The "Greatest" Carry Trade Ever?
Understanding Eurozone Bank Risks

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Abstract

We show that eurozone bank risks during 2007-2013 can be understood as a form of "carry trade" behavior. Bank equity returns load positively on peripheral (Greece, Ireland, Portugal, Spain, and Italy, or GIPSI) bond returns and negatively on German government bond returns, a position that generated "carry" until the deteriorating GIPSI bond returns impacted bank balance sheets. The positive GIPSI loadings correlate with banks' holdings of GIPSI bonds, as well as the negative German loading with banks' short-term debt exposures. We find support for risk-shifting moral hazard and regulatory arbitrage motives at banks in that carry trade behavior is stronger for large banks and banks with low capital ratios and high risk-weighted assets. We also evaluate alternative hypotheses such as the home bias of peripheral banks and suasion by domestic governments.

Keywords: Sovereign debt crisis, banking crisis, risk-shifting, regulatory arbitrage, home bias

JEL Classification: G01, G21, G28, G14, G15, F3

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"And of course, the deterioration of the Euro zone situation and particularly the sovereign crisis in the peripheral economies hit very badly the group. And that's of course not a surprise for a group that still had very important short-term funding needs that was mainly present in strong exposures in peripheral countries. [...] Before 2008, it was the group's high rating granting easy access to wholesale funding that led to the situation of October 2008 with short-term funding need of €260 billion outstanding in October 2008, i.e. 43% of total balance sheet. [...] with very significant acceleration and buildup of the bond portfolio was amounting at €203 billion at the end of 2008. Mostly carry trades with marginal improvement of customer access [...] that led to a very significant gearing ratio because the portfolio size was, at that time, 25 times the group equity." - Pierre Mariani, Chairman of the Management Board and CEO, Dexia SA, Earnings Call, February 23, 2012.

The ongoing sovereign debt crisis in Europe has cast doubt on the solvency of European banks that incurred substantial mark-to-market losses and impairments on their peripheral (Greece, Ireland, Portugal, Spain, and Italy, or GIPSI) sovereign bond holdings. Since mid-2008, government bond yield spreads between pairs of European countries, for example, between German bunds and GIPSI bonds, have widened considerably, mirroring the economic divergence between these across the region (Figure 1).[1] This divergence is challenging the survival of the eurozone. Since then, banks have on average lost 70% of their market value and shed billions of euros of assets in an effort to increase regulatory capital ratios.

[Figure 1]

In this paper, we show that banks' risks during the 2007-2013 period can be understood as a form of "carry trade." With access to short-term unsecured funding in wholesale markets, banks appear to have undertaken long peripheral sovereign bond positions. On the upside, the trade would pocket the "carry," which is the spread between long-term peripheral sovereign bonds and banks' short-term funding costs. On the downside, which has materialized, the spreads between the two legs of the trade diverged even further, resulting in significant losses for banks and leading to concerns about their solvency and liquidity. In essence, this

[1] For almost a decade prior to this, the ten-year sovereign bond yields for these countries hovered around the four percent benchmark with a small yield spread difference between core and peripheral European countries.

carry trade reflects a bet that eurozone countries would converge economically, resulting in a convergence of the spread involving its two legs.

Dexia SA (Dexia) and the Bank of Cyprus provide two quintessential examples of such behavior as they invested heavily in these carry trades.[2] We document that this behavior has in fact been pervasive among eurozone banks. We investigate the causes of the European banking crisis and argue that banks' substantial share price decline can in part be explained by banks anticipating the survival of the eurozone, choosing to hold peripheral sovereign bonds and financing their investments in short-term wholesale markets. While correlations between the bond yields of Germany (or France) and peripheral sovereign bond yields were above 95% in 2005, these correlations became negative in 2010 when markets became more reluctant to finance banks' investments in risky sovereign debt, which resulted in a flight into longer-term core European (particularly German) government bonds. In other words, the banks lost on both sides of the carry trade.

At the core of our analysis are the publicly listed banks that took part in five consecutive stress tests conducted by the European Banking Authority (EBA) starting in 2010 and ending in June 2012. March 2010 is the first reporting date for which detailed information about European banks' sovereign bond holdings is available. We document interesting patterns in the sovereign bond holdings of banks for the March 2010 to June 2012 period.

Our data show that European banks entered the stress test period with a substantial exposure to GIPSI sovereign debt, which overall remained remarkably constant over the next two years. More importantly, GIPSI banks and (in particular) non-GIPSI banks appear to have actively managed their sovereign bond portfolios by *increasing* their exposures to the periphery even as yield spreads on these countries' debt widened between March and December 2010.

[2] Dexia built up a risky bond portfolio of almost a third of the bank's total balance sheet, almost 50% of which was financed with short-term funding. As the quality of the bond portfolio declined, Dexia was unable to roll over the financing of its assets and was bailed out in October 2011. Dexia is not an isolated case. The Bank of Cyprus more than quadrupled its investments in Greek government bonds in 2010 as Greek bonds were among the highest yielding sovereign bonds. This investment was financed with short-term funds obtained from the ECB in 2009.

This behavior rules out the alternative that banks were *passively* caught in the sovereign debt crisis due to exposures to peripheral sovereign debt prior to the emergence of the sovereign crises Greece and Ireland in 2009. In fact, our analysis suggests that part of these purchases were financed with proceeds from selling non-GIPSI (i.e., German and French) sovereign debt.

We find that both GIPSI and non-GIPSI banks with lower Tier 1 ratios and higher risk-weighted assets increased their peripheral exposure between March and December 2010 *and* January to June 2012 periods, strongly supporting regulatory arbitrage as an important motivation for bank behavior.[3] We document that peripheral banks substantially increased their exposure to their domestic sovereign bonds between January and June 2012, while non-domestic banks decreased their holdings, consistent with an increase in home bias over time.[4] Additionally, we find that GIPSI banks that were bailed out do not explain the overall increase in sovereign bond purchases by GIPSI banks.

Micro-level data of sovereign bond positions (except for the five EBA reporting dates) are unavailable to us on a high-frequency basis. Furthermore, banks may be exposed to sovereign bond risk other than through direct bond positions (e.g., through credit default swap positions and counterparty exposure in derivatives transactions with governments). Given this limitation and to link bank risk to both the investment leg and the funding leg of the carry trade, we collect daily stock prices for these banks, as well as daily ten-year sovereign bond yields over the January 2007 to June 2012 period.[5]

We find a *positive* correlation between banks' stock returns and GIPSI bond returns and a negative correlation with German bund returns. These correlations are significantly larger

[3] Interestingly, non-domestic banks increased their exposure more relative to domestic banks in 2010. For example, non-Spanish banks increased their Spanish sovereign bond positions by 66% between March 2010 and December 2010. S&P downgraded Spanish bonds to AA from AA+ in April 2010, pushing yield spreads for ten-year sovereign bonds higher than (worse rated) Italian bonds.

[4] To facilitate these trades, in December 2011 and February 2012 the ECB injected about €1 trillion with a maturity of three years and a 1% coupon into the banking system in two three-year Long-Term Refinancing Operations (LTROs).

[5] To further strengthen our methodology, we relate our estimates to actual portfolio holdings throughout the paper.

during the 2007–2012 period as compared to the pre-2007 period. European banks are thus effectively, on average, long GIPSI government bonds, thus their stock returns decline when bond prices depreciate. The *negative* loadings on German government bonds (bunds) suggest that banks are "short" long-term German bunds. In other words, these results suggest that banks were financing long-term peripheral bonds with short-term debt in a carry trade.[6] We also find that non-GIPSI banks, and in particular banks from strong countries such as Germany and France, are heavily loaded on peripheral debt, which helps to rule out that reverse causality (i.e., weak sovereigns weaken banks in a vicious cycle) is driving our factor loading estimates.

We show that the peripheral exposures relate to banks' actual government bond holdings rather than non-sovereign exposures (to firms, households, and real estate). Moreover, banks with more short-term funding exposure, through U.S. money market funds (MMF)[7] and other wholesale funding sources, have more negative factor loadings on German bunds. Interestingly, we find that MMFs withdraw, particularly from weakly capitalized institutions, which highlights how liquidity and solvency risk interact.

In this paper, we explore incentives for banks to engage in carry trades, namely risk shifting by under-capitalized banks and regulatory capital arbitrage, as well as the home bias of peripheral banks and suasion by their domestic sovereigns to maintain asset exposures.

The *regulatory capital arbitrage* motive arises under the current Basel II regulations, which assign a zero-risk weight for investments in sovereign debt.[8] The governments may themselves have had incentives to preserve the zero-risk weight to be able to continue to

[6] If long-term German bund prices appreciate whenever short-term funding dries up (due to a flight-to-safety or quality) and banks are exposed to short-term funding, then it would appear as if banks were "short" long-term German bunds.

[7] The dependence on U.S. MMFs by European banks for U.S. dollar funding potentially poses a threat to their (short-term) liquidity and could be transmitted to other financial institutions or the real economy (Chernenko and Sunderam, 2012; Ivashina, Scharfstein, and Stein, 2012).

[8] The Capital Requirement Directive (CRD) assigns a zero-risk weight for "exposures to Member States' central government […] denominated and funded in the domestic currency of that central government" (BIS, 2011). That is, despite (even little) differences in country ratings, banks are allowed to reduce the capital they hold against these positions to zero. Consequently, particularly undercapitalized banks, that is, banks with low Tier 1 capital ratios, have an incentive to shift their portfolios into assets with lower risk weights (regulatory capital arbitrage).

borrow.[9] Undercapitalized banks, that is, banks with low Tier 1 capital ratios, now have an incentive to increase short-term return on equity by shifting their portfolios into the highest-yielding assets with lowest risk weights in an attempt to meet regulatory capital requirements without having to issue economic capital (regulatory capital arbitrage).[10]

Moreover, riskier banks might shift into riskier government bonds by placing a bet on their own survival (risk shifting) as this way they shift risk into the states of the world (government defaults) where they are likely to experience bank runs [as argued by Diamond and Rajan (2011)]. While the regulatory arbitrage incentive would be stronger for both GIPSI banks and non-GIPSI banks, the second incentive would be stronger for the domestic banks of GIPSI countries, which would increase the home bias of these countries over time.

The premise behind the moral suasion hypothesis is that peripheral sovereigns force domestic banks to purchase more own sovereign debt because overall demand is weak and to reduce sovereign bond yields. This hypothesis also implies an increase in home bias over time.

We bring these hypotheses to the data in a variety of tests. We first conduct a large number of falsification tests and find that the return exposures are consistent with a carry trade behavior that is specific to banks, not to hedge funds or industrial firms, and are also specific to eurozone banks but not to the banks of other Western economies. Only European banks benefit from the zero-risk weights and do not have to hold capital against risky sovereign debt, which reduces the incentives of the other financial institutions to hold these assets. Moreover, a funding "put" from domestic central banks and the ECB against eurozone sovereign collateral is only available to eurozone banks.

Analyzing the carry trade behavior of European banks in subsamples of GIPSI banks, non-GIPSI and German and French banks shows that non-GIPSI banks have significant

[9] The more entangled the financial sector and the governments become, the more costly the government default would be due to "collateral damage" in the form of bank runs and disruption of interbank and repo markets (Broner, Martin, and Ventura, 2010; Acharya and Rajan, 2011; Bolton and Jeanne, 2011).

[10] See Acharya, Engle, and Pierret (2013) for a formal derivation of this perverse incentive when banks disregard the risks that arise from earning returns on capital subject to a risk-weight based capital requirement scheme.

exposures to the periphery, which highlights that there are motives other than home bias that can explain our findings. Moreover, we find that larger non-GIPSI banks are significantly more exposed, which is consistent with large banks exploiting an implicit bailout guarantee from their (stronger) sovereign.

We also repeat our tests in consecutive subperiods and document a significant exposure of non-GIPSI banks. Consistent with our descriptive results, this exposure decreases over time, while GIPSI banks' factor loadings increase, which is consistent with an increase in home bias. Interestingly, the loadings on German bunds are significantly lower for GIPSI banks in the first half of 2012, suggesting that the LTRO injections by the ECB reduced the funding risk of GIPSI banks.

We show that banks with a high short-term leverage, high risk-weighted assets, and low Tier 1 ratios have more exposure to peripheral sovereign debt. The results of a subsample test of GIPSI versus non-GIPSI banks show that the moral hazard (risk shifting) motive is stronger for GIPSI banks, which is consistent with Diamond and Rajan (2011). The regulatory arbitrage motive, however, is stronger in the subsample of non-GIPSI banks. Moreover, our tests over different subperiods suggest that moral hazard by under-capitalized banks is an important determinant of banks' carry trade behavior, even during periods when home bias is increasing.

We then investigate whether banks that have been bailed-out by their government have larger exposures, which would make peripheral banks more prone to pressure by their governments to buy their own sovereign debt. However, we find that banks that have not been bailed out have significant exposures, which lends support to the carry trade hypothesis.

In final tests, we examine whether and when the carry trades became profitable. We find that only the ECB interventions in summer 2012, when ECB President Mario Draghi explained that he will do anything to save the eurozone and, in particular, the announcement of the details of the Outright Monetary Transaction (OMT) program implying possible unlimited purchases of sovereign debt in secondary markets by the ECB, made these trades profitable. We analyze

both announcement effects on sovereign bonds returns as well as on banks' equity returns. Both interventions significantly reduced peripheral bond yields and benefited the banks with high GIPSI exposures. Interestingly, the LTRO capital injections did not have a significant impact on peripheral bond yields, but the first tranche in December 2011 helped to reduce banks' funding costs.

The paper proceeds as follows. In Section 1, we discuss the related literature. In Section 2, we discuss Dexia and Bank of Cyprus as two quintessential examples of carry trade behavior, and explain the data sources and some descriptive statistics. In Section 3, we provide portfolio-level evidence on sovereign bond exposures. In Section 4, we discuss our carry trade exposure estimates from multifactor models, as well as various robustness tests to demonstrate their validity. In Section 5, we relate our carry trade estimates to reported sovereign bond holdings as reported by the EBA and measures of short-term funding risk. In Section 6, we explore bank incentives for carry trades. In Section 7, we analyze the profitability of carry trades. We present concluding remarks in Section 8.

1. Related literature

Our paper is related to the literature investigating the yield-chasing investment behavior of financial institutions. Becker and Ivashina (2013) analyze the investment behavior of insurance firms and document a reaching for yield behavior due to agency frictions. Kacperczyk and Schnabl (2013) analyze the investment behavior of U.S. MMFs and find that they invested in riskier securities searching for higher yields as money inflow was responsive to fund yields. Fischer et al. (2012) focus on the investment behavior of German Landesbanken and document a searching for yield due to risk-shifting incentives after the announcement that government guarantees will be revoked. We show in our paper that yield chasing by European banks implies investing in high-yielding long-term government debt financed with low-yielding short-term wholesale funds, which ultimately leaves the banks exposed to risky assets and high funding risk.

Our paper is also related to the literature highlighting that regulatory arbitrage is an important motive for banks' investment and financing decisions. Acharya, Schnabl, and Suarez (2011) investigate the widespread use of conduits in the securitization process and find evidence consistent with regulatory arbitrage: Most conduits were set up with capital-reducing liquidity guarantees, which were initiated by weakly capitalized commercial banks; risks were not transferred to investors, and losses were rather booked by the guarantee issuing institutions.[11] Boyson, Fahlenbrach, and Stulz (2013) analyze the use of trust preferred securities by U.S. bank holding companies as part of their regulatory capital. They also find evidence consistent with a regulatory capital arbitrage motive.[12] Acharya, Engle, and Pierret (2013) compare the results from macroprudential stress tests both in the U.S. and Europe with stress tests based on market data. They conclude that the reliance on regulatory risk weights in the original stress tests is in part responsible for the undercapitalization of the banking sector that create incentives for banks to invest in low risk-weight assets.

The paper relates more broadly to the literature on the risk-shifting incentives of firms (Jensen and Meckling, 1976). Several theoretical studies emphasize banks' incentives to shift into riskier assets. Furlong and Keeley (1987, 1989), for example, show that banks increase asset risks if they have higher leverage. Keeley (1990) shows that increased competition among banks induces risk shifting because of lower charter values. Relatedly, Hellman, Murdock, and Stiglitz (2000) argue that banks have higher gambling incentives if they are poorly capitalized. The Japanese experience from the 1990s provides supporting evidence too. Undercapitalized Japanese banks followed a policy of regulatory forbearance: extending loans to troubled borrowers to avoid their insolvency and subsequent capital write-downs (Peek and Rosengren, 2005; Hoshi and Kashyap, 2010). Particularly affiliated banks channeled funds to these firms

[11] Acharya and Richardson (2010) also emphasize the importance of regulatory capital relief in explaining the huge increase in the securitization schemes of banks.

[12] The Collins amendment to the Dodd-Frank Act requires that any trust preferred securities issued after May 19, 2010 no longer count towards Tier 1 capital, which effectively eliminates the regulatory capital arbitrage using these instruments.

instead of extending credit to high-quality firms betting that the banks were going to be bailed out by the government if the firms eventually defaulted (Caballero, Hoshi, and Kashyap, 2008).

2. Background and data

In this section, we provide brief examples of two non-peripheral European banks that heavily invested in carry trades and eventually defaulted: Dexia SA and Bank of Cyprus. We describe their trading behavior, as well as the costs when these trades fail: losses through sales of bonds at lower prices, losses through mark-to-market of trading portfolios, an increase in short-term funding costs, less collateral for private repo markets, and losses through hedges that went wrong. We then describe the data we used.

A. Carry trades gone wrong: Dexia and Bank of Cyprus

A.1. Dexia SA

In October 2011, Dexia SA (Dexia)[13] was bailed out because of carry trades that went wrong (see the quote of Dexia's current CEO at the start of the paper): Dexia built a proprietary bond portfolio amounting to €203 billion at the end of 2008 (about 32% of its balance sheet), searching for higher yields compared to their significantly less profitable municipal lending business.[14] These investments were financed in short-term wholesale markets. The bond exposure was mainly to fixed rate bonds and Dexia hedged the interest rate risk using credit derivatives. Effectively, Dexia was short German bunds in the total return swap market betting on an increase in bund yields.

Dexia sold part of its portfolio in 2011 and incurred losses of about €2.6 billion. At the same time, it wrote down 75% of its Greek sovereign bond holdings due its private sector involvement. The losses on the exposure to Greek sovereign debt amounted to €3.4 billion. Moreover, Dexia incurred substantial mark-to-market losses on its remaining bond portfolio.

[13] Dexia SA was formed in 1996 through a merger of Crédit Local (France) and Crédit Communal (Belgium).
[14] Holding a large amount of securities given Dexia's funding imbalances was even encouraged by rating agencies: "Dexia's widely diversified funding base and the liquidity reserve provided by its large securities portfolio offset its reliance on wholesale capital markets" (S&P Ratings Direct, May 22, 2008).

Consequently, Dexia's Tier 1 ratio fell to 7.56% at end of 2011 and its book equity even became negative. Both Moody's and S&P placed Dexia's ratings under review for possible downgrade in spring 2011. Between April and June 2011, €22 billion in unsecured short-term funds were withdrawn and its U.S. dollar position was impacted first. Figure 2. shows that U.S. MMF reduced their holdings of Dexia's commercial papers and repos within a few months in spring 2011 from about $10 billion to zero.

[Figure 2]

Dexia lost about €40 billion in short-term funding within six months in the second half of 2011. An additional €6 billion in unsecured short-term funding was withdrawn during the July - September 2011 period, and another €6 billion after Moody's announcement of placing the group's long- and short-term rating under review for possible downgrade on October 3, 2011. Moreover, the group lost commercial deposits of €7 billion in the fourth quarter of 2011.[15] Consequently, Dexia needed to rely increasingly on central bank funding, which reduced the amount of available collateral for further repo transactions.[16]

The European Commission explicitly addressed its concerns with respect to the large amount of sovereign debt in Dexia's portfolio and the use of interest rate derivatives, which "probably requires significant collateral for Dexia, which may reduce its eligible collateral base for financing from the central banks or in the interbank repo market" (EC, 2010).[17]

Dexia's derivative positions put even more pressure on short-term liquidity. Between June and September 2011, Dexia had to post €15 billion cash collateral due to the fall in interest

[15] The 1-year CDS spread of the banking subsidiary Dexia Crédit Local. The CDS spread increased within a few weeks after June 2011 from 200 bps to 1,000 bps, reflecting its rise in short-term funding costs, as well as the market's expectation of Dexia's default probability over the next year.

[16] The ratio of repurchase agreements with the ECB over total repurchase agreements almost doubled between 2010 and 2011.

[17] Dexia held a portfolio of GIPSI sovereign bonds amounting to €26.1 billion as of March 31, 2010 consisting mainly of Italian bonds (€17.6 billion) and Greek government bonds (€3.7 billion). The size of the sovereign bond portfolio corresponds to almost three times its book equity. Importantly, Dexia has kept the positions unchanged since then.

rates. On October 7, 2011 Dexia incurred an additional €16 billion margin call but was unable to post the collateral.[18]

A.2. Bank of Cyprus

The bailout of Cyprus to rescue its two failing banks, Bank of Cyprus (BOC) and Cyprus Popular Bank, provides the most recent example of how aggressive yield chasing by banks in the form of investing in risky sovereign debt brings an entire country to the verge of financial collapse. A recent investigation by the Cypriot central bank into the activities of BOC documents a premeditated trading in Greek sovereign bonds by BOC. Appendix Table I in the Online Appendix reports the purchases of Greek sovereign bonds by ISIN in 2009:Q1. Buying and selling the same ISIN within the same quarter suggests active trading, rather than holding sovereign bonds to manage liquidity risk. Importantly, trades with the same ISIN have frequently occurred with the same counterparty. The report mentions Deutsche Bank, Barclays, and Société Générale SA as the most important European trading partners, which indicates that this behavior was prevalent across European banks.[19]

Internal emails from BOC executives reveal the motives behind these trades. The non-performing loan portfolio eroded the capital of the firm. BOC thus purchased Greek government bonds to pursue an "absolute yield" strategy to deliver net interest income and "relative value" strategy to take advantage of selling opportunities to generate gains around reporting dates ("window dressing"). They invested in the highest yielding bonds including longer maturity

[18] Dexia was eventually bailed out by the governments of Belgium, France, and Luxembourg. The government assured debtholders as well as swap counterparties that they would not incur any losses in order not to trigger a default event. This is similar to September 2008, when the U.S. government bailed out American International Group (AIG). Also in the case of Dexia, governments were concerned with massive losses that had to be booked by the (unidentified) counterparties, emphasizing the systemic importance of Dexia. It was bailed out a third time in November 2012 and the European Commission extended an additional €85 billion refinancing guarantee to restructure Dexia in December 2012.

[19] Figure II in the Internet Appendix II shows the Greek sovereign bond holdings over the January 2009 to December 2011 period. BOC purchased about €2 billion Greek government bonds in 2010, increasing its holdings to about €2.4 billion (A&S, 2013) when Greece was downgraded further and rescue packages made a default of Greece more likely. The data published by the EBA shows a consistent increase in Greek bond exposure. BOC actually kept their holdings up to the private sector involvement in late 2011.

inflation-linked bonds. Hedges were put in place to swap longer dated bonds onto floating rates and maintain BOC's target duration.

ECB repo funding was not driving the banks' decision to do the carry trades. "We have no reliance on ECB borrowing because (a) we borrow and invest in liquid bonds and (b) alternatively, we could have utilized our USD cash, swap them into Euro, and invest in such assets. Moreover, we could utilize undrawn (but uncommitted money-market lines) amount to EUR 500 million […] The reason we used repos is because the cost was lower." ECB funding improves the profitability of the trades and made them still look attractive while private repo markets were already rejecting the collateral: "Almost no bank accepts Greek government bonds as repo collateral for 1 year. Those that do, impose very high haircuts… The cost of repoing Greek government bonds for 3 months is around 0.7%."

Total losses as a result of BOC's Greek government bond holdings amounted to €1.9 billion on November 16, 2012: €910 million relates to the costs of restructuring due to the Private Sector Involvement (PSI) program; €562 million relates to mark-to-market adjustments on the new bonds; €48 million relates to transfers from available for sale (AFS) reserves; €399 million relates to the costs of unwinding the hedges related to the bonds.

Overall, these are two illuminating examples documenting the widespread and active use of carry trades and the associated costs when the downside scenario materializes.

B. Data Sources

To identify the effects of banks' carry trade behavior, we construct a dataset using three data sources. We collect market information (bank stock prices, bank and sovereign CDS spreads, and sovereign bond yields) from Bloomberg, information about bond portfolio holdings from the European Banking Authority (EBA) and annual and quarterly reports from the banks, and financial information from SNL Financial as well as company reports. We augment the data with information from S&P Credit Portal, investor presentations, and the ECB and Bank of International Settlement (BIS).

We start with all public European banks included in the EBA stress tests. A list of these banks is included in Appendix II.[20] We collect financial information such as size, leverage, and capitalization from SNL Financial. In addition, we compute stock returns from daily stock prices. We use ten-year benchmark government bond yields, which are observed on a daily basis.

Information about banks' actual portfolio holdings of sovereign bonds is obtained from the EBA. The EBA took over the responsibilities from the Committee of European Banking Supervisors (CEBS) on January 1, 2011. They have been responsible for five stress tests and capitalization exercises that have been conducted in the European banking market since 2010 to "ensure the orderly functioning and integrity of financial markets and the stability of the financial system in the EU."[21] The results of the tests together with detailed information about banks sovereign bond portfolios were published for the following reporting dates: (1) March 2010, (2) December 2010, (3) September 2011, (4) December 2011, and (5) June 2012.[22]

We use the iMoneyNet database to collect monthly information about the holdings of U.S. MMFs in European banks' commercial paper and repurchase agreements (repos). As a consequence of the recent financial crisis, in 2010 the Securities and Exchange Commission (SEC) approved changes to Rule 2a-7 of the Investment Company Act of 1940 and took other actions to strengthen the regulatory framework that governs MMFs. Following the SEC regulation, U.S. MMFs have to report monthly mark-to-market net asset value (NAV) per share of their portfolios on Form N-MFP, which is then published by the SEC. We can access the data from November 2010 onwards.

[20] We exclude six banks from our analysis either because of data availability or because the bank is part of a banking group where the parent owns the vast majority of stocks. These are: Bankia (BKIA), Raiffeisenbank International AG (RBI), Österreichische Volksbanken AG (VBPS), Caja de Ahorros del Mediterraneo (CAM), Hypo Real Estate (HRX), and Irish Life and Permanent (IPM).

[21] The first stress test was already performed in 2009, but neither the identity of the participating institutions nor details about the results have been disclosed except for the information that all institutions were adequately capitalized.

[22] The data are publicly available on the EBA website (http://www.eba.europa.eu/Home.aspx).

C. Summary statistics

In Table 1, we provide descriptive statistics for the returns of GIPSI banks as well as German ten-year government bonds. Panel A of Table 1 shows the mean daily bond returns since January 2007 in basis points (bps). Greek government bonds have the highest negative return as well as the highest variance followed by Portugal and Ireland. All three countries have already been bailed out by the European Union. Germany has positive daily returns with a small variance.

[Table 1]

Panel B (Panel C) in Table 1 reports bond return correlations between 2001 and 2006 (2007 and 2013). In the period between 2001 and 2007, bond returns were almost perfectly correlated. This demonstrates that these countries were perceived by investors as being almost identical despite the major economic differences between them. The government bond returns in Greece and Germany, for example, had a correlation of 0.99. This changed significantly as the sovereign debt crisis unfolded. Between 2007 and 2013, the bond return correlation among the GIPSI countries declined, while the correlation between GIPSI and German bond returns became negative, which shows the divergence within the eurozone and the flight-to-quality.[23]

Panel A of Appendix III lists the averages of key variables for each bank. Log-Assets is the natural logarithm of total book assets. ST-LVG is short-term debt divided by total debt. RWA/Assets is risk-weighted assets divided by book assets. Tier 1 is the Tier 1 capital divided by risk-weighted assets. ΔMMF/Assets is the monthly withdrawal by US Money Market Mutual Funds scaled by book assets. On average, 33% of the total debt is short-term debt and banks have a Tier 1 ratio of 10.15%. Panel B of Appendix III reports bond holdings of GIPSI banks versus non-GIPSI banks. Sovereign bonds correspond to 8.69% (1.2%) of total assets of GIPSI

[23] We explore further time-series characteristics of GIPSI bond yields. The time-series are non-stationary but first differenced time-series are. GIPSI bond yields are thus integrated of the order of 1 (I(1)). We test the co-integration relationship between, for example, Italian government bond and German government bond yields and find that there is no co-integrating relationship in the period starting in Q4 2009.

(non-GIPSI) banks and domestic sovereign bonds account for 83.9% (50.97%) of GIPSI (non-GIPSI) banks' sovereign bond portfolios. Panel C of Appendix III provides time series characteristics of banks' stock returns and CDS prices observed on a daily basis. The average daily realized return is -13.21 bps and the average five-year CDS spread is about 185 bps.

3. How did banks manage their GIPSI exposures? Evidence from micro-level data

In this section, we document the trading behavior of European banks and discuss alternative explanations for our findings based on micro-level (portfolio) holding data from EBA. Moreover we explore important differences as to the investments of peripheral versus core European banks in peripheral sovereign debt, particularly how these patterns change once the ECB funded carry trades with two three-year LTROs in December 2011 and February 2012.

A. Sovereign bond holdings

The carry trade hypothesis implies that banks exploited a widening of yield spreads by betting on their subsequent convergence while short-term funding was available. The incentives were particularly strong for weakly capitalized banks to shift their portfolios into riskier assets and to improve their regulatory capital without incurring the costs of raising equity as these exposures had zero capital requirements. However, there are alternative explanations for these findings. For example, it could be that European banks did not increase their exposure to GIPSI sovereign debt and simply held on to their pre-crisis holdings, that is, before the spreads widened ("inertia hypothesis"). European banks' exposure to GIPSI countries might also simply reflect a home bias of banks holding domestic sovereign debt ("home bias hypothesis"). Moreover, domestic sovereigns might have forced domestic banks to maintain asset exposures ("moral suasion hypothesis").

The EBA disclosed the sovereign bond holdings of European banks on five reporting dates during the March 2010 to June 2012 period, which provides evidence that helps us to analyze banks' behavior as to investments in risky sovereign debt and to disentangle the different hypotheses. The various explanations for bank behavior are relevant during different

time periods, as well as for different countries, and depend in part on the regulatory environment.

Table 2 reports European banks' sovereign bond holdings at five reporting dates since March 2010 both for the full sample (Panels A and C) and separately for GIPSI and non-GIPSI banks (Panels B and D). Table II.1 in the Online Appendix documents the holdings of GIPSI sovereign debt by domestic banks.

[Table 2]

In Table 2, we document several important findings. First, European banks entered the sovereign debt crisis with a substantial exposure to peripheral sovereign debt; however, their total exposure towards Italian, Spanish, and Portuguese government debt did not decrease substantially during the March 2010 to June 2012 period. For example, Italian government bond positions decreased only from €264.5 billion to €258.9 billion.

Second, we observe an *increase* in GIPSI and non-GIPSI banks' exposure to Spanish, Italian, and to some extent Portuguese sovereign debt between March and December 2010 when yield spreads widened (see Figure 1). Non-GIPSI banks even increased their exposure to Spanish sovereign debt more than GIPSI banks in absolute euro amounts.[24] In other words, banks were not *passively* caught by the emergence of the sovereign debt crisis as implied by the inertia hypothesis. On the contrary, they *actively* increased risky sovereign debt positions in their portfolios in response to a surge in yields (e.g., Spanish sovereign bond yields).

We find that non-GIPSI banks were actively purchasing Italian and Spanish sovereign debt. Purchases by GIPSI banks were achieved mostly by domestic (i.e., Italian and Spanish) banks; however, other GIPSI banks also purchased smaller amounts. In Ireland and Portugal, we observe a deleveraging in 2010 by non-GIPSI banks; the purchasers were domestic Irish and Portuguese banks. In fact, Table II.1 in the Online Appendix shows that non-domestic

[24] Spanish bond yields surged above Italian bond yields after Spain was downgraded by S&P in April 2010 despite a higher rating of Spain vis-à-vis Italy.

GIPSI banks even sold Irish and Portuguese debt to some extent. Thus, we observe a home bias particularly for those countries that were hit first by the sovereign debt crisis.

Taken together, non-GIPSI banks increased their holdings of Italian and Spanish sovereign debt, which is consistent with our carry trade hypothesis. Domestic Italian and Spanish banks also increased their holdings by a significant amount and the purchases by Irish and Portuguese banks were all done by domestic banks. These observations are consistent both with the carry trade hypothesis and the moral suasion hypothesis; however, we need more cross-sectional evidence to disentangle these hypotheses.

Third, there is a de-leveraging in 2011 with respect to peripheral sovereign debt. GIPSI (non-GIPSI) banks reduce their exposures to GIPSI sovereign debt by about 29% (45%). Non-GIPSI banks continued their de-leveraging process in the first half of 2012, reducing their total exposure to GIPSI sovereign debt to €105 billion. Interestingly, this decrease is driven by the write-down of Greek sovereign bonds due to the PSI, but the exposures to the other peripheral countries remain largely unchanged.

Fourth, there is a further substantial exposure increase to GIPSI sovereign debt in the portfolios of GIPSI banks between December 2011 and June 2012. For example, Italian banks invested about €37 billion in domestic sovereign debt; Spanish banks increased their exposure to Spanish government debt by about €13 billion.[25] In other words, we observe a shift in risk exposure towards peripheral sovereign debt from non-GIPSI banks into GIPSI banks' portfolios which is consistent with an increase in home bias over time and thus consistent with both the carry trade hypothesis and the moral suasion hypothesis.

Fifth, there is an increase in exposure to non-peripheral (in particular, German and French) government debt during the March 2010 to June 2012 period, which is driven by non-GIPSI banks consistent with flight-to-quality behavior.

[25] Note that Greek banks have not participated in the stress tests or capitalization exercises since September 2011.

In the following sub-sections, we provide more cross-sectional evidence to differentiate between the carry trade, home bias and moral suasion hypotheses.

B. Increasing sovereign exposures: Moral hazard, home bias, and suasion

In this sub-section, we take a first step in differentiating between the different hypotheses as to European banks' incentives to purchase GIPSI sovereign debt after the emergence of the sovereign crisis in 2009. We analyze the changes in banks' sovereign bond holdings (1) by domestic versus non-domestic bank, (2) by bank risk, (3) by bond maturity, and (4) by government interventions. The results are reported in Table 3.

[Table 3]

Panel A of Table 3 reports the percentage changes in Italian, Spanish, and overall GIPSI sovereign bond holdings for domestic and non-domestic banks for the five stress tests. Between March and December 2010, non-domestic banks had a larger percentage increase in peripheral sovereign debt compared to domestic banks. For example, non-Spanish banks increased their holdings by 66.34%. GIPSI banks simultaneously decreased their German and French sovereign bond holdings, which suggests that they used the proceeds to finance the purchase of their own sovereign debt. While GIPSI and non-GIPSI banks decrease their exposures to peripheral sovereign debt in 2011, this process is accelerated by GIPSI banks after the capital exercise of the EBA in September 2011. Between January and June 2012, non-GIPSI banks reduced their peripheral sovereign exposures, whereas GIPSI banks purchased a significant amount of their own sovereign bonds, which is consistent with the interpretation that home bias increases. Interestingly, while GIPSI banks decreased German bunds in the first half of 2012, they loaded up on French government bonds, whose yields have substantially increased vis-à-vis German bunds since late 2011.

In Panel B of Table 3, we exploit cross-sectional variation among European banks and show the changes in GIPSI, and German and French sovereign debt as a percentage of total assets for banks with high/low Tier 1 or RWA/TA ratios and for GIPSI versus non-GIPSI banks.

We use indicator variables equal to 1 if the banks' Tier 1 ratio (RWA/Assets ratio) is within the lowest (highest) quartile to identify under-capitalized banks. Between March and December 2010, low Tier 1 and high RWA/TA banks both from core and peripheral European increased their exposure to GIPSI sovereign debt and finance at least part of their purchases with proceeds from selling German bunds. We observe a similar pattern during the January to June 2012 period. Moreover, we find that weakly capitalized GIPSI banks increase their exposure to French sovereign bonds in 2012, which is consistent with our earlier result. Overall, we find that banks with low Tier-1 ratios and high RWA/Assets, that is banks with higher gambling and regulatory arbitrage incentives, increase their exposure to GIPSI sovereign debt more relative to other banks.

While non-domestic banks increased their holdings in Italian and Spanish bonds relatively more than domestic banks between March and December 2010, this trend reversed between January and June 2012. Domestic banks increased their holdings while non-domestic banks even decreased their sovereign bond exposures. These results indicate an increase in home bias in the first half of 2012, which was in part been funded by the ECB. In December 2011 and February 2012, the ECB injected about €1 trillion into the banking system in two three-year LTROs at an initial interest rate of 1%.[26]

Panel C of Table 3 reports the change in GIPSI, Italian and Spanish sovereign bond holdings of our sample banks between January and June 2012. The data show that Italian banks increased Italian sovereign bond holdings with a maturity equal to or less than three years by €28.6 billion and longer dated bonds by €7.8 billion. [27] Similarly, Spanish banks increased their

[26] Since then, the interest rate on these funds has decreased to 0.25%.

[27] We aggregate all individual bank exposures to the country level and distinguish between changes in bond holdings with maturities equal to or less than three years and greater than three years. If banks use LTRO funds for new carry trades and match the maturities of the securities they purchase with the maturity of these funds, we would expect to see increases in sovereign debt holdings particularly for maturities equal to or less than three years. Note that Panel B of Table 3 reports holding changes. That is, if banks use the funds to simply replace maturing bonds or to replace own funding with ECB funding, this is not recognized in this analysis. Only increases in euro exposures are recognized as "new" carry trades.

exposure to Spanish sovereign bonds by €6 billion with a maturity of less than or equal to three years and €6.6 billion with maturities above three years.[28] Overall, non-GIPSI banks' exposure changes were small in comparison to purchases by Italian or Spanish banks and holdings were, on average, reduced not increased. Taken together, these results indicate that carry trades with Italian and Spanish sovereign debt have been executed by domestic banks, which is consistent with the notion that home bias increased over time due to funding by the ECB.

An alternative explanation for these results might be that domestic regulators forced domestic banks to maintain asset exposures to reduce bond yields. After the recent financial crisis, several European banks were bailed out by their governments, thereby increasing the influence regulators have over their domestic banks. We test this in Panel D of Table 3 and differentiate between GIPSI (Italian and Spanish) banks that have or have not been bailed out (we call them "intervened" after they have received bailout funds).[29] We compile data on government interventions using information disclosed on the official EU state-aid websites. While intervened banks increase GIPSI sovereign exposures, the majority of the bonds were purchased by non-intervened banks in the first half of 2012.[30]

4. Estimating banks' carry trade exposure using multifactor models

Can carry trade behavior be understood using market data? In this section, we investigate the carry trade behavior of European banks inferring banks' peripheral sovereign debt, as well as short-term funding exposures using sensitivities of banks' equity with GIPSI and German sovereign bond returns. We then provide a series of robustness and falsification tests to support our interpretation of carry trade behavior among European banks. We

[28] However, about €12 billion short-term bonds matured between December 2011 and June 2012, so net purchases of Spanish banks were about €19 billion.
[29] Appendix V provides a list of the intervened banks.
[30] We also document substantial exposure increases by intervened GIPSI banks in 2010 which even exceed those of non-intervened banks and is consistent with moral suasion. Unfortunately, we cannot further decompose these purchases as all Greek, Irish and Portuguese banks in our sample have been bailed out at that time.

demonstrate that this behavior is bank specific and does not extend to hedge funds, non-European banks, or non-financial firms.

A. Methodology: Measuring banks' carry trade exposure

Unfortunately, micro-level data of sovereign bond positions are unavailable to us on a high frequency basis. Furthermore, banks may be exposed to sovereign bond risk other than through direct bond positions (e.g., through credit default swap positions and counterparty exposure in derivatives transactions with governments). Given this limitation and to link bank risk to both the investment and funding leg of the carry trade, we use multifactor models in which the sensitivities of banks' stock returns to sovereign bond returns are measures of their exposure to sovereign debt.[31] To improve these models, we also link our estimates to micro-level portfolio holdings. We estimate the following regression:

$$R_{i,t} = \beta_{0,i} + \beta_{GIPSI,i} R_{GIPSI,t} + \beta_{Germany,i} R_{Germany,t} + \beta_{m,i} R_{m,t} + \varepsilon_{i,t}, \qquad (1)$$

where $R_{i,t}$ is bank *i*'s daily stock return, $R_{GIPSI,t}$ is the daily return on ten-year government bonds from Greece, Italy, Portugal, Spain or Ireland. We also construct a GDP-weighted GIPSI Sovereign Bond Index, which is a comprehensive measure of the overall exposure of banks' to peripheral sovereign debt.[32] $R_{Germany,t}$ is the daily return on ten-year German government bonds and $R_{m,t}$ is the daily return of the equity market index in country *m* in which the bank is headquartered. Because of the co-movement of $R_{m,t}$ and the sovereign bond returns of country *m* and Germany, we orthogonalize $R_{m,t}$ to both return series.[33] Note that the ten-year German government bond is an additional risk factor in our model.

The estimate of $\beta_{GIPSI,i}$ provides an unbiased estimate of the exposure of bank *i* to GIPSI sovereign debt. A positive factor loading suggests that banks have invested in long-term

[31] Our approach to estimate European banks' sovereign risk exposure is similar to the procedure employed by Agarwal and Naik (2004) to characterize the exposures of hedge funds.
[32] A GDP-weighted index has the advantage over other (market value) weights as it captures the ability of governments to repay their debt.
[33] Not orthogonalizing gives qualitatively similar results.

(peripheral) government bonds. $\beta_{Germany,i}$ is an estimate of bank i's short-term funding exposure. The negative factor loading suggests that banks are "short" long-term German bonds. This reflects a "flight to quality" of investors who purchase long-term safe (German) government bonds, at the same time reducing the supply of short-term capital. If long-term bond prices appreciate whenever short-term funding dries up and banks are exposed to short-term funding, then it appears as if banks were short long-term bonds. $\beta_{GIPSI,i} > 0$ and $\beta_{Germany,i} < 0$ is consistent with a carry trade behavior of European banks: they appear to have invested in long-term government bonds financed in the short-term wholesale market to maximize the carry between both legs of the trade.

[Table 4]

Panel A of Table 4 provides descriptive statistics of the estimated carry trade exposures, for the full sample of banks and separately for GIPSI and non-GIPSI banks. The factor loadings are estimated quarterly and averaged across all banks. The mean factor loadings for peripheral bond exposure (GIPSI Sovereign Bond Index, Italy and Spain) suggest that non-domestic banks had large exposures to the periphery. A large negative loading of German bunds indicates the funding pressure on banks during our sample period due to a flight to quality of investors. The pre-2007 carry trade estimates show that the exposure estimates were close to zero and sometimes even small and negative before the yield spreads widened in mid-2008. This evidence supports our hypothesis that banks built substantial carry trade positions as bets on the convergence of sovereign bond yields in the euro area.

B. "Carry trade" behavior of European banks

We estimate regression equation (1) using pooled OLS regressions and cluster standard errors at two dimensions, bank and quarter, to account for (unobserved but time-variant) variation that is both bank specific in different quarters and that is common across all banks in the same quarter. The results are reported in Panel B of Table 4.

The estimated values of β_{GIPSI} and $\beta_{Germany}$ represent the cross-sectional averages of European banks' carry trade exposure. We also estimate (1) for each bank individually. Our results indicate that banks' stock returns are very sensitive to peripheral sovereign bond returns. Model (1), for example, estimates the sensitivity of stock returns to Greek government bond returns. The positive factor loading indicates an (unhedged) exposure of banks to Greek government debt. All other factor loadings are (when employed individually) positive and significant and the exposure is largest with respect to Italian and Spanish government debt. Model (6) estimates the sovereign debt exposures collectively and model (7) uses the GIPSI Sovereign Bond Index to measure banks' exposure to peripheral debt. The R^2s of the models show that a substantial proportion of the variation in stock returns is explained by these covariates. $\beta_{Germany}$ is negative and large in magnitude, which indicates banks' funding pressure is caused by their exposure to short-term debt. Overall, our results are consistent with a carry trade behavior by European banks.

C. Robustness of our carry trade estimates

In Table 5, we report a series of robustness tests that supports the notion of carry trade behavior of European banks. We first construct an index of bond returns using the daily average return of sovereign bonds from euro area members other than GIPSI countries or Germany or France (*Bond Index*). If banks invested in GIPSI government debt to exploit the highest-yielding sovereign investments, banks' stock returns should be less sensitive to the return of this index. Model (1) of Table 5 reports a regression including *Bond Index* as separate control variable and, as expected, its coefficient is not statistically significant.

[Table 5]

We include a variety of other macroeconomic state variables in the model to control for changes in macroeconomic fundamentals that could drive both stock and sovereign bond

prices.[34] Model (2) in Table 5 reports the results. Most importantly, the factor loadings do not change including these variables. Model (3) includes all macroeconomic proxies but uses the GIPSI Sovereign Bond Index as an exposure measure.

The sovereign debt market is characterized by a high degree of collinearity as shown in Table 1 above. Principal component analysis (PCA) is a statistical procedure we use to construct different linear combinations of the factor returns that are uncorrelated with each other using the covariance matrix of the returns.[35] Instead of using the GIPSI returns as independent variables, we regress the banks' stock return on PC1 and Germany. We find a positive and significant relationship between PC1 and stock returns (Model (4) in Table 5), which is consistent with a carry trade behavior by banks.

In Model (5) in Table 5, we substitute French for German government bonds and find a negative and significant value for β_{France}, which is smaller in magnitude compared to the factor loadings of German bunds. This reflects the increasing divergence of yields between French and German government debt that started in 2011. The coefficients of Greece and Italy are even stronger. In Model (6), we include the Fama-French factors *SMB* and *HML*, however, the results remain unchanged.[36]

Carry trade exposure should also be reflected in CDS spreads as an important proxy for bank risk and funding costs. We expect to see that CDS spreads reflect a widening of the gap between GIPSI bond and German bund yields, either through an increase in peripheral bond

[34] There are: (i) VSTOXX, the European counterpart to the VIX index in the U.S., is the change in the volatility index of the European stock market; (ii) *TermStructure* is the slope of the term structure of interest rates measured as the difference between the yield on a ten-year euro area government bond and the one-month Euribor; (iii) *BondDefSpread* is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (iv) *1mEuribor* is the level of the short-term risk-free interest rate measured as the one-month Euribor; (v) Δ*ESI* is the monthly change in the economic sentiment indicator obtained from opinion surveys conducted by the ECB; (vi) Δ*IntProd* is the monthly change in the level of industrial production; (vii) Δ*CPI* is the change in the rate of inflation measured as the monthly change in the European Consumer Price Index.

[35] As the covariance matrix is symmetric, it has linearly independent eigenvectors corresponding to the number of positive eigenvalues. The eigenvectors are called principal components and are ranked according to the eigenvalue. The first principal component (PC1) is the linear combination of GIPSI bond returns with the highest eigenvalue. It is the component that explains the largest part of the variation in GIPSI bond returns.

[36] *HML* and *SMB* are measured for European portfolios and available on Kenneth French's website since 1990.

yields or if funding conditions deteriorate. We test this in Models (7) and (8) in Table 5 and use *ΔLog* (*Bank CDS*) as a dependent variable, which is the change in the natural logarithm of daily bank CDS spreads. As reported in column (7), the coefficient of Greek bond returns is negative and significant, whereby, if Greek bond prices fall, banks experience, on average, an increase in their CDS spreads. Moreover, if German bund prices appreciate, banks' funding costs also rise, ceteris paribus, pointing to their exposure to short-term wholesale markets. The PCA in Model (8) shows a similar result. Overall, we find strong evidence consistent with a carry trade behavior by European banks.[37]

D. Subsamples of GIPSI versus Non-GIPSI banks

An alternative explanation of our results is an intensification of weak sovereign bank linkages, i.e., banks become weaker when their sovereigns become weaker, which could explain the positive factor loadings on GIPSI sovereign debt. If sovereign risk makes GIPSI banks weaker, then non-GIPSI (particularly German and French) banks should get stronger under the alternative hypothesis and should thus not get affected the same way GIPSI banks do. We test this by splitting our sample into subsamples of (1) GIPSI, (2) non-GIPSI, and (3) German and French banks. We report the results in Panel B of Table 5, where we estimate banks' exposure using the GIPSI Sovereign Bond Index. While the loadings for GIPSI banks are larger in magnitude, we find evidence consistent with large and significant exposures of non-GIPSI and German and French banks to peripheral sovereign bonds. Similarly, non-GIPSI banks are vulnerable to a flight-to-quality as the sensitivity of their equity return to changes in German bund returns suggests.

[37] We perform further tests that remain unreported for brevity. We include bank fixed effects to control for time-invariant bank characteristics. In other tests, we use bond yield changes instead of bond returns. We also construct an equally-weighted portfolio of bank stocks from our sample and estimate a time series regression. In separate tests, we exclude broker-dealer banks. These banks might have larger portfolios due to this specific function. Lastly, we use weekly (instead of daily) stock returns. In all tests, our results from Table 4 remain qualitatively unchanged.

E. Falsification tests

We provide a variety of falsification tests as European banks have different incentives to load up on peripheral sovereign debt compared to similar banks in other Western economies. First, the CRD IV establishes zero-risk weights for EU member banks' exposure to sovereign debt issued in their domestic currency. Thus, U.K. and U.S. bank have to hold capital against investments in peripheral sovereign debt. Second, U.K. and U.S. banks were systematically recapitalized after the U.S. mortgage crisis.[38] European banks, on the other hand, are still undercapitalized based on various standards (such as leverage ratios). Third, U.K. and U.S. banks cannot use sovereign debt to the same extent as European banks as collateral for liquidity. We thus expect to find smaller estimates on similar tests using U.K. or U.S. banks. A third set of firms we consider are non-financial (industrial) firms, which do not have similar incentives such as gambling or regulatory capital arbitrage as banks, which should also be reflected in their factor loadings.

We run tests with the following index returns as dependent variables: (1) a value-weighted index of all EBA banks in our sample; (2) a value-weighted index of U.K. banks; (3) a value-weighted index of the 100 largest U.S. banks based on market values; (4) a HFRX Macro Hedge Fund Index; (5) an equally-weighted industrial index formed from the underlying MSCI industrial indices from Italy, Spain. and Portugal (MSCI GIPSI)[39]; (6) the MSCI Industrial Germany index; (7) an equally-weighted index of the most important countries in Europe other than Germany and the periphery (France, Netherlands, Norway, Denmark. and Sweden); and (8) the MSCI Industrial U.K. Index. Panel C of Table 5 reports the results. Control variables include the Fama-French factors, *SBM* and *HML*. As market return, we include the Euro Stoxx 600 Index for European indices, the S&P 500 Index for the U.S. banks, and the MSCI World for the HFRX Macro Hedge Fund Index. Newey-West standard errors are adjusted

[38] Many of the U.K. banks have been nationalized and their capital position strengthened after the recent financial crisis.

[39] We exclude Ireland and Greece from this index due to missing data in their respective industrial indices.

for heteroscedasticity and autocorrelation using eight lags. Column (1) shows the time-series estimates for all EBA banks, which reflect our earlier cross-sectional results. We do not find statistically significant exposure of U.K. banks to peripheral sovereigns (column (2)). Moreover, the value of $\beta_{Germany}$ is much smaller, which indicates a lower funding exposure. Column (3) reports the result for U.S. banks echoing the results for U.K. banks.[40] We use daily returns of the HFRX Macro fund as the dependent variable in column (4). The results are intriguing and suggest that macro hedge funds are betting against Italy but are long German bunds, thus effectively taking opposite positions in trades with European banks. Columns (5) to (8) show sensitivities of country-specific industry indices to GIPSI and German sovereign debt. Overall, the betas are close to zero and insignificant.

5. Factor loadings, sovereign bond holdings, and liquidity risk

Do our factor loadings relate to actual government bond holdings of banks or simply reflect some other underlying economic exposures and linkages? What determines banks' liquidity, i.e., short-term funding risk? And does liquidity risk interact with a bank's solvency risk? To address these important questions, in this section we examine bank-level data, sovereign bond holdings, and short-term funding exposure.

A. Relating factor loadings to micro-level holding data

Since June 2010, the EBA has disclosed bank-level sovereign bond holdings reported during five sequential stress tests.[41] If $\hat{\beta}_{GIPSI}$ reflects higher exposure to GIPSI sovereigns, we expect to find higher $\hat{\beta}_{GIPSI}$ if banks have higher reported holdings. To visualize this relationship, in Panel A of Figure 3 we plot the factor loadings against average GIPSI holdings (measured between the EBA reporting dates as the sum of the exposures to all peripheral sovereigns) scaled by total assets for GIPSI and non-GIPSI banks. In Panel B, we plot these

[40] We also run these results for a portfolio of Goldman Sachs, JPMorgan, Morgan Stanley, Citigroup, and Bank of America. It has frequently been claimed that these banks had huge counterparty exposure to the GIPSI countries. We do not find significant exposures to sovereign debt of either of the GIPSI countries.

[41] Note that not all banks participated in all stress tests or the capitalization exercise.

relationships between each EBA stress date. Overall, all scatterplots show a positive relationship between factor loadings and portfolio holdings for GIPSI and non-GIPSI banks.[42]

One possibility of how non-GIPSI banks could be affected (other than through bond holdings) is contagion through real-sector exposure. We thus exploit the data released by the EBA in 2011 on non-sovereign bond exposure to show that it is not real-sector exposure (particularly among the non-GIPSI banks) that is explaining their factor loadings. More importantly, it is their direct sovereign bond holdings that matter. If it was contagion, they should not matter, but since they do (also) matter, it shows that the bond exposure channel is at work too. We report the results in Panels C and D of Appendix Table IV in the Online Appendix.

[Figure 3]

B. Funding liquidity risk and interaction of liquidity and solvency risk

We argue above that the negative factor loading of German bond returns reflect a flight-to-quality from short-term investors into long-term German government bonds. We thus expect to see cross-sectional differences in the factor loadings across banks arising from their short-term funding exposure. An important source of funding risk for European banks is their exposure to U.S. MMFs.[43]

Figure 4 shows U.S. MMFs' exposure to European banks since October 2010. These funds withdrew about $167 billion in repurchase agreements and commercial paper from European banks in 2011 alone. Panel B shows the percentage withdrawal from individual banks in 2011. U.S. MMFs completely eliminated their exposure to seven banks in the eurozone, among them Dexia S.A., suggesting that MMFs responded to potential solvency concerns of these banks. Other banks, predominantly Scandinavian banks, experienced massive inflows

[42] Internet Appendix IV provides further results, linking factor loadings to individual peripheral bond holdings.
[43] Ivashina, Scharfstein, and Stein (2012) show that the reduction in U.S. dollar lending by U.S. MMFs caused a significant decline in the dollar lending relative to euro lending by European banks, which was not the case for U.S. banks.

such as Svenska Handelsbanken AB, SEB Banken AB, and Swedbank, which indicates the divergence in funding opportunities for European banks.

[Figure 4]

We aggregate the monthly MMF holdings data to the quarter and estimate quarterly $\hat{\beta}_{Germany,i}$ using (1). We find some variation in the value of $\hat{\beta}_{Germany,i}$ ranging from -3.92 to -0.93. Panel A in Figure 5 shows the relationships between the factor loading estimates and MMF withdrawals in the cross-section of banks in 2011. This correlation is 0.71, suggesting that U.S. MMF exposure is an important determinant of banks' liquidity problems.

[Figure 5]

We plot the time series of U.S. MMF withdrawals for weakly versus well capitalized banks in Panel B in Figure 5. We measure capitalization using a one-year lagged market leverage ratio (defined as (total assets – book equity + market equity) / market equity) and define weak (well) capitalized banks as those in the upper (lower) quartile of the market leverage ratio.[44] We document an asymmetric development as to MMF fund withdrawals. MMFs withdrew more than 60% of their investments from weakly capitalized institutions after November 2010 but have more than doubled their investments in well-capitalized banks, which reinforces our earlier conjecture that short-term liquidity risk interacts with solvency risk.

C. Results from seemingly unrelated regressions

In this subsection, we assess the importance of portfolio holdings of sovereign debt as well as MMF exposure in explaining our factor loadings more formally in a one-step regression framework using Zellner's (1968) seemingly unrelated regression (SUR) technique.[45] The pooled time series cross-sectional approach is well suited in our setting because there might be

[44] The figure looks similar using regulatory or book leverage measures.
[45] This approach has also been used, for example, in French et al. (1983) to estimate the effects of nominal contracting on stock returns.

substantially more variation in the bond portfolios across banks as there is variation over time for a single bank given the limited portfolio data that is available to us. Regression model (1) is estimated as a system of equations consisting of *N* (i.e., the number of banks) time series equations and is estimated using GLS.

In Panel A of Table 6, $\hat{\beta}_{GIPSI}$ takes the form $\alpha_0 + \alpha_1 \frac{Holdings_{GIPSI,i,t-1}}{Assets_{i,t-1}}$ and $\hat{\beta}_{Germany}$ takes the form $\alpha_2 + \alpha_3 \frac{Holdings_{Germany,i,t}}{Assets_{i,t-1}}$. The coefficients are point estimates and constrained to be constant across all banks. We thus can interpret these coefficients as average factor loadings of our sample banks. We expect the value of $\hat{\alpha}_1$ and $\hat{\alpha}_3$ to be positive.

[Table 6]

We report the results using banks overall GIPSI as well as Italian and Spanish bond holdings. $\hat{\alpha}_1$ and $\hat{\alpha}_3$ are positive, which indicates that banks benefit from higher bond returns if they own bonds from the periphery or Germany. In Panel B of Table 6, $\hat{\beta}_{Germany}$ takes the form $\alpha_2 + \alpha_3 \frac{\Delta MMF_{i,t}}{Assets_{i,t-1}}$. ΔMMF are monthly money market withdrawals denominated in million euros. We re-estimate our systems of equations and find that $\hat{\alpha}_3$ is negative and highly significant. Banks with larger withdrawals from MMFs experience more short-term funding pressure. $\hat{\alpha}_2$ is also negative and significant, which indicates that even if banks do not have exposure to U.S. MMFs, they are still subject to short-term funding risk.[46]

[46] In unreported tests, we also analyze the effect of other measures of liquidity risk on banks' sensitivity to German bunds, which have been used widely in the literature. There are: short-term debt over total debt and repurchase agreements with other banks or the ECB over total assets. As expected, banks with more short-term debt (relative to total debt) or more repo funding have more negative factor loadings on German bunds.

6. Carry trade incentives

Who is doing the carry trades? In this section, we look at various explanations for this behavior: (1) home bias of peripheral banks, (2) moral hazard and regulatory arbitrage of under-capitalized banks, and (3) suasion of national regulators.

A. Home bias of peripheral banks

A possible explanation for our results is a home bias of peripheral banks to accumulate domestic sovereign debt. Our descriptive results suggests a rotation of peripheral sovereign debt in banks' portfolios with non-GIPSI banks reducing and GIPSI banks increasing their exposure. The ECB injected about €1 trillion into the financial system in two LTRO transactions and Table 3 showed a corresponding jump in GIPSI portfolio holdings in GIPSI banks. Simultaneously, the provision of liquidity most likely mitigated the funding problems of GIPSI banks. We test this by estimating regression model (1) over various subperiods and using interaction terms to analyze factor loadings for GIPSI banks versus non-GIPSI banks. We interact both the returns on the GIPSI Sovereign Bond Index and German bund returns with an indicator variable equal to 1 if the bank is from one of the GIPSI countries ($I_{GIPSI\ Bank}$). We chose the time periods between the EBA stress test dates consistent with our descriptive analysis in Tables 2 and 3 and to link our factor loadings to micro-level holding data. The results are reported in Table 7.

[Table 7]

$\hat{\beta}_{GIPSI}$ reflects the exposure of non-GIPSI banks to peripheral sovereign debt. We find that non-GIPSI banks load significantly on peripheral sovereign debt, which (in addition to our subsample analysis above) helps us to rule out the alternative hypothesis that our results reflect an intensification of weak sovereign bank linkages. Moreover, we find that non-GIPSI banks reduce their peripheral sovereign debt exposure between March 2010 and June 2012, which consistent with our descriptive results. The negative and decreasing coefficient $\hat{\beta}_{Germany}$ suggests that the funding problems (even of non-GIPSI banks) magnified. The interaction term

$\hat{\beta}_{GIPSIxGIPSI\ Bank}$ shows the additional exposure and $\hat{\beta}_{GermanyxGIPSI\ Bank}$ the additional funding risk of GIPSI banks. Interestingly, the interaction terms suggest that GIPSI banks increased their exposure to GIPSI sovereign debt significantly in the first half of 2012 and had lower funding risk following the ECB's LTRO injections. Overall, these results are consistent with an increase in the home bias of GIPSI banks in 2012. However, non-GIPSI banks continue to have a significant exposure to the periphery, which is consistent with the moral hazard hypothesis for carry trades, which we discuss in detail in the following subsection.

B. Moral hazard and regulatory arbitrage

It is posited in the moral hazard hypothesis that under-capitalized banks are more likely to invest in carry trades to comply with regulatory capital requirement ("regulatory arbitrage") and/or shift risk betting on their own survival ("risk shifting").

We use the Tier 1 capital ratio defined as Tier 1 capital over risk-weighted assets (RWA) and the RWA/Asset ratio to measure capital constraints. We also include bank characteristics such as bank size (Log-Assets) and short-term leverage (ST-LVG) to investigate the investment behavior of European banks. In all tests, we use one-year lagged bank characteristics.[47] We run the regression on the full sample of banks and report the results in Model (1) of Table 8.

[Table 8]

In Table 8, we show that banks with higher Tier 1 capital ratios have lower exposure to GIPSI sovereign debt. Tier 1 capital increases if banks have higher RWA or if they decide to hold more economic capital. For a given amount of RWA, the negative coefficient implies higher risk-shifting incentives. Moreover, the positive coefficient on RWA/Assets (unlike the sign on Tier 1) indicates that there is a regulatory arbitrage motive. Only including one of these

[47] ST Debt and Log-Assets are included in addition to the interaction terms in the respective models as well as a constant term, but all remain unreported for brevity.

variables might result in biased estimates of the coefficients due to confounding effects.[48] Moreover, we find that banks with high exposure to short-term funding have significantly more exposure to GIPSI sovereign debt. We document that larger banks (that is banks with more international focus, more wholesale funding and that are more systemically important) also have larger GIPSI sovereign exposures.

We estimate the regression separately for GIPSI and non-GIPSI banks and report the results in columns (2) and (3) in Table 8. Interestingly, only larger non-GIPSI banks have more peripheral sovereign exposures, which is consistent with the moral hazard behavior of European banks of stronger countries that are able to bailout their struggling banks. We find that GIPSI banks with high short-term funding and low Tier 1 ratios are more loaded on GIPSI sovereign debt. Additionally, GIPSI banks with more short-term debt are also more exposed to funding shocks. These results provide strong evidence for the moral hazard behavior of GIPSI banks, consistent with Diamond and Rajan (2011).[49] We also find evidence consistent with regulatory capital arbitrage in the sample of non-GIPSI banks.

We next estimate the regression over subperiods and report the results in columns (4) to (6) in Table 8. The results are again consistent with the interpretation that weakly capitalized banks are more exposed to peripheral sovereign debt. In Appendix Table IV, we provide similar analyses regressing GIPSI bond holdings scaled by total assets on our regulatory capital measures and bank characteristics. Overall, these results provide strong support for the moral hazard and regulatory arbitrage hypotheses.[50]

[48] In unreported results, we include either Tier 1 or RWA/Assets and find that the coefficient of Tier 1 is less negative when we do not control for RWA/Assets. This result indicates that the discretionary part of Tier 1 capital is more strongly related to the risk-shifting hypothesis. In other words, not controlling for RWA understates the risk-shifting effect.

[49] Interestingly, we do not find statistically significant evidence that riskier Italian banks (that is, banks with lower capital ratios or higher RWA or short-term debt) invest more in domestic sovereign debt, which is in line with our earlier results. Domestic banks most likely have different motives to invest in own sovereign debt (over and above the carry trade motive).

[50] Panel A of Appendix Table IV reports cross-sectional tests, Panel B reports the same regressions using bank-by-bank means which gives very similar results. An Analysis of Variance (ANOVA) helps us to identify the sources of variation in reported sovereign bond holdings. We find that 95% of the variation can be explained by differences between banks. The F-statistic based on Mean Squares is 62 and the p-value is < 0.001. In other words,

C. Moral suasion

An alternative explanation for our findings could be peripheral sovereigns forcing domestic banks to purchase their own sovereign debt because of limited demand by other investors (moral suasion hypothesis). The results in Panel D of Table 3 indicate that non-intervened banks significantly increased their exposure to peripheral sovereign debt. We test this hypothesis using our multifactor model interacting both GIPSI Sovereign Bond Index returns and German bund returns with the indicator variable *Intervened*. Table 9 reports the results for the full sample (column (1)), as well as for GIPSI banks (column (2)) and non-GIPSI banks (column (3)).

[Table 9]

Column (1) in Table 9 shows that intervened banks have higher GIPSI sovereign bond exposures compared to non-intervened banks and also more funding risk. However, GIPSI banks that have *not* been bailed out have significant exposures to GIPSI debt (column (2)), which indicates that our earlier results relating to moral hazard and regulatory arbitrage cannot be explained as moral suasion of GIPSI banks. Interestingly, non-GIPSI banks have larger GIPSI exposure and higher funding risk if they have been bailed out. European governments bailed out domestic banks using debt guarantees rather than recapitalizing them, which left the banking system severely under-capitalized. In other words, the design of European bailout programs might play an important role in explaining banks' carry trade behavior. We leave this hypothesis for future research.

Columns (4) and (5) in Table 9 show that also in the subsample of non-intervened banks, weakly capitalized banks had higher carry trade exposures, which is consistent with our moral hazard and regulatory arbitrage hypotheses.

including bank fixed effects in these regressions will eliminate virtually all of the variation in sovereign bond holdings.

7. Profitability of carry trades

Figure 1 shows that the yield spreads between German bunds and GIPSI bonds have substantially compressed since summer 2012, which is likely due to unconventional measures taken by the ECB and EU officials to contain the sovereign debt crisis. In this section, we investigate the effects of some of these measures on sovereign bond yields and bank equity returns.

A. Cumulative abnormal returns of sovereign bond portfolios

Panel A in Figure 6 displays the value of €1 invested in a 10-year Italian sovereign bond on January 1, 2011 until end of June 2013. Evidently, a declining trend in the market value of this portfolio only reversed in the second half of 2012 and this investment was not profitable. Similarly, Panel B shows the value of €1 invested in a 10-year Italian sovereign bond on December 21, 2011, the allotment date of the first tranche of the LTRO funds. The second tranche was allotted on February 29, 2012. The three red lines indicate specific events that might have helped to mitigate the fallout from the sovereign debt crisis: (1) the EU summit on June 29, 2012, where the European Commission proposed that direct financing of banks through the European Stability Mechanism (ESM) should be possible; (2) the announcement of ECB chief Draghi on July 26, 2012 that he would do everything to save the euro ("Draghi speech"); and (3) the announcement of the details of the Outright Monetary Transaction (OMT) program in September 2012. The OMT program enables the ECB to purchase (an unlimited amount of) sovereign bonds in the secondary market to stabilize asset prices.[51] Overall, the profitability of the trades was ultimately due to the "Draghi speech" and the OMT announcement.

[Figure 6]

It is thus a conservative approach to assess the profitability of the purchases of

[51] The ECB purchased Italian and Spanish bonds earlier in 2011. The OMT, however, differs substantially because claims of the ECB will (for the first time) rank pari passu, that is, ECB purchases will not make other bondholders junior claimants.

sovereign bonds by analyzing cumulative abnormal returns (CARs) around these events in 2012.[52] We report the results in Table 10. We calculate the CARs of sovereign bonds (Panel A) and average the CARs c for our public sample banks (Panel B) around five events: (1) LTRO 1, (2) LTRO 2, (3) the EU summit, (4) the Draghi speech, and (5) the OMT announcement.

[Table 10]

In Panel A of Table 10, we report the CARs of 10-year GIPSI bonds and German 10-year sovereign bonds for these events.[53] Interestingly, the €1 trillion injected into the financial system in both LTRO transactions did not have a major effect on sovereign bond yields despite some effect on Italian sovereign bond prices in the second LTRO tranche. However, the first LTRO had a significant negative effect on German bund returns, which is consistent with the interpretation that it substantially reduced the funding pressure of European banks. The EU summit in June 2012 did not affect returns. In line with our observations in Figure 6, we find significant positive CARs following the Draghi speech and, in particular, after the OMT announcement. For example, the two-day CAR of Spanish bonds around the OMT announcement is 4.8% and increases to 10.8% using the five-day CAR. Italian sovereign bonds show similar CARs. German bund returns, on the other hand, exhibit significant negative CARs, which indicates that both ECB actions helped to reduce the flight-to-quality in German bunds. Overall, these results highlight the importance of ECB interventions designed to reduce the bond yields of the periphery and to understand why the carry trades eventually became profitable.

[52] We ignore the funding side of the trades by assuming that they used LTRO money at an interest rate of 1%.
[53] The results are based on market model adjusted abnormal bond returns. We use the Lehman Brothers EU Sovereign Bond Index (obtained from Bloomberg) as the benchmark bond market index in computing these abnormal returns.

B. Cumulative abnormal equity returns

We perform a related analysis in Panel B of Table 10, investigating average cumulative abnormal returns (ACAR) of European public banks around the same events.[54] We also find that banks have significant abnormal return around the first tranche of the LTROs and the OMT announcement. For example, the two-day CAR around LTRO is about 1.4%. The results are consistent with banks benefiting from less funding pressure and suppressed sovereign bond yields following the OMT.

C. Understanding CARs

To understand the drivers behind the abnormal returns, we regress the two-day CAR of each bank around all five events on sovereign bond portfolio holdings (as reported in the most recent stress test of each event) and bank characteristics (Log-Assets, Tier 1 ratio, RWA/Assets). The number of observations corresponds to the number of banks in the stress tests for which data are available. We report the results in Panel C of Table 10. The banks with higher German bond holdings have somewhat lower CARs around the first LTRO tranche, which is consistent with the interpretation that the LTRO funds reduced funding pressure for these banks but did not help in decreasing peripheral sovereign yields. However, we find that banks that have large holdings of Spanish and Italian sovereign debt have substantially higher CARs around Draghi's speech in July 2012 and the OMT announcement, which is consistent with the CARs we reported for Italian and Spanish sovereign bonds. The measures taken by the ECB made carry trades profitable, which increased the market value of the banks invested in these trades.

[54] The results are based on market model adjusted abnormal bond returns. We use the MSCI Europe Index (obtained from Bloomberg) as the benchmark stock market index in computing these abnormal returns.

8. Conclusion

In the wake of the recent financial crisis, increasing economic divergence between the core of Europe and the periphery have caused a surge in the yield spread of peripheral countries (e.g., Greece, Italy, Ireland, Portugal, and Spain) and a flight to German bunds. We suggest that European banks have placed bets on the opposite economic development — convergence — within the euro area expecting yield spreads between, for example, Italy and Germany or Spain and Germany to converge. These bets or "carry trades" were designed as investments in GIPSI government bonds financed with short-term debt. As the sovereign debt crisis deepened, European banks lost a substantial portion of their market value. In a series of cross-sectional and time series tests, we find evidence that these trades have been widespread among European banks, not just GIPSI banks but even non-GIPSI European banks. We find convincing evidence for bank moral hazard and regulatory capital arbitrage in that large banks, banks with more short-term debt, and undercapitalized banks with high risk-weighted assets, are more likely to engage in carry trades employing low risk-weight GIPSI government bonds to earn higher and riskier returns on their diminished economic capital while meeting regulatory capital requirements.

Several policy implications stem from our empirical findings. First, under-capitalized banking sectors as the European countries had at the end of the financial crisis of 2007-2009 can lead to subsequent problems through excess risk taking, a theme that is reminiscent of the Japanese banking crisis of the 1990s (see Caballero, Hoshi and Kashyap, 2008). The European response in Fall of 2008 and early 2009 featured more debt and asset guarantees than bank recapitalization, unlike the U.S., and the ongoing sovereign crisis left several banks under-capitalized to the point that their market funding dried up. The lack of capital prevents a cleaning-up of European banks' balance sheets and an efficient allocation of credit throughout the economy. Popov and van Horen (2013) report that it has taken European banks much longer to recover in terms of their global syndicated lending than other banks, largely due to the GIPSI

holdings.

Second, simply restoring bank capitalizations up to regulatory risk weight-based requirements does not suffice in environments where the regulatory risk weights have become out of sync with the market's perception of asset risk and indeed the underlying fundamental asset risk, the zero-risk weights on sovereign bonds of peripheral countries being far from being risk-free to deserve such regulatory capital treatment. Worse, the continued reliance on such outdated risk weights, as in the first two stress tests of 2010 in Europe, can give under-capitalized banks perverse incentives to shift portfolios toward assets that have high economic risk and return. In the case of Europe, this created a strengthening of the nexus between sovereign and financial sectors, making sovereign debt crises in southern periphery a pan-European concern. The stress tests of July 2011 in Europe did address the zero-risk-weight issue more seriously and the outcomes — at least for non-GIPSI banks — have been more salubrious and their GIPSI bond holdings have declined.

Third, the ECB's LTRO interventions appear to have provided funding to domestic Spanish and Italian banks to significantly build up their exposures to their sovereign debt, a move that should have helped the sovereigns in question. However, the resulting "home bias" in the debt holdings of these sovereigns has nevertheless strengthened the financial sector and the sovereign's nexus in the periphery, implying that a further deterioration of the sovereign's health would lead to a significant peripheral crisis, even if not a fully pan-European one in similar magnitude [Battistini et al. (2013) provide corroborating evidence]. Again, this form of ECB funding does not address the problem of bank recapitalization for GIPSI banks and their incentives to load up on sovereign debt — and of their sovereigns to encourage (or not discourage) such home bias — continue unabated.

Finally, our results highlight the link between asset-side risk and the short-term funding problems of banks, which has been ignored in the Basel II recommendations. The Basel III framework addresses the liquidity problems of banks by requiring them to comply with new

liquidity ratios. However, it is still heavily debated as to which assets count as being "liquid." If sovereign bonds and other risky securities fall into that category, banks will have similar incentives to load-up on these assets as when they had zero-risk weights for capital requirements. Going forward it will be important to investigate how bank solvency and liquidity risk interact. When assets held by banks are risky, this generates funding problems for these banks if they heavily rely on short-term wholesale funding. The months following the third European stress-test showed some relief for non-GIPSI banks' funding conditions. For the first time, regulators stressed sovereign risk and eventually required banks to increase their regulatory capital, which has been addressed at least by some banks issuing new equity. Non-GIPSI banks also broadly reduced their risky sovereign debt positions. Again, this suggests that banks' incentives to accumulate risky assets is driven by low capital requirements to hold them on their balance sheets and similar regulatory arbitrage of Basel III liquidity requirements will have to be addressed by the regulators.

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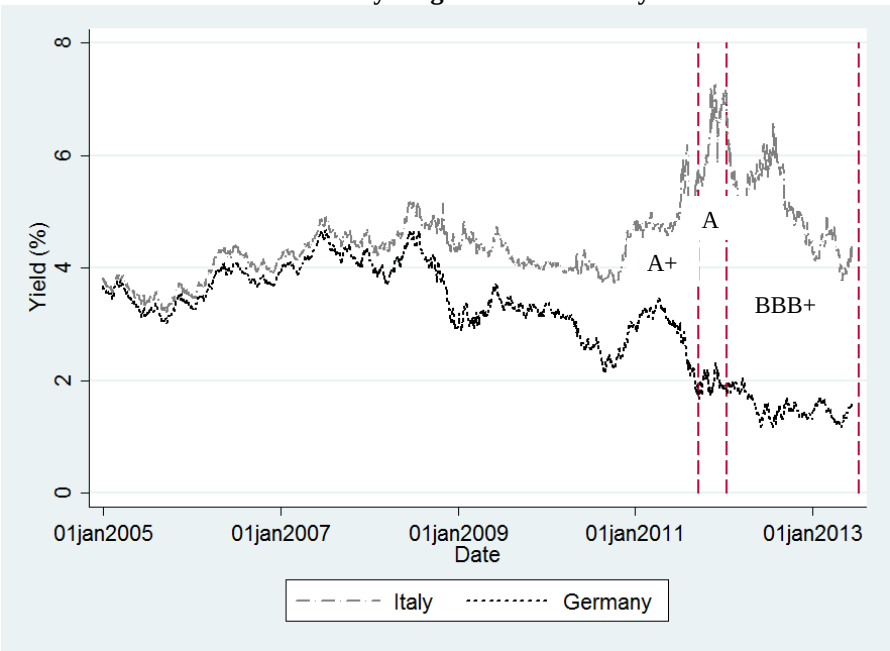
Figure 1. Pairwise Comparison of Government Bond Yield Spreads: Italy versus Germany

This graphic shows the time series of 10-year government bond yields comparing Italian and German 10-year government bond yields (Panel A) and Spanish and German 10-year government bond yields (Panel B) since January 2005. Vertical lines indicate rating downgrades by S&P.

Panel A. Italian and German 10-year government bond yields



Panel B. Spanish and German 10-year government bond yields

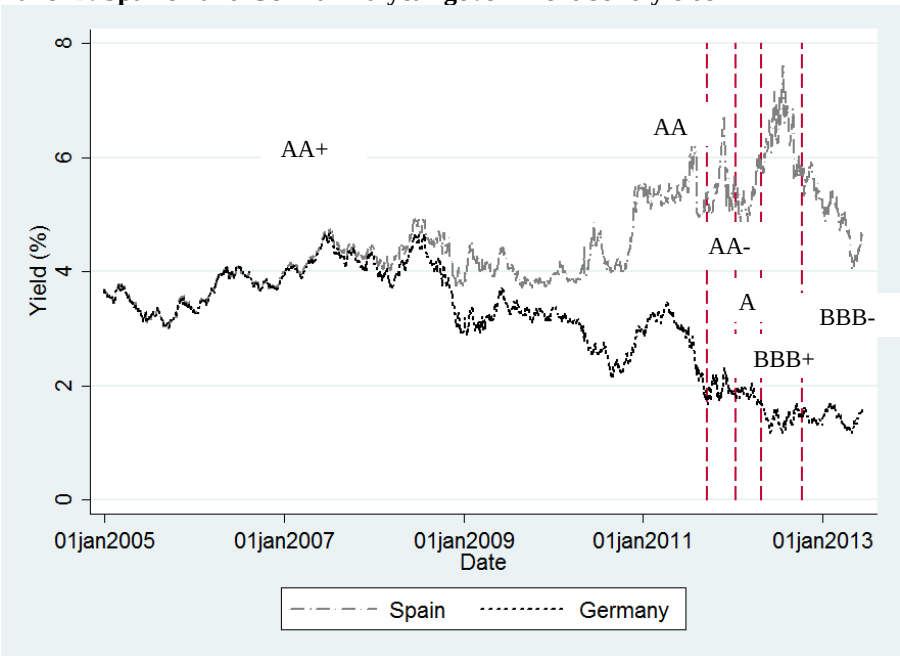


Figure 2. Dexia Stock Price and U.S. Money Market Mutual Fund Holdings (October 2010 – September 2011)

This graphic shows Dexia's stock price and commercial paper and repo holdings of U.S. money market mutual funds over the October 2010 to September 2011 period.

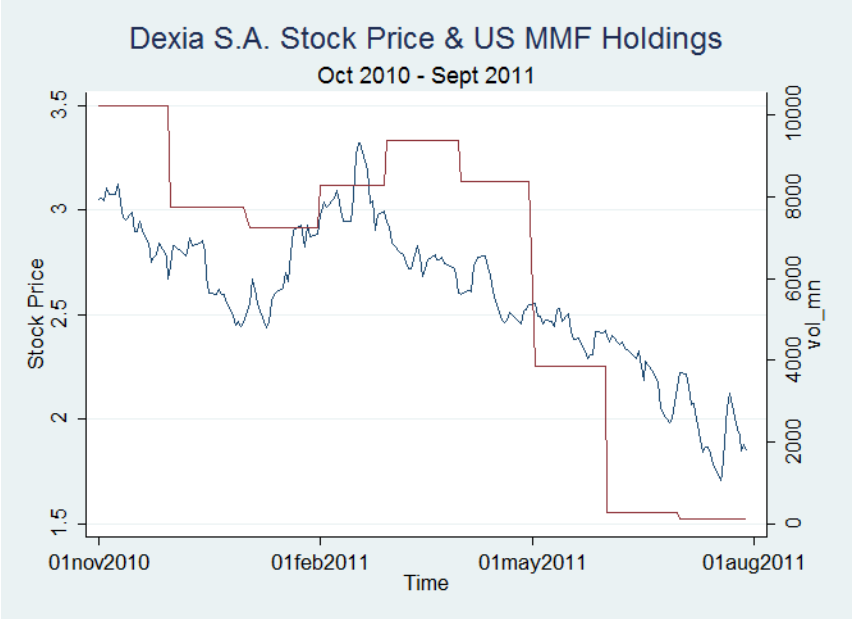
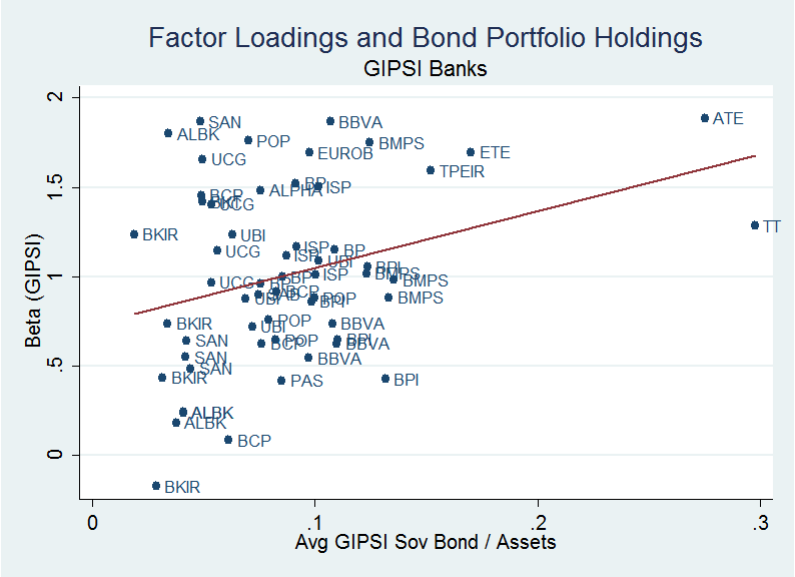


Figure 3. A. Factor Loadings and Bond Portfolio Holdings

This figure is a scatter plot of beta (GIPSI) estimated during the EBA stress test periods on average GIPSI sovereign bond holdings during this period scaled by lagged total assets. Panel A shows this separately for GIPSI and non-GIPSI banks.



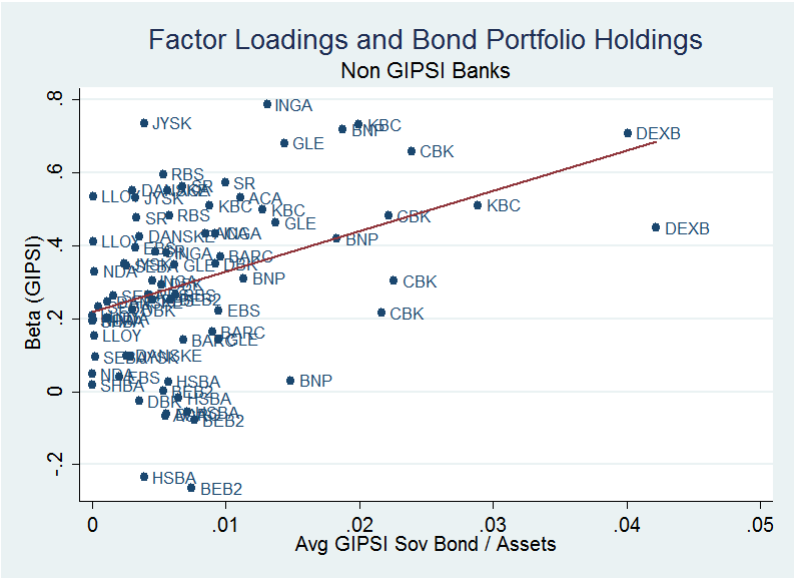
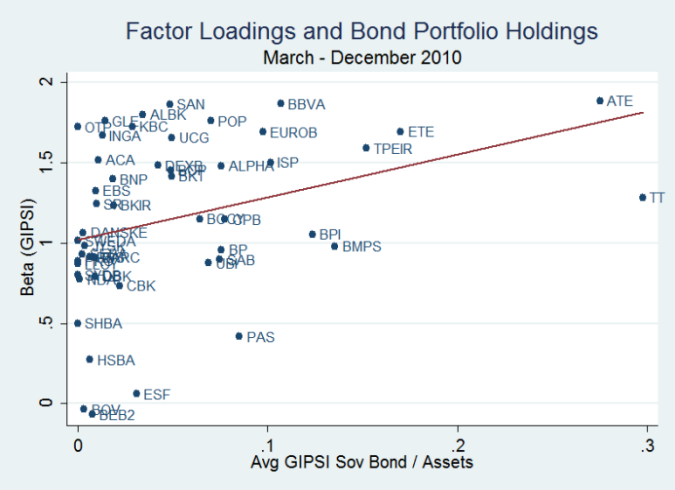
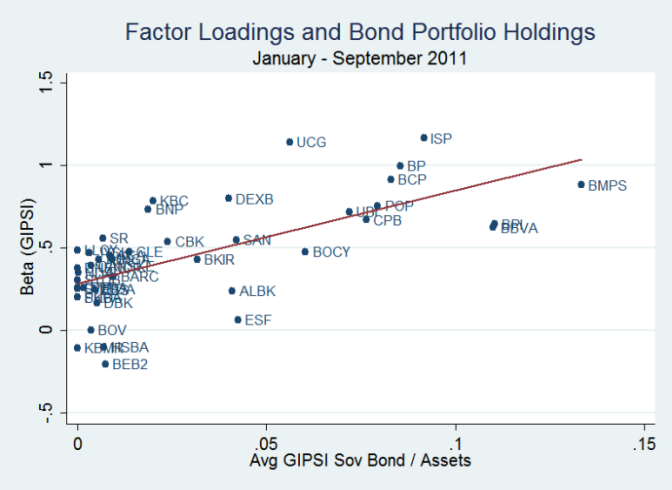
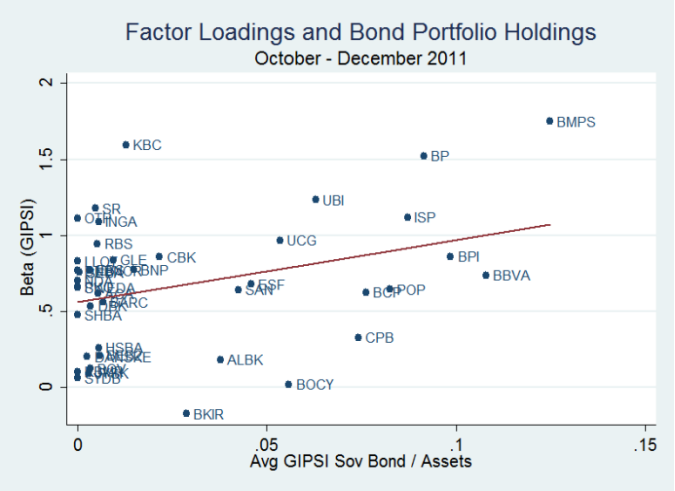


Figure 3.B. Factor Loadings and Sovereign Bond Holdings (between EBA Stress Tests)
This figure is a scatter plot of beta (GIPSI) estimated from regressions as shown in column (3) of Panel A of Table 5 and estimated for each bank. Factor loadings are estimated between the EBA stress test periods.







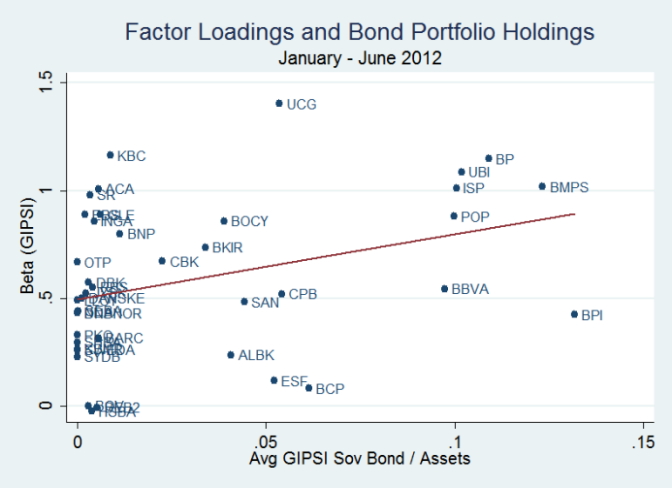
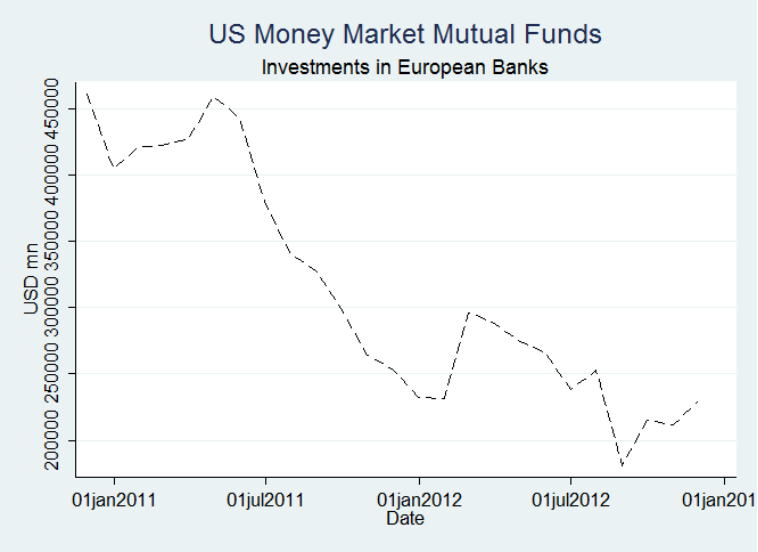

Factor Loadings and Bond Portfolio Holdings
January - June 2012
Beta (GIPSI)
0
.5
1
1.5
0
.05
.1
.15
Avg GIPSI Sov Bond / Assets
UCG
KBC
BP
UBI
ISP
BMPS
ACA
SK
BOCY
POP
BNP
BKIR
OTP
CBK
BBVA
CPB
SAN
BPI
ALBK
ESF
BCP

Figure 4. U.S. Money Market Fund Holdings of European Banks

Panel A depicts the investments of U.S. MMFs in European banks since October 2010. Panel B shows the percentage sale of commercial paper and repurchase agreements of European banks during the January to December 2011 period

Panel A. Overall Investments in European Banks



Panel B. % Sell off of U.S. MMFs in 2011

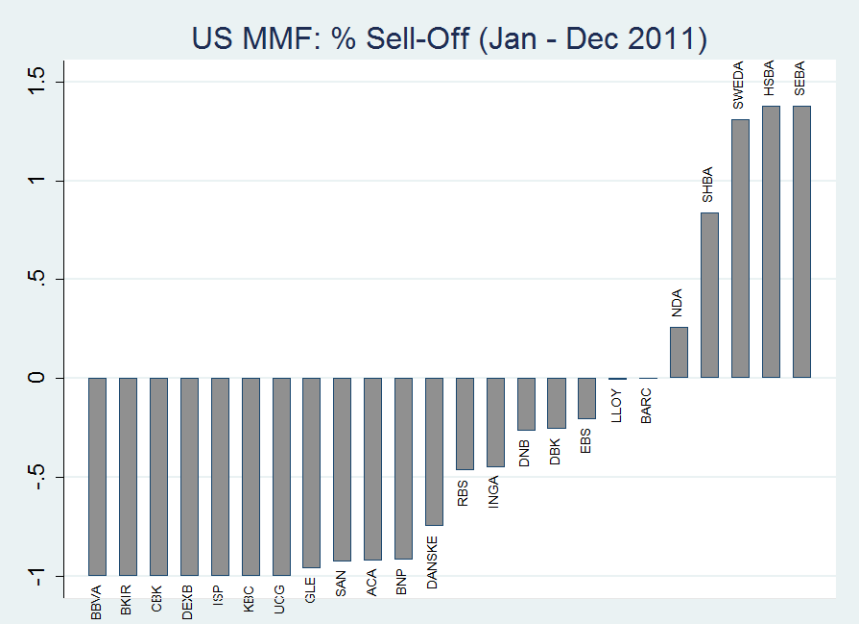
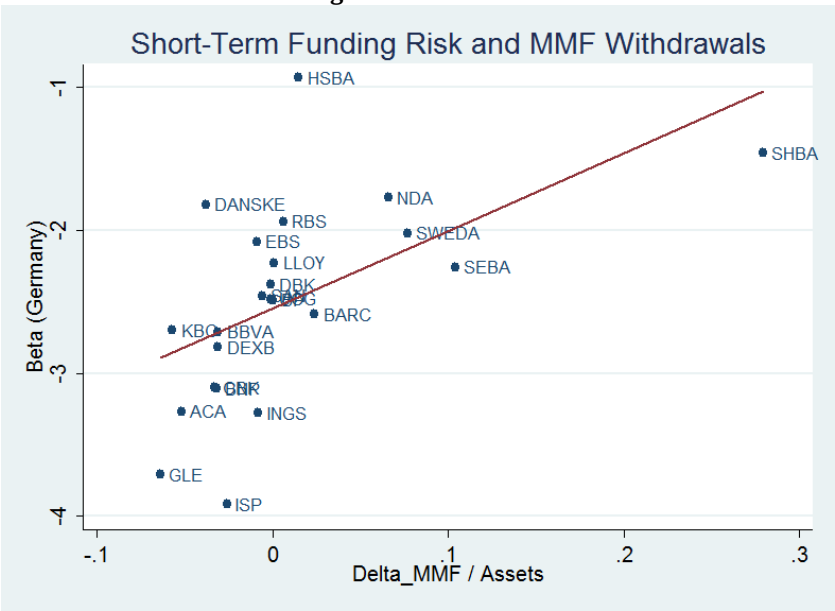


Figure 5. Cross-Sectional Differences

Panel A shows $\hat{\beta}_{Germany.i}$ as measured during 2011 plotted against U.S. MMF withdrawals scaled by total assets. Panel B shows the investments of U.S. MMFs in European banks for well-capitalized banks (low leverage) and weakly capitalized banks (high leverage). We use the firm's market leverage (market LVG) as a measure of bank capitalization. Market LVG is defined as (total assets – book equity + market equity) / market equity.

Panel A. Short-Term Funding Risk and MMF Withdrawal



Panel B. U.S. MMF Withdrawals and Bank Capitalization

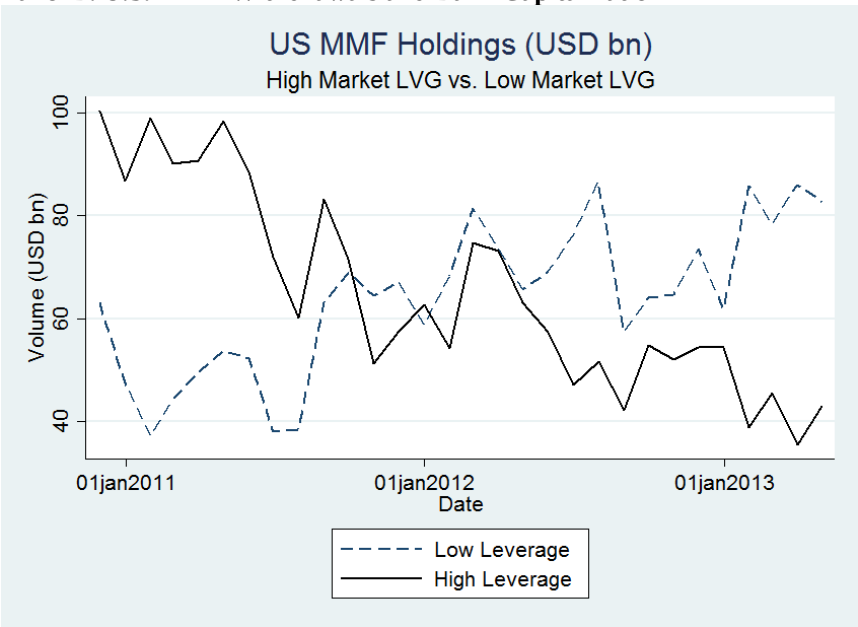


Figure 6.A. Profitability of Carry Trades

Panel A shows the value of €1 invested in Italian sovereign bonds at the time of the first LTRO (December 21, 2011) until June 2013. Panel B shows the development of €1 invested in Italian sovereign bonds on January 1, 2011 until June 2013. The red lines indicate various events: (1) the EU summit in June 2012, (2) the Draghi speech in July 2012, and (3) the announcement of the details of the Outright Monetary Transactions (OMT) by the ECB.

Panel A. €1 Investment in Italian Government Bonds on 1 Jan 2011

Panel B. Profitability of Carry Trades

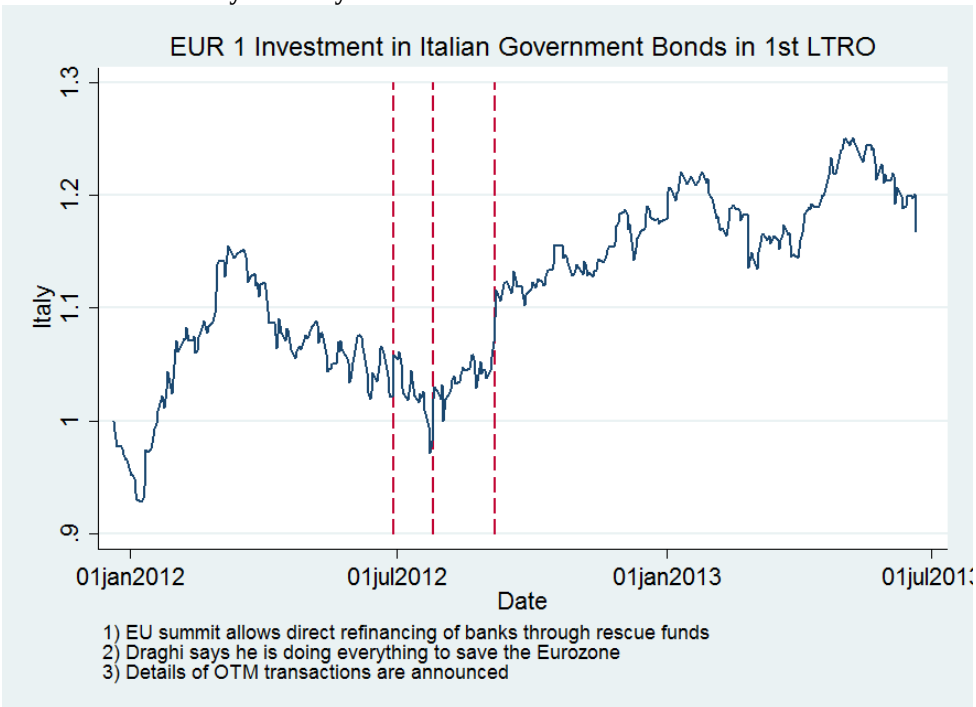


Table 1
Descriptive Statistics on Return Correlations

Panel A of Table 1 contains descriptive statistics during the 2007 to June 2013 period. Panel B shows correlations of ten-year sovereign bond returns in Greece, Italy, Portugal, Spain, Ireland, and Germany during the 2001 to June 2006 and Panel C during the 2007 to 2013 period.

Panel A. Descriptive statistics of daily sovereign bond returns (bps)

Country	Mean	Std. Dev.	Min	P50	Max
Greece	-3.28	441.98	-2,449.13	-3.82	14,220.73
Italy	-0.08	73.88	-445.76	0.00	755.06
Portugal	-1.36	150.59	-1,868.39	-1.77	1,549.32
Spain	-0.34	80.01	-404.87	-0.47	837.14
Ireland	-0.07	93.50	-672.63	0.57	976.10
Germany	1.38	49.60	-224.44	0.97	252.22

Panel B. Sovereign bond return correlations (2001 - 2006)

	Greece	Italy	Portugal	Spain	Ireland	Germany
Greece	1.00					
Italy	1.00	1.00				
Portugal	0.97	0.96	1.00			
Spain	1.00	1.00	0.97	1.00		
Ireland	0.99	0.99	0.97	0.99	1.00	
Germany	0.99	0.99	0.97	0.99	0.99	1.00

Panel C. Sovereign bond return correlations (2007 - 2013)

	Greece	Italy	Portugal	Spain	Ireland	Germany
Greece	1.00					
Italy	0.66	1.00				
Portugal	0.95	0.78	1.00			
Spain	0.82	0.80	0.84	1.00		
Ireland	0.69	0.53	0.76	0.59	1.00	
Germany	-0.82	-0.35	-0.68	-0.58	-0.29	1.00

Table 2
Summary Statistics of Sovereign Bond Holdings of European Banks

This table reports summary statistics of sovereign bond holdings as reported along with the European Banking Authority (EBA) stress test results. Reporting dates are March 2010, December 2010, September 2011, December 2011, and June 2012. Panel A reports aggregated holdings of all publicly listed banks that participated in the EBA stress tests in GIPSI (defined as the sum of all Greek, Italian, Portuguese, Spanish, and Irish sovereign bonds) and Greek, Italian, Portuguese, Spanish, and Irish sovereign bonds. Panel B distinguishes between GIPSI and non-GIPSI banks. Panel C reports holdings of all banks in Non-GIPSI banks, as well as German and French sovereign bonds. Panel D distinguishes between Non-GIPSI and GIPSI banks.

Panel A. GIPSI sovereign bond exposure (€ million)

	GIPSI	Greece	Italy	Portugal	Spain	Ireland
March 2010	586,276	94,912	264,500	27,154	174,833	24,878
December 2010	638,859	85,558	303,999	30,799	200,283	18,221
September 2011	515,002	24,579	267,218	28,723	177,466	17,016
December 2011	419,615	19,939	223,208	22,267	137,874	16,327
June 2012	452,228	1,818	258,894	25,600	148,422	17,494

Panel B. GIPSI sovereign bond exposure: GIPSI versus non-GIPSI banks (€ million)

	GIPSI	Greece	Italy	Portugal	Spain	Ireland
Non-GIPSI banks						
March 2010	212,928	34,814	115,472	14,776	29,190	18,677
December 2010	222,587	28,208	132,803	14,636	41,923	5,017
September 2011	172,827	21,832	103,137	13,975	30,039	3,845
December 2011	122,828	17,355	69,243	10,390	22,311	3,528
June 2012	104,761	1,672	69,344	10,169	20,615	2,961
GIPSI banks						
March 2010	373,348	60,098	149,028	12,378	145,643	6,201
December 2010	416,272	57,351	171,196	16,162	158,360	13,204
September 2011	342,175	2,747	164,082	14,748	147,427	13,171
December 2011	296,787	2,585	153,964	11,877	115,563	12,799
June 2012	347,467	146	189,550	15,430	127,807	14,533

Panel C. Non-GIPSI sovereign bond exposure (€ million)

	Non-GIPSI	Germany	France
March 2010	687,297	185,251	99,208
December 2010	1,000,124	268,174	151,718
September 2011	954,986	253,067	147,099
December 2011	841,377	237,150	118,699
June 2012	896,622	227,692	136,031

Panel D. Non-GIPSI sovereign bond exposure: GIPSI versus non-GIPSI banks (€ million)

	Non-GIPSI	Germany	France
Non-GIPSI banks			
March 2010	611,120	160,090	90,451
December 2010	936,117	244,593	145,961
September 2011	882,506	229,328	141,358
December 2011	771,676	206,187	116,094
June 2012	824,794	203,410	130,903
GIPSI banks			
March 2010	76,177	25,161	8,757
December 2010	64,007	23,581	5,757
September 2011	72,481	23,739	5,741
December 2011	69,701	30,964	2,605
June 2012	71,828	24,282	5,128

Table 3

Analysis of Sovereign Exposures using Micro Level Sovereign Bond Holding Data

This table provides changes in bond holdings over the four stress tests conducted by the European Banking Authority (EBA). These time periods are: (1) March to December 2010, (2) January to September 2011, (3) October to December 2011, and (4) January to June 2012. Panel A reports the change in holdings in Italian and Spanish sovereign debt of Italian and non-Italian (Spanish and non-Spanish) banks as well as the percentage change.

Panel A. Changes in GIPSI Sovereign Bond Holdings by Country

Changes in Exposure to *Italian* Sovereign Debt (% Change)				
Italian Bank	**March – Dec. 2010**	**Jan. – Sept. 2011**	**Oct. – Dec. 2011**	**Jan. - June 2012**
No	19.26%	-20.84%	-18.43%	-0.86%
Yes	13.22%	-4.86%	-5.32%	24.65%

Changes in Exposure to *Spanish* Sovereign Debt (% Change)				
Spanish Bank	**March – Dec. 2010**	**Jan. – Sept. 2011**	**Oct. – Dec. 2011**	**Jan. - June 2012**
No	66.34%	-27.50%	-20.40%	-7.69%
Yes	3.68%	4.64%	-1.58%	8.54%

Changes in Exposure to *GIPSI* Sovereign Debt (% Change)				
GIPSI Bank	**March – Dec. 2010**	**Jan. – Sept. 2011**	**Oct. – Dec. 2011**	**Jan. - June 2012**
No	11.79%	-23.02%	-16.63%	-15.69%
Yes	9.48%	-0.08%	-4.39%	17.08%

Changes in Exposure to *German* Sovereign Debt (% Change)				
GIPSI Bank	**March – Dec. 2010**	**Jan. – Sept. 2011**	**Oct. – Dec. 2011**	**Jan. - June 2012**
No	28.56%	-6.04%	-7.97%	-0.06%
Yes	-8.23%	2.96%	30.99%	-21.58%

Changes in Exposure to *French* Sovereign Debt (% Change)				
GIPSI Bank	**March – Dec. 2010**	**Jan. – Sept. 2011**	**Oct. – Dec. 2011**	**Jan. - June 2012**
No	25.96%	-3.24%	-17.78%	13.01%
Yes	-37.05%	4.08%	-20.05%	96.87%

Panel B. Changes in Sovereign Bond Holdings by Regulatory Ratios

Panel B reports the change in GIPSI, German and French bond holdings scaled by total assets segregated by regulatory capital ratios. High Tier 1 is an indicator variable equal to 1 if a bank's Tier 1 ratio is in the first quartile of the distribution among all banks. High RWA/Assets is an indicator variable equal to 1 if the bank's RWA/Assets is within the upper quartile of the distribution among all banks.

	Δ GIPSI March 2010 - Dec. 2010			Δ German March 2010 - Dec. 2010			Δ French March 2010 - Dec. 2010		
	All	GIPSI Banks	Non-GIPSI Banks	All	GIPSI Banks	Non-GIPSI Banks	All	GIPSI Banks	Non-GIPSI Banks
High Tier 1	0.218	0.431	0.034	0.192	-0.012	0.384	0.042	-0.028	0.087
Low Tier 1	1.094	2.894	0.059	-0.147	-0.085	-0.153	-0.064	-0.144	0.039
Low RWA/TA	0.129	0.802	0.039	0.180	0.000	0.347	0.034	-0.067	0.111
High RWA/TA	0.978	0.922	0.046	0.0001	-0.036	-0.006	-0.008	-0.007	-0.010

	Δ GIPSI Dec. 2010 - Sept 2011			Δ German Dec. 2010 – Sept. 2011			Δ French Dec. 2010 – Sept. 2011		
	All	GIPSI Banks	Non-GIPSI Banks	All	GIPSI Banks	Non-GIPSI Banks	All	GIPSI Banks	Non-GIPSI Banks
High Tier 1	-0.082	-0.076	-0.159	-0.072	-0.024	-0.099	0.016	-0.002	-0.007
Low Tier 1	-0.272	-0.728	0.198	0.038	0.0001	0.052	-0.050	-0.109	0.090
Low RWA/TA	-0.213	-0.268	-0.203	-0.087	-0.027	-0.120	-0.024	-0.017	-0.028
High RWA/TA	0.058	-0.086	0.144	0.024	0.003	0.033	0.0535	-0.046	0.091

	Δ GIPSI Sept 2011-Dec 2011			Δ German Sept 2011-Dec 2011			Δ French Sept 2011-Dec 2011		
	All	GIPSI Banks	Non-GIPSI Banks	All	GIPSI Banks	Non-GIPSI Banks	All	GIPSI Banks	Non-GIPSI Banks
High Tier 1	-0.098	-0.520	-0.095	0.007	0.079	0.044	-0.058	0.000	-0.074
Low Tier 1	-0.452	0.386	-0.179	0.113	0.027	-0.093	0.017	0.052	-0.040
Low RWA/TA	-0.187	-0.710	-0.124	0.037	0.098	0.013	-0.061	0.000	-0.090
High RWA/TA	-0.156	0.328	-0.090	0.017	0.018	0.016	0.005	0.031	-0.010

	Δ GIPSI Dec 2011 - June 2012			Δ German Dec 2011 - June 2012			Δ French Dec 2011 - June 2012		
	All	GIPSI Banks	Non-GIPSI Banks	All	GIPSI Banks	Non-GIPSI Banks	All	GIPSI Banks	Non-GIPSI Banks
High Tier 1	0.236	1.503	-0.056	-0.070	-0.072	-0.045	0.033	0.020	-0.010
Low Tier 1	2.034	3.211	0.298	-0.015	-0.037	-0.083	0.030	0.079	0.151
Low RWA/TA	0.194	1.307	-0.029	-0.049	-0.080	-0.031	0.033	0.024	0.038
High RWA/TA	1.567	3.225	0.164	-0.077	-0.027	-0.101	0.031	0.057	0.020

Panel C. Changes in GIPSI Sovereign Bond Holdings Surrounding LTROs

Panel C reports changes in sovereign bond holdings by publicly listed European banks between Dec 31st, 2011 and June 30th, 2012 aggregated to the country level. Changes are reported by bond maturity. ≤ 3 years (> 3 years) denotes bonds that have a remaining maturity of less than or equal to (greater than) three years. For each country, we report changes in total GIPSI sovereign bond holdings, as well as holdings of Italian and Spanish sovereign debt.

	GIPSI (€ million)		Italy (€ million)		Spain (€ million)	
	≤ 3 years	**> 3 years**	**≤ 3 years**	**> 3 years**	**≤ 3 years**	**> 3 years**
Austria	-583	-10	-473	-4	-100	1
Belgium	-940	-555	-137	-232	-814	-189
Cyprus	-2,672	-2,116	30	-27	0	-5
Denmark	137	130	158	151	-31	8
France	492	-3,788	4,009	-881	345	231
Germany	-3,063	-283	-48	767	56	-588
Hungary	0	0	0	0	0	0
Ireland	1,511	119	1	15	-30	0
Italy	27,355	7,261	28,643	7,782	-65	-271
Malta	-2	-2	0	0	0	0
Netherlands	-27	-95	230	-187	-319	142
Norway	0	0	0	0	0	0
Portugal	3,215	36	-1	65	-19	27
Spain	7,446	5,268	1,531	-2,450	6,032	6,579
Sweden	-27	-51	11	-6	-13	0
U.K.	-3,042	-3,101	-1,468	-1,791	-956	528

Panel D. Intervened vs. Non-intervened Banks

Panel D reports changes in sovereign bond exposures for Italian, Spanish, and all GIPSI banks. We distinguish between banks that have been bailed out during or after the 2007 – 2009 financial crisis (we call these banks "intervened") and those who were not bailed out.

	Exposure to *Italian* Sovereign Debt (€ million)			
Italian Bank & Intervened	**March - Dec 2010**	**Jan - Sept 2011**	**Oct - Dec 2011**	**Jan - June 2012**
No	10,951	-4,910	-8,957	32,822
Yes	8,204	-3,058	661	3,603

	Exposure to *Spanish* Sovereign Debt (€ million)			
Spanish Bank & Intervened	**March – Dec. 2010**	**Jan. – Sept. 2011**	**Oct. – Dec. 2011**	**Jan. - June 2012**
No	2,575	6,178	-2,077	7,612
Yes	2,760	1,430	-387	4,999

	Exposure to *GIPSI* Sovereign Debt (€ million)			
GIPSI Bank & Intervened	**March – Dec. 2010**	**Jan. – Sept. 2011**	**Oct. – Dec. 2011**	**Jan. - June 2012**
No	20,944	-7,810	-14,690	35,296
Yes	36,657	-41,204	-27,411	-2,239

Table 4

Panel A. Summary Statistics of Factor Loadings and Bond Holdings

This table reports summary statistics of our carry trade estimates (Panel A), $\hat{\beta}_{GIPSI}$, $\hat{\beta}_{Italy}$, $\hat{\beta}_{Spain,}$ and $\hat{\beta}_{Germany}$. The carry trade estimates are measured on a quarterly basis for each bank for the January 2007 - June 2013 and pre-2007 periods.

2007 - 2013						
	Obs	**Mean**	**Std-Dev**	**Min**	**P50**	**Max**
Factor loadings						
$\hat{\beta}_{GIPSI}$	1,391	1.70	2.41	-13.14	1.09	19.35
$\hat{\beta}_{Italy}$	1,391	1.45	1.92	-10.84	1.05	16.42
$\hat{\beta}_{Spain}$	1,391	1.48	2.56	-9.26	0.85	21.68
$\hat{\beta}_{Germany}$	1,391	-2.59	2.39	-21.56	-2.28	10.11
Non-GIPSI banks						
$\hat{\beta}_{GIPSI}$	821	1.67	2.40	-10.13	0.97	16.35
$\hat{\beta}_{Italy}$	821	1.41	1.90	-5.59	0.92	13.43
$\hat{\beta}_{Spain}$	821	1.41	2.49	-7.75	0.72	15.08
$\hat{\beta}_{Germany}$	821	-2.61	2.36	-16.33	-2.22	7.61
GIPSI banks						
$\hat{\beta}_{GIPSI}$	570	1.76	2.42	-13.14	1.28	19.35
$\hat{\beta}_{Italy}$	570	1.50	1.95	-10.84	1.19	16.42
$\hat{\beta}_{Spain}$	570	1.58	2.67	-9.26	0.96	21.68
$\hat{\beta}_{Germany}$	570	-2.56	2.42	-21.56	-2.37	10.11
Pre-2007						
Factor loadings						
$\hat{\beta}_{GIPSI}$	769	0.08	6.67	-49.37	1.34	14.64
$\hat{\beta}_{Italy}$	769	0.35	3.85	-25.37	0.30	21.26
$\hat{\beta}_{Spain}$	769	-0.95	7.68	-116.30	-0.12	37.80
$\hat{\beta}_{Germany}$	769	-0.88	3.89	-19.79	-0.70	20.98
Non-GIPSI banks						
$\hat{\beta}_{GIPSI}$	448	-0.32	5.76	-15.91	1.14	12.06
$\hat{\beta}_{Italy}$	448	0.32	3.90	-11.99	0.36	21.26
$\hat{\beta}_{Spain}$	448	-1.03	7.19	-35.67	-0.15	37.80
$\hat{\beta}_{Germany}$	448	-0.90	3.98	-19.79	-0.71	11.66
GIPSI banks						
$\hat{\beta}_{GIPSI}$	321	0.66	7.80	-49.37	1.56	14.64
$\hat{\beta}_{Italy}$	321	0.38	3.78	-25.37	0.25	17.00
$\hat{\beta}_{Spain}$	321	-0.83	8.31	-116.30	-0.05	24.23
$\hat{\beta}_{Germany}$	321	-0.85	3.77	-16.87	-0.70	20.98

Panel B. Banks' Carry Trade Behavior Estimates

This table contains the results of a pooled OLS regression of banks' stock returns on sovereign bond returns during the January 2007 to June 2013 period. Columns (1) to (5) of Panel B show factor loadings on GIPSI sovereign bond returns individually for Greece, Italy, Spain, Portugal, and Ireland and jointly in column (6). Column (7) shows loadings on a GIPSI Sovereign Bond Index, constructed as value-weighted index of GIPSI sovereign bond returns. All regressions include ten-year German bond returns ($R_{Germany,t}$) as the "funding leg" of the carry trade. $R_{m,t}$ is the residual from the regression of the domestic stock market's daily returns on daily 10 year domestic sovereign bond and German bond returns. *T*-statistics are in parentheses. Standard errors are clustered at bank and quarter level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

$$R_{i,t} = \beta_0 + \beta_{GIPSI} R_{GIPSI,t} + \beta_{Germany} R_{Germany,t} + \beta_m R_{m,t} + \varepsilon_{i,t}$$

	(1) Greek	(2) Italy	(4) Portugal	(3) Spain	(5) Ireland	(6) All GIPSI	(7) GIPSI Sovereign Bond Index
$\hat{\beta}_{Greece}$	0.027**					0.017**	
	(1.98)					(2.32)	
$\hat{\beta}_{\text{Italy}}$		0.310***				0.226***	
		(5.85)				(2.74)	
$\hat{\beta}_{\text{Portugal}}$			0.093***			0.014	
			(2.83)			(1.27)	
$\hat{\beta}_{\text{Spain}}$				0.255***		0.012	
				(5.96)		(0.23)	
$\hat{\beta}_{\text{Ireland}}$					0.216***	0.126***	
					(5.75)	(3.33)	
$\hat{\beta}_{GIPSI}$							0.340***
							(8.55)
$\hat{\beta}_{\text{Germany}}$	-2.165***	-2.179***	-2.175***	-2.197***	-2.216***	-2.199***	-2.183***
	(-20.34)	(-23.71)	(-21.04)	(-22.12)	(-21.24)	(-22.73)	(-22.79)
$\hat{\beta}_{\text{m}}$	1.405***	1.393***	1.404***	1.398***	1.400***	1.387***	1.389***
	(15.70)	(15.90)	(15.77)	(15.96)	(16.04)	(16.02)	(15.91)
$\hat{\beta}_0$	-0.001**	-0.001***	-0.001**	-0.001**	-0.001**	-0.001***	-0.001**
	(-2.49)	(-2.61)	(-2.42)	(-2.35)	(-2.46)	(-2.66)	(-2.57)
N	71,962	71,962	71,962	71,962	71,962	71,962	71,962
R^2	42.86%	43.12%	43.04%	42.89%	43.04%	43.29%	43.23%

Table 5
Robustness

This table contains the results of a pooled OLS regression of banks' stock returns on sovereign bond returns during the January 2007 to June 2013 period. Model 1 includes *BondIndex*, the daily average return of sovereign bonds from Euro area members other than GIPSI countries or Germany or France. Model 2 includes various macro variables: (1) *VSTOXX* is the return of the VSTOXX Index; (2) *TermStructure* is measured as the difference between the yield on a ten-year euro area government bond and the one-month Euribor; (3) *BondDefSpread* is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (4) *1mEuribor* is measured as the one-month Euribor; (5) Δ*ESI* is the monthly change in the European economic sentiment indicator; (6) Δ*IndProd* is the monthly change in the level of industrial production; and (7) Δ*CPI* is the change in inflation measured as the monthly change in the European Consumer Price Index. Model 3 reports the results of a principal component analysis (*PCA*); Model 4 uses French bond returns as the funding leg of the carry trade; Model 5 includes Fama-French factors (*SMB, HML*). Models 6 and 7 report the results of the cross-sectional analyses of bank CDS spread changes on GIPSI bond returns. The dependent variable in both models is ΔLog (Bank CDS). Standard errors are clustered at bank and quarter level. *t*-statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Robustness Tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			GIPSI Sovereign			Fama-French		CDS 5 year
	Bond Index	Macro	Bond Index	PCA	Funding Leg	Factors	CDS 5 year	PCA
$\hat{\beta}_{Greece}$	0.016**	0.019**			0.021*	0.016**	-0.145***	
	(2.26)	(2.42)			(1.69)	(2.30)	(-3.81)	
$\hat{\beta}_{\text{Italy}}$	0.211***	0.225***			0.666***	0.219***	-0.090	
	(2.79)	(2.71)			(5.75)	(2.65)	(-0.56)	
$\hat{\beta}_{\text{Portugal}}$	0.014	0.018			0.009	0.013	-0.100*	
	(1.27)	(1.61)			(0.39)	(1.24)	(-1.82)	
$\hat{\beta}_{\text{Spain}}$	0.005	0.026			0.004	0.020	-0.248*	
	(0.10)	(0.50)			(0.04)	(0.39)	(-1.73)	
$\hat{\beta}_{\text{Ireland}}$	0.121***	0.128***			0.091	0.124***	-0.224*	
	(3.11)	(3.39)			(1.34)	(3.45)	(-1.93)	
$\hat{\beta}_{GIPSI}$			0.366***					
			(9.05)					
$\hat{\beta}_{\text{Germany}}$	-2.295***	-2.363***	-2.350***	-2.201***		-2.198***	2.753***	2.825***
	(-16.42)	(-22.43)	(-22.23)	(-22.33)		(-22.65)	(6.02)	(5.71)
$\hat{\beta}_{\text{m}}$	1.382***	1.452***	1.454***	1.389***	1.404***	1.377***	-0.767***	-0.786***
	(15.48)	(17.43)	(17.31)	(16.03)	(15.97)	(16.26)	(-7.58)	(-7.58)
$\hat{\gamma}_{VSTOXX}$		0.098***	0.099***					
		(3.94)	(3.99)					
$\hat{\gamma}_{\Delta TermStructure}$		0.062	0.061					
		(1.49)	(1.35)					
$\hat{\gamma}_{BondDefSpead}$		-0.006	-0.006					
		(-0.20)	(-0.17)					
$\hat{\gamma}_{1mEuribor}$		0.071*	0.067					
		(1.80)	(1.62)					
$\hat{\gamma}_{\Delta ESI}$		0.037***	0.035***					
		(2.92)	(2.77)					
$\hat{\gamma}_{\Delta IndProd}$		0.004	0.003					
		(0.14)	(0.13)					
$\hat{\gamma}_{\Delta CPI}$		-0.060	-0.056					
		(-0.58)	(-0.54)					
$\hat{\gamma}_{BondIndex}$	0.188							
	(1.11)							
$\hat{\gamma}_{PCA}$				0.001***				-0.003***
				(8.70)				(-3.77)
$\hat{\gamma}_{France}$					-1.880***			
					(-8.64)			
$\hat{\gamma}_{SMB}$						-0.029		
						(-0.83)		
$\hat{\gamma}_{HML}$						0.018		
						(0.98)		
$\hat{\beta}_0$	-0.001***	-0.003**	-0.003*	-0.001**	-0.001***	-0.001***	0.002*	0.003**
	(-2.79)	(-1.99)	(-1.82)	(-2.52)	(-2.60)	(-2.98)	(1.88)	(2.03)
N	71,962	70,631	70,631	71,962	71,962	70,631	28,103	28,103
R^2	43.31%	44.74%	44.68%	43.25%	39.65%	44.54%	13.16%	12.88%

Panel B. Subsamples: GIPSI versus Non-GIPSI Banks

This table contains the results of a pooled OLS regression of banks' stock returns on the return of a value-weighted GIPSI Sovereign Bond Index and 10-year German Bund returns during the January 2007 to June 2013 period using various subsamples of banks. We use the following subsamples: (1) all GIPSI banks, (2) all non-GIPSI banks, and (3) German and French banks. All regressions include ten-year German bond returns as the "funding leg" of the carry trade. All regressions further include all macroeconomic control variables used in Model (2) of Panel A of Table 5 (*VSTOXX*, *TermStructure*, *BondDefSpread*, *1mEuribor*, Δ*ESI*, Δ*IndProd*, Δ*CPI*). *T*-statistics are in parentheses. Standard errors are clustered at bank and quarter level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1) GIPSI	(2) Non-GIPSI	(3) Germany & France
$\hat{\beta}_{GIPSI}$	0.458***	0.287***	0.389***
	(6.81)	(5.10)	(4.71)
$\hat{\beta}_{Germany}$	-2.364***	-2.290***	-2.227***
	(-16.30)	(-15.88)	(-6.59)
$\hat{\beta}_{\mathrm{m}}$	1.542***	1.334***	1.166***
	(16.09)	(12.87)	(5.80)
$\hat{\beta}_0$	-0.005**	-0.002	0.000
	(-2.20)	(-0.97)	(0.06)
N	31,089	39,542	9,186
R^2	46.11%	43.79%	46.05%

Panel C. Falsification Tests (Alternative Specifications)

This table reports the results from OLS regressions of daily returns on a value-weighted index of EBA Banks (EBA Banks), U.K. banks (EBA U.K. Banks), U.S. Banks, macro hedge funds (HFRX Macro), and various country-specific industrial indices during the 2007 to June 2013 period. There are: MSCI GIPSI, which is an equally-weighted index formed from the underlying indices for Italy, Spain, and Portugal, MSCI Germany, MSCI Non-GIPSI, which is an equally-weighted index of the most important countries in Europe other than Germany or the periphery (France, Netherlands, Norway, Denmark, and Sweden), and MSCI UK. As market return, we include the Euro Stoxx 600 (STOXX 600) for European indices, the S&P 500 (S&P500) for the U.S. index and MSCI World for the HFRX Macro Hedge Fund index. The inference variables are the return of a value-weighted GIPSI Sovereign Bond Index and 10-year German Bund returns. We also include the Fama-French factors (*SMB* and *HML*). The Newey-West standard errors were adjusted for heteroscedasticity and autocorrelation using with eight lags. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1) EBA Banks	(2) EBA U.K. Banks	(3) U.S. Banks	(4) HFRX Macro	(5) MSCI GIPSI	(6) MSCI Germany	(7) MSCI Non-GIPSI	(8) MSCI U.K.
$\hat{\beta}_{GIPSI}$	0.340***	0.090	-0.063	0.007	0.014	-0.041	0.025	0.003
	(6.51)	(1.45)	(-1.33)	(0.36)	(0.26)	(-0.66)	(0.66)	(0.06)
$\hat{\beta}_{Germany}$	-2.416***	-1.965***	-1.911***	0.087**	0.004	-0.085	-0.002	0.042
	(-31.31)	(-15.73)	(-18.25)	(2.75)	(0.06)	(-0.66)	(-0.03)	(0.48)
$\hat{\gamma}_{SMB}$	-0.000	0.000	-0.000	0.000	-0.000	-0.000	0.000	-0.000
	(-0.01)	(0.76)	(-0.59)	(0.83)	(-0.66)	(-0.44)	(0.58)	(-0.18)
$\hat{\gamma}_{HML}$	0.001***	0.000*	0.000	0.000	0.000*	0.000*	-0.000	-0.000
	(4.06)	(1.82)	(1.50)	(0.25)	(1.88)	(1.93)	(-0.92)	(-0.37)
$\hat{\beta}_{\mathrm{m}}$	1.409***	1.312***	1.644***	0.004	0.006	0.038	0.304***	0.003
	(21.99)	(14.65)	(13.69)	(0.37)	(0.24)	(0.75)	(10.42)	(0.06)
$\hat{\beta}_0$	-0.000	-0.000	0.000	-0.000	-0.000	0.000	-0.000	0.000
	(-1.37)	(-0.73)	(0.12)	(-0.73)	(-0.70)	(0.45)	(-0.94)	(0.67)
N	1,591	1,559	1,523	1,523	1,591	1,591	1,591	1,591
R^2	77.95%	53.26%	65.83%	0.56%	0.11%	0.15%	12.80%	0.03%

Table 6
Results from Seemingly Unrelated Regressions

This table reports the results from seemingly unrelated regression (SUR). In Panel A, the sensitivity of equity to GIPSI sovereign bond returns $\hat{\beta}_{GIPSI}$ (measured during the 2010 to 2012 period) takes the form $\alpha_0 + \alpha_1 \frac{Holdings_{GIPSI,i,t-1}}{Assets_{i,t-1}}$. The sensitivity of equity to German bond returns $\hat{\beta}_{Germany}$ takes the form $\alpha_2 + \alpha_3 \frac{Holdings_{Germany,i,t-1}}{Assets_{i,t-1}}$. $\hat{\alpha}_0$, $\hat{\alpha}_1$, $\hat{\alpha}_2$, and $\hat{\alpha}_3$ are point estimates under the constraints: $\alpha_{0,1} = \alpha_{0,2} = \cdots = \alpha_0$, $\alpha_{1,1} = \alpha_{1,2} = \cdots = \alpha_1$, $\alpha_{2,1} = \alpha_{2,2} = \cdots = \alpha_2$, $\alpha_{3,1} = \alpha_{3,2} = \cdots = \alpha_3$, and $\alpha_{4,1} = \alpha_{4,2} = \cdots = \alpha_4$. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. SUR Models including German Bund holdings

$$R_{i,t} = \beta_{0,i} + \alpha_0 R_{GIPSI,t} + \alpha_1 \frac{Holdings_{GIPSI,i,t-1}}{Assets_{i,t-1}} R_{GIPSI,t} + \alpha_2 R_{Germany,t} + \alpha_3 \frac{Holdings_{Germany,i,t-1}}{Assets_{i,t-1}} R_{Germany,t} + \beta_{m,t} R_{m,t} + \varepsilon_{i,t}.$$

GIPSI	α0	α1	α2	α3	Prob > chi²
GIPSI	0.316***	6.423***	-2.446***	4.380***	<0.001
	(8.86)	(16.07)	(-37.89)	(2.73)	
Italy	0.365***	9.444***	-2.330***	3.664**	<0.001
	(10.87)	(13.46)	(-31.37)	(2.21)	
Spain	0.381***	5.368***	--2.442***	3.690**	<0.001
	(10.42)	(12.18)	(-38.00)	(2.24)	

Panel B. SUR Models including U.S. MMF Withdrawals

Panel B reports the results from seemingly unrelated regression. The sensitivity of equity to GIPSI sovereign bond returns $\hat{\beta}_{GIPSI}$ (measured during the 2010 to 2012 period) take the form $\alpha_0 + \alpha_1 \frac{Holdings_{GIPSI,i,t-1}}{Assets_{i,t-1}}$. The sensitivity of equity to German bond returns $\hat{\beta}_{Germany}$ takes the form $\alpha_2 + \alpha_3 \frac{\Delta MMF_{i,t}}{Assets_{i,t-1}}$. $\hat{\alpha}_0$, $\hat{\alpha}_1$, $\hat{\alpha}_2$, and $\hat{\alpha}_3$ are point estimates under the constraints: $\alpha_{0,1} = \alpha_{0,2} = \cdots = \alpha_0$, $\alpha_{1,1} = \alpha_{1,2} = \cdots = \alpha_1$, $\alpha_{2,1} = \alpha_{2,2} = \cdots = \alpha_2$, $\alpha_{3,1} = \alpha_{3,2} = \cdots = \alpha_3$, and $\alpha_{4,1} = \alpha_{4,2} = \cdots = \alpha_4$.

$$R_{i,t} = \beta_{0,i} + \alpha_0 R_{GIPSI,t} + \alpha_1 \frac{Holdings_{GIPSI,i,t-1}}{Assets_{i,t-1}} R_{GIPSI,t} + \alpha_2 R_{Germany,t} + \alpha_3 \frac{\Delta MMF_{i,t}}{Assets_{i,t-1}} R_{Germany,t} + \beta_{m,t} R_{m,t} + \varepsilon_{i,t}.$$

GIPSI	α0	α1	α2	α3	Prob > chi²
GIPSI	0.310***	6.709***	-2.324***	-11.595***	<0.001
	(6.48)	(12.28)	(-31.75)	(-3.82)	
Italy	0.296***	11.203***	-2.210***	-8.091***	<0.001
	(7.2)	(10.53)	(-25.47)	(-2.58)	
Spain	0.399***	4.736***	-2.32***	-10.389***	<0.001
	(8.29)	(8.9)	(-32.48)	(-3.45)	

Table 7
Subperiods and Home Bias

This table reports the results from regressing bank equity returns on the return of a value-weighted GIPSI Sovereign Bond Index and 10-year German bund returns. I_{GIPSI} is an indicator variable equal to 1, if the bank is headquartered in a GIPSI country. Regressions are performed on subperiods that represent the time periods between the four stress tests conducted by the European Banking Authority (EBA). Column (1) reports regression results for the March to December 2010 period, column (2) for the January to September 2011 period, column (3) for the October to December 2011 period, and column (4) for the January to June 2012. All regressions further include all macroeconomic control variables used in model (2) of Panel A of Table 5 (*VSTOXX*, *TermStructure*, *BondDefSpread*, *1mEuribor*, Δ*ESI*, Δ*IndProd*, Δ*CPI*). T-statistics are in parentheses. Standard errors are clustered at the bank and quarter levels. Standard errors in column (4) are clustered at the bank level as the time period spans only one quarter. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

$$R_{i,t} = \beta_0 + \beta_{GIPSI} R_{GIPSI,t} + \beta_{GIPSI\ x\ GIPSI\ Bank} R_{GIPSI,t} I_{GIPSI\ Bank} + \beta_{Germany} R_{Germany,t} + \beta_{Germany\ x\ GIPSI\ Bank} R_{Germany,t} I_{GIPSI} + \beta_{GIPSI\ Banks} I_{GIPSI\ Bank} + \beta_m R_{m,t} + \sum Macro + \varepsilon_{i,t.}$$

	(1) March – Dec. 2010	(2) Jan. – Sept. 2011	(3) Oct. – Dec. 2011	(4) Jan. - June 2012
$\hat{\beta}_{GIPSI}$	0.391***	0.390***	0.235***	0.125**
	(6.96)	(8.43)	(4.00)	(2.47)
$\hat{\beta}_{GIPSI\ x\ GIPSI\ Bank}$	-0.012	0.197**	-0.119	0.470***
	(-0.09)	(2.54)	(-1.09)	(3.13)
$\hat{\beta}_{\text{Germany}}$	-2.262***	-2.322***	-2.927***	-3.104***
	(-23.18)	(-15.58)	(-18.16)	(-16.95)
$\hat{\beta}_{\text{Germany x GIPSI Bank}}$	-0.074	0.331	-0.056	1.079***
	(-0.37)	(1.56)	(-0.32)	(3.22)
$\hat{\beta}_{GIPSI\ Bank}$	-0.001**	-0.002**	0.001	0.001
	(-2.51)	(-2.58)	(0.82)	(0.98)
$\hat{\beta}_M$	1.341***	1.434***	1.781***	1.742***
	(23.61)	(18.36)	(25.38)	(17.49)
$\hat{\beta}_0$	0.000	0.003	0.036	-0.122***
	(0.05)	(0.60)	(1.23)	(-5.67)
N	9,747	8,570	2,903	5,507
R^2	56.42%	50.50%	48.65%	48.43%

Table 8
Moral Hazard and Regulatory Arbitrage

Panel A of Table 8 reports the results from OLS regressions of banks' equity returns on the return of a value-weighted GIPSI Sovereign Bond Index and 10-year German bund returns and interaction terms of these returns with various bank characteristics during the 2007 to June 2013 period: Log-Assets, ST-LVG, Tier 1, and RWA/Assets. Column (1) reports the results for the full sample and columns (2) and (3) for subsamples of GIPSI and non-GIPSI banks, respectively. Columns (4) – (6) report the results of regressions performed on subperiods which represent the time periods between the 5 stress tests conducted by the European Banking Authority (EBA). Column (4) reports regression results for the March to December 2010 period, column (5) for the January to December 2011 period, and column (6) for the January to June 2012 period. Bank characteristics are lagged by one year and are included as separate variables, which are omitted for brevity. All regressions include all macroeconomic control variables used in Model (2) of Panel A of Table 5 (*VSTOXX*, *TermStructure*, *BondDefSpread*, *1mEuribor*, Δ*ESI*, Δ*IndProd*, Δ*CPI*). *T*-statistics are in parentheses. Standard errors are clustered at the bank and quarter levels. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1) All Banks	**(2) GIPSI Banks**	**(3) Non-GIPSI Banks**	**(4) March - Dec 2010**	**(5) Jan - Dec 2011**	**(6) Jan - June 2012**
$\hat{\beta}_{GIPSI}$	-0.267	0.822	-0.559*	-1.306***	0.039	0.001
	(-1.00)	(0.86)	(-1.92)	(-4.62)	(0.16)	(0.00)
$\hat{\beta}_{GIPSIx\ Log\text{-}Assets}$	0.033**	-0.035	0.044**	0.058***	0.014	0.014
	(2.27)	(-0.62)	(2.36)	(4.23)	(1.22)	(1.45)
$\hat{\beta}_{GIPSIx\ ST\text{-}LVG}$	0.338**	0.717***	0.102	0.790*	0.365*	0.345*
	(2.01)	(3.31)	(0.51)	(1.85)	(1.88)	(1.84)
$\hat{\beta}_{GIPSIx\ RWA/Assets}$	0.003**	-0.003	0.003***	0.005***	0.001	0.002
	(2.39)	(-0.58)	(2.59)	(4.87)	(1.17)	(1.66)
$\hat{\beta}_{GIPSIx\ Tier\ 1}$	-0.020***	-0.022***	-0.001	0.027	-0.031***	-0.028***
	(-4.22)	(-4.77)	(-0.08)	(1.36)	(-4.38)	(-3.77)
$\hat{\beta}_{Germany}$	-0.003	-3.386**	0.779	0.723	-1.707**	-1.281
	(-0.00)	(-2.01)	(0.38)	(0.52)	(-2.50)	(-1.07)
$\hat{\beta}_{Germany\ x\ Log\text{-}Assets}$	-0.114**	0.027	-0.162*	-0.098	-0.035	-0.035
	(-2.03)	(0.23)	(-1.82)	(-1.44)	(-0.69)	(-0.59)
$\hat{\beta}_{Germany\ x\ ST\text{-}LVG}$	-0.464	-1.876***	-0.024	-2.119	0.839	1.409*
	(-1.12)	(-5.19)	(-0.04)	(-1.50)	(1.11)	(1.95)
$\hat{\beta}_{Germany\ x\ RWA/Assets}$	-0.004	0.029***	-0.013	-0.017***	-0.004	-0.003
	(-0.60)	(2.91)	(-1.51)	(-3.52)	(-1.41)	(-1.09)
$\hat{\beta}_{Germany\ x\ Tier\ 1}$	-0.056	-0.062	-0.037	-0.018	-0.046	-0.127***
	(-1.64)	(-1.55)	(-0.70)	(-0.25)	(-0.91)	(-2.76)
$\hat{\beta}_{\mathrm{m}}$	1.408***	1.541***	1.245***	1.340***	1.728***	1.755***
	(15.78)	(13.86)	(12.68)	(19.17)	(9.67)	(8.65)
$\hat{\beta}_0$	-0.008**	-0.008***	-0.005	-0.005	-0.018	-0.129***
	(-2.41)	(-3.48)	(-1.46)	(-0.81)	(-1.34)	(-17.37)
N	49,596	23,927	25,669	7,051	7,294	3,687
R^2	44.71%	48.31%	41.60%	55.77%	44.24%	49.03%

Table 9
Moral Suasion

This table reports the results from OLS regressions of banks' equity returns on the return of a value-weighted GIPSI Sovereign Bond Index and 10-year German bund returns and interaction terms of these returns with various bank characteristics during the 2007 to June 2013 period: Log-Assets, ST-LVG, Tier 1, and RWA/Assets. Intervened is an indicator variable equal to 1 if the banks was bailed-out by its government after/during the 2007-2009 financial crisis. Appendix V provides a list of these banks. All regressions include all macroeconomic control variables used in Model (2) of Panel A of Table 5 (*VSTOXX*, *TermStructure*, *BondDefSpread*, *1mEuribor*, Δ*ESI*, Δ*IndProd*, Δ*CPI*). *T*-statistics are in parentheses. Standard errors are clustered at the bank and quarter level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1) All Banks	(2) GIPSI Banks	(3) Non-GIPSI Banks	(4) All Banks	(5) Non-Intervened Banks
$\hat{\beta}_{GIPSI}$	0.086	0.202***	-0.006	-0.596**	-0.983*
	(1.38)	(2.92)	(-0.11)	(-2.19)	(-1.84)
$\hat{\beta}_{GIPSI\ x\ Intervened}$	0.329***	0.236*	0.412***	0.364***	
	(4.40)	(1.86)	(5.48)	(2.82)	
$\hat{\beta}_{Germany}$	-2.055***	-2.167***	-1.920***	1.553	4.761
	(-19.16)	(-14.28)	(-10.56)	(0.67)	(1.57)
$\hat{\beta}_{Germany\ x\ Intervened}$	-0.530***	-0.359	-0.649***	-2.184	
	(-3.70)	(-1.61)	(-2.99)	(-0.85)	
$\hat{\beta}_{Intervened}$	-0.001**	-0.001***	-0.001*	-0.001**	
	(-2.42)	(-2.67)	(-1.85)	(-2.16)	
$\hat{\beta}_{GIPSIx\ Log\text{-}Assets}$				0.037***	0.059***
				(3.36)	(2.69)
$\hat{\beta}_{GIPSIx\ Tier\ 1}$				-0.011	-0.001
				(-0.73)	(-0.04)
$\hat{\beta}_{GIPSIx\ ST\text{-}LVG}$				0.351*	0.352*
				(1.74)	(1.87)
$\hat{\beta}_{GIPSIx\ RWA/Assets}$				0.004***	0.005**
				(2.77)	(2.42)
$\hat{\beta}_{GIPSIx\ Tier\ 1\ x\ Intervened}$				-0.008	
				(-0.54)	
$\hat{\beta}_{GIPSIx\ RWA/Assets\ x\ Intervened}$				-0.002	
				(-1.28)	
$\hat{\beta}_{GIPSIx\ ST\text{-}LVG\ x\ Intervened}$				0.110	
				(0.40)	
$\hat{\beta}_{GIPSIx\ Log\text{-}Assets\ x\ Intervened}$				0.008	
				(0.54)	
$\hat{\beta}_{Germany\ x\ Log-Assets}$				-0.171*	-0.303**
				(-1.94)	(-2.34)
$\hat{\beta}_{Germany\ x\ Tier\ 1}$				-0.090	-0.132**
				(-1.54)	(-2.11)
$\hat{\beta}_{Germany\ x\ ST-LVG}$				-0.320	-1.122
				(-0.60)	(-1.24)
$\hat{\beta}_{Germany\ x\ RWA/Assets}$				-0.010	-0.026*
				(-0.76)	(-1.96)
$\hat{\beta}_{Germany\ x\ Tier\ 1\ x\ Intervened}$				0.060	
				(1.04)	
$\hat{\beta}_{Germany\ x\ RWA/Asstes\ x\ Interve}$				0.010	
				(0.71)	
$\hat{\beta}_{Germany\ x\ ST-LVG\ x\ Intervened}$				-0.622	
				(-0.67)	
$\hat{\beta}_{Germany\ x\ Log-Assets\ x\ Interve}$				0.081	
				(0.73)	
$\hat{\beta}_{m}$	1.462***	1.558***	1.333***	1.349***	1.246***
	(17.07)	(15.57)	(12.75)	(16.19)	(13.01)
$\hat{\beta}_{0}$	-0.003*	-0.005**	-0.001	-0.000**	-0.000
	(-1.68)	(-2.07)	(-0.69)	(-1.97)	(-1.30)
N	70,631	31,089	39,542	50,413	19,633
R^2	44.73%	46.20%	43.92%	43.27%	59.33%

Table 10
Profitability of Carry Trade Portfolios

This table reports the cumulative abnormal sovereign bond and bank equity returns (CAR). Panel A reports cumulative abnormal sovereign bond returns for all 10-year GIPSI bonds and German bunds surrounding various interventions from the European Central Bank (ECB). These are: LTRO 1 (December 21, 2011), LTRO 2 (February 28, 2012), the EU Summit (June 2012), the Draghi speech (July 2012), and the announcements of the OMT details (September 6, 2012). The evidence in this table is based on market model adjusted abnormal bond returns. We use the Lehman Brothers EU Sovereign Bond Index as the benchmark bond market index in computing these abnormal returns. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Cumulative Abnormal Returns of Sovereign Bonds Surrounding various ECB interactions

	CAR of Sovereign Bond Portfolio					
	Spain	**Italy**	**Ireland**	**Portugal**	**Greece**	**Germany**
LTRO 1						
[-2;+2]	0.007	0.019	0.009	-0.008	-0.033	-0.015***
	(.468)	(1.343)	(.605)	-(.891)	(-0.633)	(-2.916)
[-1;+1]	-0.008	0.006	0.006	0.002	0.010	-0.015***
	(-0.552)	(.329)	(.566)	(.189)	(.36)	(-3.211)
[-1;0]	0.002	0.010	<0.001	-0.007	-0.016***	-0.013***
	(.151)	(.398)	(.012)	-(1.521)	(-7.208)	(-7.585)
LTRO 2						
[-2;+2]	0.002	0.038***	-0.010	-0.108***	0.069	-0.003
	(.413)	(3.799)	(-0.821)	(-4.662)	(1.092)	(-0.556)
[-1;+1]	-0.005	0.016*	-0.006	-0.059*	-0.017	0.002
	(-0.974)	(1.684)	(-0.371)	(-1.84)	(-0.428)	(.68)
[-1;0]	-0.006	0.003*	0.009	-0.014	-0.043***	0.004
	(-1.129)	(1.691)	(1.136)	(-1.220)	(-3.972)	(1.599)
EU Summit						
[-2;+2]	0.032	0.012	0.068	-0.045	0.058*	-0.0036
	(.905)	(.351)	(1.238)	-(1.313)	(1.718)	(-0.413)
[-1;+1]	0.034	0.009	0.066	-0.02	0.054*	0.001
	(.899)	(.207)	(1.068)	-(.571)	(1.853)	(.083)
[-1;0]	0.035	0.027	0.063	-0.023	0.056***	-0.005
	(.891)	(1.016)	(1.04)	-(.585)	(3.204)	-0.375)
Draghi speech						
[-2;+2]	0.08***	0.022	0.014	-0.044	0.152	-0.024***
	(6.171)	(.905)	(1.031)	-(.853)	(1.248)	(-6.449)
[-1;+1]	0.055***	0.033***	-0.002	-0.031	0.101*	-0.016***
	(4.943)	(2.4)	-(.226)	-(.596)	(1.683)	(-7.370)
[-1;0]	0.035***	0.026***	-0.004	-0.04	0.043	-0.009***
	(3.314)	(2.625)	-(.571)	-(.779)	(1.305)	(-8.129)
OMT						
[-2;+2]	0.108***	0.047***	0.018	0.079	0.111	-0.018***
	(4.413)	(2.474)	(1.487)	(1.504)	(1.371)	(-2.490)
[-1;+1]	0.075***	0.044***	0.018*	0.071*	0.018	-0.014***
	(3.298)	(6.88)	(1.796)	(1.885)	(.9)	(-2.777)
[-1;0]	0.048*	0.031***	0.008	0.027	0.014	-0.012***
	(1.842)	(4.714)	(.861)	(1.043)	(.588)	(-2.096)

Panel B. Cumulative Abnormal Equity Returns

Panel B reports average cumulative abnormal equity returns (ACAR) for all publicly traded European banks that participated in the EBA stress tests surrounding various ECB interventions. These are: LTRO 1 (December 21, 2011), LTRO 2 (February 28, 2012), the EU Summit (June 2012), the Draghi speech (July 2012), and the announcements of the OMT details (September 6, 2012). The evidence in this table is based on market model adjusted abnormal bond returns. We use the MSCI Europe Index as the benchmark stock market index in computing these abnormal returns. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Event Window	ACAR
LTRO 1	
[-2;+2]	0.025***
	(3.45)
[-1;+1]	0.021***
	(3.58)
[-1;0]	0.014***
	(3.56)
LTRO 2	
[-2;+2]	0.025***
	(3.45)
[-1;+1]	0.013
	(1.65)
[-1;0]	-0.009
	(-1.16)
EU Summit	
[-2;+2]	-0.001
	-(0.07)
[-1;+1]	0.006
	(.73)
[-1;0]	0.002
	(.2)
Draghi speech	
[-2;+2]	0.014
	(1.64)
[-1;+1]	-0.003
	(.35)
[-1;0]	-0.003
	(-0.36)
OMT	
[-2;+2]	0.049***
	(3.55)
[-1;+1]	0.027***
	(4.34)
[-1;0]	0.013***
	(2.69)

Panel C. Regression Analysis of Determinants of Cumulative Abnormal Returns Surrounding Various ECB Interventions

This table presents estimates from a linear regression analysis of the determinants of cumulative abnormal banks' stock returns (CARs) surrounding the different ECB interventions. The dependent variable is the two-day [-1;0] CAR. Independent variables are each banks' GIPSI sovereign bond holdings scaled by total assets. Bank characteristics and sovereign bond holdings are from the period prior to the intervention. All variables are defined in Appendix II. T-statistics are in parentheses. Standard errors ar**e** heteroscedasticity robust. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	LTRO 1		**LTRO 2**		**Draghi Speech**		**OMT**	
	CAR [-1;0]	**CAR [-1;0]**	**CAR [-1;0]**	**CAR [-1;0]**	**CAR [-1;0]**	**CAR [-1;0]**	**CAR [-1;0]**	**CAR [-1;0]**
$\hat{\beta}_{Italy/Assets}$	-0.144		0.034		0.385***		0.329**	
	(-1.13)		(0.25)		(3.02)		(2.23)	
$\hat{\beta}_{Spain/Assets}$	-0.095		0.303		0.561***		0.174*	
	(-0.77)		(1.00)		(3.01)		(1.71)	
$\hat{\beta}_{Ireland/Assets}$	0.460		-0.151		0.903*		0.350	
	(0.32)		(-0.21)		(1.87)		(0.88)	
$\hat{\beta}_{Portugal/Assets}$	-0.307**		0.789		-0.029		0.328	
	(-2.29)		(1.58)		(-0.21)		(0.99)	
$\hat{\beta}_{GIPSI/Assets}$		0.018		-0.011		0.322***		0.304**
		(0.30)		(-0.04)		(2.78)		(2.31)
$\hat{\beta}_{Germany/Assets}$	-0.209*	-0.201*	0.012	-0.011	0.127	0.122	-0.188	-0.193
	(-1.87)	(-1.74)	(0.07)	(-0.07)	(1.08)	(0.93)	(-1.54)	(-1.65)
$\hat{\beta}_{Log\text{-}Assets}$	-0.001	-0.001	0.002	0.002	0.003	0.005	0.005	0.005
	(-0.20)	(-0.36)	(0.35)	(0.28)	(0.66)	(1.17)	(1.08)	(1.04)
$\hat{\beta}_{Tier\ 1}$	0.001	0.001	0.002*	0.002	-0.000	0.000	-0.002	-0.002*
	(0.58)	(0.57)	(1.68)	(1.10)	(-0.33)	(0.47)	(-1.63)	(-1.86)
$\hat{\beta}_{RWA/Assets}$	0.000	0.000	-0.000	-0.000	0.000*	0.001**	-0.001	-0.001
	(0.34)	(0.16)	(-1.03)	(-0.85)	(1.70)	(2.17)	(-1.51)	(-1.67)
$\hat{\beta}_0$	0.015	0.019	-0.047	-0.039	-0.061	-0.107	-0.008	0.000
	(0.23)	(0.32)	(-0.56)	(-0.40)	(-0.87)	(-1.52)	(-0.10)	(0.00)
N	54	54	51	51	42	42	42	42
R^2	8.77%	3.72%	12.00%	6.77%	39.8%	31.23%	32.74%	32.07%

Appendix I
Variable Definition

Variable	Definition
Greece, Italy, Spain, Portugal, Ireland (GIPSI)	Daily returns on 10-year government bonds issued by Greece, Italy, Spain, Portugal, and Ireland
Home	Home is the return from the 10-year government bond of the country in which the bank is headquarters.
BondIndex	BondIndex is the daily average return of sovereign bonds from euro area members other than GIPSI countries or Germany or France.
PC1	The first principal component (PC1) is the linear combination of GIPSI bond returns with the highest eigenvalue.
Germany	Daily returns on ten-year government bonds issued by Germany.
France	Daily returns on ten-year government bonds issued by France.
Log-Assets	Log-Assets is the natural logarithm of total book assets.
ST-LVG	ST-LVG is short-term debt divided by total debt.
RWA/TA	RWA/TA is risk-weighted assets divided by total assets.
Tier 1	Tier 1 is Tier 1 capital divided by risk-weighted assets.
Bank Stock Return (%)	Realized Return is the bank's equity return.
Bank CDS (bps)	Bank CDS is the five-year CDS spread of European banks.
ΔLog(Bank CDS)	ΔLog(Bank CDS) is the change in the log of daily CDS spreads.
$\hat{\beta}_i$	Estimated factor loadings from cross-sectional regressions from banks' stock returns on ten-year government bond returns from country i (Greece, Italy, Spain, Portugal, Ireland or Germany).
$\hat{\beta}_{GIPSI}$	Estimated factor loadings from cross-sectional regressions from banks' stock returns on GDP GIPSI Sovereign Bond Index returns
ΔMMF	ΔMMF is the monthly withdrawal by US Money Market Mutual Funds in million euros.
ΔMMF/Assets	ΔMMF scaled by total book assets.
$I_{GIPSI\ Bank}$	Indicator variable equal to 1 if bank is from GIPSI countries
$I_{Intervened}$	Indicator variable equal to 1 if bank has been bailed-out.
Macro-State Variables & Indices	
Stock Index "m"	Stock Index is the residual from the regression of the domestic stock market's daily log returns on daily domestic sovereign bond and German bund returns.
STOXX600	STOXX600 is the daily return of the Euro STOXX 600 Index
S&P 500	S&P 500 is the daily return of the S&P 500 Index.
VSTOXX	VSTOXX is the daily return of the VSTOXX Index for the European stock market.
TermStructure	Term Structure is the slope of the term structure of interest rates measured as the difference between the yield on a ten-year euro area government bond and the one-month Euribor.
BondDefSpread	Bond Default Spread is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt.
1 month EURIBOR	One-month EURIBOR is level of the short-term risk-free interest rate measured as the one-month Euribor.
ΔESI	ΔEuropean Economic Sentiment is the monthly change in the economic sentiment indicator obtained from opinion surveys conducted by the European Central Bank.
ΔIndProd	ΔLevel of Industrial Production is the monthly change in the level of industrial production.
ΔCPI	European Consumer Price Index is the change in inflation measured as the monthly change in the European Consumer Price Index.
Fama-French Factors	
SMB	Fama-French Factor: Small-minus-Big.
HML	Fama-French Factor: High-minus-Low.
Time Indicator	
March'10 – Dec'10	Indicates time period between March and December 2010.
Jan'11 – Sept'11	Indicates time period between January 2011 and September 2011.
Oct'11 – Dec'11	Indicates time period between October 2011 and December 2011.
Jan'12 – June'12	Indicates time period between January 2012 and June 2012.

Appendix II
List of Banks

This table is a list of all public banks included in the EBA stress tests sorted by asset size as of December 31, 2011. We provide the identifier used to match the banks to SNL Financial, Bloomberg, and the EBA stress test data.

Bank	Ticker	Ticker-Exchange	EBA-ID	Country	Total Assets
Deutsche Bank AG	DBK	DBK-ETR	DE017	Germany	2,164,103
HSBC Holdings Plc	HSBA	HSBA-LON	GB089	United Kingdom	1,967,796
BNP Paribas SA	BNP	BNP-PAR	FR013	France	1,965,283
Barclays Plc	BARC	BARC-LON	GB090	United Kingdom	1,871,469
Royal Bank of Scotland Group Plc	RBS	RBS-LON	GB088	United Kingdom	1,803,649
Crédit Agricole SA	ACA	ACA-PAR	FR014	France	1,723,608
ING Groep N.V.	INGA	INGA-AMS	NL047	Netherlands	1,273,580
Banco Santander SA	SAN	SAN-MAD	ES059	Spain	1,251,525
Société Générale SA	GLE	GLE-PAR	FR016	France	1,181,372
Lloyds Banking Group Plc	LLOY	LLOY-LON	GB091	United Kingdom	1,161,698
UniCredit SpA	UCG	UCG-MIL	IT041	Italy	926,769
Nordea Bank AB	NDA	NDA-OME	SE084	Sweden	716,204
Commerzbank AG	CBK	CBK-ETR	DE018	Germany	661,763
Intesa Sanpaolo SpA	ISP	ISP-MIL	IT040	Italy	639,221
Banco Bilbao Vizcaya Argentaria, SA	BBVA	BBVA-MAD	ES060	Spain	597,688
Danske Bank A/S	DANSKE	DANSKE-CSE	DK008	Denmark	460,832
Dexia SA	DEXB	DEXB-BRU	BE004	Belgium	412,759
Bankia	BKIA	BKIA-MAD	ES061	Spain	312,343
KBC Group NV	KBC	KBC-BRU	BE005	Belgium	285,382
Svenska Handelsbanken AB	SHBA	SHB.A-OME	SE086	Sweden	275,514
DNB ASA	DNB	DNB-OSL	NO051	Norway	274,216
Skandinaviska Enskilda Banken AB	SEBA	SEB.A-OME	SE085	Sweden	264,852
Banca Monte dei Paschi di Siena SpA	BMPS	BMPS-MIL	IT042	Italy	240,702
Hypo Real Estate	HRX	HRX.ETR	DE023	Germany	236,586
Erste Group Bank AG	EBS	EBS-WBO	AT001	Austria	210,006
Swedbank AB	SWEDA	SWED.A-OME	SE087	Sweden	208,464
Bank of Ireland	BIR	BIR-DUB	IE038	Ireland	154,880
Raiffeisen Bank International AG	RBI	RBI-WBO	AT002	Austria	146,985
Allied Irish Banks, Plc	AIB	AIB-DUB	IE037	Ireland	136,651
Banco Popolare Società Cooperativa	BP	BP-MIL	IT043	Italy	134,127
SNS Real	SR	SR-AMS	NL050	Netherlands	132,174
Landesbank Berlin Holding AG	BEB2	BEB2-ETR	DE027	Germany	131,175
Banco Popular Español SA	POP	POP-MAD	ES064	Spain	130,926
Unione di Banche Italiane SCpA	UBI	UBI-MIL	IT044	Italy	129,804
National Bank of Greece SA	ETE	ETE-ATH	GR031	Greece	106,732
Banco Sabadell SA	SAB	SAB-MAD	ES065	Spain	100,437
Banco Comercial Português SA	BCP	BCP-LIS	PT054	Portugal	93,482
Espirito Santo Financial Group SA	ESFN	ESFN-LIS	PT055	Luxembourg	84,020
EFG Eurobank Ergasias SA	EUROB	EUROB-ATH	GR030	Greece	76,822
Permanent TSB Group Holdings Plc	IL0	IL0-DUB	IE039	Ireland	72,037
Bankinter SA	BKT	BKT-MAD	ES069	Spain	59,491
Alpha Bank AE	ALPHA	ALPHA-ATH	GR032	Greece	59,148
Piraeus Bank SA	TPEIR	TPEIR-ATH	GR033	Greece	49,352
Banco BPI SA	BPI	BPI-LIS	PT056	Portugal	42,956
Österreichische Volksbanken AG	VBPS	VBPS-WBO	AT003	Austria	41,135
Bank of Cyprus Public Company Limited	BOCY	BOCY-CYP	CY007	Cyprus	37,474
Jyske Bank A/S	JYSK	JYSK-CSE	DK009	Denmark	36,364
Cyprus Popular Bank Public Co. Ltd.	CPB	CPB-CYP	CY006	Cyprus	33,762
OTP Bank Nyrt.	OTP	OTP-BUD	HU036	Hungary	32,413
Banco Pastor SA	PAS	PAS-MAD	ES074	Spain	30,376
ATEbank SA	ATE	ATE-ATH	GR034	Greece	28,818
Sydbank A/S	SYDB	SYDB-CSE	DK010	Denmark	20,649
TT Hellenic Postbank SA	TT	TT-ATH	GR035	Greece	16,396
Bank of Valletta Plc	BOV	BOV-MAL	MT046	Malta	6,623
FHB Jelzalogbank Nyrt	FHB	FHB-BUD	HU111	Hungary	2,593
Caja de Ahorros del Mediterráneo	CAM	CAM-MAD	ES083	Spain	

Appendix III
Descriptive Statistics

All variables are defined in Appendix I.

Panel A. Bank Characteristics

	Obs	Mean	Std. Dev.	Min	P50	Max
Log-Assets	56	12.03	1.51	7.91	11.92	14.53
ST-LVG	44	0.33	0.11	0.00	0.32	0.63
RWA / Assets	56	0.49	0.17	0.17	0.52	0.76
Tier 1 (%)	56	10.15	2.80	5.97	9.63	23.98
ΔMMF/Assets (%)	25	0.12	0.73	-1.52	0.18	1.44

Panel B. Bond Holdings

	Obs	Mean	Std. Dev.	Min	P50	Max
GIPSI banks						
GIPSI (% Assets)	70	8.69%	4.79%	0.67%	8.44%	29.59%
NON-GIPSI (% Assets)	70	0.93%	1.22%	0.00%	0.58%	5.32%
GIPSI (% Total Sov Bonds)	75	88.11%	14.81%	48.70%	93.09%	100.00%
NON-GIPSI (% Total Sov Bonds)	75	11.89%	14.81%	0.00%	6.91%	51.30%
Domestic (% Total Sov Bonds)	86	83.90%	16.04%	24.32%	89.79%	100.00%
NON-GIPSI banks						
GIPSI (% Assets)	145	1.21%	2.32%	0.00%	0.45%	20.33%
NON-GIPSI (% Assets)	145	6.63%	5.05%	0.00%	4.88%	25.13%
GIPSI (% Total Sov Bonds)	145	15.87%	23.08%	0.00%	7.86%	99.93%
NON-GIPSI (% Total Sov Bonds)	145	84.13%	23.08%	0.07%	92.14%	100.00%
Domestic (% Total Sov Bonds)	154	50.97%	30.57%	0.00%	45.42%	100.00%

Panel C. Time-series

	Obs	Mean	Std. Dev.	Min	P50	Max
Daily returns January 2007 - June 2013						
Bank Stock Return (bps)	1,613	-8.75	351.96	-1771	-3.17	2143
Bank CDS (bps)	1,336	112.76	87.49	6.01	97.56	440.27
Δ Log (Bank CDS) (bps)	1,336	29.12	529.65	3,258.00	20.69	3,293
Daily Time Series Variables						
STOXX 600 (bps)	1,591	-2.48	143.61	-792.3	2.09	941
VSTOXX (bps)	1,613	1.93	62.5	-2492	51.46	3,277
S&P 500 (bps)	1,523	0.4	155	947	6.97	1,096
TermStructure (%)	1,613	2.12	1.39	-0.78	2.83	3.76
BondDefSpread (%)	1,613	2.09	1.04	0.74	1.82	5.67
1mEuribor (%)	1,613	1.79	1.68	0.11	0.93	5.20
Monthly Time Series Variables						
SMB	76	0.20	7.14	-26.35	0.76	16.50
HML	76	0.49	14.03	-49.05	0.80	32.59
ΔESI	76	-0.30	2.17	-6.50	-0.10	4.70
ΔIndProd	76	-0.15	1.12	-3.49	0.08	2.15
ΔCPI	76	-0.01	0.30	-1.10	0.00	0.80

Appendix IV
GIPSI Sovereign Bond Holdings and Bank Characteristics

This table reports the results from OLS regressions of bank's individual bond holdings on bank characteristics: Log-Assets, Tier 1, and RWA/Assets. Holdings are available during the March 2010 to June 2012 period and are scaled by banks' total assets. Dependent variable is GIPSI sovereign bond holdings over total assets, which is defined as the sum of each banks' GIPSI sovereign bond holdings. Columns (5) to (7) report the results of regressions performed on subperiods that represent the time periods between the stress tests conducted by the European Banking Authority (EBA). Column (5) reports regression results for the March to December 2010 period, column (6) for the January to December 2011 period, and column (7) for the January to June 2012 period, respectively. Panel B reports the regressions using bank-by-bank means of all variables. All bank characteristics are lagged by one year (half-year if available). Standard errors are clustered at the bank level. *T*-statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Cross-Sectional Tests

	Dependent Variable: GIPSI/Assets						
					March – Dec. 2010	**Jan. – Dec. 2011**	**Jan. - June 2012**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
$\hat{\beta}_{Tier\ 1}$	-0.513***		-0.362***	-0.289**	-0.470**	-0.298	0.330
	(-5.27)		(-3.20)	(-2.37)	(-2.22)	(-1.46)	(0.83)
$\hat{\beta}_{RWA/Assets}$		0.081***	0.055***	0.081***	0.044	0.092***	0.320**
		(6.46)	(3.55)	(3.88)	(1.63)	(2.91)	(2.92)
$\hat{\beta}_{Log\text{-}Assets}$				0.004**	0.003	0.004	0.012
				(2.11)	(1.25)	(1.14)	(1.27)
$\hat{\beta}_0$	0.086***	-0.009*	0.045**	-0.025	0.018	-0.024	-0.297
	(7.03)	(-1.94)	(2.47)	(-0.64)	(0.31)	(-0.36)	(-1.41)
N	193	208	184	184	91	73	20
R^2	17.07%	13.36%	23.07%	24.59%	22.61%	29.47%	63.18%

Panel B. Regression Using Bank-by-Bank Means

	Dependent Variable: GIPSI/Assets			
	(1)	**(2)**	**(3)**	**(4)**
$\hat{\beta}_{Tier\ 1}$	-0.381**		-0.253	-0.190
	(-2.25)		(-1.40)	(-1.04)
$\hat{\beta}_{RWA/Assets}$		0.067***	0.044*	0.069**
		(3.07)	(1.78)	(2.37)
$\hat{\beta}_{Log\text{-}Assets}$				0.005*
				(1.76)
$\hat{\beta}_0$	0.070***	-0.006	0.034	-0.041
	(3.25)	(-0.74)	(1.19)	(-0.81)
N	52	52	52	52
R^2	11.41%	11.27%	14.97%	18.12%

Appendix V
Intervened Banks

This table reports the banks that received bailouts during the 2007 – 2009 financial crisis and sovereign debt crisis. Only the first bailout is reported in case multiple bailouts were provided to the bank. The data are obtained via official EU filings: http://ec.europa.eu/competition/elojade/isef/index.cfm?clear=1&policy_area_id=3.

Bank	Country	Date of First Intervention	Year	Type of Intervention
Allied Irish Banks, Plc	Ireland	30.09.2008	2008	Debt guarantee
Alpha Bank AE	Greece	25.11.2008	2008	Debt guarantee
ATEbank SA	Greece	12.01.2009	2009	Recapitalization
Banca Monte dei Paschi di Siena SpA	Italy	27.03.2009	2009	Recapitalization
Banco BPI SA	Portugal	04.06.2012	2012	Recapitalization
Banco Comercial Português SA	Portugal	15.12.2008	2008	Debt guarantee
Banco Pastor SA	Spain	20.02.2009	2009	Debt guarantee
Banco Popolare Società Cooperativa	Italy	26.03.2009	2009	Recapitalization
Banco Popular Español SA	Spain	16.02.2009	2009	Debt guarantee
Bank of Cyprus Public Company Limited	Cyprus	27.06.2012	2012	Recapitalization
Bank of Ireland	Ireland	30.09.2008	2008	Debt guarantee
Bankia	Spain	23.10.2008	2008	Debt gurantee
Bankinter SA	Spain	18.02.2009	2009	Debt guarantee
Barclays Plc	UK	24.10.2008	2008	Debt guarantee
BNP Paribas SA	France	21.10.2008	2008	Recapitalization
Caja de Ahorros del Mediterráneo	Spain	16.03.2009	2009	Debt guarantee
Commerzbank AG	Germany	03.11.2008	2008	Recapitalization
Crédit Agricole SA	France	21.10.2008	2008	Recapitalization
Cyprus Popular Bank Public Co. Ltd.	Cyprus	14.05.2012	2012	Recapitalization
Danske Bank A/S	Denmark	06.10.2008	2008	Debt guarantee
Dexia SA	Belgium	30.09.2008	2008	Recapitalization
Erste Group Bank AG	Austria	30.10.2008	2008	Recapitalization
Espirito Santo Financial Group SA	Portugal	27.11.2008	2008	Debt guarantee
Eurobank Ergasias SA	Greece	31.12.2008	2008	Debt guarantee
FHB Jelzalogbank Nyrt	Hungary	25.03.2009	2009	State loan
Hypo Real Estate Holding AG	Germany	29.09.2008	2008	State loan/debt guarantee
ING Bank NV	Netherlands	19.10.2008	2008	Recapitalization
KBC Group NV	Belgium	27.10.2008	2008	Recapitalization
Lloyds Banking Group Plc	UK	08.10.2008	2008	Debt guarantee
National Bank of Greece SA	Greece	31.12.2008	2008	State loan
Nova Kreditna Banka Maribor d.d.	Slovenia	20.12.2012	2012	Recapitalization
Österreichische Volksbanken-AG	Austria	09.02.2009	2009	Debt guarantee
OTP Bank Nyrt.	Hungary	26.03.2009	2009	State loan
Permanent TSB Group Holdings Plc	Ireland	30.09.2008	2008	Debt guarantee
Piraeus Bank SA	Greece	31.12.2008	2008	State loan
Royal Bank of Scotland Group Plc	UK	08.10.2008	2008	Debt guarantee
SNS Bank NV	Netherlands	13.11.2008	2008	Recapitalization
Société Générale SA	France	27.10.2008	2008	State loan
Swedbank AB	Sweden	10.11.2008	2008	Debt guarantee
TT Hellenic Postbank SA	Greece	16.05.2012	2012	Recapitalization