct lending from FIN to GIIPS, although this is only reflected in flow measures. We also find increased syndicated lending from CORE to FIN after the introduction of the euro.

To summarize the results of Tables 1 and 2, we find that during the pre-crisis EMU period there was a pronounced and statistically significant increase in debt flows from core EMU to GIIPS, relative to other region pairs. This increase is observed in all data sources we use, regardless of their representation (stocks or flows). We also find a substantial increase in lending from FIN to CORE, especially in the syndicated loan market. These two findings, however, do not prove that there was a link between lending provided to GIIPS by financial institutions in CORE and lending by financial institutions in FIN to CORE. To show this link, we now turn to bank-level analysis.

4.2 Bank-level evidence

The only comprehensive and accessible source of data on the geographical composition of borrowing and lending by individual banks is the Loan Analytics database. Top banks appear as both lenders and borrowers in these data, allowing us to see how the geography of their lending is related to 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 FIN. For at least some large banks we definitely see this link, as shown in Figure 8.[34]

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 52 banks — either large global

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[34]These banks are systemically large: Bayern and Deutsche Bank's assets were 17 and 82 percent of Germany's GDP, ING Group's assets were 212 percent of Netherlands' GDP, and Reiffeisen's assets were 38 percent of Austrian GDP, all as of the end of 2011.

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, 11 are in FIN, and 13 are in GIIPS.[35] For these banks, we collect information on syndicated lending to them from different regions 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 FIN and their lending to GIIPS during the pre-crisis EMU period – a roughly one-to-one increase. We do not find such a link for banks from other regions. In addition, we find that financial center and GIIPS banks, but not Core banks, seem to have been intermediating flows from ROW to GIIPS.[36] This finding is expected, in that the ROW lenders are likely to be facing even larger transaction and information costs in lending directly to GIIPS than do the financial center banks.

4.3   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. So far, we demonstrated a reorientation of global capital flows beyond an increase in CORE lending to GIIPS. We believe this comparative advantage caused not only greater lending from the CORE to the GIIPS, but also more lending

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[35]The list of banks is provided in the footnote to Table 3.

[36]The ROW countries that lend to GIIPS banks in this sample are Australia, China, Egypt, Hong Kong, Israel, Malaysia, Norway, Panama, Singapore, Korea, Taiwan, and Turkey, as well as Middle East and offshore financial centers.

from FIN to CORE and possibly less lending by FIN to GIIPS. While testing for the mechanisms underlying these dynamics is impossible due to data limitations, we provide two pieces of evidence that are consistent with the premises we brought forth in discussion of the comparative advantage mechanism.

First we show that the collateral advantage that the ECB gave to the euro area sovereign bonds had an effect that spread beyond the euro area. To do this, we use data on syndicated lending to sovereigns. Since syndicated loans to sovereigns did not have the same collateral advantages as sovereign bonds, GIIPS sovereigns found it cheaper to borrow through the debt market. Indeed, we observe a sharp decline in syndicated lending from CORE to GIIPS sovereigns at the start of the EMU period. While overall syndicated lending from CORE banks to GIIPS increased throughout this time period, lending to sovereigns dropped nearly to zero, resulting in a sharp drop of the share of sovereign borrowers in total syndicated lending to GIIPS in the early 2000s (Figure 9). This was not the case for the rest of the market — while there is a downward trend in the share of lending to sovereigns in all countries in total lending to all countries, this share did not drop to zero. We also note that syndicated lending to GIIPS sovereigns by lenders outside the euro area also dropped to zero once a cheaper form of financing became available to them. Thus, we observe that the ECB collateral policy (one of the four factors contributing to the core EMU comparative advantage) indeed had an effect.

Next, we study regional composition of loan syndicates to provide evidence that FIN lenders found GIIPS borrowers relatively less attractive after the introduction of the euro. To do so, we estimate linear probability regressions of an indicator that there is at least one bank from FIN in the syndicate for all loans, for loans in which at least 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, number of lenders in the syndicate, and

year fixed effects.[37]

Figure 11 shows a plot of the estimated year fixed effects from these regressions.[38] 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 FIN bank participating in lending to GIIPS, whether or not a CORE bank is also in a syndicate.[39] One potential explanation for this dynamics is that, consistently with our argument, FIN banks were no longer as active in arranging syndicated loans to GIIPS and their share of origination was replaced by CORE banks. As Figure **??** shows by depicting the shares of loans with at least one lead arranger from FIN and from GIIPS, this was indeed the case. It is possible that in addition, CORE banks originating loans to GIIPS were not as likely to invite FIN banks to participate after 1999, fearing that inclusion of EMU outsiders in the syndicate might reduce the likelihood of a bailout by the European authorities.

4.4   Other regional patterns and robustness tests

In the above analysis we relied on the groupings of countries into regions. While the definitions of the core euro area and GIIPS are conventional, the choice of countries included in FIN is somewhat arbitrary and there is no *a priori* reason to believe that they represent a homogeneous group. The same can be said for the ROW countries. For this reason, and to gain additional insight into changes in the geography of debt flows brought about by the EMU, we conduct some additional tests. In the interest of space we do not report all regressions, but summarize their results.[40]

United Kingdom

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

[38]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.

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

[40]Regression results are available upon request.

Our first concern is that the European Union banks outside the euro zone might have considerable advantage over banks outside the EU. There are two main reasons for this: first is the general harmonization of banking rules in the EU; second is the fact that some EU banks outside the euro zone have access to ECB lending facilities. The most important set of non-euro zone EU banks resides in the U.K., which we include among the financial centers, but which may behave differently than banks from the U.S. or Japan.

For locational BIS data, it is especially important to note that there are many foreign-owned banks in the U.K., and these happen to be banks that are internationally active. 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 are 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. However, it might be important to separate the U.K. for the analysis of the syndicated loans, since London is a central hub for international syndicated lending.

Thus, we separate the U.K. from the rest of the FIN group and re-estimate our regressions in Tables 1 and 2 with addition of UK to CORE, UK to GIIPS, and CORE to GIIPS dummies, thus leaving the benchmark unchanged. We find that the coefficients on CORE to FIN, FIN to CORE, and FIN to GIIPS are surprisingly unchanged, both in terms of statistical significance and in terms of magnitude.[41] If anything, we now observe a larger relative increase in lending from FIN to CORE and FIN to GIIPS, by 134 and 144 percent, respectively, in the cross-section regression. In all specifications we observe a large increase in lending from UK to both CORE and GIIPS, with magnitudes comparable to or higher than the increase in lending from FIN to CORE and to GIIPS. The results are even less affected in the panel regression, suggesting that the UK is not that different from the rest of the FIN group and including the UK into the FIN group is not what

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[41]Obviously, coefficients on CORE to GIIPS are unaffected by construction.

drives the results.

United States

Similarly, the position of the U.S. in the global financial markets is known to be unique. We separate the US from the rest of the FIN group in the same way and return the U.K. back to this group. The coefficients on FIN to CORE and FIN to GIIPS, as well as CORE to FIN are remarkably similar. In addition, we find an increase in lending from the U.S. to CORE in all but BIS consolidated regressions in the cross-section. This suggests that some of the increase in lending from the U.S. to CORE was conducted by affiliates of foreign institutions located in the U.S. We do, however, observe an increase in syndicated lending by U.S. banks to CORE borrowers. Overall, our alterations of the FIN group of countries do not produce substantial changes in the results, indicating that, surprisingly, the FIN group is sufficiently homogeneous in terms of our analysis.

Central and Eastern Europe

During the sample period that we are focusing on, substantial changes were observed in financial flows to Central and Eastern Europe (CEE),[42] especially countries that were preparing to join the EMU. Much of the lending to these economies was provided by banks in Germany and Austria. For this reason, it might be useful to separate lending from CORE to CEE from the benchmark category. Unfortunately, we cannot estimate this regression with BIS consolidated data because we do not have information on lending to CEE countries. For the rest of the regressions we find that the coefficients on other region pairs remain basically unchanged and that in most specifications we observe a relative increase in lending from CORE to CEE borrowers, as one would expect.

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[42]Countries in our sample that we categorize as CEE are Bulgaria, Russia, Ukraine, Czech and Slovak Republics, Hungary, Slovenia, Poland, and Romania.

Rest of Europe

In addition to the UK and the US, the FIN group is comprised of Japan and other European countries: Denmark, Sweden, and Switzerland (DSS). We can conduct a similar exercise and separate these countries from the rest of the FIN group and estimate their lending to GIIPS and to CORE, as well as to CEE. For completeness, we also add an indicator for loans from remaining countries in the FIN group to DSS.[43] We find that differences in the coefficients on the remaining FIN group are substantially different only in a couple of specifications and are overall quite different from those of CORE banks. Moreover, we only find an increase in lending from DSS to CORE in the syndicated loan market, but not in the BIS data. Changes in lending by DSS to GIIPS and to CEE as well as in lending from FIN to DSS are not consistent across data sets and specifications. These results, along with those for the U.K. discussed above, show that banks located in European countries outside of the euro area behaved quite differently than banks in the CORE, confirming that the comparative advantage increase for CORE was specific to the effect of the euro and not merely the effect of the EU.

GIIPS lending

Our next exercise is to separate lending from GIIPS to CORE and to FIN from the benchmark group. Since it is affecting the benchmark group, this change may affect the coefficients on region pairs of interest. In practice, however, the differences are very small. In addition, we observe a large and statistically significant relative increase in lending from GIIPS to both CORE and FIN regions, with the exception of cross-section regression with BIS locational flows.

Robustness tests

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[43]We found that if we include UK alongside Denmark, Sweden, and Switzerland in the group, the results were essentially the same.

We conducted a series of robustness tests in addition to those described above. In terms of countries included in the analysis, we tested whether the inclusion of Luxembourg (which we excluded from the main specification due to its special status as a financial center) or exclusion of Ireland (which had close financial ties with the UK) affect our results and found that this was not the case. We also tested to see whether the inclusion of Italy in GIIPS was driving all the results and found that this is not the case either: excluding Italy from GIIPS does not change the results. We also attempted to control for trade flows for each country pair and found that, while trade flows do have significant impacts on financial flows in some specifications, including them does not alter the rest of the results.

5 Conclusion

The big 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 the patterns of international debt flows that financed and potentially amplified the accumulation of these imbalances. Not only did peripheral countries borrow more after EMU was established; 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.

The findings raise important questions for future research, questions that would have to be pursued at a more granular level with respect to both lenders and borrowing countries. Can we identify the precise mechanisms promoting heavy lending from the EMU core to the EMU periphery during the euro's first decade, and which were most important quantitatively? Acharya and Steffen (2013) have made some progress on similar questions using recent data from the European Banking Authority stress tests. To what extent did peripheral countries differ in their borrowing behavior?

Before 2009, the peripheral economies showed considerable diversity in terms of financial infrastructure, government deficits, and asset-price developments. How did these differences affect their demands for loans from abroad, as well as their own investments in foreign countries? We leave these questions to be answered in future research.

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Figure 1: Equilibrium lending before and after EMU
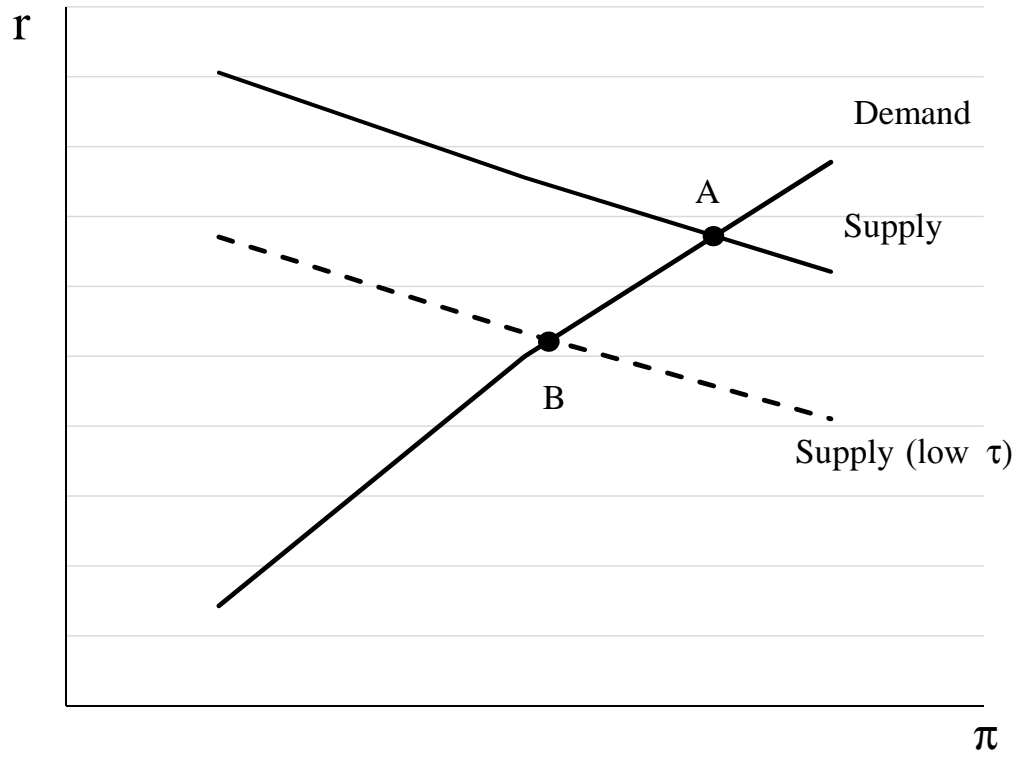
Equations (1) and (2) plotted for $R = 1.2$, $r^* = 1.05$, $\tau = 0.1$, low $\tau = 0$.

Figure 2: Government bond spreads between GIIPS and Core
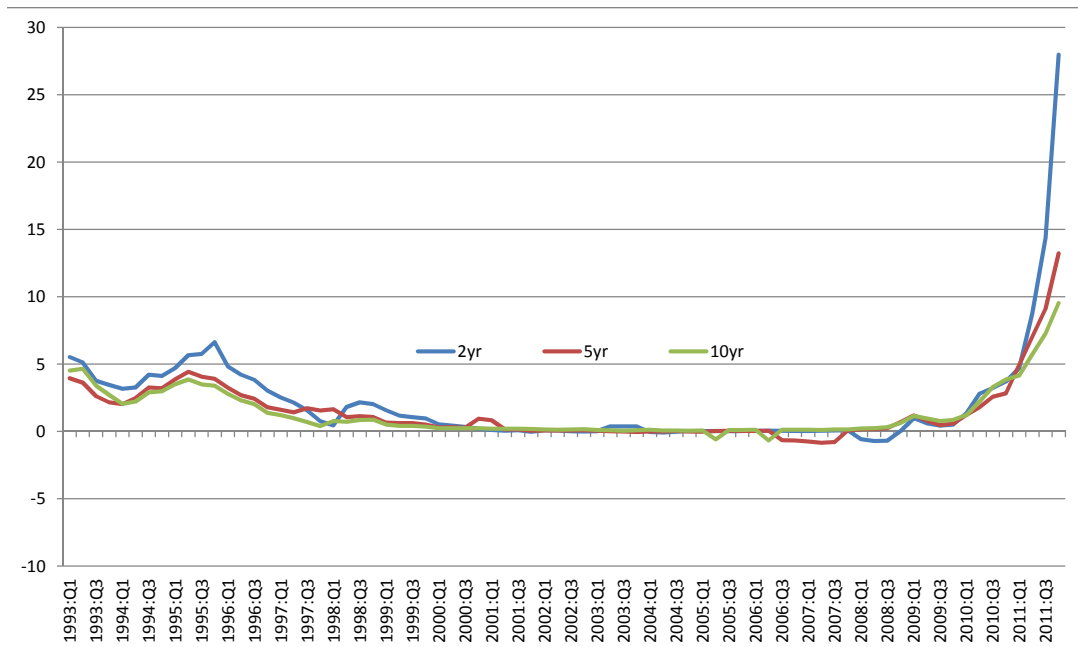
Source: Global Financial Data and authors' calculations. Bond spreads are computed as a difference between unweighted average government bond yields in core EMU countries and in GIIPS.

Figure 3: Evidence from position (not flow) data

Net Foreign Assets of GIIPS versus Other EZ and ROW
(percent of EZ12 GDP)
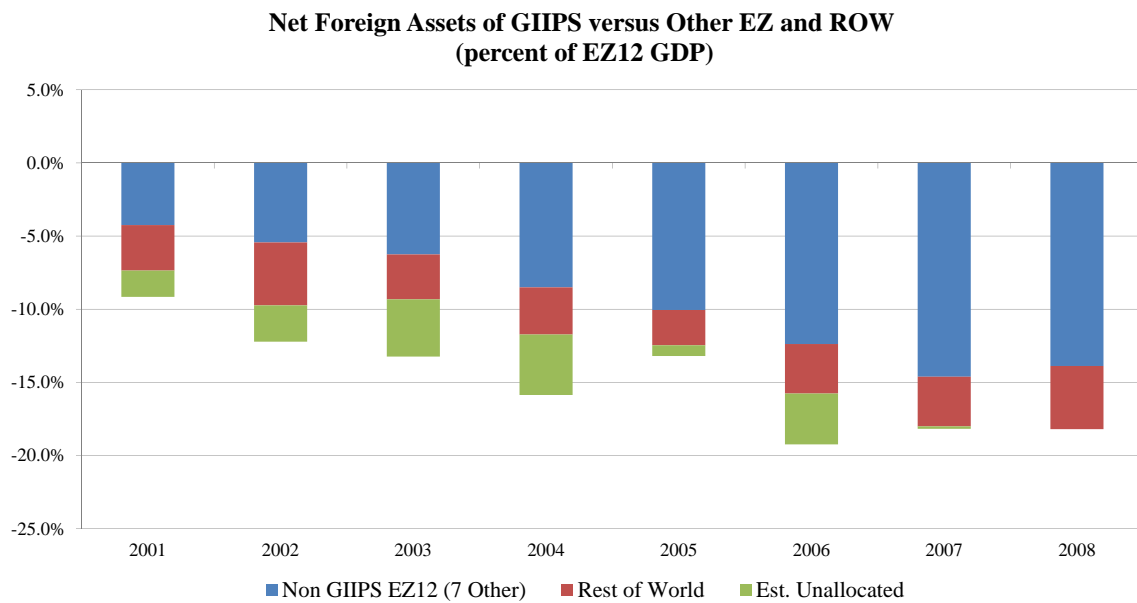
Source: Waysand et al. (2010), following Chen et al. (2013). EZ and EZ12 is euro zone, ROW is rest of the world.

Figure 4: Net foreign asset positions of euro area core countries
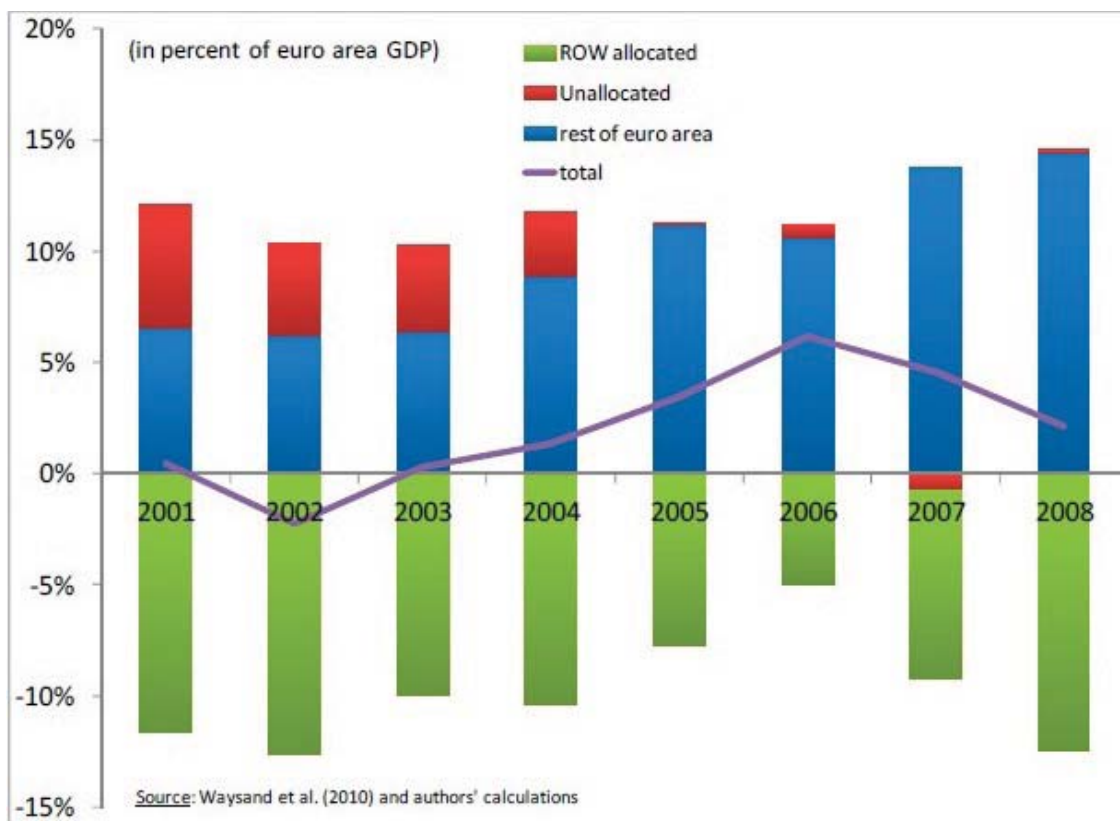
Source: Chart courtesy of F.Pappada

Figure 5: Changes in bilateral debt stocks during EMU period.

BISC percent change in real stock from 1999 to 2007.

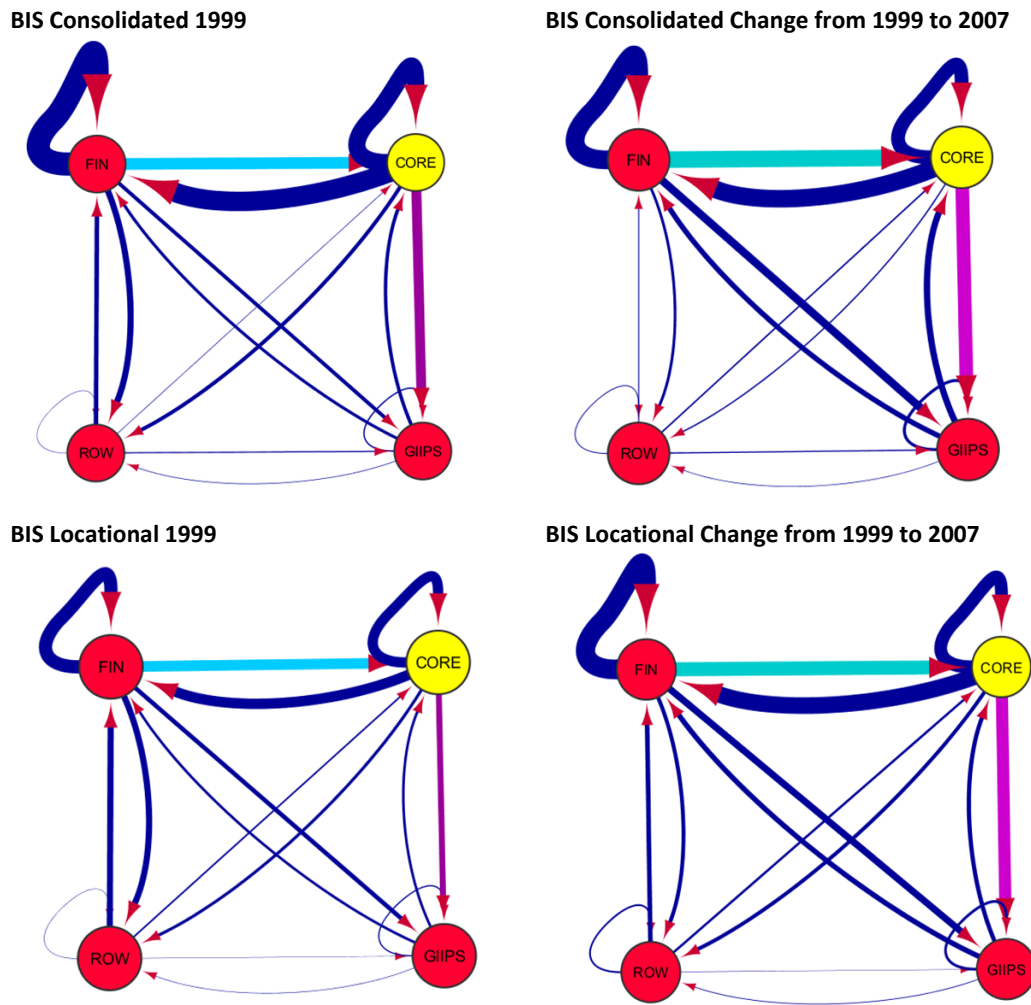| Source	CORE Targets							GIIPS Targets					FIN Targets		
	Austria	Belgium	Finland	France	Germany	Luxembourg	Netherlands	Greece	Ireland	Italy	Portugal	Spain	Switzerland	UnitedKingdom	UnitedStates
Austria		1.39%	1.98%	1.64%	2.20%	0.73%	3.14%	5.02%	3.17%	4.14%	2.56%	5.61%	1.61%	0.94%	-0.18%
Belgium	1.18%		1.02%	2.20%	0.81%	0.13%	3.88%	12.33%	3.84%	0.39%	1.56%	4.91%	0.64%	1.99%	1.43%
Finland	-0.81%	-0.82%		-0.21%	-0.82%	-0.88%	-0.11%	-0.63%	0.71%	-0.62%	-0.14%	4.04%	-0.96%	-0.80%	-0.94%
France	1.49%	1.25%	1.25%		0.66%	3.58%	2.82%	2.02%	11.92%	1.25%	4.22%	3.83%	1.40%	3.33%	0.79%
Germany	1.44%	0.51%	0.22%	1.23%		0.18%	1.38%	2.08%	3.51%	1.38%	1.68%	4.17%	0.49%	1.76%	1.88%
Luxembourg	-0.50%	-0.07%	-0.63%	1.00%	0.07%		-0.02%	0.70%	-0.41%	-0.20%	-0.05%	0.48%	0.09%	-0.43%	-0.40%
Netherlands	0.40%	2.43%	0.52%	4.95%	1.30%	3.37%		3.77%	5.71%	0.81%	2.88%	6.88%	1.88%	4.55%	0.75%
Ireland	19.18%	17.26%	18.99%	1.98%	1.57%	8.60%	5.99%	26.97%		21.67%	31.76%	6.46%	5.69%	6.53%	6.87%
Italy	8.32%	1.01%	6.67%	1.53%	6.49%	0.64%	1.91%	1.17%	3.08%		-0.10%	1.69%	2.19%	0.86%	0.32%
Portugal	1.47%	1.62%	1.89%	-0.33%	2.61%	2.68%	4.71%	2.31%	3.45%	-0.28%		0.82%	4.22%	0.55%	-0.12%
Spain	1.02%	3.33%	2.30%	3.19%	0.22%	2.07%	6.11%	-0.45%	7.16%	0.36%	3.84%		1.94%	3.44%	0.79%
Switzerland	1.85%	-0.23%	0.05%	0.87%	0.68%	2.24%	1.27%	6.07%	13.96%	0.53%	2.02%	0.75%		0.75%	1.62%
UnitedKingdom	0.98%	3.44%	3.27%	8.33%	7.49%	8.37%	12.59%	0.60%	12.19%	3.00%	2.14%	9.68%	1.73%		1.86%
UnitedStates	1.21%	0.28%	-0.12%	3.29%	0.40%	5.65%	0.72%	0.30%	10.58%	0.84%	0.94%	4.48%	0.84%	2.66%	

BISL percent change in real stock from 1999 to 2007.

| Source	CORE Targets							GIIPS Targets					FIN Targets		
	Austria	Belgium	Finland	France	Germany	Luxembourg	Netherlands	Greece	Ireland	Italy	Portugal	Spain	Switzerland	UnitedKingdom	UnitedStates
Austria		1.76%	2.09%	2.41%	3.15%	1.08%	3.96%	7.01%	5.00%	4.59%	3.28%	8.38%	2.82%	2.34%	0.49%
Belgium	0.94%		0.90%	2.10%	0.89%	0.70%	5.00%	9.61%	6.98%	0.03%	2.56%	3.30%	0.34%	2.09%	1.50%
Finland	-0.26%	-0.69%		1.46%	-0.22%	0.06%	0.87%	-0.59%	1.99%	-0.08%	-0.06%	5.12%	2.61%	0.97%	-0.60%
France	1.61%	1.49%	0.41%		2.13%	2.86%	4.15%	3.90%	15.83%	2.31%	4.86%	6.32%	0.96%	3.47%	1.49%
Germany	2.04%	1.02%	0.89%	1.79%		2.01%	1.91%	2.17%	5.12%	1.93%	1.53%	6.00%	0.77%	3.55%	3.06%
Luxembourg	0.38%	0.33%	-0.15%	1.23%	0.36%		1.07%	1.75%	0.32%	0.51%	1.86%	3.81%	1.01%	0.82%	0.90%
Netherlands	0.15%	2.96%	0.54%	1.38%	0.88%	5.81%		3.08%	1.32%	1.77%	3.04%	6.49%	2.35%	4.65%	1.96%
Greece	0.73%	-0.05%	11.00%	0.57%	1.16%	6.96%	0.38%		1.60%	0.42%	23.17%	-0.40%	-0.94%	0.79%	1.35%
Ireland	2.16%	9.46%	0.44%	1.92%	1.60%	2.92%	4.02%	6.96%		5.56%	6.50%	3.44%	1.20%	7.68%	4.09%
Italy	13.91%	1.38%	3.34%	1.29%	4.08%	1.28%	0.78%	1.53%	2.34%		1.12%	3.31%	1.30%	0.49%	-0.21%
Portugal	0.03%	1.27%	-0.54%	0.84%	1.62%	3.16%	9.75%	6.81%	12.12%	-0.27%		2.50%	2.31%	1.63%	0.54%
Spain	2.46%	3.78%	3.49%	3.41%	0.76%	2.39%	11.00%	0.34%	5.23%	1.77%	5.64%		1.11%	6.81%	2.62%
Switzerland	0.82%	-0.22%	-0.28%	0.46%	0.25%	0.71%	0.42%	0.63%	1.32%	-0.21%	1.26%	-0.17%		0.21%	-0.31%
UnitedKingdom	0.44%	1.59%	0.74%	3.70%	0.73%	2.70%	3.07%	0.81%	5.81%	0.46%	1.23%	4.36%	1.75%		2.51%
UnitedStates	0.03%	0.43%	9.98%	3.47%	-0.14%		2.31%	-0.58%	8.51%	2.34%	-0.36%	2.84%	0.98%	4.41%	

Source: BIS and authors' calculations. BISC is consolidated BIS data, BISL is locational BIS data.

Figure 6: BIS bank claims by region in the beginning of EMU period and their change by 2007.

BIS Consolidated 1999

BIS Consolidated Change from 1999 to 2007

BIS Locational 1999

**BIS Locational Change from 1999 to 2007**

Source: BIS and authors' calculations. The left-hand side of the chart presents each regions's stock of claims at the beginning of EMU vis-à-vis another region, with the thickness of the lines reflecting holdings, measured in real USD, as a share of global gross positions, also measured in real USD. The right-hand side of the chart presents changes in gross positions from the beginning of the EMU period through the end of 2007, in real USD, scaled by the global change in gross positions in real USD over this same time period. CORE includes Austria, Belgium, France, Germany, Netherlands, and Finland. GIIPS includes Greece, Ireland, Italy, Portugal, and Spain. FIN includes Canada, Denmark, Japan, Sweden, Switzerland, the U.K., and the U.S. ROW includes all 10 available countries for BIS consolidated data, all 31 available countries for BIS locational data.

Figure 7: Geographical distribution of Core to GIIPS lending.
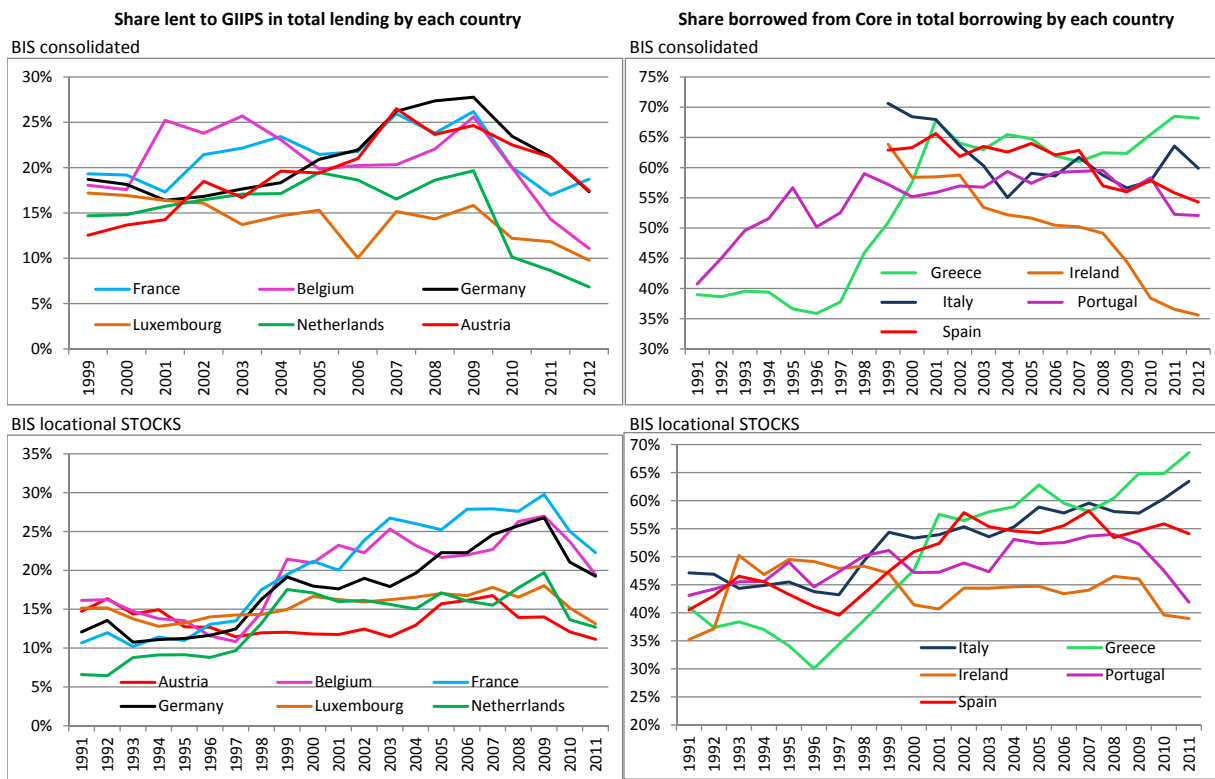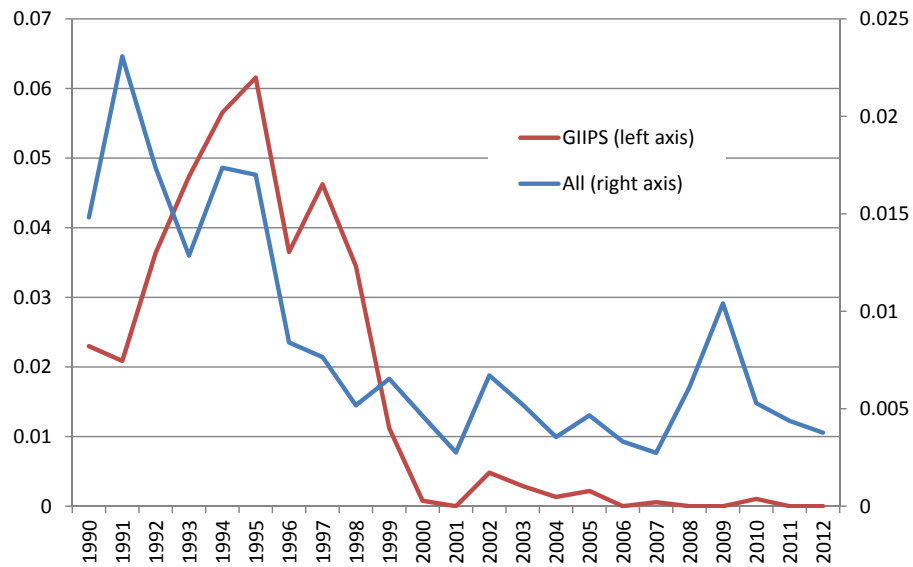
Source: BIS and authors' calculations.

Figure 8: Syndicated borrowing from financial centers and lending to GIIPS of individual banks
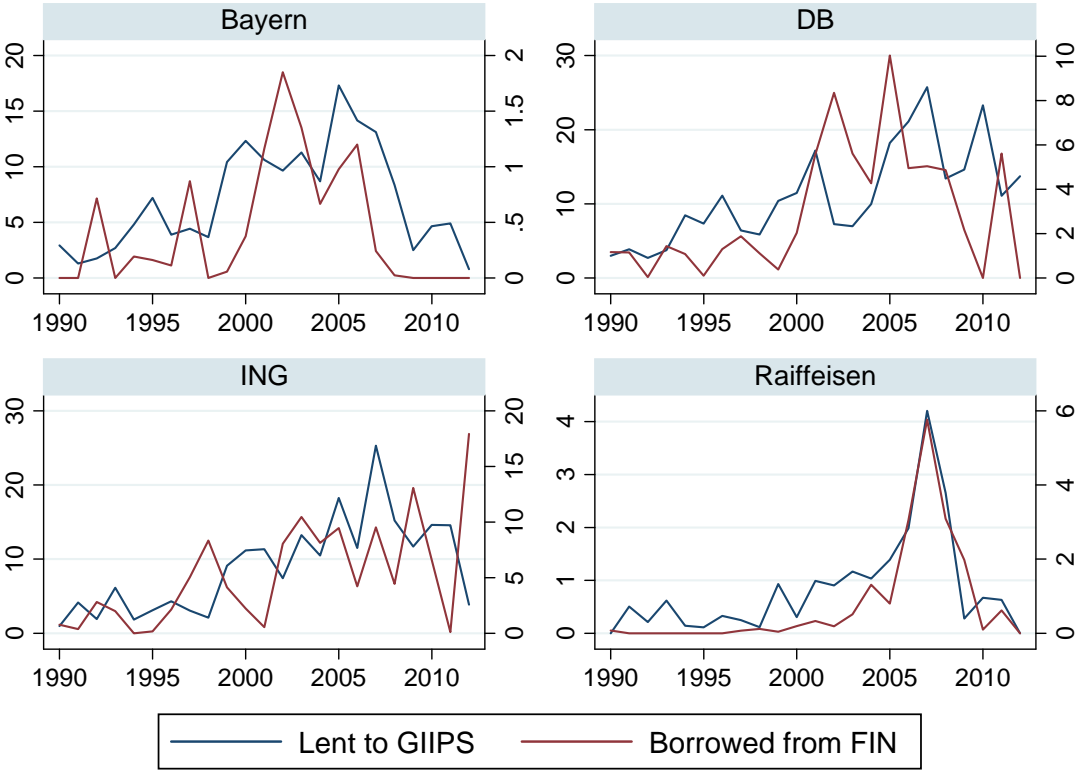

This Figure shows that for some banks there was a close association between their borrowing from FIN and their lending to GIIPS. Source: Dealogic Loan Analytics and authors' calculations. Syndicated borrowing and lending only. GIIPS includes Greece, Ireland, Italy, Portugal, and Spain. FIN includes Canada, Denmark, Japan, Sweden, Switzerland, the U.K., and the U.S.

Figure 9: Share of sovereign borrowers in syndicated lending to GIIPS and to all countries

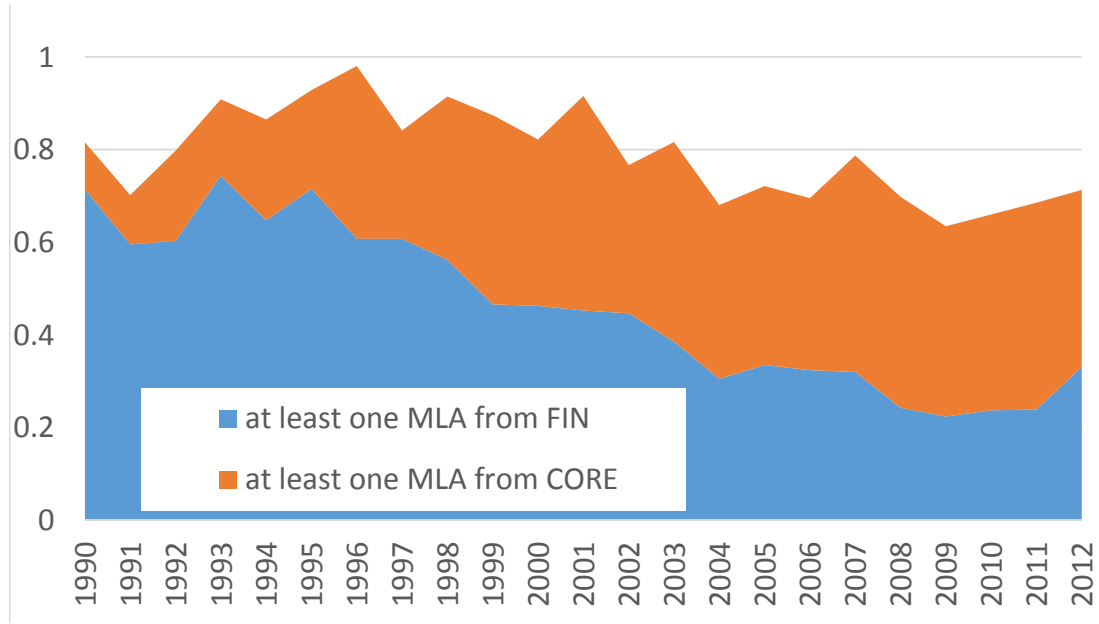This Figure demonstrates that GIIPS sovereigns were no longer borrowing in the syndicated loan market after the introduction of the Euro, while this was not the case for the other countries. Source: Dealogic Loan Analytics and authors' calculations. Syndicated lending only. Plotted are shares of loans, by loan number, to sovereigns in GIIPS in total lending to GIIPS and to sovereign in all countries in total lending to all countries.

Figure 10: Probability of FIN bank participating in a loan syndicate (year fixed effects from linear probability regression)
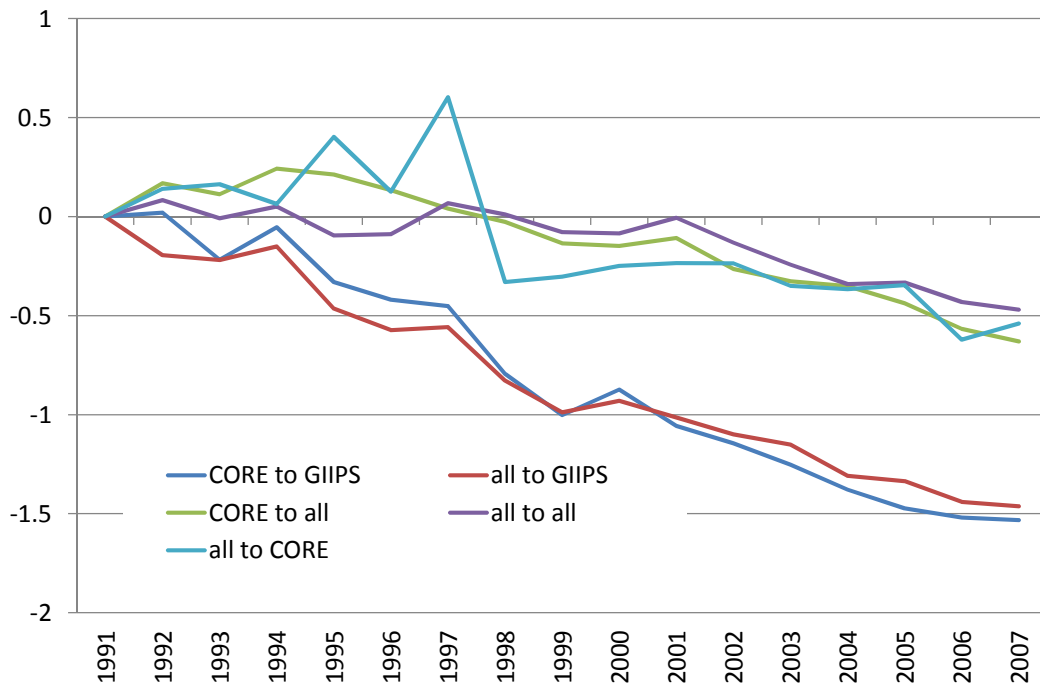
This Figure demonstrates that loans to GIIPS were less likely to include participants from FIN after 1999. Reported are year fixed effects of the probit regressions by subsample indicated. Regressions are estimated as linear probability model of an indicator of at least one bank from FIN present as a participant in the loan syndicate. Regressions include controls for loan amounts and number of lenders in the syndicate. Fixed effects are normalized to be 0 in the beginning of the sample for comparability across samples. Data source: Dealogic Loan Analytics.

Figure 11: Share of loans to GIIPS with at least one bank from FIN and CORE among mandated lead arrangers

This Figure demonstrates a decline in the share of loans to GIIPS that are arranged by FIN banks after 1999 and a corresponding increase in loans to GIIPS that are arranged by CORE banks. The sample is limited to loans to GIIPS. For each year the share of loans is computed (in terms of loan count), for which at least one of mandated lead arrangers is in FIN and in CORE. The remaining share are loans for which none of the mandated lead arrangers are in FIN or CORE. Data source: Dealogic Loan Analytics.

Table 1: Cross Section regressions.

Dependent variable:	Δln(BISC)	Δln(BISL)	ln$\sum$(BISLF)	Δln(SLEC)	ln$\sum$(LW)
	2000-2007	1999-2007	1999-2007	1999-2007	1999-2007
	(1)	(2)	(3)	(4)	(5)
CORE to FIN	-0.605***	0.0284	-0.818***	0.296***	3.709**
	(0.148)	(0.0673)	(0.181)	(0.0387)	(1.359)
CORE to GIIPS	0.321**	0.722***	1.715***	0.311***	1.289
	(0.148)	(0.0673)	(0.169)	(0.0387)	(1.098)
FIN to CORE	-0.0285	0.181**	0.851***	0.674***	3.817***
	(0.148)	(0.0673)	(0.169)	(0.0387)	(1.220)
FIN to GIIPS	0.244	0.456***	0.893***	-0.0285	-0.620
	(0.148)	(0.0673)	(0.123)	(0.0387)	(1.076)
ln(Stock in 1999)			0.274***		5.330***
			(0.0420)		(0.498)
Constant	0.821***	0.659***	0.558***	0.175***	-0.979**
	(0.148)	(0.0673)	(0.0485)	(0.0387)	(0.420)
Observations	556	1348	1760	1756	1140
Adjusted R^2	0.019	0.0026	0.24	0.037	0.80

BISC is stock of total international bank claims from consolidated BIS data in real USD.
BISL is stock of total international bank claims from locational BIS data in real USD.
BISLF is valuation-adjusted flows of total international bank claims from locational BIS data in real USD.
SLEC is syndicated loan exposures as defined in the text aggregated on consolidated basis in real USD.
LW is the total amount of syndicated loans originated by country i to country j in year t in real USD.
Difference between logs of stocks in 2007 and 1999 or 2000 is computed for stock variables, as indicated.
Flows are summed up for years 1999-2007. We control for stock in 1999 for BISLF and LW flow regressions.
CORE includes Austria, Belgium, France, Germany, Netherlands, and Finland. GIIPS includes Greece,
Ireland, Italy, Portugal, and Spain. FIN includes Canada, Denmark, Japan, Sweden, Switzerland, the U.K., and the U.S.
ROW includes: Turkey, Taiwan, Hong Kong, and Singapore for BISC lenders, all 10 available
countries for BISC borrowers, all 31 available countries for BISL and BISLF lenders and borrowers.
The same 31 countries are included in SLEC and LW regressions for the ROW category.
Robust standard errors are 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(BISL) (1)	ln(BISLF) (2)	ln(SLEC) (3)	ln(LW) (4)
CORE to FIN $*$ EMU	-0.198**	0.403***	0.356***	0.335***
	(0.0732)	(0.0428)	(0.0543)	(0.0574)
CORE to GIIPS $*$ EMU	0.459***	0.481***	0.273***	0.201***
	(0.117)	(0.0777)	(0.0406)	(0.0608)
FIN to CORE $*$ EMU	0.0762	0.415***	0.557***	0.610***
	(0.0469)	(0.0382)	(0.0803)	(0.0576)
FIN to GIIPS $*$ EMU	-0.245***	0.291***	0.00710	0.170***
	(0.0806)	(0.0643)	(0.0394)	(0.0561)
ln(Total lent)	0.591***	0.263***	0.0742***	0.220***
	(0.138)	(0.0542)	(0.0138)	(0.0548)
ln(Total borrowed)	0.559***	0.130	0.197***	0.311***
	(0.0849)	(0.0847)	(0.0657)	(0.0242)
Observations	24312	24312	33014	12508
Adjusted R^2	0.124	0.00786	0.241	0.441

Sample years are 1991-2007. EMU= years 1999-2007.
BISL: stock of total international bank claims from locational BIS data in real USD. BISLF:
valuation-adjusted flows of total international bank claims from locational BIS data in real USD.
LW: the total amount of loans issued by country i to country j in year t in real USD.
CORE includes Austria, Belgium, France, Germany, Netherlands, and Finland.
GIIPS includes Greece, Ireland, Italy, Portugal, and Spain. FIN includes Canada, Denmark,
Japan, Sweden, Switzerland, the U.K., and the U.S. ROW includes 31 countries available in BISL data.
Country-pair and year fixed effects are included in all regressions. 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 ROW	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

Sample years are 1990-2007. EMU= years 1999-2007.

Borrowed from X and lent to X are total amounts of loans issued by X in real USD.

CORE includes Austria, Belgium, France, Germany, Luxembourg (except CPIS), and Netherlands.

GIIPS includes Greece, Ireland, Italy, Portugal, and Spain.

FIN includes Canada, Denmark, Japan, Sweden, Switzerland, the U.K., and the U.S.

ROW includes Australia, China, Egypt, Hong Kong, Israel, Malaysia, Norway, Panama, Singapore, Korea, Taiwan, Turkey, and Middle East and offshore financial centers.

Bank and year fixed effects in all regressions. Robust standard errors are in parentheses.

FIN banks: Barclays, Danske Bank, HSBC, Jyske Bank, Lloyds, Nordea Markets, Nykredit, RBS, Svenska Handelsbanken, Swedbank First Securities, and Sydbank.

CORE banks: ABN Amro, Bayer, BNP Paribas, Commerzbank, Credit Agricole, Deutsche Bank, Dexia, DZ Bank, Este Group, Helaba, HSH Norbank, Hypo, ING, KBC, Landesbank Berlin, Oesterrichische Volksbanken, Op-pohjola, Rabobank, Raiffeisen, SNS Reaal, Weslb, and WGZ.

GIIPS banks: Allied Irish, Banco BPI, Banco Espirito Santo, Banco Popular Espanol, Bank of Ireland, Bankia, BBVA, Caixa Geral de Depositos, Intesa Sanpaolo, Mote Dei Paschi, Santander, Unicredit, and UBI.

*(P< 0.10), **(P< 0.05), ***(P< 0.01).