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MSc Economics & Business

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When will Banks' Carry Trade stop?

Home Bias and Moral Hazard

Abstract

The aim of this thesis is to investigate whether carry trade behavior of banks is still a persistent phenomenon. Following the method outlined by Acharya and Steffen (2015), I investigate a larger sample of 81 European banks from January 2007 to December 2015. The results prove that banks are still performing a carry trade with government sovereign debts even though to a slighter less extent. The evidence shows that home bias and moral hazard are the motives behind this phenomenon. The first motive making banks purchase more domestic debt. Instead, moral hazard splits into regulatory capital arbitrage and risk shifting. Banks perform the carry trade either to accomplish regulatory capital requirements or to shift their risk to earn higher yields. Finally, I also create a new risk shifting measure showing that overexposed and highly leveraged banks are involved in the carry trade to a higher extent.

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1. Introduction

The Global Financial Crisis started in 2008 and the following Sovereign Debt Crisis of the Eurozone in 2009 have greatly changed the setting and environment of the world economy. In fact, the American and European economies have experienced the worst post-war economic recession. The effects of such crisis have spread out from the financial markets to the real economies forcing central banks to enact unconventional monetary policies and governments to preserve the stability of their financial systems bailing out domestic banks. In particular, the Eurozone faced something that was not believed as a possible event in the Monetary Union: the possibility that a government could default became a real risk, also dubbed as sovereign credit risk.

The government bond yield spreads between the Core Euro area countries (mainly Germany) and peripheral Euro Countries (e.g.: Greece) widened in a considerable way. This phenomenon casted doubts on the solvency of European banks as they were incurring in losses due to their exposures to GIIPS (i.e. Greece, Italy, Ireland, Portugal, Spain) sovereign bond holdings. Increasing spreads reflected the different economic outlook among banks across Europe. Moreover, many banks were forced to sell many of their assets, incurring in further losses, in order to increase their regulatory equity capital ratios. This situation was challenging the survival of the Eurozone. Consequently, the European Central Banks and local Governments were forced to act in a strong way to preserve the Eurozone.

Acharya & Steffen (2015) investigate Eurozone banks risks from 2007 to 2013 and show a pervasive carry trade behavior among banks. Such behavior, consisted in financing investments in sovereign bonds of GIIPS countries with short-term unsecured funding from the wholesale market. In this way, banks made profits from the spread between long-term bonds and short-term funding costs. The authors illustrate that risk-shifting and regulatory arbitrage motives drive this behavior. Both two motives are forms of moral-hazard: the former consists in riskier banks shifting from safer into riskier government bonds. In this way, banks bet on their own survival; in fact, as argued by

Diamond & Rajan (2011), the risk shifts into the states of the world (government defaults) where they are likely to experience bank runs. Regulatory Capital arbitrage, instead, brings banks with low capital ratios (i.e. Tier 1) to invest in high yield bonds in order to meet regulatory capital requirements without issuing new economic capital. In general, the paper shows that this behavior is stronger for large banks and banks with low capital ratios and high risk-weighted assets. Moreover, the authors find evidence for home bias and moral suasion in the subsample of GIIPS banks. Home bias occurs when banks purchase more debt of their own country compared to foreign debt. According to Battistin et al. (2014) home bias increases the fragmentation of sovereign bond markets. With regards to moral suasion, it consists in governments forcing domestic banks to purchase their own sovereign debt due to a lack in demand by other investors. In this context, governments tried to preserve the stability of their financial systems bailing out banks or at least ensuring depositors. The paper demonstrates that, as a consequence, the CDS spreads of banks decreased while the ones of governments increased substantially suggesting that the risk of default of governments became a serious and possible issue. The European Central Bank as well tried to reduce the funding pressure on GIIPS banks and help the recapitalization of such banks channeling €1 trillion into the banking system using non-standard monetary policy measures, namely, three-year Long-Term Refinancing Operations (LTROs). However, this intervention did not solve the issue of recapitalization of banks making them increase their exposure toward sovereign debts and home bias.

In this paper, following the methodology proposed by Acharya & Steffen (2015), I investigate whether this carry trade behavior has persisted after 2013. Their method consists in performing a sensitivity analysis of banks daily stock returns to government bond returns of GIIPS countries and Germany. The interest is not on the effect of sovereigns on banks equity returns but the exposure of banks toward them. In fact, a positive effect indicates that a bank is purchasing a certain government bond while a negative effect indicates that the bank is selling it. Although the methodology is the same, there are some differences in the dataset and the period studied is longer.

I analyze all the publicly listed banks that were part at least once of different stress tests and assessments by the European Banking Authority (EBA) between 2010 and 2015. The sample includes Eurozone banks, as well as banks of countries that are part of the European Union (EU) but not part of the Eurozone. I find that carry trade is persistent across European banks to a slightly less extent. Both home bias and moral hazard motives explain this phenomenon. The former makes banks purchasing more domestic debt over foreign one. The latter occurs through regulatory capital arbitrage and risk shifting. Moreover, for risk shifting I also perform a new analysis showing that highly leveraged and highly exposed banks tend to perform the carry trade even more.

The paper is structured as follows: Section 2 reviews the previous research on this topic and the relevant causes for the carry trade behavior; Section 3 describes the data used in the analysis; Section 4 outlines the methodology; Section 5 analyzes the results and their meaning; finally, Section 6 draws the conclusions.

2. Literature Review

Even though the carry trade behavior of banks is a recent phenomenon, it has been greatly studied due to the relevance of the banking system in the world economy. Therefore, the literature in this field is extensive. Besides the study of Acharya & Steffen (2015), many others analyze the banking system during the Eurozone crisis and the carry trade phenomenon. Crosignani et al. (2015) studying Portuguese banks note how during the sovereign debt crisis banks tended to increase their exposure to short term sovereign debt. More specifically, banks took advantage of the unconventional monetary policy adopted by the ECB across 2011 and 2012 through the LTRO. They enacted a "collateral trade" consisting in purchasing government bonds with three-year or shorter maturity (the maturity of the LTRO) and pledging them at the ECB in exchange for a cheaper three-year loan. The authors explain that one of the main consequences is a significant increase in the holdings of domestic government bonds. In general, the literature identifies four main reasons for such behavior: risk shifting, regulatory capital arbitrage (both part of the moral hazard motive), home bias and moral suasion.

Risk Shifting

Risk shifting consists in the practice of a firm or an individual aimed at transferring risk to another party (Jensen & Meckling, 1976). Among its many connotations, the most relevant is the case of a firm that under financial distress undertakes excessive risk. In case of a corporate this high-risk behavior has the objective of increasing the reward for equity holders who face little downside risk. In fact, this risk is shifted toward debt holders. With regards to financial institution the sovereign debt crisis has spotlighted a new kind of risk shifting. Diamond & Rajan (2011) argue that one of the reasons for carry trade behavior is risk shifting. Banks shifts their risk into the states of the world (government defaults) where they are likely to experience bank runs.

Regulatory Capital Arbitrage

Regulatory capital is the capital banks are required to hold to insulate themselves from losses. There are different kinds of capital requirements that a financial institution must hold depending on the risk (credit, operational, liquidity…). Arbitrage, instead, occurs whenever banks find loopholes through financial operations and engineering in order to avoid, or at least decrease, this amount of capital. With regards to the carry trade behavior, many attribute the zero-risk weight treatment and the absence of concentration limit for Eurozone sovereign debt the main causes of regulatory capital arbitrage. Thus, banks with low capital ratios (i.e. Tier 1) invest in high yield bonds to meet regulatory capital requirements without issuing new economic capital. In other words, peripheral public debt became a way to buy risky and high-yield securities while improving regulatory capital ratios (Korte & Steffen, 2013).

Home Bias

Home bias is defined as the propensity of investors to overinvest in domestic equities despite the well-known benefits of diversification. Coval and Moskowitz (1999 and 2001) explain how home bias is driven by information asymmetries mainly deriving from the location of the firm. With regards to banks and their carry trade behavior, home bias occurs when banks purchase more debt of their own country compared to foreign debt. Horváth et al. (2015) find that European banks bias towards domestic sovereign debt increases as riskiness of the sovereign increases (linked to risk shifting), shareholders' rights are stronger and the bank is fully or partially owned by the government. De Marco and Macchiavelli (2016) explain that politics do matter in home bias. In fact, banks that are government-owned and have politicians in their board have significantly higher exposure to domestic debt compared to other banks.

Moral Suasion

Moral suasion consists in governments forcing domestic banks to purchase their own sovereign debt due to a lack in demand by other investors. In this context, governments tried to preserve the stability of their financial systems bailing out banks or at least ensuring depositors. Uhlig (2014) describes how in countries with fiscally weak governments banks tend to hold more domestic sovereign debt, while in fiscally stronger countries governments set stricter regulation. In this way, financially vulnerable governments can borrow more cheaply. In other words, the closer the relationship between the government and the banks in stressed period the higher the holding of domestic debt of banks will be (Battistini et al., 2014; Altavilla et. al., 2016).

Once determined the causes of carry trade, literature develops on the banking sector, its dynamics and on the consequences that banks have on the real economy mainly though their lending activity to firms. Firstly, the effects of the carry trade have different effects on the banking system and the economy. According to Battistini et al. (2014), home bias increases the fragmentation of sovereign bond markets. The paper demonstrates that the CDS spreads of banks decreased while the ones of governments increased substantially suggesting that the risk of default of governments became a serious potential issue. The European Central Bank as well tried to reduce the funding pressure on GIIPS banks and help the recapitalization of such banks channeling €1 trillion into the banking system using non-standard monetary policy measures, namely, three-year Long-Term Refinancing Operations (LTROs). However, the authors show how this intervention did not solve the issue of recapitalization of banks making them increase their exposure toward sovereign debts and home bias. Acharya et al. (2014) show that one of the major consequences of the financial crisis deriving from sovereign taking on credit risk is the feedback loop. In fact, as the financial sector and the sovereign creditworthiness become closely related, whenever a shock hits one side there is a feedback on the other side. More specifically, *"a negative shock (e.g., to output and hence tax revenue) that reduces the sovereign's creditworthiness feeds back to the*

financial sector's credit risk via its sovereign exposure". Moreover, the authors show that after the bailouts there is a co-movement between CDS spreads of banks and sovereign, while before bailouts such relationship did not exist. The paper by Popov and Van Horen (2014), besides adding pieces of evidence to the home bias theory, shows how the sovereign debt crisis affected the banking system bringing to a great decline in lending by those banks that were most exposed to GIIPS sovereign bonds. The same effect is studied and proved by Becker and Ivashina (2014) who develop on the financial repression concept. Those banks that were mostly influenced by local government, and thus increased their government bond holdings, generated a crowding out of corporate lending. The channels used to exercise financial repression are direct government ownership as well as government influence through banks' boards of directors. Acharya et al. (2014) further analyze the negative consequences of the sovereign debt crisis on the economy. The authors show that during the crisis companies strongly related to banks that are highly exposed to sovereign debts face financial distress. Subsequently, these companies perform badly in terms of employment and growth sales rates. Popov and Van Horen (2013) explain that due to the special treatment of Eurozone sovereign debt European banks tend to hold a large amount of government debt securities on their balance sheet. The increased riskiness of foreign sovereign debt held on banks' portfolios affect their lending activities through two channels. First, losses on bank capital negatively affect the asset side of the bank's balance sheet and its profitability, with adverse consequences for the cost and availability of funding (Gertler and Kiyotaki, 2010). In addition, expected losses on sovereign bonds can raise concerns about counterparty risk. Secondly, sovereign debt is often used by banks as collateral to secure wholesale funding. Higher sovereign risk can therefore reduce the eligibility of collateral, and hence banks' funding capacity. The authors show a direct link between deteriorating creditworthiness of sovereign debt and lending activity of banks. This phenomenon is strongly observed with foreign companies; this is a supporting evidence of the cross-border implications for the real economy through the banks' lending channel. Acharya et al. (2014) and

Becker and Ivashina (2014) suggest that this behavior is consistent with risk-shifting and moral suasion, respectively. Crosignani (2015) shows that these two hypotheses are intertwined, as governments have an incentive to keep domestic banks undercapitalized. Similarly, Hildebrand et al. (2012) find that worse-capitalized banks hold more government bonds and that banks shifted investments to securities that are eligible to be posted as collateral at the ECB. Altavilla et al. (2016) analyze 226 euro-area banks and find that both moral suasion and risk shifting are the main reasons for large sovereign exposures. The authors, also, prove the negative effect on lending activity of the most stressed and exposed banks. Uhlig (2013) depicts moral suasion suggesting that regulators might allow banks to hold risky domestic bonds; thus, shifting sovereign default losses to the common central bank. Several other papers examine how a deterioration of the fiscal position of the own sovereign affects banks. Brown and Din (2011) provide evidence that a country's ability to support its financial sector, as reflected in its public deficit, affects its treatment of distressed banks. Demirguc-Kunt and Huizinga (2013) find that in 2008 systemically large banks saw a reduction in their market valuation in countries running a large fiscal deficit as these banks became too big to save.

This research aims at investigating whether the carry trade is still a persistent phenomenon among European banks even after the crisis and now that the yields between peripheral and core countries do not differ as much as during the crisis (even though they are still higher then pre-crisis period). Previous literature extensively looks at the causes of such behavior and find that risk shifting, regulatory capital arbitrage, home bias and moral suasion as main drivers of it. In this study, I focus on the entire period from the beginning of the carry trade, coinciding with the begging of the crisis in 2007, till the end of 2015 adding a piece of evidence to the carry trade behavior investigated by previous literature. In addition, I also use a new variable to study the risk shifting phenomenon looking at banks' sovereign exposures and leverage.

3. Data Description

To perform my analysis, I construct a data set containing all the publicly listed banks that were part at least once of ten different stress tests and assessments by the European Banking Authority (EBA) between 2010 and 2015. The reporting dates from EBA stress tests are the followings: March 2010, December 2010, September 2011, December 2011, June 2012, December 2012, June 2013, December 2013, December 2014 and June 2015[1]. The EBA is the European institution designated to supervise the European banking sector through an effective and consistent regulation. One of the main tools of the EBA to supervise over financial institution are the stress tests. These tests aim at assessing the capability of financial institution to adapt to adverse market conditions and, more in general, to estimate the systemic risk in the European financial system. Appendix I reports total exposure of banks towards each GIIPS country, total GIIPS and France and Germany retrieved from the European Banking Authority. The data show that Eurozone non-GIIPS and non-Eurozone banks are more exposed to core countries sovereign debt (i.e. France and Germany) then to peripheral countries all over the entire stress tests period considered. On the other hand, GIIPS banks present great exposures to peripheral governments, and thus also their own government. These exposures are on an aggregate level more than ten times higher compared to the ones to France and Germany. Another interesting point to highlight is how for non-GIIPS Eurozone and non-Eurozone banks the exposures toward GIIPS countries decrease in 2012 and 2013 at the peak of the sovereign crisis. For some countries, they even become negligible; for instance, non-Eurozone banks have an exposure toward the Greek government of just six million Euros in June 2013. However, this phenomenon can be identified also for GIIPS banks exposures but with lower magnitudes. The last two reporting dates (December 2014 and June 2015) show again a decrease in the exposures of all banks toward Greece. This is most likely due

[1] Acharya and Steffen (2015) collect data on publicly listed banks for the first five reporting dates: March 2010, December 2010, September 2011, December 2011 and June 2012.

to the turmoil period in which Greece defaulted once again and the market started believing in Greece leaving the Euro Area.

I collect daily market data (such as banks' stock prices, ten-year benchmark bond benchmark returns, stock market indexes, inflation…) and banks characteristics (e.g. Tier 1 capital, Tier 1 ratio, leverage ratio…) from Datastream. The data set is composed by 81 banks from 20 different European countries: 61 Eurozone banks split as: 36 GIIPS (6 Greece, 3 Ireland, 12 Italy, 3 Portugal, 12 Spain); and 25 Eurozone non-GIIPS (3 Austria, 2 Belgium, 4 Cyprus, 1 Finland, 3 France, 7 Germany, 1 Malta, 3 Netherlands, 1 Slovenia); 20 non-Eurozone (3 Denmark, 2 Hungary, 6 Poland, 4 Sweden, 4 UK, 1 Norway). For a complete list of the banks please refer to Appendix II.

Table 1 reports summary statistics for the main variables used in the regression model. The dependent variable is the daily returns of banks' equities. The independent variables are ten-year government bonds daily returns of Greece, Ireland, Italy, Portugal, Spain, Germany and France. In addition, a GDP weighted bond index is constructed for the GIIPS countries. Data are collected for each of the 81 banks at daily frequency for a period of nine years (2007-2015). This sums up to almost two hundred thousand observations[2]. During both the financial and sovereign debt crisis banks incurred in great losses and were under great pressure. In fact, the mean daily equity return is negative and the standard deviation is high showing how the crisis hit the banking sector both with negative returns and volatility. Greek government bonds have the lowest mean daily return but the highest standard deviation. On the other hand, France and Germany have the lowest standard deviation. The GIIPS government bond is constructed as a weighted average by GDP of GIIPS bond returns and it is rebalanced annually. Therefore, it is skewed toward the returns of Spain and Italy that are the countries with the highest GDPs among GIIPS countries. In fact, both its mean return and standard deviation are close to those of Italy and Spain.

[2] The observation for equity returns are slightly less since some banks were listed after 2007 or delisted before 2015.

Table 1
Sample characteristics. Table 1 displays sample characteristics for the sample of 81 banks. The total sample includes daily equity returns of banks as dependent variable; instead, as independent variables: ten-year government bond daily returns of Greece, Ireland, Italy, Portugal, Spain, Germany, France a GDP weighted bond index of GIIPS. The period analyzed spans from January 2007 till December 2015.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
ID	190,269	NA	NA	1	81
EQ. Return	171,575	-0.000350	0.0355	-0.920	1.903
Greece	190,269	2.87e-06	0.0226	-0.253	0.415
Ireland	190,269	0.000139	0.00642	-0.0496	0.0871
Italy	190,269	0.000155	0.00541	-0.0362	0.0611
Portugal	190,269	0.000162	0.00925	-0.110	0.120
Spain	190,269	0.000140	0.00549	-0.0270	0.0672
Germany	190,269	0.000159	0.00381	-0.0183	0.0227
France	190,269	0.000159	0.00368	-0.0200	0.0233
GIIPS	190,269	0.000136	0.00529	-0.0308	0.0591

Table 2 presents the correlation matrix of the bonds daily returns. Positive correlation (close to 1) indicates that bonds returns move together while a negative one (close to -1) that they move in the opposite direction. Instead, a low correlation (close to 0) indicates that there is no relationship. The correlation between GIIPS countries and Germany or France are very low; and in the case of Greece and Germany even negative. This is consistent with the fact that, during the crisis, the integration of the European Union was stressed and yield on government bonds started widening. This mirrored the divergence between the core Eurozone countries and peripheral ones. In addition, the table shows that the correlation between France and Germany is high while it is not among GIIPS countries exception made for Spain and Italy. With respect to the GIIPS bond index, its correlation is higher with Spain and Italy. This is consistent with what stated above: since Italy and Spain have the highest weights in the composition of the index, then the GIIPS bond index is more correlated to these two countries. In the regression analysis, other variables are constructed and used. For a full list and description of the variables please refer to Appendix III.

Table 2

Correlation table. This table displays the correlation matrix of the main dependent variables used in the regression analysis (i.e. GIIPS countries, GIIPS index, Germany and France daily bond returns). The correlation coefficients can range from -1, which indicates a perfect negative linear relationship between two variables, to +1, which denotes a perfect positive linear relationship. A value of 0 (zero) indicates that there is no relationship.

	Greece	Ireland	Italy	Portugal	Spain	GIIPS	Germany	France
Greece	1							
Ireland	0.2654	1						
Italy	0.2532	0.4070	1					
Portugal	0.3369	0.5018	0.3714	1				
Spain	0.2907	0.4452	0.8039	0.3962	1			
GIIPS	0.5301	0.5472	0.9156	0.5422	0.8964	1		
Germany	-0.1171	0.1769	0.1266	0.0530	0.1667	0.1096	1	
France	0.0120	0.2833	0.4150	0.1440	0.4121	0.3907	0.7957	1

4. Methodology

Analyzing banks' exposure to sovereign debt can be challenging due to the availability of the data and the data themselves. In fact, the banks might be exposed through loans to governments and their enterprises. In addition, banks could be exposed through the derivative market like credit default swaps and other transactions with the governments (Acharya and Steffen, 2015). Therefore, the sensitivity of banks' daily equity returns to daily government bond returns gives a lower bound. This analysis does not measure the performance of equities of European banks but their sensitiveness to sovereign debts. Following the model defined by Acharya and Steffen (2015), I run a pooled OLS regression with country fixed effects as follows:

$$R_{i,t} = \beta_{0,i} + \beta_{GIIPS,t}R_{GIIPS,t} + \beta_{Germany,t}R_{Germany,t} + \beta_{m,t}R_{m,t} + \sum \gamma MACRO + \varepsilon_{i,t}$$

$R_{i,t}$ being bank i's daily stock return; $R_{GIIPS,t}$ is the daily return on ten-year government bonds from Greece, Ireland, Italy, Portugal, Spain; $R_{Germany,t}$ is the daily return on ten-year German government bond; $R_{m,t}$ is the daily return of the equity market index in country m in which the bank is headquartered. *MACRO* includes several macroeconomics variables that might affect both the equity and bond returns. More specifically, it includes the followings: the change in the volatility index of the European stock market, namely, the Vstoxx. The Vstoxx is the European volatility benchmark. It reflects the investor sentiment and overall economic uncertainty by measuring the 30-day implied volatility of the EURO STOXX 50[3]. As shown in the European Central Bank Monthly Bulletin of March 2008, after a relatively mild period for the equity stock market the Vstoxx increased again in 2007 with the burst of the financial crisis. Periods of high volatility are a symptom of market turmoil in which investors require higher returns for holding equities. Therefore, periods of high stock market volatility can coincide with stock prices falls.

[3] Source: http://www.eurexchange.com/exchange-en/products/vol/vstoxx

The Term structure, instead, is constructed as the difference between the yield of a ten-year Euro area government bond and the one-month Euribor. This spread reflects the credit risk of the Euro Area governments. The bond default spread is constructed as the difference between the yield on 10-year German BBB bonds and yields on 10-year German government debt. According to Elton et al. (2001), this spread is mainly driven by three factors: loss from expected default, tax treatment (which must be paid on corporate bonds but not on government ones) and a systematic risk premium. The authors find that taxes and systemic risk are the factors mainly affecting these spreads. The Euribor is the Euro Interbank Offered Rate and is based on the interest rates at which a panel of European banks borrow funds from one another. The one-month Euribor considers only loans with a maturity of one month. It affects banks operations and their profitability as it is the benchmark of many products sold by banks to the public like mortgages. The economic sentiment indicator is a composite indicator made up of five sectoral confidence indicators with different weights: Industrial confidence indicator, Services confidence indicator, Consumer confidence indicator, Construction confidence indicator and Retail trade confidence indicator[4]. It shows how different players in the market feel about the current economic environment and possible future development. Looking at its monthly change: a positive value means an increase in optimisms while a negative change indicates pessimism. Industrial production index measures the monthly change in the output of industry and it is a business cycle measure. The European Union adopted the Harmonized index of consumer prices (HICP). Keeping other factors equal (e.g. wages), when there is an increase in inflation the purchasing power of consumers falls as they are no longer able to purchase the same amount of goods and services with the same amount of money. The Effective exchange rate of the Euro considers exchange rate effects of the Euro and trade partners of the EU capturing potential issues concerning the existence of the Eurozone (Battistini et al, 2014).

[4] Source: Eurostat (http://ec.europa.eu/eurostat/web/products-datasets/-/teibs010)

The aim of my study is to investigate whether and to which extent banks are exposed to sovereign debt. A positive coefficient indicates that banks load positively on (are long in) sovereign debt of a country, while a negative coefficient indicates that banks load negatively on (are short in) the sovereign debt of another one. The carry trade behavior of banks would consist in buying GIIPS government bonds ($\beta_{GIIPS,t} > 0$) in order to gain from their higher yields and financing these purchases through the sales of core European government debt like the one of Germany ($\beta_{Germany,t} < 0$). More specifically, $\beta_{Germany,t}$ represents the banks' short-term funding pressure. In fact, investors tilted toward long-term safe German bunds while reducing the supply of short-term capital. Thus, if the increase in demand for German sovereign (considered to be safe), which makes German bunds appreciate, is contemporary to a great decline in short-term funding, to which banks are exposed to, then it is as if banks are short in long-term German bonds.

5. Results

Before performing my analysis, I check whether the methodology followed is consistent with the one outlined by Acharya and Steffen (2015). Therefore, I study their data set composed by 55 banks and check whether I obtain similar results. Results are shown in Appendix V. Table 3 presents the results from the main regression model. Column 1 shows the results for the time span used by Acharya and Steffen (i.e. from January 2007 till June 2013); column 2 shows the coefficients for the period after the one analyzed by Acharya and Steffen (i.e. from June 2013 till December 2015); and, column 3 shows the results for the entire period (January 2007 – December 2015). The β_{GIIPS} and $\beta_{Germany}$ are the cross-sectional averages of European banks' carry trade exposures. The results show that banks load positively on Italian and Irish government debts while loading negatively on German government debt. The magnitude of the latter being greater in magnitude as an evidence of funding pressure due to the high exposure of banks to short-term debt. In fact, carry trade is the act of borrowing cheaply at one interest rate and invest these money somewhere else at a higher rate. For example, banks can use German debt as collateral to borrow cheap in the wholesale market or from the European Central Bank and invest in high yield risky peripheral sovereign debt. The phenomenon is stronger for the first period analyzed (January 2007-June 2013) then the second one. In fact, the exposure toward Italy decreases by 0.105 from 0.282 to 0.177 and its significance decreases from the 1% to the 10% level. While for Ireland loading in the second period is not significant at all. The negative coefficients on the German bund reflects the funding pressure of the banks which strongly decreases after June 2013. The reason might be that after 2013 several unconventional monetary policies have been undertaken by the European Central Bank in order to preserve the Euro. These policies have succeeded in decreasing the spreads between peripheral and core countries, thus making carry trade behavior less profitable for banks. This is also confirmed by a statement of the president of the ECB Mario Draghi in July 2014: "*The convenience to use the ECB cheap money to buy government*

bonds is much less (…). The general situation is such that these carry trades are going to be much less profitable"[5]

The high R-squared indicates that most of the variation in the stock returns is explained by the bond returns. I also conduct the analysis using a GDP weighted bond index rebalanced annually. The results presented in Table 4 are consistent with a carry trade behavior. Banks are short in long-term German bonds and long in GIIPS countries long-term bonds. The magnitude for the GIIPS index is very close to the sum of the exposure to Ireland and Italy exposed in table 3 in all periods; while for Germany the magnitudes are almost identical. Column 4 shows also that the exposure estimated for the GIIPS index is close to the one estimated by Acharya and Steffen (2015).

In Appendix IV the analysis is conducted using the French government bonds as the funding leg of the carry trade. Also in this case, the results hold both for the individual countries and the bond index but the magnitudes are slightly smaller compared to the German case as there is lending funding pressure on French bonds. Once assessed that banks performed a carry trade loading positively on GIIPS countries government bonds and negatively on core Euro countries (i.e. Germany and France), the reasons for such a behavior must be investigated. In this study, I focus on two main motives: home bias and moral hazard. The model used is the one outlined in the methodology however some new regressors are added to identify specific effects and phenomena.

[5] Source: Bloomberg (https://www.bloomberg.com/news/articles/2014-07-14/draghi-says-banks-shouldn-t-count-on-another-carry-trade)

Table 3

Carry Trade Behavior. The table contains the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks that participated at least once in the European Banking Authority (EBA) stress tests on sovereign bond returns from Greece, Italy, Portugal, Spain, Ireland (GIIPS) and Germany. Column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. All models include various macro variables: (1) Market is the daily return of the equity market index of the country in which the bank is headquartered; (2) Vstoxx is the return of the VSTOXX; (3) TermStructure is measured as the difference between the yield on a 10-year euro area government bond and the one-month Euribor; (4) BondDefSpread is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (5) Euribor is measured as the one-month Euribor; (6) SENT is the monthly change in the European economic sentiment indicator; (7) IND is the monthly change in the level of industrial production; (8) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (9) EER19 is the change in the effective exchange rate of the Euro. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(01.01.2007-06.30.2013) EQ. RETURN	(06.30.2013-12.31.2015) EQ. RETURN	(01.01.2007-12.31.2015) EQ. RETURN
Greece	0.00539	0.00852	0.00425
	(0.00958)	(0.00641)	(0.00715)
Italy	0.282***	0.177*	0.272***
	(0.0597)	(0.0858)	(0.0554)
Portugal	0.0232	0.0300	0.0200
	(0.0213)	(0.0415)	(0.0219)
Spain	-0.0177	-0.0171	-0.0218
	(0.0693)	(0.0589)	(0.0609)
Ireland	0.118***	0.00525	0.118***
	(0.0247)	(0.112)	(0.0265)
Germany	-0.450***	-0.185*	-0.422***
	(0.153)	(0.0880)	(0.128)
Market	1.073***	1.047***	1.069***
	(0.180)	(0.0700)	(0.156)
Vstoxx	0.0102	0.00621	0.00989
	(0.0195)	(0.00609)	(0.0159)
TermStructure	0.000578***	-0.000640	0.000363**
	(0.000180)	(0.000836)	(0.000168)
BondDefSpread	0.000325**	0.000623	0.000169
	(0.000145)	(0.00167)	(0.000138)
Euribor	0.000173**	0.00620***	3.33e-06
	(7.54e-05)	(0.00138)	(9.97e-05)
SENT	-0.0312	0.150	-0.0230
	(0.0294)	(0.208)	(0.0229)
IND	-0.0368	0.263*	-0.0187
	(0.0327)	(0.139)	(0.0262)
HICP	0.000119	-0.000360**	-0.000131
	(0.000380)	(0.000163)	(0.000169)
EER19	-8.21e-05	0.251**	0.0603
	(0.0331)	(0.0995)	(0.0427)
Constant	-0.00195***	-0.000759	-0.000972**
	(0.000437)	(0.00223)	(0.000445)
Observations	90,359	31,424	121,783
R-squared	0.312	0.149	0.270
Number of countries	20	20	20

Table 4

Carry Trade Behavior Bond Index. The table contains the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks that participated at least once in the European Banking Authority (EBA) stress tests on GDP weighted GIIPS (Greece, Ireland, Italy, Portugal and Spain) sovereign bond index returns and Germany bond returns. Column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. Column 4 displays the results of the main regression model by Acharya and Steffen 2015. All models include various macro variables: (1) Market is the daily return of the equity market index of the country in which the bank is headquartered; (2) Vstoxx is the return of the VSTOXX; (3) TermStructure is measured as the difference between the yield on a 10-year euro area government bond and the one-month Euribor; (4) BondDefSpread is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (5) Euribor is measured as the one-month Euribor; (6) SENT is the monthly change in the European economic sentiment indicator; (7) IND is the monthly change in the level of industrial production; (8) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (9) EER19 is the change in the effective exchange rate of the Euro. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(01.01.2007-06.30.2013) EQRETURN	(06.30.2013-12.31.2015) EQRETURN	(01.01.2007-12.31.2015) EQRETURN	Acharya and Steffen EQRETURN
GIIPSINDEX	0.371***	0.198**	0.342***	0.357***
	(0.0814)	(0.0683)	(0.0755)	(8.50)
Germany	-0.438**	-0.179**	-0.399***	-2.278***
	(0.153)	(0.0694)	(0.128)	(-21.80)
Market	1.075***	1.048***	1.070***	1.426***
	(0.180)	(0.0697)	(0.156)	(17.04)
Vstoxx	0.0104	0.00589	0.0100	0.098***
	(0.0196)	(0.00606)	(0.0159)	(4.00)
TermStructure	0.000540***	-0.000635	0.000336*	0.054
	(0.000171)	(0.000830)	(0.000163)	(1.19)
BondDefSpread	0.000352**	0.000572	0.000198	-0.006
	(0.000148)	(0.00163)	(0.000141)	(-0.18)
Euribor	0.000148*	0.00617***	-1.28e-05	0.065
	(7.82e-05)	(0.00142)	(0.000100)	(1.56)
SENT	-0.0297	0.146	-0.0228	0.038***
	(0.0294)	(0.205)	(0.0230)	(3.21)
IND	-0.0468	0.266*	-0.0263	0.002
	(0.0337)	(0.139)	(0.0264)	(0.07)
HICP	6.36e-05	-0.000362**	-0.000141	-0.062
	(0.000377)	(0.000164)	(0.000171)	(-0.62)
EER19Change	0.00195	0.248**	0.0620	0.000
	(0.0322)	(0.104)	(0.0426)	(0.02)
Constant	-0.00190***	-0.000687	-0.000968**	-0.002
	(0.000422)	(0.00218)	(0.000445)	(-1.27)
Observations	90,344	31,423	121,767	72,871
R-squared	0.311	0.149	0.269	43.32%
Number of Countries	20	20	20	19

Home Bias

The home bias motive claims that banks tilt their exposures toward domestic government debt. This phenomenon is especially true for peripheral banks. As shown previously, Appendix I reports total exposure of banks towards each GIIPS country, total GIIPS and France and Germany retrieved from the European Banking Authority. Already from these statistics we see that GIIPS banks increased their exposure toward their governments while Eurozone non-GIIPS and non-Eurozone European banks increased their exposure toward their domestic government debts (while reducing the exposures toward GIIPS debt). To test formally this phenomenon, I follow the methodology outlined by Acharya and Steffen (2015). The process consists in taking the non-Eurozone European banks as a benchmark group and include interaction terms of both the GDP weighted GIIPS sovereign bond index return and the German 10-year bond returns with a dummy variable equal to 1 if a bank is from a GIIPS country and another one equal to 1 if a bank is from a non-GIIPS Eurozone country. Therefore, EU_{GIIPS} reflects the exposure of the benchmark group (non-Eurozone European banks) to GIIPS government debt; EU_{GIIPS} *x GIIPSBanks* and EU_{GIIPS} *x non-GIIPSBanks* the additional exposure toward peripheral debt of GIIPS and non-GIIPS Eurozone banks, respectively. The same holds for the German returns with the difference that it shows the funding leg. In addition, to investigate the home bias of non-GIIPS banks two new variables are constructed. *HOME x non-GIIPSEurozone* for the exposure of non-GIIPS Eurozone banks and *HOME x non-EurozoneEU* for the exposure of non-Eurozone European banks. *HOME* indicates the exposure of each bank to its own domestic sovereign debt. The periods analyzed are those between the 10 reporting dates of the EBA stress tests. The results are reported in Table 5. Panel A shows the first 4 intervals (as analyzed by Acharya and Steffen (2015)) and Panel B the last 5. The results show that also non-Eurozone European and non-GIIPS Eurozone banks load positively on peripheral debt consistently with the findings of Acharya and Steffen (2015). Moreover, non-GIIPS Eurozone banks decrease their exposure toward GIIPS sovereigns in 2012 and 2013 while GIIPS increase them consistently as shown in

the summary statistics in Appendix I. In general, across the entire period analyzed from 2007 to 2015 GIIPS banks increase their exposure from 0.2554 (0.0674+0.188) to 0.4685 (0.0795+0.389) significant at the 10% level. On the other hand, non-GIIPS Eurozone banks across the entire period decrease their factor loadings on GIIPS debt from 0.5404 (0.0674+0.473) to 0.1333 (0.0795+0.0538) which is not even significant. Finally, the positive factor loadings 1.144 in 2010 and 1.911 in 2013 of non-GIIPS Eurozone banks towards their domestic debt is consistent with the home bias hypothesis. In general, the home bias motive seems to decline after 2013 where there is no or little significance.

Table 5

Home Bias. The table reports the results from regressing bank equity returns on the return of a value-weighted GIIPS (Greece, Italy, Ireland, Portugal, and Spain) Sovereign Bond Index and 10-year German bund returns. I use non-Eurozone European Union (EU) banks as a benchmark group and include interaction terms of the returns on the GIIPS Sovereign Bond Index and German bund returns with an indicator variable equal to one if the bank is a GIIPS or a non-GIIPS Eurozone bank. Regressions are performed on sub-periods that represent the time periods between the ten stress tests conducted by the European Banking Authority (EBA). Panel A reports the first four sub-periods: Column 1 for March–December 2010; Column 2 for January–September 2011; Column 3 for October–December 2011; and Column 4 for January–June 2012. Panel B reports the last five: Column 1 for July-December 2012; Column 2 for January-June 2013; Column 3 for July-December 2013; Column 4 January-December 2014; Column 5 for January-June 2015. All regressions further include Vstoxx, TermStructure, BondDefSpread, Euribor, Senti, Ind, HICP and EER19. t- Statistics are in parentheses. Standard errors are clustered at the bank level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

PANEL A

VARIABLES	(Mar 2010 – Dec 2010) EQRETURN	(Jan 2011 – Sept 2011) EQRETURN	(Oct 2011– Dec 2011) EQRETURN	(Jan 2012 – June 2012) EQRETURN
EUGIIPS	0.0674	0.193	0.344***	0.0889
	(0.226)	(0.124)	(0.0694)	(0.117)
EUGIIPS x GIIPS Banks	0.188*	0.532***	0.186	0.248
	(0.0946)	(0.0542)	(0.269)	(0.237)
EUGIIPS x non-GIIPS Banks	0.473**	0.342***	0.352*	0.145
	(0.190)	(0.0742)	(0.184)	(0.196)
EU Germany	0.0593	-0.119	0.261	0.223
	(0.216)	(0.428)	(0.483)	(0.210)
EU Germany x GIIPS Banks	-0.469	0.386	-0.0674	0.649
	(0.378)	(0.227)	(0.904)	(0.691)
EU Germany x non-GIIPS Banks	-1.304**	-1.317*	-0.614	-0.948
	(0.474)	(0.615)	(0.369)	(0.566)
HOME x non-GIIPSEurozone	1.144*	0.927*	0.314	1.230**
	(0.545)	(0.520)	(0.296)	(0.499)
HOME x non-Eurozone EU	-0.108	-0.197	-0.630*	-0.257
	(0.202)	(0.246)	(0.325)	(0.291)
Market	1.267***	1.297***	1.471***	1.767***
	(0.105)	(0.154)	(0.324)	(0.255)
Constant	-0.00284	0.000430	0.0489**	-0.0774***
	(0.00264)	(0.00866)	(0.0163)	(0.0152)
Observations	10,086	9,933	3,307	6,725

R-squared	0.472	0.377	0.399	0.368	
Number of Countries	17	17	17	17	
PANEL B					
VARIABLES	(July 2012-December 2012) EQRETURN	(January 2013- June 2013) EQRETURN	(July 2013-Decmber 2013) EQRETURN	(January 2014-December 2014) EQRETURN	(January 2015- June 2015) EQRETURN
EUGIIPS	0.0427	-0.154	0.161	0.169	0.0795
	(0.0432)	(0.145)	(0.219)	(0.155)	(0.109)
EUGIIPS x GIIPS Banks	0.0484	-0.147	0.279	0.318*	0.389*
	(0.146)	(0.233)	(0.187)	(0.148)	(0.192)
EUGIIPS x non-GIIPS Banks	0.214	-0.313	0.0871	0.290*	0.0538
	(0.189)	(0.208)	(0.525)	(0.143)	(0.185)
EU Germany	0.266	-0.255*	-0.379***	-0.0600	0.204
	(0.207)	(0.135)	(0.122)	(0.157)	(0.142)
EU Germany x GIIPS Banks	-0.266	-0.127	-0.258	-0.208	-0.793***
	(0.214)	(0.274)	(0.187)	(0.137)	(0.118)
EU Ger x non-GIIPS Banks	-0.925**	-1.649*	-1.488***	-0.360	0.245
	(0.392)	(0.884)	(0.279)	(0.274)	(1.328)
HOME x non-GIIPSEurozone	0.857***	1.289*	1.911**	0	0.0162
	(0.242)	(0.682)	(0.757)	(0)	(1.299)
HOME x non-Eurozone EU	0.0748	0.0676	0.00647	-0***	-0.159**
	(0.153)	(0.0723)	(0.119)	(0)	(0.0707)
Market	1.247***	1.187***	0.917***	1.031***	1.107***
	(0.108)	(0.141)	(0.0887)	(0.133)	(0.134)
Constant	-0.0297**	0.0426**	0.00881	-0.0141***	0.0340
	(0.0112)	(0.0169)	(0.00631)	(0.00339)	(0.0256)
Observations	6,706	5,499	6,858	12,312	5,494
R-squared	0.266	0.121	0.076	0.198	0.139
Number of Countries	17	17	17	17	17

The results support evidence of home bias as previously documented by Acharya et al. (2014) who document that 69% of the average bank's sovereign bonds in 2010 were in domestic sovereign. In addition, Altavilla et al (2015) explain how the home bias is generally observed for banks in stressed countries. In fact, the authors argue that the carry trade hypothesis does not automatically imply that undercapitalized banks load positively and systematically on domestic debt. For instance, if the domestic debt is stable while the price of foreign debt declines a bank willing to perform a carry trade will tilt toward the foreign sovereign debt while divesting the domestic one. Therefore, the positive loadings of non-GIIPS Eurozone banks shows that if banks are undercapitalized, or more in general financially stressed, the home bias incentive is less strong as these banks will simply tilt toward high-yield and more risky debt independently on whether this debt is domestic or foreign.

Moral Hazard

The moral hazard hypothesis states that it is more likely that banks tend to perform carry trade on government debts when they are undercapitalized. Through carry trade, on the one hand banks try to comply with regulatory capital requirements (regulatory capital arbitrage); on the other hand, they shift risk betting on their own survival (risk shifting). To investigate these phenomena, I consider banks characteristics related to capital constraints like Tier 1 ratio and RWA/Assets and other banks characteristics like size (LogAssets) and short term debt (STDebt). All the characteristics are lagged by one year. Tier 1 ratio is one of the Basel requirements on banking regulation and it is a measure of the financial health of a bank. It is calculated as the ratio between a bank's core capital (Tier 1 Capital) and its Risk Weighted Assets (RWA), which are bank's assets weighted according to their risk exposure. Currently the new minimum capital requirement under Basel III is 6%. The short-term debt is a measure of short term leverage that includes portion of debt payable in one year and the current portion of long-term debt.

Panel A of Table 6 reports the results. As explained before, column 1 refers to the period analyzed by Acharya and Steffen (2015), column 2 to the following period till December 2015 and column 3 to the whole period spanning from January 2007 till December 2015. The results show that the exposure toward GIIPS bond index becomes insignificant while the exposure toward Germany remains significant but the factor loading is now positive. However, the evidence for risk shifting is strong and consistent with the results of Acharya and Steffen (2015). In fact, like the authors, I find a negative coefficient for the Tier 1 ratio meaning that undercapitalized banks shift risk increasing their exposure to GIIPS governments debts. As Tier 1 ratio is computed as Tier 1 capital over RWA a low ratio indicates that a bank has little buffer capital compared to the risky assets it holds. Therefore, to increase this ratio a bank can either decrease its risk weighted assets disposing part of its risky assets or increase its Tier 1 capital. The latter option is usually preferred and it is achieved purchasing Eurozone sovereign bonds that have a zero-weight treatment; thus, they increase the Tier 1

capital but do not increase the RWA. In my analysis, when the Tier 1 ratio of a bank decreases by 1% its exposure toward GIIPS government bonds increases by 0.0268 and 0.0948 in the first and second period, respectively.

In addition, I also find a positive and larger coefficient on RWA/Assets indicating the regulatory arbitrage motive. When a bank increases its RWA/Assets ratio by 1% its exposure towards GIIPS government bonds increase significantly by 1.074 in the first period, while in the other period such relationship is not significant. Overall, across the entire period the increase in exposure is 1.011. In fact, when banks have high RWA relative to total assets they increase their assets buying more government debt, which has zero weight treatment. Therefore, the reasoning explained before applies but in a slightly different way. In fact, banks tilt their exposure toward government debts. In other words, banks shift the risk to the government defaults. Moreover, consistently with Acharya and Steffen (2015), the short-term debt has a positive effect on the exposure to GIIPS government debt and a negative on the German one in the period from June 2013 to December 2015. This result is consistent with the fact that the more dependent on short term funding a bank is the more it will perform the carry trade on government bonds as it faces a stronger funding pressure due to an evaporation of the wholesale market.

Finally, size (i.e. Log Assets) increases the sales of German debt in order to finance the carry trade. Panel B of Table 6 displays the result for different subsamples. Column 1 looks at all the banks in the sample; column 2 at GIIPS banks only; column 3 at non-GIIPS Eurozone banks; column 4 at non-Eurozone EU banks; and column 5 shows the results for French and German banks only. All columns consider the entire period from January 2007 till December 2015. The results show that GIIPS banks follow a risk shifting behavior to a higher extent compared to non-GIIPS Eurozone banks and non-Eurozone banks. These results reinforce the moral hazard motives for GIIPS banks as Diamond and Rajan (2011) explain. In Appendix VI I run the same model using centered variables for the interaction terms. The results change as the carry trade behavior seems to be stronger for all the groups of banks.

Table 6

Moral Hazard: risk shifting and regulatory capital arbitrage. The table reports the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks that participated at least once in the European Banking Authority (EBA) stress tests on GDP weighted GIIPS (Greece, Ireland, Italy, Portugal and Spain) sovereign bond index returns, 10-year German government bond returns and interaction terms of these returns with various characteristics lagged by one year: *Log-Assets, Tier 1 ratio, Short Term Debt and RWA/Assets*. All models include banks characteristics lagged by one year and various macro variables which are omitted for brevity: All regressions further include Vstoxx, TermStructure, BondDefSpread, Euribor, Senti, Ind, HICP and EER19. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. In Panel A: column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. In Panel B, the period analyzed spans from January 2007 to December 2015. Column 1 looks at all the banks in the sample; column 2 at GIIPS banks only; column 3 at non-GIIPS Eurozone banks; column 4 at non-Eurozone EU banks; and column 5 shows the results for French and German banks only.

PANEL A: Sub Periods

VARIABLES	(01.01.2007-06.30.2013) EQRETURN	(06.30.2013-12.31.2015) EQRETURN	(01.01.2007-12.31.2015) EQRETURN
GIIPSINDEX	-1.264	-1.294	-1.394
	(1.229)	(1.905)	(1.274)
Index x LogAssets	0.0936	0.131	0.0997
	(0.0649)	(0.0902)	(0.0668)
Index x STDebt	0.0398	1.130*	0.168
	(0.345)	(0.576)	(0.375)
Index x RWA/Assets	1.074**	0.563	1.011*
	(0.445)	(1.139)	(0.497)
Index x Tier 1	-0.0268*	-0.0948**	-0.0239
	(0.0148)	(0.0434)	(0.0201)
Germany	6.451**	2.078	5.384**
	(2.383)	(1.752)	(2.133)
Germany x LogAssets	-0.407***	-0.164*	-0.372***
	(0.115)	(0.0883)	(0.104)
Germany x STDebt	-0.663	-0.812**	-0.723
	(0.499)	(0.320)	(0.434)
Germany x RWA/Assets	-0.926	-0.751	-0.876
	(0.707)	(0.759)	(0.685)
Germany x Tier 1	0.0322	0.0702	0.0836
	(0.0567)	(0.0488)	(0.0527)
Constant	-0.00296**	-0.00320	0.000548
	(0.00131)	(0.00383)	(0.00148)
Observations	69,111	26,129	95,240
R-squared	0.150	0.059	0.125
Number of Countries	20	20	20

PANEL B: Subsamples

VARIABLES	(All Banks) EQRETURN	(GIIPS) EQRETURN	(non-GIIPS Eurozone) EQRETURN	(non-Eurzone EU) EQRETURN	(French and German) EQRETURN
GIIPSINDEX	-1.394	-4.068*	-2.950**	-1.902**	-5.619
	(1.274)	(1.592)	(0.908)	(0.244)	(2.006)
Index x LogAssets	0.0997	0.222**	0.170*	0.0807**	0.200*
	(0.0668)	(0.0791)	(0.0867)	(0.0102)	(0.0306)
Index x STDebt	0.168	0.177	0.395	0.604*	1.599**
	(0.375)	(0.350)	(0.526)	(0.199)	(0.0665)
Index x RWA/Assets	1.011*	1.552**	0.451	-0.156	1.247
	(0.497)	(0.413)	(0.564)	(0.233)	(1.301)
Index x Tier 1	-0.0239	0.0188	-0.00179	0.0223	0.0842
	(0.0201)	(0.0117)	(0.0685)	(0.0104)	(0.0810)
Germany	5.384**	11.50***	8.111***	1.111	3.677**
	(2.133)	(1.361)	(1.586)	(0.985)	(0.0860)
Germany x LogAssets	-0.372***	-0.604***	-0.554***	-0.142***	-0.281*
	(0.104)	(0.0781)	(0.103)	(0.00429)	(0.0422)
Germany x STDEBT	-0.723	-0.737**	-0.387	-0.816	-1.946**
	(0.434)	(0.263)	(0.672)	(0.310)	(0.0503)
Germany x RWA/Assets	-0.876	-2.504*	-0.770	0.509	-0.598**
	(0.685)	(0.993)	(0.460)	(0.351)	(0.0154)
Germany x Tier 1	0.0836	-0.0307	0.124***	0.0686	0.137
	(0.0527)	(0.0569)	(0.0359)	(0.0781)	(0.0911)
Constant	0.000548	0.000419	-0.00109	-3.11e-05	0.00856**
	(0.00148)	(0.00274)	(0.00303)	(0.00144)	(0.000434)
Observations	95,240	45,029	36,095	14,116	17,433
R-squared	0.125	0.149	0.112	0.148	0.223
Number of Countries	20	5	9	6	2

As anticipated in the introduction, I also construct a new risk shifting measure. This measure looks at both the exposures of banks toward GIIPS government countries and their leverage ratios. The idea is that banks with higher exposures and higher leverage ratios will tend to increase their exposure toward GIIPS governments' debts.

In order to perform this analysis, I split banks in above and below median according to their GIIPS government exposure and leverage ratio levels. First, I consider only the banks for which there are available data for their government holdings at the time of the first stress test conducted by the EBA (European Banking Authority) in March 2010. GIIPS and non-GIIPS[6] banks are kept separate in the analysis. For GIIPS banks, I take the percentage of domestic government debt exposure to total sovereign exposures. For non-GIIPS banks, I take the percentage of the highest exposure toward

[6] For non-GIIPS banks also defined as CORE banks, I consider those from the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Netherlands and Sweden.

a GIIPS government to total sovereign exposures. With regards to the leverage ratio, it is computed for the year 2010 and it is calculated as total assets divided by total equity and is also dubbed equity multiplier. As banks, and companies in general, finance their activities with either equity or debt, a high equity multiplier indicates that most of the activities are financed through debt. The leverage ratio is computed separately for GIIPS and non-GIIPS banks due to differences in reporting between these two groups. From this data collection, I come up with 50 banks: 25 GIIPS and 25 non-GIIPS. For both the leverage ratio and the government exposure banks are split in above and below median. Table 7 summarizes the results. Panel A shows summary statistics for the leverage ratio. GIIPS banks have lower leverage ratios compared to non-GIIPS ones. Panel B shows the splitting of the banks. Among the 25 GIIPS banks: 13 have a below median exposure to domestic government debt and 12 above. Among the 13 banks below median exposure: 6 have a below median leverage ratio and 7 above median. The 12 banks above median exposure to domestic debt are equally distributed above and below median leverage ratio. Among the 25 non-GIIPS banks: 13 banks have an exposure toward GIIPS government debt below median and 12 above. Among the 13 below median government exposure, 10 banks have a below median leverage ratio and only 2 above median. For the 12 above median exposure to GIIPS government debt the situation is the opposite: 10 banks have an above median leverage ratio and 2 below.

Table 7
Leverage Ratio and Sovereign Exposures
Table 7 displays statistics about the leverage ratio and the sovereign exposures of banks toward GIIPS (Greece, Ireland, Italy, Portugal and Spain) governments. Panel A gives summary statistics of the Leverage Ratio that is computed as total assets divided by total equity. The leverage ratio is computed separately for GIIPS and non-GIIPS (Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Netherlands and Sweden) countries due to differences in financial reporting. Panel B shows the distribution of banks based on being above and below median of the exposure toward government debt and leverage ratio. For the GIIPS banks the domestic exposure is considered. For the non-GIIPS banks the highest exposure toward a GIIPS government is considered.

Panel A: Leverage Ratio

LEVERAGE RATIO	MEAN	ST. DEV.	MIN.	MAX.	MEDIAN
GIIPS BANKS	26,66	10,97	15,21	63,05	24,28
NON-GIIPS BANKS	72,76	246,80	3,87	1278,77	17,27

Panel B: Banks distribution

GIIPS BANKS		Leverage Ratio		
		Below Median	Above Median	Total
Domestic Government Exposure	Below Median	6	7	13
	Above Median	6	6	12
	Total	12	13	25
Non-GIIPS Banks		Leverage Ratio		
		Below Median	Above Median	Total
GIIPS Government Exposure	Below Median	10	3	13
	Above Median	2	10	12
	Total	12	13	25

Following this analysis, I construct four dummy variables, two per each group of banks. One dummy is equal to 1 if a bank has an exposure to GIIPS (domestic in case of GIIPS banks) government debt above median, while the other dummy is equal to 1 if a bank has a leverage ratio above median, always compared to their respective group. These dummies are then interacted with the bond returns to see the effect on the exposure of banks. The expected effect is that high exposure and high leverage banks are more sensitive to periphery government bonds returns. The reason is that when banks have a high leverage they rely more on debt to finance themselves. During the crisis, and in period of financial turbulence in general, debt might become more costly and difficult to raise. Therefore, banks relying on debt tend to perform the carry trade to greater extent to face this issue. On the other side, instead, banks that are already heavily exposed toward government debt might tend to increase their exposure furthermore. Finally, a combination of high leverage and high exposure could significantly increase a bank's incentives to perform the carry trade.

The results are exposed in Table 8. Column 1 and 2 show the results for GIIPS banks from 2007 and 2010, respectively. Column 3 and 4 for CORE countries. The results show again that both GIIPS and CORE banks perform the carry trade loading positively on the GIIPS bond index and negatively on the German bund, with the first

group doing it to a higher extent. However, the main outcome from this analysis is that high exposure and high leverage GIIPS banks increase their exposure to GIIPS countries. More specifically, a highly leveraged and exposed GIIPS bank increases its exposure to 1.923 (1.618 + 0.305) starting from 2007 or to 1.946 (1.694 + 0.252) from 2010. The same effect does not occur for CORE banks.

Table 8

Risk Shifting: exposure and leverage

Table 8 reports the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks that were included in the first European Banking Authority (EBA) stress tests in March 2010 on GDP weighted GIIPS (Greece, Ireland, Italy, Portugal and Spain) sovereign bond index returns, 10-year German government bond returns and interaction terms of banks characteristics: The characteristics are defined as dummy variables equal to 1 when a bank has an exposure toward domestic debt (GIIPS debt for non-GIIPS banks) or a leverage ratio above median, and interaction of the two. Column 1 and 2 show the results for GIIPS banks from 2007 and 2010, respectively. Column 3 and 4 show the results for CORE banks from 2007 and 2010, respectively. All models include various macro variables which are omitted for brevity: Vstoxx, TermStructure, BondDefSpread, Euribor, Senti, Ind, HICP and EER19. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(2007) EQRETURN	(2010) EQRETURN	(2007) EQRETURN	(2010) EQRETURN
GIIPSINDEX	1.618***	1.694***	0.587**	0.727***
	(0.0400)	(0.0496)	(0.165)	(0.177)
GIIPS Exposure	-0.225***	-0.206***		
	(0.0337)	(0.0197)		
GIIPS Leverage	-0.881***	-0.902***		
	(0.0941)	(0.0801)		
GIIPS_Exp x Lev	0.305**	0.252**		
	(0.0821)	(0.0726)		
Germany	-2.771***	-2.495***	-1.526***	-1.157***
	(0.119)	(0.0830)	(0.297)	(0.212)
GIIPS Exposure Germany	0.801***	0.805***		
	(0.0433)	(0.123)		
GIIPS Leverage Germany	1.339*	1.334**		
	(0.509)	(0.364)		
GIIPS_Ger_Exp x Lev	-0.581	-0.713		
	(0.505)	(0.352)		
CORE Exposure			0.210	0.221
			(0.330)	(0.345)
CORE Leverage			-0.234	-0.275
			(0.191)	(0.202)
CORE_Exp x Lev			0.0886	0.117
			(0.443)	(0.457)
CORE Exposure Germany			-0.121	-0.152
			(0.652)	(0.480)
CORE Leverage Germany			0.494	0.319
			(0.361)	(0.255)
CORE_Ger_Exp x Lev			-0.964	-0.772
			(0.746)	(0.619)
Constant	-0.000459	-0.00278	0.000190	-0.000642
	(0.000935)	(0.00170)	(0.000552)	(0.000489)
Observations	34,416	22,928	31,954	21,213
R-squared	0.112	0.107	0.171	0.147
Number of Countries	5	5	9	9

6. Conclusion

In this research, I investigate whether the carry trade behavior of banks studied by Acharya and Steffen (2015) is still occurring. It consists in purchasing peripheral government debt and selling core European debt (of Germany and France) to benefit from differences in yields, which are higher for peripheral countries. I find that this behavior is still persistent across Eurozone banks, though to a slightly less extent. In addition, on the one hand, the results provide evidence for home bias motive which consists in banks purchasing more domestic debt compared to foreign one. On the other hand, results also show that moral hazard, through regulatory capital arbitrage and risk shifting, is a strong motive for banks as well. Regulatory capital arbitrage makes banks with low capital ratios (i.e. Tier 1) to invest in high yield bonds to meet regulatory capital requirements without issuing new economic capital. Risk shifting, instead, makes banks bet on their own survival shifting to higher risk states of the world. For the latter motive, I also construct a new measure of risk shifting and find that highly leveraged and exposed banks tend to perform the carry trade even to a higher extent, especially GIIPS ones. The relevance of the analysis is strong. In fact, it provides evidence of how just recapitalization of banks might not be sufficient. In fact, as long as Eurozone government debts have a special treatment (i.e. no concertation limit and zero risk weight), banks will be incentivized to be highly exposed toward government debts which are far from being risk-free as the Greek case proved. Finally, as seen in the crisis this close interaction between government and banks can pose great danger to the entire economy.

References

Acharya, V., Drechsler, I., & Schnabl, P. (2014). A pyrrhic victory? Bank bailouts and sovereign credit risk. *The Journal of Finance*, *69*(6), 2689-2739.

Acharya, V. V., Eisert, T., Eufinger, C., & Hirsch, C. W. (2016). Real effects of the sovereign debt crisis in europe: Evidence from syndicated loans.

Acharya, V. V., & Steffen, S. (2015). The "greatest" carry trade ever? Understanding eurozone bank risks. Journal of Financial Economics, 115(2), 215-236.

Altavilla, C., Pagano, M., & Simonelli, S. (2016). Bank exposures and sovereign stress transmission.

Balli, H. O., & Sørensen, B. E. (2013). Interaction effects in econometrics. Empirical Economics, 1-21.

Battistini, N., Pagano, M., & Simonelli, S. (2014). Systemic risk, sovereign yields and bank exposures in the euro crisis. *Economic Policy*, *29*(78), 203-251.

Becker, B., & Ivashina, V. (2014). Financial repression in the European sovereign debt crisis.

Brown, C. O., & Dinç, I. S. (2011). Too many to fail? Evidence of regulatory forbearance when the banking sector is weak. *Review of Financial Studies*, *24*(4), 1378-1405.

Coval, J. D., & Moskowitz, T. J. (1999). Home bias at home: Local equity preference in domestic portfolios. *The Journal of Finance*, *54*(6), 2045-2073.

Coval, J. D., & Moskowitz, T. J. (2001). The geography of investment: Informed trading and asset prices. Journal of political Economy, 109(4), 811-841.

Crosignani, M. (2015). Why are banks not recapitalized during crises?

Crosignani, M., Faria-e-Castro, M., & Fonseca, L. (2015). The Portuguese Banking System during the Sovereign Debt Crisis.

De Marco, F., & Macchiavelli, M. (2016). The political origin of home bias: The case of Europe.

Demirgüç-Kunt, A., & Huizinga, H. (2013). Are banks too big to fail or too big to save? International evidence from equity prices and CDS spreads. *Journal of Banking & Finance*, *37*(3), 875-894.

Diamond, D. W., & Rajan, R. G. (2011). Fear of fire sales, illiquidity seeking, and credit freezes. *The Quarterly Journal of Economics*, *126*(2), 557-591.

Elton, E. J., Gruber, M. J., Agrawal, D., & Mann, C. (2001). Explaining the rate spread on corporate bonds. *the journal of finance*, *56*(1), 247-277.

Gertler, M., & Kiyotaki, N. (2010). Financial intermediation and credit policy in business cycle analysis. *Handbook of monetary economics*, *3*(3), 547-599.

Hildebrand, T., Rocholl, J., & Schulz, A. (2012). Flight to where? Evidence from bank investments during the financial crisis.

Horváth, B. L., Huizinga, H., & Ioannidou, V. (2015). Determinants and Valuation Effects of the Home Bias in European Banks' Sovereign Debt Portfolios.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics*, *3*(4), 305-360.

Korte, J., & Steffen, S. (2013, December). Zero risk contagion–Banks' sovereign exposure and sovereign risk spillovers. In *22nd International Conference on Money, Banking and Finance* (pp. 12-13).

Popov, A. A., & Van Horen, N. (2013). The impact of sovereign debt exposure on bank lending: Evidence from the European debt crisis.

Popov, A., & Van Horen, N. (2015). Exporting sovereign stress: Evidence from syndicated bank lending during the euro area sovereign debt crisis. *Review of Finance*, *19*(5), 1825-1866.

Uhlig, H. (2014). Sovereign default risk and banks in a monetary union. *German Economic Review*, *15*(1), 23-41.

APPENDIX I

The table presents aggregate exposures toward GIIPS Banks, in Total and France and Germany of banks included in the 10 stress tests performed by the EBA on European Banks. Values are in Millions of Euros. The panels look at exposure of non-Eurozone, Eurozone non-GIIPS and GIIPS banks, respectively.

	N. OF BANKS	GREECE	IRELAND	ITALY	PORTUGAL	SPAIN	TOTAL	FRANCE - GERMANY
NON-EUROZONE								
MAR-10	14	4.615	6.090	11.458	2.643	6.154	30.961	104.642
DEC-10	15	2.361	1.334	12.281	1.894	6.849	24.720	73.439
SEP-11	15	1.291	516	6.016	1.306	3.477	12.605	46.968
DEC-11	15	2.413	758	5.371	1.243	2.498	12.282	74.235
JUN-12	15	67	600	4.034	1.140	2.456	8.298	66.492
DEC-12	15	15	437	5.416	977	2.956	9.801	66.579
JUN-13	15	6	494	4.444	682	812	6.439	61.358
DEC-13	21	10	5.334	3.523	508	1.445	10.820	98.278
DEC-14	15	135	1.489	8.978	1.304	4.587	16.493	90.945
JUN-15	15	28	994	5.021	1.399	3.056	10.497	88.601
EUROZONE NON-GIIPS								
MAR-10	33	42.226	16.511	160.315	19.035	47.661	285.748	515.059
DEC-10	32	28.673	3.512	106.433	10.736	31.733	181.088	509.984
SEP-11	33	23.780	3.098	80.450	9.524	26.634	143.486	471.909
DEC-11	30	18.730	2.545	54.761	6.346	19.936	102.319	425.816
JUN-12	30	1.707	2.409	52.275	4.775	17.487	78.653	454.183
DEC-12	29	76	2.037	51.970	4.647	17.376	76.106	459.718
JUN-13	29	59	2.322	54.875	4.694	17.560	79.511	450.795
DEC-13	62	198	3.145	91.511	7.077	26.669	128.600	635.071
DEC-14	56	77	5.236	100.449	7.673	34.817	148.251	689.805
JUN-15	56	33	6.354	89.997	8.281	33.517	138.182	682.254
GIIPS								
MAR-10	44	60.482	6.511	156.143	23.715	193.872	440.723	30.631
DEC-10	43	51.646	10.938	167.232	24.965	217.319	472.099	26.969
SEP-11	17	2.773	13.583	157.211	26.254	158.830	358.651	24.154
DEC-11	16	2.634	13.602	145.097	22.781	134.980	319.094	29.936
JUN-12	16	147	14.864	178.995	28.673	151.869	374.548	25.790
DEC-12	20	27.246	16.412	192.609	26.087	157.252	419.606	35.436
JUN-13	20	22.995	18.899	215.200	28.863	180.734	466.692	36.974
DEC-13	40	21.001	19.583	264.240	21.096	230.826	556.747	34.566
DEC-14	34	40	20.974	276.444	27.397	271.915	596.770	40.928
JUN-15	34	21	18.217	275.151	29.007	276.388	598.784	53.272

APPENDIX II

The table presents the banks analyzed in the study. The banks included are those that were at least once part of the European Banking Authority stress test performed during the 2010-2015 period. They are sorted by ISIN code, country and the last column indicates whether a bank is also part of the dataset used by Acharya and Steffen 2015.

BANK NAME	ISIN CODE	COUNTRY	ACHARYA AND STEFFEN
EURZONE BANKS			
Erste Group Bank	AT0000652011	Austria	Yes
Raiffeisen Bank International	AT0000606306	Austria	
Immigon portfolio AG	AT0000755665	Austria	
Dexia Bank	BE0974290224	Belgium	Yes
KBC Group	BE0003565737	Belgium	Yes
Hellenic Bank	CY0105570119	Cyprus	
Cyprus Popular Bank	CY0000200119	Cyprus	Yes
CPB Bank	CY0000200119	Cyprus	
Bank of Cyprus	CY0104810110	Cyprus	Yes
Pohjola Pankki	FI0009003222	Finland	
BNP Paribas	FR0000131104	France	Yes
Credit Agricole	FR0000045072	France	Yes
Societe Generale	FR0000130809	France	Yes
Aareal Bank	DE0005408116	Germany	
IKB Deutsche Industriebank	DE0008063306	Germany	
Deutsche Bank	DE0005140008	Germany	Yes
Commerzbank	DE000CBK1001	Germany	Yes
Deutsche Postank	DE0008001009	Germany	
Hypo Real Estate Holding	DE0008027707	Germany	
Landesbank Berlin Holding Aktie	DE0008023227	Germany	Yes
Bank of Valletta	MT0000020116	Malta	Yes
ING Group	NL0011821202	Netherlands	Yes
ABN Amro Group	NL0011540547	Netherlands	
SNS Reaal	NL0000390706	Netherlands	Yes
Nova Kreditna Banka Maribor	SI0021104052	Slovenia	Yes
GIIPS BANKS			
Eurobank Ergasias	GRS323003012	Greece	Yes
Agricultural Bank of Greece	GRS414003004	Greece	Yes
TT Hellenic Postbank	GRS492003009	Greece	Yes
National Bank of Greece	GRS003003027	Greece	Yes
Alpha Bank	GRS015003007	Greece	Yes
Bank of Piraeus	GRS014003016	Greece	Yes
Allied Irish Banks	IE00BYSZ9G33	Ireland	Yes
Bank of Ireland	IE0030606259	Ireland	Yes
Permanent TSB Group Holdings plc	IE00BWB8X525	Ireland	
Banca Carige	IT0005108763	Italy	
Bana Piccolo Credito Valtellinese	IT0000064516	Italy	
Banca Popolare Emilia Romagna	IT0000066123	Italy	
Banca Popolare di Milano	IT0000064482	Italy	
Banca Popolare di Sondrio	IT0000784196	Italy	
Credito Emiliano	IT0003121677	Italy	
Mediobanca	IT0000062957	Italy	

Intesa San Paolo	IT0000072618	Italy	Yes
Unicredit	IT0004781412	Italy	Yes
Banca Monte dei Paschi	IT0005092165	Italy	Yes
Bancor Popolare	IT0005002883	Italy	Yes
Unione di Banche Italiane	IT0003487029	Italy	Yes
Banco Comercial Potugues	PTBCP0AM0015	Portugal	Yes
Espirito Santo Financial Group	LU0011904405	Portugal	Yes
Banco BPI	PTBPI0AM0004	Portugal	Yes
Liberbank	ES0168675090	Spain	
Banco Santander	ES0113900J37	Spain	Yes
BBV Argentaria	ES0113211835	Spain	Yes
Caixa Bank	ES0140609019	Spain	
Banco Popular Espanol	ES0113790226	Spain	Yes
Banco de Sabadell	ES0113860A34	Spain	Yes
Bankinter	ES0113679I37	Spain	Yes
Bankia	ES0113307021	Spain	Yes
Banca Civica	ES0148873005	Spain	Yes
Banco Pastor	ES0113790085	Spain	Yes
Caja de Ahorros del Mediterraneo	ES0114400007	Spain	Yes
Banco Guipuzcoano	ES0113860011	Spain	
Non-EUROZONE BANKS			
Dankse Bank	DK0010274414	Denmark	Yes
Jyske Bank	DK0010307958	Denmark	Yes
Sydbank	DK0010311471	Denmark	Yes
FHB Share	HU0000078175	Hungary	Yes
OTP Bank	HU0000061726	Hungary	Yes
DNB Asa	NO0010031479	Norway	Yes
Alior Bank	PLALIOR00045	Poland	
Bank BPH	PLBPH0000019	Poland	
Bank Handlowy	PLBH00000012	Poland	
Bank Ochrony Środowiska	PLBOS0000019	Poland	
Getin Noble Bank	PLGETBK00012	Poland	
Powszechna Kasa Oszczędności Bank	PLPKO0000016	Poland	Yes
Nordea Bank	SE0000427361	Sweden	Yes
Skandinaviska Enskilda Banken	SE0000148884	Sweden	Yes
Svenska Handelsbanken AB	SE0007100599	Sweden	Yes
Swedbank AB	SE0000242455	Sweden	Yes
Royal Bank of Scotland Group	GB00B7T77214	UK	Yes
HSBC Holdings Plc	GB0005405286	UK	Yes
Barclays Plc	GB0031348658	UK	Yes
Lloyds Banking Group	GB0008706128	UK	Yes

APPENDIX III

Variables description

Variable	Description
GIIPS Banks	Dummy equal to 1 if bank is from Greece, Italy, Ireland, Portugal or Spain (GIIPS)
Non-GIIPS Eurozone Banks	Dummy equal to 1 if bank is from a non-GIIPS but Eurozone country
Non-Eurozone EU Banks	Dummy equal to 1 if bank is from a non-Eurozone but European Union (EU) country.
Greece	Daily return on ten-year government bonds from Greece
Italy	Daily return on ten-year government bonds from Italy
Portugal	Daily return on ten-year government bonds from Portugal
Spain	Daily return on ten-year government bonds from Spain
Ireland	Daily return on ten-year government bonds from Ireland
Germany	Daily return on ten-year government bonds from Germany
France	Daily return on ten-year government bonds from France
Market Return	Daily return of the equity market index in which the bank is headquartered
GIIPS Index	Daily return of gross domestic product weighted Index of GIIPS countries
Vstoxx	Daily return of the VSTOXX Index for the European stock market
Bond def. Spread	Bond default spread; difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt
CPI	Harmonized consumer price index; change in inflation measured as the monthly change in the European Consumer Price Index
SENT	Change in European economic sentiment; monthly change in the economic sentiment indicator obtained from opinion surveys conducted by the European Central Bank
IND	Change in level of industrial production; monthly change in the level of industrial production
EER 19	Change of the nominal effective exchange rate of the euro toward 19 partner countries
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
LogAssets	Natural logarithm of total book assets
Tier 1	Tier 1 Capital divided by risk weighted assets
RWA/assets	Risk weighted assets divided by total book assets
STDebt	Short term debt divided by total debt
Leverage	Leverage ratio; total assets divided by total equity
GIIPS Exposure	Dummy equal to 1 if bank is from Greece, Ireland, Italy, Portugal or Spain (GIIPS) and its exposure to domestic government debt (as percentage of total government exposure) is above the median value for all GIIPS banks
CORE Exposure	Dummy equal to 1 if bank is from a non-GIIPS country and its highest exposure to a GIIPS government debt (as percentage of total government exposure) is above the median value for all non-GIIPS banks
GIIPS Leverage	Dummy equal to 1 if banks if from Greece, Ireland, Italy, Portugal or Spain (GIIPS) and its Leverage ratio (total equity assets by total equity) is above the median value for all GIIPS banks
CORE Leverage	Dummy equal to 1 if bank is from a non-GIIPS country and its Leverage ratio (total assets divided by total equity) is above the median value for all non-GIIPS banks
GIIPS_Exp x Lev	Interaction term of the GIIPS Exposure and GIIPS Leverage variables
CORE_Exp x Lev	Interaction term of the CORE Exposure and CORE Leverage variables

APPENDIX IV - French Leg

Table A

Carry Trade Behavior – French Leg

The table contains the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks that participated at least once in the European Banking Authority (EBA) stress tests on sovereign bond returns from Greece, Italy, Portugal, Spain, Ireland (GIIPS) and France. Column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. Column 4 displays the results of the main regression model by Acharya and Steffen 2015. All models include various macro variables: (1) Market is the daily return of the equity market index of the country in which the bank is headquartered; (2) Vstoxx is the return of the VSTOXX; (3) TermStructure is measured as the difference between the yield on a 10-year euro area government bond and the one-month Euribor; (4) BondDefSpread is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (5) Euribor is measured as the one-month Euribor; (6) SENT is the monthly change in the European economic sentiment indicator; (7) IND is the monthly change in the level of industrial production; (8) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (9) EER19 is the change in the effective exchange rate of the Euro. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(01.01.2007-06.30.2013) EQRETURN	(06.30.2013-12.31.2015) EQRETURN	(01.01.2007-12.31.2015) EQRETURN	(Acharya and Steffen 2015) PAPER
Greek	0.0106	0.00982	0.00882	0.018*
	(0.00994)	(0.00618)	(0.00740)	(1.67)
Italy	0.326***	0.191**	0.311***	0.615***
	(0.0633)	(0.0836)	(0.0599)	(5.28)
Portugal	0.0172	0.0321	0.0151	0.008
	(0.0202)	(0.0407)	(0.0210)	(0.33)
Spain	-0.0296	-0.0138	-0.0303	0.016
	(0.0673)	(0.0598)	(0.0597)	(0.20)
Ireland	0.106***	0.00150	0.106***	0.090
	(0.0263)	(0.122)	(0.0275)	(1.39)
France	-0.262**	-0.174*	-0.271***	-1.752***
	(0.0985)	(0.0989)	(0.0867)	(-6.49)
Market	1.087***	1.048***	1.081***	1.329***
	(0.177)	(0.0705)	(0.153)	(16.69)
Vstoxx	0.00444	0.00568	0.00579	-0.046
	(0.0213)	(0.00600)	(0.0169)	(-0.73)
TermStructure	0.000653***	-0.000577	0.000412**	0.036
	(0.000197)	(0.000848)	(0.000169)	(0.81)
BondDefSpread	0.000311**	0.000514	0.000147	-0.010
	(0.000146)	(0.00167)	(0.000139)	(-0.28)
Euribor	0.000213**	0.00602***	2.57e-05	0.053
	(7.64e-05)	(0.00143)	(9.48e-05)	(1.24)
SENT	-0.0314	0.155	-0.0222	0.049***
	(0.0295)	(0.208)	(0.0231)	(3.19)
IND	-0.0269	0.260*	-0.0119	0.006
	(0.0320)	(0.138)	(0.0261)	(0.20)
HICP	0.000207	-0.000344*	-7.25e-05	-0.001
	(0.000366)	(0.000168)	(0.000165)	(-0.01)
EER19Change	0.0334	0.247**	0.0908**	0.001
	(0.0334)	(0.100)	(0.0394)	(0.06)
Constant	-0.00209***	-0.000648	-0.00103**	-0.001
	(0.000451)	(0.00222)	(0.000437)	(0.90)
Observations	90,359	31,424	121,783	72,871
R-squared	0.310	0.149	0.269	0.3964
Number of Countries	20	20	20	19

Table B

Carry Trade Behavior Bond Index – French leg

The table contains the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks that participated at least once in the European Banking Authority (EBA) stress tests on GDP weighted GIIPS (Greece, Ireland, Italy, Portugal and Spain) sovereign bond index returns and France bond returns. Column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. All models include various macro variables: (1) Market is the daily return of the equity market index of the country in which the bank is headquartered; (2) Vstoxx is the return of the VSTOXX; (3) TermStructure is measured as the difference between the yield on a 10-year euro area government bond and the one-month Euribor; (4) BondDefSpread is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (5) Euribor is measured as the one-month Euribor; (6) SENT is the monthly change in the European economic sentiment indicator; (7) IND is the monthly change in the level of industrial production; (8) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (9) EER19 is the change in the effective exchange rate of the Euro. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(01.01.2007-06.30.2013) EQRETURN	(06.30.2013-12.31.2015) EQRETURN	(01.01.2007-12.31.2015) EQRETURN
GIIPSINDEX	0.396***	0.217***	0.365***
	(0.0846)	(0.0742)	(0.0803)
France	-0.253**	-0.168**	-0.249**
	(0.101)	(0.0716)	(0.0890)
Market	1.088***	1.049***	1.082***
	(0.178)	(0.0703)	(0.154)
Vstoxx	0.00467	0.00535	0.00589
	(0.0214)	(0.00598)	(0.0170)
TermStructure	0.000624***	-0.000572	0.000391**
	(0.000190)	(0.000844)	(0.000164)
BondDefSpread	0.000332**	0.000465	0.000171
	(0.000149)	(0.00163)	(0.000143)
Euribor	0.000193**	0.00598***	1.27e-05
	(7.92e-05)	(0.00147)	(9.49e-05)
SENT	-0.0290	0.152	-0.0213
	(0.0296)	(0.204)	(0.0232)
IND	-0.0399	0.263*	-0.0215
	(0.0332)	(0.138)	(0.0263)
HICP	0.000154	-0.000346*	-8.25e-05
	(0.000366)	(0.000167)	(0.000167)
EER19	0.0324	0.246**	0.0904**
	(0.0327)	(0.105)	(0.0396)
Constant	-0.00205***	-0.000579	-0.00103**
	(0.000437)	(0.00217)	(0.000437)
Observations	90,344	31,423	121,767
R-squared	0.310	0.149	0.268
Number of Countries	20	20	20

APPENDIX V

Acharya and Steffen data set

In this Appendix I perform part of the study conducted in my paper using the data set used by Acharya and Steffen (2015). Doing so, ensures that my study is performed correctly according to the methodology outlined by Acharya and Steffen. In fact, my research is based on their study using a larger sample of 81 banks and for a longer period, from January 2007 to December 2015. Instead, Acharya and Steffen analyze a data set of 55 banks, which are part also of my dataset, for the period spanning from January 2007 to June 2013. This time span includes the following European Banking Authority five stress tests: March 2010, December 2010, September 2011, December 2011, and June 2012. Their sample has banks from 19 EU countries, 13 Eurozone countries, and 6 non-Eurozone EU countries. The tables below show the consistency of the results with the study of Acharya and Steffen (2015) as they show the results for the same data set and extend the analysis further to the period analyzed by Acharya and Steffen (i.e. after June 2013).

Table A and Table B display the results for the carry trade behavior. Table A presents the results from the main regression model. Column 1 shows the results for the time span used by Acharya and Steffen (i.e. from January 2007 till June 2013); column 2 shows the coefficients for the period after the one analyzed by Acharya and Steffen (i.e. from June 2013 till December 2015); instead, column 3 shows the results for the entire period investigated (January 2007 – December 2015). Column 4, shows the results of the analysis of Acharya and Steffen. The results show that banks load positively on Italian and Irish government debts while selling German government debt. Acharya and Steffen also find some positive significance for Greek and Portuguese bonds. In general, magnitudes, significance levels and R-squared are quite similar. Table B shows the results using a GDP weighted bond Index for GIIPS countries. Again, the results are like those found by Acharya and Steffen. Moreover, the analysis is of interest since it shows that in the period after June 2013 the carry trade behavior persists but with lower magnitudes. Table C, D and F show the results

for the French leg, home bias and risk shifting, respectively. Table E and G report the results for home bias and risk shifting of the study by Acharya and Steffen (2015).

CARRY TRADE BEHAVIOR

Table A

Carry Trade Behavior. The table contains the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks studied by Acharya and Steffen (2015) that participated at least once in the European Banking Authority (EBA) stress tests on sovereign bond returns from Greece, Italy, Portugal, Spain, Ireland (GIIPS) and Germany. Column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. Column 4 displays the results of the main regression model by Acharya and Steffen 2015. All models include various macro variables: (1) Market is the daily return of the equity market index of the country in which the bank is headquartered; (2) Vstoxx is the return of the VSTOXX; (3) TermStructure is measured as the difference between the yield on a 10-year euro area government bond and the one-month Euribor; (4) BondDefSpread is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (5) Euribor is measured as the one-month Euribor; (6) SENT is the monthly change in the European economic sentiment indicator; (7) IND is the monthly change in the level of industrial production; (8) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (9) EER19 is the change in the effective exchange rate of the Euro. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(01,01,2007-06,30,2013) EQRETURN	(06,30,2013-12,31,2015) EQRETURN	(01,01,2007-12,31,2015) EQRETURN	(Acharya and Steffen 2015) EQ. RETURN
Greece	-0.00732	0.0171*	-0.00341	0.019**
	(0.00792)	(0.00805)	(0.00698)	(2.40)
Italy	0.329***	0.310***	0.324***	0.213**
	(0.0415)	(0.0852)	(0.0378)	(2.57)
Portugal	0.00335	-0.00608	-0.00688	0.021*
	(0.0251)	(0.0547)	(0.0268)	(1.91)
Spain	-0.0243	-0.0569	-0.0390	0.028
	(0.0756)	(0.0801)	(0.0709)	(0.58)
Ireland	0.149***	-0.133	0.149***	0.120***
	(0.0312)	(0.114)	(0.0355)	(3.38)
Germany	-0.461**	-0.210	-0.469***	-2.291***
	(0.167)	(0.122)	(0.139)	(-21.78)
Market	1.261***	1.066***	1.226***	1.424***
	(0.159)	(0.102)	(0.139)	(17.14)
Vstoxx	0.0139	0.000223	0.0116	0.097***
	(0.0181)	(0.00865)	(0.0150)	(3.96)
TermStructure	0.000770***	-0.000344	0.000529***	0.057
	(0.000248)	(0.000667)	(0.000113)	(1.34)
BondDefSpread	0.000381**	0.000375	0.000196	-0.006
	(0.000141)	(0.00253)	(0.000130)	(-0.22)
Euribor	0.000357***	0.00619***	0.000154	0.069*
	(0.000113)	(0.00150)	(9.70e-05)	(1.74)
SENT	-0.0298	0.211	-0.0149	0.039***
	(0.0392)	(0.330)	(0.0278)	(3.33)
IND	-0.00752	0.227	-0.000995	0.001
	(0.0387)	(0.198)	(0.0349)	(0.06)
HICP	-0.000314	-0.000508**	-0.000397**	-0.066
	(0.000427)	(0.000211)	(0.000175)	(-0.66)
EER19	0.0528	0.356***	0.142***	-0.000
	(0.0420)	(0.103)	(0.0429)	(-0.06)
Constant	-0.00261***	-0.000801	-0.00147***	-0.002
	(0.000652)	(0.00328)	(0.000432)	(-1.43)

Observations	59,439	19,770	79,209	72,871
R-squared	0.407	0.179	0.351	0.434
Number of Countries	19	19	19	19

Table B

Carry Trade Behavior Bond Index. The table contains the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks studied by Acharya and Steffen (2015) that participated at least once in the European Banking Authority (EBA) stress tests on GDP weighted GIIPS (Greece, Ireland, Italy, Portugal and Spain) sovereign bond index returns and Germany bond returns. Column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. Column 4 displays the results of the main regression model by Acharya and Steffen 2015. All models include various macro variables: (1) Market is the daily return of the equity market index of the country in which the bank is headquartered; (2) Vstoxx is the return of the VSTOXX; (3) TermStructure is measured as the difference between the yield on a 10-year euro area government bond and the one-month Euribor; (4) BondDefSpread is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (5) Euribor is measured as the one-month Euribor; (6) SENT is the monthly change in the European economic sentiment indicator; (7) IND is the monthly change in the level of industrial production; (8) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (9) EER19 is the change in the effective exchange rate of the Euro. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(01.01.2007-06.30.2013) EQRETURN	(06.30.2013-12.31.2015) EQRETURN	(01.01.2007-12.31.2015) EQRETURN	(Acharya and Steffen 2015) EQRETURN
GIIPSINDEX	0.389***	0.225**	0.354***	0.357***
	(0.0807)	(0.105)	(0.0819)	(8.50)
Germany	-0.441**	-0.256**	-0.436***	-2.278***
	(0.165)	(0.0955)	(0.138)	(-21.80)
Market	1.262***	1.067***	1.227***	1.426***
	(0.159)	(0.101)	(0.139)	(17.04)
Vstoxx	0.0143	-6.55e-05	0.0118	0.098***
	(0.0182)	(0.00863)	(0.0150)	(4.00)
TermStructure	0.000748***	-0.000345	0.000506***	0.054
	(0.000240)	(0.000669)	(0.000109)	(1.19)
BondDefSpread	0.000435***	0.000389	0.000239*	-0.006
	(0.000146)	(0.00250)	(0.000134)	(-0.18)
Euribor	0.000343***	0.00587***	0.000139	0.065
	(0.000110)	(0.00141)	(9.63e-05)	(1.56)
SENT	-0.0283	0.210	-0.0145	0.038***
	(0.0399)	(0.322)	(0.0283)	(3.21)
IND	-0.0202	0.235	-0.0120	0.002
	(0.0397)	(0.200)	(0.0354)	(0.07)
HICP	-0.000405	-0.000513**	-0.000415**	-0.062
	(0.000421)	(0.000213)	(0.000177)	(-0.62)
EER19	0.0570	0.366***	0.145***	0.000
	(0.0411)	(0.105)	(0.0420)	(0.02)
Constant	-0.00266***	-0.000835	-0.00150***	-0.002
	(0.000636)	(0.00323)	(0.000435)	(-1.27)
Observations	59,424	19,769	79,193	72,871
R-squared	0.406	0.179	0.350	0,433
Number of Countries	19	19	19	19

Table C

Carry Trade Behavior: French Leg. The table contains the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks studied by Acharya and Steffen (2015) that participated at least once in the European Banking Authority (EBA) stress tests on sovereign bond returns from Greece, Italy, Portugal, Spain, Ireland (GIIPS) and Germany. Column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. Column 4 displays the results of the main regression model by Acharya and Steffen 2015. All models include various macro variables: (1) Market is the daily return of the equity market index of the country in which the bank is headquartered; (2) Vstoxx is the return of the VSTOXX; (3) TermStructure is measured as the difference between the yield on a 10-year euro area government bond and the one-month Euribor; (4) BondDefSpread is the difference between the yield on ten-year German BBB bonds and yields on ten-year German government debt; (5) Euribor is measured as the one-month Euribor; (6) SENT is the monthly change in the European economic sentiment indicator; (7) IND is the monthly change in the level of industrial production; (8) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (9) EER19 is the change in the effective exchange rate of the Euro. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(01.01.2007-06.30.2013) EQRETURN	(06.30.2013-12.31.2015) EQRETURN	(01.01.2007-12.31.2015) EQRETURN	(Acharya and Steffen 2015) PAPER
Greek	-0.00205	0.0191**	0.00155	0.018*
	(0.00921)	(0.00780)	(0.00800)	(1.67)
Italy	0.377***	0.319***	0.370***	0.615***
	(0.0420)	(0.0816)	(0.0412)	(5.28)
Portugal	-0.00294	-0.00207	-0.0127	0.008
	(0.0234)	(0.0543)	(0.0256)	(0.33)
Spain	-0.0357	-0.0536	-0.0478	0.016
	(0.0721)	(0.0815)	(0.0686)	(0.20)
Ireland	0.137***	-0.155	0.137***	0.090
	(0.0331)	(0.126)	(0.0366)	(1.39)
France	-0.275**	-0.167	-0.308***	-1.752***
	(0.0984)	(0.141)	(0.0858)	(-6.49)
Market	1.273***	1.067***	1.237***	1.329***
	(0.156)	(0.102)	(0.137)	(16.69)
Vstoxx	0.00782	-0.000612	0.00685	-0.046
	(0.0201)	(0.00856)	(0.0163)	(-0.73)
TermStructure	0.000848***	-0.000251	0.000584***	0.036
	(0.000267)	(0.000659)	(0.000112)	(0.81)
BondDefSpread	0.000367**	0.000220	0.000171	-0.010
	(0.000142)	(0.00252)	(0.000132)	(-0.28)
Euribor	0.000399***	0.00594***	0.000178*	0.053
	(0.000119)	(0.00151)	(9.03e-05)	(1.24)
SENT	-0.0299	0.218	-0.0141	0.049***
	(0.0392)	(0.328)	(0.0279)	(3.19)
IND	0.00279	0.225	0.00675	0.006
	(0.0388)	(0.198)	(0.0353)	(0.20)
HICP	-0.000225	-0.000489**	-0.000332*	-0.001
	(0.000406)	(0.000218)	(0.000168)	(-0.01)
EER19	0.0871*	0.354***	0.176***	0.001
	(0.0451)	(0.104)	(0.0393)	(0.06)
Constant	-0.00276***	-0.000647	-0.00154***	-0.001
	(0.000673)	(0.00328)	(0.000419)	(0.90)
Observations	59,439	19,770	79,209	72,871
R-squared	0.406	0.179	0.350	0.3964
Number of Countries	19	19	19	19

HOME BIAS

Table D

This table reports the results from regressing bank equity returns on the return of a value-weighted GIIPS (Greece, Italy, Ireland, Portugal, and Spain) Sovereign Bond Index and 10-year German bund returns. The data set used is the one studied by Acharya and Steffen (2015). The non-Eurozone European Union (EU) banks are used as a benchmark group and interaction terms of the returns on the GIIPS Sovereign Bond Index and German bund returns are added with an indicator variable equal to one if the bank is a GIIPS or a non-GIIPS Eurozone bank. Regressions are performed on sub-periods that represent the time periods between the 5 stress tests conducted by the European Banking Authority (EBA). Panel A reports the first four sub-periods: Column 1 for March–December 2010 period; Column 2 for January–September 2011 period; Column 3 for October–December 2011 period; and Column 4 for January–June 2012 period. All regressions include ten- year German bond returns as the funding leg of the carry trade. All regressions further include Vstoxx, TermStructure, BondDefSpread, Euribor, SENT, IND, HCPI, and EER 19. t- Statistics are in parentheses. Standard errors are clustered at the bank level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(Mar 2010 – Dec 2010) EQRETURN	(Jan 2011 – Sept 2011) EQRETURN	(Oct 2011– Dec 2011) EQRETURN	(Jan 2012 – June 2012) EQRETURN
EUGIIPS	0.164	0.281*	0.246**	0.0680
	(0.191)	(0.151)	(0.0880)	(0.141)
EUGIIPS x GIIPS Banks	0.0918	0.594***	0.0465	0.120
	(0.133)	(0.0988)	(0.257)	(0.226)
EUGIIPS x non-GIIPS Banks	0.545**	0.473***	0.380	0.288
	(0.246)	(0.0658)	(0.219)	(0.178)
EU Germany	-0.0622	-0.223	0.133	0.249
	(0.111)	(0.272)	(0.559)	(0.146)
EU Germany x GIIPS Banks	-0.430	0.332	-0.469	0.916
	(0.371)	(0.193)	(0.888)	(0.794)
EU Germany x non-GIIPS Banks	-1.421***	-1.369***	-0.798*	-1.127***
	(0.336)	(0.404)	(0.442)	(0.276)
HOME x non-GIIPS Eurozone	1.078	0.721	0.0820	1.251***
	(0.664)	(0.530)	(0.351)	(0.265)
HOME x non-Eurozone EU	-0.0915	-0.0587	-0.498**	-0.198
	(0.0755)	(0.0718)	(0.211)	(0.176)
Market	1.378***	1.433***	1.814***	1.935***
	(0.0801)	(0.117)	(0.309)	(0.171)
Constant	-0.00280	-0.00541	0.0578**	-0.0860***
	(0.00270)	(0.00923)	(0.0216)	(0.0234)
Observations	6,720	6,618	2,202	4,400
R-squared	0.556	0.505	0.500	0.577
Number of COUNTRY	19	19	19	19

Table E

his table reports the results for the home bias analysis performed Acharya and Steffen (2015) study.

Variables	March-December 2010 (1)	January-September 2011 (2)	October-December 2011 (3)	January-June 2012 (4)
$\hat{\beta}_{GIIPS}$	0.291***	0.324***	0.216**	0.001
	(5.04)	(5.70)	(3.69)	(0.02)
$\hat{\beta}_{GIIPS\ x} GIIPS\ Banks$	0.0006	0.251***	-0.110	0.562***
	(0.05)	(3.18)	(-1.11)	(3.96)
$\hat{\beta}_{GIIPS\ x}\ Non-\ GIIPS\ Eurozone\ Banks$	0.143	0.076	0.030	0.167
	(0.92)	(0.70)	(-0.19)	(1.48)
$\hat{\beta}_{Germany}$	-2.316***	-2.294***	-2.891	-2.988***
	(-13.61)	(-10.50)	(-11.24)	(-19.92)
$\hat{\beta}_{Germany\ x}\ GIIPS\ Banks$	0.153	0.511*	0.223	1.085***
	(0.61)	(1.91)	(0.75)	(3.64)
$\hat{\beta}_{Germanuy\ x}\ Non - GIIPS\ Eurozone\ Banks$	-0.729***	-0.968***	-0.343	-1.028***
	(-3.10)	(-3.51)	(-1.34)	(-3.51)
$\hat{\beta}_{Home\ x}\ Non-\ Eurozone\ EU\ Banks$	0.186	0.198	0.370*	0.290***
	(0.90)	(1.04)	(2.52)	(2.95)
$\hat{\beta}_{Home\ x}\ Non-\ GIIPS\ Eurozone\ Banks$	0.986***	1.016***	0.269	1.359***
	(2.94)	(2.95)	(1.24)	(4.81)
$\hat{\beta}_{M}$	1.283***	1.394***	1.703***	1.696***
	(19.05)	(17.13)	(12.53)	(16.53)
$\hat{\beta}_{0}$	-0.000	0.006	0.020	-0.094***
	(0.05)	(1.19)	(0.61)	(-4.22)
N	10,064	8,914	3,054	5,686
R^2	54.26%	46.04%	46-75%	48.26%

RISK SHIFTING

Table F

Moral Hazard: risk shifting and regulatory capital arbitrage. The table reports the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks studied by Acharya and Steffen (2015) that participated at least once in the European Banking Authority (EBA) stress tests on GDP weighted GIIPS (Greece, Ireland, Italy, Portugal and Spain) sovereign bond index returns, 10-year German government bond returns and interaction terms of these returns with various characteristics lagged by one year: *Log-Assets, Tier 1 ratio, Short Term Debt and RWA/Assets*. All models include banks characteristics lagged by one year and various macro variables which are omitted for brevity: (1) Vstoxx is the return of the VSTOXX; (2) TermStructure is measured as the difference between the yield on a 10-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) Euribor is measured as the one-month Euribor; (5) SENT is the monthly change in the European economic sentiment indicator; (6) IND is the monthly change in the level of industrial production; (7) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (8) EER19 is the change in the effective exchange rate of the Euro. The period analyzed spans from January 2007 to June 2013. Column 1 looks at all the banks in the sample; column 2 at GIIPS banks only; column 3 at non-GIIPS Eurozone banks; column 4 at non-Eurozone EU banks; and column 5 shows the results for French and German banks only. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(All Banks)	(GIIPS)	(non-GIIPS Eurozone)	(non-Eurozone EU)	(French and German)
VARIABLES	EQRETURN	EQRETURN	EQRETURN	EQRETURN	EQRETURN
GIIPSINDEX	0.767***	0.983***	0.835***	0.636***	1.032**
	(0.117)	(0.145)	(0.0872)	(0.0428)	(0.0379)
Index x LogAssets	0.609	1.936	-0.863	-3.822**	1.085*
	(0.695)	(1.399)	(0.632)	(0.624)	(0.0874)
Index x STDebt	-1.309	-1.674	1.895	-1.595	-1.959
	(0.988)	(1.483)	(1.256)	(0.973)	(0.384)
Index x RWA/Assets	4.373*	4.905	14.59**	1.195***	22.91
	(2.198)	(2.852)	(5.505)	(0.116)	(10.13)
Index x Tier 1	0.0114	-0.00342	0.110	-0.0732	-0.285
	(0.0167)	(0.0134)	(0.0949)	(0.0279)	(0.0653)
Germany	-1.656***	-1.672***	-1.851***	-1.290***	-2.136*
	(0.159)	(0.239)	(0.216)	(0.0248)	(0.224)
Germany x LogAssets	-1.781	-3.956	0.119	3.855	-0.671
	(1.354)	(2.011)	(1.755)	(1.706)	(0.542)
Germany x STDebt	-0.132	0.738	-4.302	1.923*	2.353
	(1.685)	(2.094)	(3.850)	(0.615)	(0.755)
Germany x RWA/Assets	-6.466	-11.44	-12.42*	-0.592	-15.49
	(3.949)	(5.578)	(5.956)	(0.838)	(4.434)
Germany x Tier 1	-0.00199	-0.102*	-0.0184	0.184**	0.403**
	(0.0609)	(0.0333)	(0.208)	(0.0370)	(0.0135)
Constant	-0.00260	0.00123	-0.00528	-0.00343	0.000934
	(0.00245)	(0.00455)	(0.00341)	(0.00401)	(0.00445)
Observations	48,500	22,213	17,312	8,975	8,757
R-squared	0.158	0.144	0.184	0.234	0.349
Number of Countries	19	5	8	6	2

Table G

This table reports the results for the risk shifting analysis performed Acharya and Steffen (2015) study.

VARIABLES	All Banks (1)	GIIPS (2)	non-GIIPS Eurozone (3)	French and German (4)	Non-Eurozone EU (5)	March-December 2010 (6)	January-December 2011 (7)	January-June 2012 (8)
$\hat{\beta}_{GIIPS}$	-0.385	0.872	-1.900**	-1.857**	-0.265	-1.272***	-0.253	-0.297*
	(-1.46)	(0.96)	(-2.48)	(-4.29)	(-1.27)	(-4.15)	(-1.49)	(-1.86)
$\hat{\beta}_{GIIPS\ x}\ \mathrm{Log-Assets}$	0.039***	-0.032	0.134	0.181*	0.036**	0.057***	0.029***	0.030***
	(2.76)	(-0.57)	(1.54)	(2.39)	(2.41)	(3.85)	(3.10)	(4.09)
$\hat{\beta}_{GIIPS\ x}\ \mathrm{ST-LVG}$	0.412***	0.814***	-0.058	0.533	0.083	0.954**	0.468**	0.454***
	(2.23)	(3.43)	(-0.05)	(0.53)	(0.50)	(2.16)	(2.47)	(2.59)
$\hat{\beta}_{GIIPS\ x}\ RWA/Assets$	0.321***	-0.495	0.543**	0.990***	0.213*	0.377***	0.278***	0.315***
	(2.87)	(-1.03)	(4.05)	(7.27)	(1.90)	(3.24)	(3.21)	(3.96)
$\hat{\beta}_{GIIPS\ x}\ Tier\ 1$	-0.021***	-0.023***	0.009	-0.078*	-0.016	0.024	-0.030***	-0.028***
	(2.87)	(-4.85)	(0.28)	(-2.40)	(-0.89)	(1.26)	(-4.19)	(-3.76)
$\hat{\beta}_{Germany}$	0.190	-3.122*	14.436***	16.155***	-0.943	0.803	-1.080	-0.217
	(0.15)	(-1.86)	(3.87)	(17.32)	(-1.34)	(0.55)	(-0.86)	(-0.13)
$\hat{\beta}_{Germany\ x}\ Log-Assets$	-0.125**	-0.001	-1.140***	-1.142***	-0.074**	-0.102	-0.063	-0.084
	(-2.14)	(-0.01)	(-4.22)	(-10.39)	(-2.15)	(-1.45)	(-0.85)	(-0.97)
$\hat{\beta}_{Germany\ x}\ ST-LVG$	-0.496	-1.896***	-1.875	-2.850	0.101	-2.532*	0.699	1.114
	(-1.18)	(-5.36)	(0.53)	(-1.58)	(0.35)	(-1.77)	(0.81)	(1.20)
$\hat{\beta}_{Germany\ x}\ RWA/Assets$	-0.384	3.067***	-5.649***	-8.765***	-0.750*	-1.387**	-0.696	-0.807
	(-0.51)	(3.07)	(-3.86)	(-25.82)	(-1.68)	(-2.43)	(-1.46)	(-1.66)
$\hat{\beta}_{Germany\ x}\ Tier\ 1$	-0.058	-0.061	-0.031	0.051**	0.006	-0.011	-0.047	-0.127***
	(-1.69)	(-1.52)	(-0.47)	(2.86)	(0.15)	(-0.15)	(-0.93)	(-2.78)
$\hat{\beta}_0$	-0.005	-0.004*	-0.005	0.003	-0.006***	-0.003	-0.013	-0.102***
	(-1.57)	(-1.76)	(-0.60)	(1.05)	(-4.09)	(-0.66)	(-1.28)	(-6.85)
N	49,880	24,461	8,810	6,081	16,609	7,232	7,044	3,563
R^2	44.27%	47,16%	34.34%	41.75%	48.87%	53.85%	45.10%	49.72%

APPENDIX VI

In this appendix I replicate the analysis for the moral hazard motive centering the independent variables used in the interaction terms. Centering the variables consist in demeaning each observation (e.g. on a bank characteristic) from its cross-sectional average. In fact, Balli and Sørensen (2013) suggest that centering interaction terms in panel data provides a hedge against spurious results. With centering, basically one looks at the marginal effect of the exposition of a bank when its characteristic (e.g. Tier 1 ratio) is at its mean value (and not at zero like in the case without centering).

Panel A of the Table reports the results. As explained before, column 1 refers to the period analyzed by Acharya and Steffen (2015), column 2 to the following period till December 2015 and column 3 to the whole period spanning from January 2007 till December 2015. The results show that carry trade behavior is persistent across the sub periods but the evidence for risk shifting is less obvious compared to the results of Acharya and Steffen (2015). The authors find a negative coefficient for the Tier 1 ratio meaning that undercapitalized banks shift risk increasing their exposure to GIIPS governments debts and a positive for the RWA/Assets ratio. Instead, in column 2, the RWA/Assets ratio shows a negative effect on the exposure to government debt. This different result might be driven by the fact that banks after 2013 have continued the carry trade but with less regulatory capital arbitrage motives. Moreover, consistently with Acharya and Steffen (2015), the short-term debt has a positive effect on the exposure to GIIPS government debt and a negative on the German one in the period from June 2013 to December 2015. Panel B of the Table displays the result for different subsamples. Column 1 looks at all the banks in the sample; column 2 at GIIPS banks only; column 3 at non-GIIPS Eurozone banks; column 4 at non-Eurozone EU banks; and column 5 shows the results for French and German banks only. All columns consider the entire period from January 2007 till December 2015. The results show that GIIPS banks perform carry trade to a higher extent compared to non-GIIPS Eurozone banks and non-Eurozone banks. Panel C, instead, performs the same analysis using

the dataset of Acharya and Steffen (2015). The results show that carry trade by all groups of banks and that the RWA/Tier 1 is the main driver of this phenomenon.

Table A

Moral Hazard: risk shifting and regulatory capital arbitrage with centering.

The table reports the results of a pooled ordinary least squares regression of daily stock returns of publicly listed banks that participated at least once in the European Banking Authority (EBA) stress tests on GDP weighted GIIPS (Greece, Ireland, Italy, Portugal and Spain) sovereign bond index returns, 10-year German government bond returns and centered interaction terms of these returns with various characteristics lagged by one year: *Log-Assets, Tier 1 ratio, Short Term Debt and RWA/Assets*. All models include banks characteristics lagged by one year and various macro variables which are omitted for brevity: (1) Vstoxx is the return of the VSTOXX; (2) TermStructure is measured as the difference between the yield on a 10-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) Euribor is measured as the one-month Euribor; (5) SENT is the monthly change in the European economic sentiment indicator; (6) IND is the monthly change in the level of industrial production; (7) HICP is the change in inflation measured as the monthly change in the European Harmonized Consumer Price Index; and (8) EER19 is the change in the effective exchange rate of the Euro. All regressions include countries fixed effects and robust standard errors. t-Statistics are given in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

In Panel A: column 1 shows the results for the period from January 2007 till June 2013 (the one studied by Acharya and Steffen 2015). Column 2 shows the period from June 2013 till December 2015. Colum 3 considers the entire period from January 2007 till December 2015. In Panel B, the period analyzed spans from January 2007 to December 2015. Column 1 looks at all the banks in the sample; column 2 at GIIPS banks only; column 3 at non-GIIPS Eurozone banks; column 4 at non-Eurozone EU banks; and column 5 shows the results for French and German banks only. In Panel C, the period analyzed spans from January 2007 to June 2013 and uses the dataset made of 55 banks composed by Acharya and Steffen (2015).

PANEL A: Sub Periods with centering

VARIABLES	(01.01.2007-06.30.2013) EQRETURN	(06.30.2013-12.31.2015) EQRETURN	(01.01.2007-12.31.2015) EQRETURN
GIIPSINDEX	0.769***	0.736***	0.798***
	(0.160)	(0.122)	(0.161)
Index x LogAssets	0.0258	0.174	-0.0271
	(0.202)	(0.304)	(0.200)
Index x STDebt	-0.211	1.519**	0.182
	(0.659)	(0.560)	(0.488)
Index x RWA/Assets	1.901	-2.788**	0.261
	(1.483)	(1.067)	(1.037)
Index x Tier 1	0.00599	0.0135	0.0112
	(0.0113)	(0.0645)	(0.0132)
Germany	-1.558***	-0.784***	-1.488***
	(0.119)	(0.104)	(0.102)
Germany x LogAssets	-0.169	-0.338*	0.207
	(0.691)	(0.178)	(0.446)
Germany x STDebt	-0.596	-1.929***	-0.911
	(1.022)	(0.605)	(0.809)
Germany x RWA/Assets	-3.086	2.616***	-1.422
	(2.797)	(0.785)	(1.812)
Germany x Tier 1	0.0327	-0.0250	0.0746
	(0.0675)	(0.0376)	(0.0638)
Constant	-0.00149	-0.00378	0.00126
	(0.00147)	(0.00425)	(0.00148)
Observations	72,155	26,674	98,829
R-squared	0.145	0.060	0.121
Number of Countries	20	20	20

PANEL B: Subsamples with centering

VARIABLES	(All Banks) EQRETURN	(GIIPS) EQRETURN	(non-GIIPS Eurozone) EQRETURN	(non-Eurzone EU) EQRETURN	(French and German) EQRETURN
GIIPSINDEX	0.798***	1.093***	0.606***	0.347*	0.619
	(0.161)	(0.111)	(0.160)	(0.139)	(0.348)
Index x LogAssets	-0.0271	0.851	0.723	-0.156	1.983**
	(0.200)	(0.675)	(0.753)	(0.317)	(0.0321)
Index x STDebt	0.182	-0.242	0.996	0.483	0.127
	(0.488)	(0.342)	(0.552)	(0.864)	(0.335)
Index x RWA/Assets	0.261	0.652	7.841**	-0.362	9.320
	(1.037)	(0.826)	(2.611)	(1.058)	(1.785)
Index x Tier 1	0.0112	0.0204	0.0584	-0.0189	0.0265
	(0.0132)	(0.0222)	(0.0620)	(0.0452)	(0.0939)
Germany	-1.488***	-1.587***	-1.457***	-1.092***	-1.661
	(0.102)	(0.0845)	(0.196)	(0.0966)	(0.396)
Germany x LogAssets	0.207	-2.303	0.253	0.930*	-1.697
	(0.446)	(1.468)	(1.252)	(0.336)	(0.327)
Germany x STDEBT	-0.911	0.0349	-1.752	-0.0998	0.0892
	(0.809)	(0.987)	(1.308)	(1.384)	(0.656)
Germany x RWA/Assets	-1.422	-4.077	-5.038	0.884	-2.779
	(1.812)	(1.979)	(5.332)	(0.683)	(4.386)
Germany x Tier 1	0.0746	-0.0303	0.141	0.166**	0.273
	(0.0638)	(0.0474)	(0.123)	(0.0517)	(0.0558)
Constant	0.00126	0.00164	0.000206	-6.67e-05	0.00914**
	(0.00148)	(0.00298)	(0.00376)	(0.00115)	(0.000367)
Observations	98,829	45,029	37,611	16,189	18,265
R-squared	0.121	0.145	0.104	0.159	0.207
Number of Countries	20	5	9	6	2

PANEL C: Acharya and Steffen 2015 with centering

VARIABLES	(All Banks) EQRETURN	(GIIPS) EQRETURN	(non-GIIPS Eurozone) EQRETURN	(non-Eurzone EU) EQRETURN	(French and German) EQRETURN
GIIPSINDEX	0.766***	0.982***	0.834***	0.637***	1.033**
	(0.117)	(0.144)	(0.0877)	(0.0432)	(0.0378)
Index x LogAssets	0.613	1.940	-0.857	-3.822**	1.084*
	(0.696)	(1.396)	(0.637)	(0.623)	(0.0882)
Index x STDebt	-1.309	-1.673	1.897	-1.602	-1.964
	(0.987)	(1.481)	(1.255)	(0.983)	(0.378)
Index x RWA/Assets	4.373*	4.905	14.60**	1.193***	22.93
	(2.200)	(2.853)	(5.501)	(0.113)	(10.13)
Index x Tier 1	0.0115	-0.00338	0.111	-0.0732	-0.284
	(0.0167)	(0.0134)	(0.0946)	(0.0278)	(0.0647)
Germany	-1.658***	-1.673***	-1.854***	-1.291***	-2.133*
	(0.159)	(0.240)	(0.216)	(0.0219)	(0.223)
Germany x LogAssets	-1.783	-3.958	0.119	3.856	-0.676
	(1.355)	(2.010)	(1.759)	(1.709)	(0.545)
Germany x STDEBT	-0.133	0.736	-4.298	1.925*	2.358
	(1.684)	(2.092)	(3.844)	(0.615)	(0.758)
Germany x RWA/Assets	-6.466	-11.44	-12.41*	-0.586	-15.51
	(3.950)	(5.575)	(5.950)	(0.851)	(4.419)
Germany x Tier 1	-0.00176	-0.102*	-0.0183	0.184**	0.403**
	(0.0609)	(0.0333)	(0.207)	(0.0366)	(0.0132)
Constant	-0.00115	0.00178	-0.000482	-0.00211	-0.00330
	(0.00202)	(0.00463)	(0.00422)	(0.00181)	(0.00725)
Observations	48,500	22,213	17,312	8,975	8,757
R-squared	0.158	0.144	0.184	0.234	0.349
Number of Countries	19	5	8	6	2