Monetary Policy and the ECB

Funding Banks' Bad Bets?

Martijn Vinks

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Supervised by: Dr. Sjoerd van den Hauwe
Co-reader: Dr. Tim Eisert

Erasmus School of Economics
Erasmus University Rotterdam
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Abstract

This thesis investigates bank behavior and its real effects, in the context of the ECBs Long Term Refinancing Operations. Specifically, I investigate the effect of changes in sovereign debt portfolios of European banks and their determinants following the LTROs, as well as the resulting real consequences for firms that rely on such banks for debt financing. I find that some banks are motivated by factors other than value or risk to expand their sovereign debt exposures. Specifically, my results suggest that GIIPS banks actively increase their (risky) domestic sovereign debt exposures (risk-shifting) directly following the LTROs and that this effect is not influenced by the degree of government control (moral suasion). In addition, I find that such risk-shifting bank behavior has negative real consequences for firms, in the form of lower EBIT in the period following the LTROs. My findings emphasize the relevance of adequate bank supervision regarding the destination of funds supplied by open market operations. More stringent supervision may prohibit banks from using the funding to bet on the survival of certain sovereigns and would thus limit the negative real effects that result from such bets.

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1 Introduction

In the wake of the global financial crisis of 2008, European banks' creditworthiness suffered from substantial trust issues, triggering a severe debt crisis spanning the entire Eurozone. To reinstate liquidity in interbank debt markets (which largely dried up during the crisis), the European Central Bank (ECB) introduced several open market operations; loans at low rates, accessible to all Eurozone banks. This thesis explores the effectiveness of a particular set of open market operations: the Long-Term Refinancing Operations (LTRO). The LTROs were the first of its kind and specifically aimed to replace bank funding for both long-term corporate- and sovereign debt exposures. Indications exist, however, that banks make inefficient risky investment choices during the sovereign debt crisis (Acharya et al., 2015), which raises the question of whether they did so using ECB funding. I investigate whether banks allocated (LTRO) funds efficiently in the period surrounding the LTROs and subsequently whether firm performance is affected by such fund allocation. I find indications that at least some banks in peripheral Eurozone countries increased their exposure to risky sovereign debt, which is consistent with "risk-shifting", directly following the LTROs. These investment choices are not driven by sovereign risk or GDP growth and are not observable in European countries with low sovereign risk, suggesting inefficient bank behavior. In terms of real effects, I find that firm dependence (through syndicated loans) on banks that risk-shift is negatively related to earnings before interest and tax (EBIT). My findings emphasize the real consequences of irresponsible fund allocation by banks and the relevance of ECB supervision of banks that participate in its funding programs.

The European sovereign debt crisis revealed the dire financial health of several European sovereigns and in particular of the peripheral countries: Greece, Italy, Ireland, Portugal and Spain, or the "GIIPS" countries. As a result, GIIPS debt yields rose substantially, while non-peripheral, such as German, debt yields decreased, signaling a divergence of risk between the peripheral- and other Eurozone countries (Acharya and Steffen, 2015). Such divergence created an incentive for GIIPS banks to risk-shift. According to risk-shifting theory, banks that find themselves in financial difficulties may opt to substantially increase risky exposures to which their earnings are highly correlated, thus decreasing diversification of their portfolio or "betting" on certain assets, as described by Crosignani (2015). Domestic sovereign debt is an ideal asset with which to risk-shift, as banks are usually largely exposed to such debt initially, resulting in high correlation between such sovereign debt yield and bank earnings. In addition, bank earnings from it's local operations are likely to be correlated with domestic sovereign risk, further increasing the correlation between the yield on domestic sovereign debt and the earnings of the bank. GIIPS banks were largely exposed to GIIPS sovereign debt at the onset of the sovereign debt crisis, meaning that many of these banks found themselves in financial difficulties. These banks now have a

large incentive to bet on the survival of their domestic and risky sovereign, as, in the upside, the sovereign pays out high yield on the debt, substantially increasing bank earnings. In the downside, or when the sovereign defaults and their bet fails, Eurozone banks are often guaranteed to be bailed out by their national governments, as the existence of the banks may be essential to the functioning of the national (and in some instances European) economy.

Besides to increase their upside potential, banks may increase their domestic sovereign debt exposure due to "moral suasion". Moral suasion is described by Becker and Ivashina (2014) and involves active government pressure on its domestic banks to increase their exposure to domestic sovereign debt. The motivation for exerting such influence is that the sovereign debt risk in certain (and in particular GIIPS) countries soared during the debt crisis, as a result of which the liquidity for such instruments decreased dramatically. In the absence of a liquid funding market for risky sovereign debt, GIIPS sovereigns may thus have had strong incentives to press domestic banks to buy up the debt, to secure their access to sufficient funding. In response to such suasion, banks may have used LTRO funding to fund the increase in exposure. In the first part of my analysis, I determine whether risk-shifting and moral suasion occurred after the LTROs, thus whether the LTROs adequately restored funding in debt markets or (partly) funded bank bets, possibly induced by government suasion.

Risk-shifting or increases in sovereign debt exposure due to moral suasion may not necessarily be harmful. Given that a sovereign survives without costly funding from fellow EU member states, a distressed bank's increase in exposure to this sovereign to in turn increase its upside potential (it's bet on the survival of this sovereign), may revive both bank and sovereign. The sovereign profits from the bet, as the bank fills a liquidity gap left by risk-averse banks in a crisis period. The bank profits from the high yield on the government debt, which it collects, as the sovereign does not default. Thus all parties involved seem to be better off, raising the question whether risk-shifting by banks is desirable. It is not; for (at least) two reasons. First, the mechanics of the Eurozone have intertwined the sovereigns that take part in it. Sovereign distress easily spills over to neighboring countries, sparking fear of the collapse of the union altogether among fellow member states. These states will thus often proceed to bail out a distressed member to avoid contamination of their own economies, as has been demonstrated in recent years by the seemingly endless emergency loans supplied to Greece. As distressed governments use part of this funding to pay off their outstanding debt, the bailout programs represent a transfer in funding from healthy EU member states to banks that bet on the survival of unhealthy ones, at the cost of the European taxpayer. Second, risk-shifting may crowd out corporate funding in the process. Banks that increase their sovereign debt exposures need funding to do so. In a stressed market where liquidity is scarce, funding is likely to be withdrawn from less profitable corporate debt markets. Firms that are dependent on such banks to fund their investments face funding constraints or more binding

debt covenants as a result, leading to lower investments and suppressing performance. In the second part of my analysis I test whether firm dependence on banks that either risk-shift or succumb to moral suasion has a negative impact on corporate funding and firm performance.

To determine whether bank behavior reflects indications of risk-shifting and moral suasion directly following the LTROs, I perform several bank-level regressions. I gather data from the European Banking Authority (EBA) on bank sovereign debt exposures, and run a first set of regressions where the change in exposure of a bank to a certain sovereign is the dependent variable. This allows me to differentiate between factors that influence whether banks increase their debt exposures to a certain sovereign, such as whether an exposure is domestic (risk-shifting), or the amount of government officials on the board of a bank (moral suasion). Subsequently, I use this dataset to indicate banks as having portrayed behavior consistent with risk-shifting or moral suasion and run a probit regression on these indicator variables. This analysis allows me to investigate the factors that influence whether a bank displays behavior that is consistent with either risk-shifting or moral suasion.

Throughout my analyses, I find strong indications of the presence of risk-shifting, especially in the period directly following the LTROs, suggesting that some Eurozone banks used ECB funding to bet on the survival of certain sovereigns. This is disturbing in the sense that the aim of the ECB is to restore stability to the banking sector, while in practice it thus contributes to its fragility (at least to a certain degree). As mentioned, European taxpayers may have to pick up the bill of bank bets, stressing the relevance of some form of control over banks' use of ECB funds. Specifically, I find that GIIPS banks increase their domestic sovereign debt exposure by an estimated average of €9.0 billion more than other sovereign exposures, following the LTROs. Furthermore, I find that this increase is not driven by regular demand factors, such as economic prospects of the issuing country. Conversely, I do not find any robust relation between changes in sovereign debt exposures and the degree to which a bank is controlled by its government in the post-LTRO period, which is an essential condition for moral suasion to occur. This result suggests that LTRO funding may have been used to increase risky exposures, undermining the stability of the Eurozone, but that government suasion is unlikely to have contributed to such behavior.

The second part of my analysis concerns the real effects of the above defined types of bank behavior on firm performance in the context of the LTROs. To address this question, I use the bank-level indicator variables used in the probit regression and match those to the Dealscan database that contains information on a large set of syndicated loans. I then determine the degree to which firms are exposed to banks that display investment patterns that are consistent with risk-shifting or moral suasion and run several regressions using these exposures as independent variables and firm-level measures of performance as dependent variables. I find that high firm dependence on banks that qualify as risk-shifting or on banks that are the object of moral suasion is associated with lower earnings than other firms and that this

effect is not driven by firm- or country characteristics such as leverage or GDP growth. Specifically, my findings indicate that a 1% increase in risk-shifting GIIPS bank dependence is associated with a decrease in EBIT of 0.03% of a firm's total assets, in the year following the LTROs. Due to high correlation between the variables for dependence on risk-shifting banks and banks that display behavior consistent with moral suasion, I fail to show that the results for both variables are statistically disjoint. Considering the result that I find regarding bank behavior, namely that risk-shifting likely occurred while moral suasion did not, I ascribe the observed result to risk-shifting and not moral suasion. This implies that firms experience adverse effects of risky portfolio choices by banks, possibly funded by the ECB.

This thesis makes three discernible contributions to the existing literature. First, my research adds to the work of Crosignani (2015) and Becker and Ivashina (2014), who respectively investigate risk-shifting and moral suasion and their effects on the functioning of the Eurozone economy. This thesis investigates these concepts in a novel context: the LTROs, which is especially relevant as the use of ECB funding to increase overall Eurozone risk is arguably undesirable. The results that I obtain support risk-shifting in favor of moral suasion, contradicting the findings of Becker and Ivashina (2014)[1]. In addition, my research links risk-shifting and moral suasion to firm performance in an unprecedented way, directly assessing the impact of such bank behavior on firms that are dependent on these banks. This is an extension of the analysis presented in Acharya et al. (2015), who perform a similar analysis, quantifying the impact of risk-shifting and moral suasion on bank lending to corporations and the effect on firm performance. I perform similar regressions, but introduce novel variables for firm dependence on bank that risk-shift or succumb to moral suasion. Third, I examine the real effects of risk shifting specifically in the context of the LTROs, providing insight into the real consequences of limited bank regulation regarding the allocation of LTRO funds.

The remainder of this thesis is organized as follows: In the first section, I present the existing literature that is relevant to my topic. Second, I define my methodological approach to formally test my research questions and provide technical details such as regression formulas and variable definitions. Section four describes the different datasets that I use and provides descriptives statistics on key variables. Section five presents and interprets the results of the regression analyses as set out in section 3 using the data described in section 4. The final section concludes.

[1] Crosignani (2015) allows for the possibility of moral suasion as a catalyst for risk-shifting using domestic sovereign debt, thus my results do not one-sidedly support his hypothesis

2 Theoretical Background

The circumstances under which central banks should intervene in the economy by means of quantitative easing were touched upon by Walter Bagehot as early as 1873 (although the actual term 'quantitative easing' did not appear in literature until much later). In his book, "Lombard Street: A Description of the Money Market", Bagehot describes the situation in late eighteenth century England regarding the collapse of Overund Gurney and Company, a London Wholesale bank, in 1866. Concerning the role of the Central Bank during such a crisis he states that: "Theory suggests and experience proves, that in a panic the holders of the ultimate Bank reserve[2] [...] should lend to all that bring good securities quickly freely and readily"[3]. Loosely interpreted this means that in case of stress on money markets, for example when the probability of bank runs is high, the central bank should supply loans to whoever is willing to put up collateral of good quality. In addition, he states that the rates under which the Central Bank lends in such an instance should be high, as to prevent that the loans are used for purposes that are not utterly necessary in light of the credit crunch[4].

The European sovereign debt crisis that started in 2009 and the resulting credit crunch are a recent example of a situation as described by Bagehot (stress in money markets), albeit on a much wider, and perhaps even unprecedented, scale. Obeying Bagehot's policy suggestions, the European Central Bank (ECB) attempted to alleviate the stress in European money markets by lending freely and readily to financial institutions in the Eurozone in the form of several open market operations. Banks were the object of the ECB loans, since the ECB does not directly buy up government bonds like for example the US Federal Reserve (Fed) does. Especially the 3-year LTROs implemented on 22 December 2011 and 1 March 2012 served this purpose[5]. In a 2011 press release, the ECB states the following concerning the LTROs: "The Governing Council of the European Central Bank (ECB) has today decided on additional enhanced credit support measures to support bank lending and liquidity in the Euro area money market". So in accordance with Bagehot, the ECB increased funding to the entire banking sector to relieve tension in credit markets, however it did so at relatively low interest rates (one percent for the first LTRO[6]). This created the opportunity for banks to fund their (risky) sovereign debt using the low-interest ECB funds and pocket the yield spread. As a result, sovereigns' access to cheap funding increased and financial distress of certain sovereigns in the Eurozone may have been steered off[7]. The GIIPS countries were

[2] In the case of the collapse of Overund Gurney & Co. this holder was the Bank of England
[3] Bagehot (1873, p.173)
[4] Again loosely interpreted
[5] Throughout this thesis I refer to these two refinancing operations as "LTROs". The three-month LTROs that are part of the ECB's regular open market operations are not implied with this term.
[6] "Intesa Sanpaolo Taps Up LTRO for 24 Billion" by David Enrich, Wall Street Journal, February 29, 2012.
[7] It is important to note that the financial distress of these sovereigns is likely to lead to financial difficulties of banks holding large portions of the debt of these sovereigns, creating a potential for bank runs and as such pose a risk to the altogether functioning Eurozone economy

most affected by credit contractions in the years 2009-2011 (de Bruyckere et al., 2013), which is why I focus on these countries throughout my analysis.

According to Acharya and Steffen (2015), prior to- and during the sovereign debt crisis, banks funded their long-term sovereign debt exposures with short-term interbank debt. When the risk on GIIPS sovereign debt rose, which fed back into the financial sector (Acharya et al., 2014) and interbank funding dried up, banks that were largely exposed to GIIPS debt were unable to roll over their funding. Simultaneously, corporate lending in GIIPS countries decreased substantially (Acharya et al., 2015), suggesting that banks withdrew from corporate debt markets to compensate for a decrease in sovereign debt funding. This is an example of the effect of a credit supply shock (the decrease in interbank funding) on corporate lending. Increased liquidity in the market due to the LTROs may have alleviated this effect by providing banks with the funding they needed on their existing government debt and lifting the pressure on corporate debt markets. However, literature indicates that banks did not always allocate their funds efficiently during the sovereign debt crisis: some banks actively shifted resources in the direction of high risk sovereign debt (Crosignani (2015); Becker and Ivashina (2014))[8], motivated by either an increased upside potential ("risk-shifting") or government pressure ("moral suasion"). In case this phenomenon extends to the funds provided by means of the LTROs (so, when banks use these funds to increase their risky sovereign debt exposures instead of merely to fund their existing exposures), the ECB's goal of re-establishing liquidity in the corporate debt market may have been impaired as a result of bank behavior. In this thesis I investigate whether risk-shifting and moral suasion occurred following the LTROs and in what way firms were influenced by such phenomena.

In the remainder of this section I in turn describe the (recent) literature that establishes the relation between sovereign stress and corporate lending, risk-shifting and moral suasion and, subsequently, the literature that has previously investigated the effect of expansionary monetary policy, and in particular the open market operations of the ECB, on banks' balance sheets and on corporate debt markets.

2.1 Sovereign stress and corporations

For the link between sovereign stress during the sovereign debt crisis and real economic effects, in the form of decreased access to bank loans, to exist, banks need to adjust their corporate lending in response to increased risk of their (domestic) sovereign. In this subsection, I discuss the literature that describes the effect of a credit supply shock on corporate lending and how sovereign stress is related to such a credit supply shock.

The potential real impact of credit supply shocks on the real economy is the object of research of

[8]Some banks did not only face funding difficulties due to their existing sovereign debt exposures but increased these exposures during the sovereign debt crisis

Peek and Rosengren (2000), who find that a decrease in funding capacity for only a distinct number of credit providers in a market can have real economic effects, implying that at least some credit takers are not able to substitute funding perfectly. Exploiting the substantial and differentiable presence of credit originated by Japanese banks in American commercial real estate markets, they find that the Japanese credit crunch of the early 1990's had significant negative effects on investment in commercial real estate in the US. The fact that Japanese banks supplied credit to commercial real estate markets in different states, combined with the sensitivity of real estate investment to local external factors, allows the authors to isolate the effect of loan contraction of Japanese banks on real estate investment. Their research shows that the decrease in loan supply on the US market was partly traceable to the loan contraction that resulted from the Japanese crisis and that this contraction had negative real effects. Specifically, they find that the Japanese pullback from US real estate markets led to a decrease in construction activity, simultaneously indicating that the loans originating from Japanese banks were not easily replaced with other sources of credit.

Closer to home, Ivashina and Sharfstein (2010a) describe the adverse effect that a shock to the balance sheets of financial institutions can have on corporate lending. Using data from European banks during the financial crisis of 2008, they find that banks that were financially more constrained in the crisis contracted their loan supply more than other banks. Their findings are twofold. First, they find that banks that have limited access to deposits, and thus stable funding, cut their lending more during the crisis than their well-funded counterparts. Second, they find that banks that have little outstanding credit lines cut lending less than others. To illustrate the mechanism underlying the second relationship, consider an exogenous credit supply shock. As credit dries up, firms become more reliant on their existing lines of credit, thus drawdowns on these credit lines increase. Banks that are more exposed to such credit lines now face a decrease in available funds, given that banks also experience funding constraints, and cut corporate lending in response. The interrelation between a bank's financial health and the amount of loans that it originates, suggests that in the event of a shock to the economy, corporate loans do not only decrease because of the deterioration of the health of firms (demand side), but also because some banks are no longer able to meet the remaining demand for loans (supply side)[9]. By employing similar reasoning, a positive credit supply shock, such as the recent LTROs, should then lead to an increase in corporate lending through the loan supply channel, provided that banks allocate funds efficiently.

In a different paper, Ivashina and Sharfstein (2010b) suggest that corporate lending decreases due to the tendency of banks to increase their lead share in syndicated loans when faced with an adverse credit supply shock. They argue that banks that are faced with a credit contraction increase their share

[9]Kashyap and Stein (2000) and Cetorelli and Goldberg (2011) find similar results studying the transmission of European liquidity shocks to respectively the US and emerging markets

in syndicated loans in which they are the lead underwriter. They then argue that the increase in lead share of existing loans crowds out new firm lending and that the presence of the syndicated loan market therefore increases the cyclicality of credit (in times when credit supply is low banks contract their lending more than they would in the absence of a syndicated loan market). In the case of the sovereign debt crisis, this effect may have inflated the credit crunch.

Similar to the effect that the collapse of the Japanese price bubble had on US real estate markets in 1992, the sovereign debt crisis in Europe may have had real economic effects. Taking the reasoning presented in Ivashina and Sharfstein (2010a) as a starting point, a contraction in the corporate loan supply by financially constrained banks has real economic implications when the gap in credit supply is not filled by other lenders, as demonstrated by Peek and Rosengren (2000). The real effects of the European sovereign debt crisis are the object of research of Acharya et al. (2015). Again using the syndicated loan market as a basis, they not only find that banks that were affected by the crisis decreased their lending to corporations, but also that this decrease had negative real effects[10]. First of all, the authors analyze whether the sovereign debt crisis has had any aggregate effect on the real economy by means of a reduction in credit supply. They construct a variable that measures a firm's dependency on GIIPS banks for it's borrowing during the sovereign debt crisis[11] and find that a firm's GIIPS bank dependency is negatively related to several real economic factors, such as investment, sales growth and employment growth. In addition, GIIPS-dependent firms display behavior consistent with firms that anticipate financial distress, as described by Almeida et al. (2004). This finding suggests that firms that were dependent on banks that contracted lending during the sovereign debt crisis were not always able to acquire substitute funding, leading to increased financial constraints and suppressing performance.

2.2 Risk-shifting and moral suasion

In addition to the aggregate effect, Acharya et al. (2015) also investigate the channels through which bank lending contracted as a result of the sovereign debt crisis. They discern one active channel: the "balance sheet hit" channel, and two passive channels: the "risk-shifting" and "moral suasion" channels. I elaborate on each of these channels in this section, as these concepts and their implications are the subject of my research.

The balance sheet hit channel is the most straightforward of the three mechanisms and refers to the reduction in lending to corporations that is caused by the banks' reduced financial health. Banks that are exposed to large amounts of GIIPS sovereign debt are more likely to experience financial difficulties

[10] Ivashina and Sharfstein (2010a) commented on their research with the note that the decrease in lending that they document may have been filled by other banks, thus merely indicating a shift of assets from weakly- to strongly-capitalized banks

[11] The variable essentially measures the percentage of a firm's pre-crisis lenders that are domiciled in a GIIPS country for every crisis year

than less exposed banks, due to the impairment of their balance sheet, resulting from rising default risk on the debt. Banks now find themselves forced to reduce their (corporate) leverage. Examples of models in which banks pass on their funding difficulties to firms are described by Gennaioli et al. (2014) and Bocola (2014).

The second channel discerned by Acharya et al. (2015) is the risk-shifting channel, in which banks actively pursue risk and thereby crowd out corporate lending. According to the risk-shifting hypothesis, banks that are distressed because of their large holdings of risky sovereign debt place a bet on the survival of this sovereign by increasing their exposure. In the upside, they gain the spread between the high-yield sovereign debt and their source of funding, and in the downside they are protected by limited liability in the form of implicit bailout guarantees (especially if the bank is "too big to fail")[12]. A description of the risk-shifting hypothesis is provided by Crosignani (2015).

The third channel is described by Becker and Ivashina (2014) and entails government influence as a catalyst for a bank's increased government bond holdings and consequently reduced corporate lending. According to this concept, sovereigns of which the risk on issued debt rises face low demand for their debt. In response, such governments put pressure on banks to buy more of their (risky) debt, to secure sufficient funds. Becker and Ivashina find that a positive relationship exists between the number of board positions of a bank that are fulfilled by government officials and its increase in domestic sovereign debt in the years 2011-2013[13]. Furthermore, they find that government ownership of banks and their change in domestic sovereign debt holdings are positively related. This suggests that distressed governments actively stimulate the buying of sovereign debt by local banks (moral suasion). In contrast, Acharya et al. (2015) find evidence that suggests risk-shifting but not moral suasion to occur during the sovereign debt crisis.

The difference between the two authors arises due to contrasting interpretations of their results. Both authors find that banks that are largely exposed to domestic sovereign debt during the sovereign debt crisis decrease lending more than others, which Becker and Ivashina explain as consistent with moral suasion, as they claim that risk-shifting does not explain the observed home bias, while moral suasion does. Acharya et al. interpret this result as consistent with risk-shifting, as yields on domestic sovereign debt are often correlated with a bank's earnings (when a substantial part of a banks business is generated in its home country), thus making domestic government debt an ideal risk-shifting instrument. I adhere to the interpretation of Acharya et al. (2015) and use a bank's increase in domestic sovereign debt exposure as a proxy for risk-shifting.

Both risk-shifting and moral suasion are characterized by banks that increase their domestic sovereign

[12]For an example of the positive effects of bank bailouts see Giannetti and Simonov (2013)
[13]They find significant results when considering only countries with high CDS spreads

debt exposure, but the types of banks that do so differ per channel, which allows for statistical testing of the predominance of the channels following the implementation of the LTROs. In the case of the risk-shifting channel, banks that are affected by the debt crisis may use ECB funding to further increase their domestic sovereign debt exposure , thus further crowding out corporate loans. In the case of moral suasion, banks that are subject to substantial government control increase their domestic sovereign debt exposure. Thus when banks that are highly exposed to GIIPS sovereign debt increase their holdings of this debt at the cost of loans to corporations following the LTROs, this can be interpreted as a sign of the presence of at least some risk-shifting, possibly funded by the LTROs. However, when only banks subject to significant government control portray this kind of behavior using only domestic sovereign debt, this is an indication of the presence of moral suasion.

I use data analysis to test which of these channels are likely to be of influence in the in the period 2011-2013. As such, I investigate whether risk-shifting and moral suasion are likely to have occurred in this period and whether firms were affected by such behavior in terms of performance. Consistent with Acharya et al. (2015), I expect to find indications of risk-shifting, but not moral suasion among European banks. In addition, I expect risk-shifting to have negative effects on firm performance, consistent with the reasoning presented by Acharya et al. (2015) and Peek and Rosengren (2000).

2.3 Enter monetary policy: the real effects through corporate lending

Several authors have investigated the effects of the ECB's recent expansionary monetary policy on corporate lending or directly on the real economy. First, I here discuss literature concerning the effect of ECB monetary policy in general, after which I discuss the literature that specifically describes the effect of the LTROs. To conclude, I review existing research that investigates the effect of bank behavior in context of the LTROs.

Monetary policy during the sovereign debt crisis

In an ECB working paper, Giannone et al. (2012) use ECB and bank balance sheet data to investigate the effects of the ECB's unconventional stimulating policy after the global financial crisis. Since their sample ends after April 2011, they exclude the LTROs and thus mainly focus on short-term open market operations. They argue that the ECB's refinancing operations are, at least to some extent, successful in replacing short-term interbank funding (which largely dried up after Lehman Brothers collapsed) after 2008. In real terms, they suggest that without intervention by the ECB, unemployment rates would have been around 0.6% higher, combined with 2% lower industrial production, aggregated over the Eurozone. Although the results of the authors shed light on the mechanisms underlying the transmission of ECB

funds to the corporate sector, they do not analyze such mechanisms during the whole length of the sovereign debt crisis, in which banks' behavior on money markets changed (as illustrated by the three "channels" discussed in the preceding section).

A larger sample period is considered by Drechsler et al. (2016), who analyze trends in ECB borrowing in the period from August 2007 until December 2011. They thus include (a portion of) the sovereign debt crisis in their sample, but also exclude the three-year LTROs. Their results do however provide insight into the allocation of ECB funding among banks. Using ECB data on borrowings and collateral posted to guarantee these borrowings, they find that, starting at the onset of the sovereign debt crisis, the risk associated with collateral posted by weakly-capitalized banks increases relative to well-capitalized banks and that the probability that a bank posts risky sovereign debt as collateral is negatively related with capitalization. This trend suggests that besides the balance sheet hit channel, where banks use central bank funding to fund only their existing risky assets and not to increase their exposure to such assets, some other mechanisms cause banks to actively increase their exposure. The authors state that they find results that are consistent with risk-shifting, possibly stimulated by regulatory forces (moral suasion). As I focus on the effect of the two largest open market operations of the ECB: the three-year LTROs, my thesis is supplementary to the work of Drechsler et al. (2016). However, in contrast to them, I am restricted to use public bank- and firm-level data[14].

The effect of the LTROs

Popov and van Horen (2013) do include the LTROs in their sample period. They use bank-level data to investigate the effect of sovereign stress on the banks' lending to corporations. In accordance with Ivashina and Sharfstein (2010a), they find that a hit to a bank's balance sheet in the form of a decrease in the value of sovereign debt holdings is likely to lead to a decrease in that bank's lending to corporations. Furthermore, they find that this effect does not disappear after the first LTRO, hence they conclude that this LTRO has not successfully stimulated corporate lending. Their research is unique in the sense that they use bank balance sheet data, and in particular a banks' holdings of GIIPS sovereign debt, to estimate the degree to which a bank is exposed to the sovereign debt crisis. Subsequently, they use Poisson regressions to estimate the probability that a bank lends to firms in a specific country (differentiating between countries allows controlling for country-specific factors) at different points in time and find that highly exposed banks decreased their lending up to 21% more than banks that are less exposed. The result is mainly driven by exposures to Greek, Spanish and Italian government debt.

The effectiveness of the LTROs is also studied by Carpinelli and Crosignani (2015). They use the Italian loan market as the object of their research, motivated by the fact that out of all EU banks, Italian

[14]Drechsler et al. use data on ECB borrowings and collateral, which is not publicly available

banks have been the most important recipients of the funds originated in the LTROs. Similar to Acharya et al. (2015), they use firm level data to control for demand-side effects (I follow a similar approach, as I am specifically interested in the three previously identified supply-side channels: the balance sheet hit channel, risk-shifting and moral suasion). The authors specifically find that after a negative credit supply shock, in their (and my) case the sovereign debt crisis, the central bank can restore liquidity in corporate debt markets by providing unlimited credit. Another addition to the literature is that the authors investigate an additional intervention performed by the Italian government along with the LTROs. After the first LTRO, the Italian government introduced the possibility for native banks to purchase government guarantees on specific assets. Since assets with a government guarantee are eligible ECB collateral, the measure represented an opportunity for banks that were suffering from a shortage in eligible collateral to obtain ECB funding nonetheless. The authors find that the degree to which a bank is affected by the sovereign debt crisis and its tendency to post collateral that is guaranteed by the Italian government are positively related, confirming their hypothesis that banks that experience liquidity difficulties as a result of the sovereign debt crisis have less eligible collateral than banks than do not experience liquidity issues. After all, constrained banks are likely to have used much of their collateral in the early stages of the sovereign debt crisis to obtain short-term ECB funding. Besides increased liquidity, Szczerbowicz (2015) finds that the LTROs lowered interest rates for both banks and governments.

The findings of Carpinelli and Crosignani are seemingly at odds with Popov and van Horen, who find that the LTROs do not have a positive effect on lending to corporations. The differences in findings may be nested in differences in methodologies. Where Popov and van Horen use exposure to GIIPS sovereign debt as a benchmark of a bank's affectedness by the sovereign debt crisis, Carpinelli and Crosignani use a banks' exposure to foreign credit wholesale markets for a similar purpose. Therefore, these two papers essentially measure two different, although related, phenomena. The two phenomena are related because sovereign stress in GIIPS countries increased the default risk on the debt securities of these countries. Banks holding large portions of such assets on their balance sheets largely financed these investments with short-term debt, which they obtained from interbank wholesale markets. The rising risk of the assets then led to higher perceived risk of these banks and margin calls on loans where risky government debt was used as collateral. Consequently, the interbank wholesale market largely dried up for banks that were highly exposed to GIIPS sovereign debt[15]. Although a devaluation of GIIPS sovereign debt led to a contraction in the interbank money market, banks that are exposed to large amounts of GIIPS sovereign debt, as investigated by Popov and van Horen, do not need to be the banks that are also signif-

[15]Engler and Steffen (2016) propose a model in which strategic default by governments leads to money market frictions and consequently a contraction of the interbank loan market in the context of the European sovereign debt crisis.

icantly exposed to credit wholesale markets. The findings of Carpinelli and Crosignani thus suggest that for banks that were significantly affected by the drying up of wholesale markets, the LTROs provided alternative funding for their assets, including corporate loans. This finding however does not suggest that banks with sufficiently impaired balance sheets, as a result of GIIPS sovereign stress (i.e. banks with large exposure to GIIPS sovereign debt), use the LTRO funding to restore their balance sheets and return to their pre-crisis lending behavior. The difference in the samples used between the two papers may have further emphasized the difference in findings[16]. Since I am interested in the supply-side channels underlying the use of LTRO funds in the context of GIIPS sovereign stress, I adhere to the approach of Popov and van Horen (2013) and use GIIPS exposure as a benchmark for the degree to which a bank or firm is effected by the sovereign debt crisis.

Bank behavior and the LTROs

Risk-shifting and moral suasion, are (to some extent) consistent with "carry trade" type of behavior as presented by Acharya and Steffen (2015). Carry trade behavior entails a bet by European banks on the survival of the Eurozone and a simultaneous convergence of sovereign bond spreads between GIIPS and non-peripheral (in particular German) sovereign debt. According to this concept, banks use short term funding to buy long term peripheral (GIIPS) sovereign debt and net the difference. The authors find that such behavior was widespread among European banks in the period between 2007 and 2013. Specifically, they show that GIIPS banks increased their sovereign bond exposure after the LTROs to all GIIPS sovereigns with the exception of Greece. The fact that non-Greek GIIPS banks load up on increasingly risky GIIPS debt can be regarded as being consistent with both the risk-shifting and moral suasion hypotheses. In the case of risk-shifting, the yield on (non-Greek) GIIPS debt is sufficiently correlated with the return on GIIPS banks' existing assets, leading to an increase in exposure. Under the moral suasion hypothesis, GIIPS governments put pressure on their local banks to increase their exposure to domestic (non-Greek) sovereign debt. Extending this reasoning, Greek banks should load up on domestic sovereign debt due to risk-shifting motives or government interference, which is not what Acharya and Steffen observe. The exclusion of Greek debt from the assets used to increase risky sovereign exposure is consistent with the risk-shifting hypothesis when Greek banks are no longer guaranteed of a bailout in the case of a Greek sovereign default. Mounting resistance in the Eurozone against a Greek bailout may have facilitated such a drop in confidence among Greek banks, confirming the consistency of the data with risk-shifting. The decrease in exposure to Greek debt is however not easily shown to be consistent with moral suasion.

[16] Popov and van Horen (2013) use data on non-GIIPS banks, while Carpinelli and Crosignani (2015) use data on Italian banks only

Furthermore, the authors find that weakly capitalized GIIPS banks increased their exposure to GIIPS sovereign debt more than other banks after the LTROs, and conclude that this is consistent with risk-shifting, supplementing the results of Crosignani (2015). They also test for moral suasion, using an indicator variable that is one when a bank is bailed out and zero otherwise as a proxy for a bank's sensitivity to moral suasion. Not only do they find evidence in favor of risk-shifting after the LTROs, but not moral suasion [17]. The differences with my thesis are twofold. The first being the time horizon of the data sample: Acharya and Steffen use a data sample from March 2010 to June 2012, where I investigate bank behavior in the context of the LTROs. I extend their sample period and construct a dataset that is symmetrical around the LTROs, to capture any delayed effect that the LTROs might have. Second, inspired by Popov and van Horen (2013) an Acharya et al. (2015), I complement the analysis, using firm-level data to identify the real effects of risk-shifting and moral suasion following the LTROs.

Consistent with Drechsler et al. (2016) and Acharya et al. (2015), I expect that GIIPS banks in particular (as they are most affected by the sovereign debt crisis) risk-shift in the period following the LTROs and that they do not do so due to moral suasion. The reasoning here is that for some GIIPS banks, the LTROs facilitate risk-shifting, in that banks can easily obtain funds with which they can increase their one-sided potential. Another reason is that sovereign debt may be used as collateral to acquire LTRO funds (Drechsler et al., 2016), which permits a negative feedback loop, where LTRO funding is used to buy risky government debt, which is then posted as collateral to obtain more funding et cetera, increasing bank risk in the process. In terms of real effects, I expect that risk-shifting behavior after the LTROs has negative effects for firms dependent on such banks, which is consistent with the findings of Popov and van Horen (2013).

To my knowledge, I am the first to investigate the relation between risk-shifting and moral suasion and corporate performance in context of the LTROs. Hereby, I add to the existing literature and provide an insight into the allocation of the ECB funds and the roles that governments and regulators fulfill in this context.

[17] Alongside risk-shifting , Acharya and Steffen identify home bias as a potential channel that causes increases in sovereign debt exposures. Throughout my thesis I regard home bias as a symptom of either risk-shifting, moral suasion or other channels, but not as the channel itself. The reasoning here is that home bias in itself (other than the home bias caused by the identified channels) is not caused by frictions in funding markets and as such is not effected by financial intermediation. I control for any home bias not related to risk shifting or moral suasion by including country fixed effects in most of my analyses.

3 Methodology

In this section I explain the methodology that I employ. First, I establish whether banks allocated funds efficiently in the period following the LTROs, and specifically whether the risk-shifting and moral suasion channels were persistent in this period. Subsequently, I investigate whether bank behavior had consequences for corporations in terms of performance. Throughout my analysis, I differentiate between GIIPS and other banks, since almost all of the LTRO funding has been allocated to GIIPS banks[18]. Similarly, in the firm-level analysis I differentiate between firms that are exposed to GIIPS banks through their syndicated loans and those that aren't.

3.1 Determinants of banks' sovereign debt portfolios

Both risk-shifting and moral suasion are characterized by an increase in domestic sovereign debt exposure by banks, but the type of banks that do so differ under both hypotheses. In the case of risk-shifting, distressed banks load up on risky securities of which the yield is substantially correlated with their performance, to increase their upside potential. In the context of the sovereign debt crisis, GIIPS sovereign debt may classify as such a risky (high-yield) security, as sovereign risk of peripheral Eurozone countries increased substantially during the crisis. GIIPS banks thus may use their domestic sovereign debt to risk-shift. For non-peripheral Eurozone countries, such a bet is largely inefficient, as, contrary to GIIPS debt, the yield on core-Eurozone debt decreased during the sovereign debt crisis, limiting the upside potential of such assets. In my analysis I thus examine GIIPS banks in particular. To identify the degree to which a bank is exposed to debt of different sovereigns, I construct the following variable:

$$Exposure_{jkt} = \frac{Sovereign\ Debt\ Holdings_{jkt}}{Total\ Assets_{jt}} \tag{1}$$

Hence, $Exposure_{jkt}$ is the percentage of country k sovereign debt held by bank j, weighted by the banks' total assets, at time t. To subsequently identify banks' domestic sovereign debt, I construct an indicator variable according to:

$$Dom_{jk} = \begin{cases} 1, & \text{if } Incorp\ Country_j = k \\ 0, & \text{otherwise} \end{cases} \tag{2}$$

Or, Dom_{jk} is equal to one when for an observation, the exposure country k is equal to a bank j's incorporation country. This indicator variable thus groups exposures into non-domestic and domestic ones.

When moral suasion occurs, banks with board seats filled by government officials would increase their

[18] "Fitch on who'll tap the LTRO", Cardiff Garcia, Financial Times, February 28, 2012.

exposure to domestic sovereign debt more than others. In accordance with Becker and Ivashina (2014), I use the number of board seats occupied by domestic government officials on a banks' board of directors as a proxy for the susceptibility of that bank to moral suasion. Specifically, I use the following variable to measure government control:

$$Gov\ Control_{jt} = \frac{\#Government\ Board\ Seats_{jt}}{\#Total\ Board\ Seats_{j}} \tag{3}$$

The variable measures the susceptibility of bank j to pressure by the its domestic government at time t, by the percentage of its board's seats that are fulfilled by government officials of its home country. Using the variables in (2) and (3), I estimate the following fixed effects model:

$$\begin{aligned}
\Delta Exposure_{jkt} = \alpha_{jk} &+ \beta_1 \times Dom_{jk} \\
&+ \beta_2 \times Dom_{jk} \times GIIPS_j \\
&+ \beta_3 \times Dom_{jk} \times LTRO_t \\
&+ \beta_4 \times Dom_{jk} \times GIIPS_j \times LTRO_t \\
&+ \beta_5 \times Gov\ Control_{jkt-1} \\
&+ \beta_6 \times Gov\ Control_{jkt-1} \times Dom_{jk} \\
&+ \beta_7 \times Gov\ Control_{jkt-1} \times GIIPS_j \times Dom_{jk} \\
&+ \beta_8 \times Gov\ Control_{jkt-1} \times LTRO_t \times Dom_{jk} \\
&+ \beta_9 \times Gov\ Control_{jkt-1} \times GIIPS_j \times LTRO_t \times Dom_{jk} \\
&+ \gamma_1 \times \Xi_{jt-1} + \gamma_2 \times \Phi_{kt-1} + \chi_j + \eta_k + \epsilon_{jkt}
\end{aligned} \tag{4}$$

Dependent- and independent variables

The dependent variable $\Delta Exposure_{jkt}$ is derived from (1) and represents the change in bank j's holdings of country k government bonds between time t and $t-1$, and is, as before, scaled by total assets[19]. $LTRO_t$ is an indicator variable equal to one in the periods after the first LTRO and zero otherwise. Similarly, $GIIPS_j$ is an indicator variable that is equal to one when a bank j is incorporated in Greece, Italy, Ireland, Portugal or Spain. To control for any bank- and country specific effects, I add χ_j and η_k, which are bank- and country fixed effects respectively. $Gov\ Control_{jkt-1}$ is a one period lag of the variable defined in (3). I use a lag here to avoid the issue of endogeneity that may arise due to two-way interdependence of a bank's sovereign debt investment choices and it's degree of government control[20]. Such interdependence is resolved when using a lagged independent variable.

[19] Formally, this variable is expressed as: $\Delta Exposure_{jkt} = Exposure_{jkt} - Exposure_{jkt-1}$

[20] A bank's change in exposure to sovereign debt of a country may create an incentive for the respective government to in- or decrease its influence over the bank.

Control variables

To capture bank-level factors that influence sovereign debt portfolio choice, I control for bank characteristics other than those implied by the explanatory variables with Ξ_{jt-1}, which is a vector of bank-level control variables. As with $Gov\ Control_{jkt-1}$, the variables in the vector are one period lags, to avoid a potential endogeneity issue as a result of a dependence loop. The first effect that is included in the vector is a a variable that captures the EU bank capital regulations under the Basel III accord: $Tier\ 1\ Ratio_{jt-1}$. This variable represents the bank's tier 1 ratio (the ratio of tier 1 capital to Risk Weighted Assets, or RWA). The reasoning here is that when a bank fails to meet its capital requirements, it may adjust its investment policy, which determines whether or not a bank invests in (domestic) sovereign debt.

The second effect captured in the vector is bank profitability, measured by the variable $Income\ (pre\text{-}tax)_{jt-1}$. Pre-tax income is used rather than net income, since differences in countries' tax regulations may favor some banks over others and may thus distort the perception of a bank's profitability. Just as before, profit is scaled by total assets to avoid capturing any size effects. A bank's profit may influence investment choice (net profit is positive cash flow, leaving a profitable bank with more investment opportunities than one that is unprofitable, ceteris paribus) and thus also a bank's investment in sovereign debt. Size effects are captured by the variable $Assets_{jt-1}$, which is a bank's level of total assets. An example of a way in which size may influence investment decisions is when large banks are more likely to be bailed out by governments (too big to fail), leaving them with less perceived restrictions on (risky) investment. Individual bank investment or corporate governance policies, driven by for example a banks' risk appetite, are captured by the bank fixed effects.

To control for any country specific elements that may drive the relation between the explanatory and dependent variables, I add a vector of country-level control variables Φ_{kt-1}. This vector includes the variable $Credit\ Rating_{kt-1}$, which is a variable reflecting the credit rating of a country's sovereign debt. The variable is an average of the ratings of the three large rating agencies: Standard & Poors (S&P), Moody's and Fitch. I assign numbers to the non-numerical ratings to be able to take the average. Specifically, I follow Drechsler et al. (2016) and assign a value of 1 to an S&P rating of AAA, a Moody's Aaa and a Fitch rating of AAA, a value of 2 to an S&P rating of AA+, a Moody's rating of Aa1 and a Fitch rating of AA+ etc. This variable captures any demand for sovereign debt that is driven by the perceived risk of the debt, regardless of the country that issued the debt or initial bank exposure. The second variable included in the country-specific vector is $GDP\ Growth_{kt-1}$ which is the percentual year-on-year (yoy) GDP growth of the country. GDP growth proxies for the economic prospects of a country, where high growth signals a positive economic outlook, which may draw investment (including investment in government debt). The country fixed effects capture any possible unique country characteristics that

drive demand for it's debt, such as government policy that stimulates sovereign debt demand.

Timing, assumptions and hypotheses

The effect of both the bank- and country-level control variables on a bank's investment policy may involve some delay. For instance, high bank profitability will arguably only lead to a change in a bank's sovereign debt exposure ex-post, when the profitability has been solidly confirmed (similar reasoning can be applied to the country-level control variables). The presence of such a delay once more justifies the use of lagged control variables. By employing bank- and country fixed effects in (4), I implicitly assume that the variances of the bank- and country-dependent variables are larger than zero (or that these variables are not constant over time). Although the variable Dom_{jk} is independent of the time dimension, this variable is defined for each exposure country k separately and thus is not included in either the bank- or country fixed effects. Furthermore, estimating (4) requires me to assume that the error term ϵ_{jkt} is independent of the independent- and control variables and independent of t, outside of the bank- or country-dimension[21]. I formally test for such independence, by means of a modified Wald test for homoskedasticity. As presented in section 5, I reject the null hypothesis of no homoskedasticity for all of my regressions. To avoid possibly underestimating the variances of the standard errors in my models, I cluster standard errors at the level of the panel identifier, meaning that I use "robust" standard errors. Such clustering allows for correlation between errors that share a panel identifier. For the model specified in (4), this means that the confidence intervals of the estimators in my model are corrected for correlation of standard errors between bank-exposure country pairs. A convenient side-effect of allowing for such correlation is that it also solves potential issues of autocorrelation[22].

The parameters of interest are β_4 and β_9. A significantly positive value for β_4 indicates that GIIPS banks increased their domestic sovereign debt exposure following the LTROs, relatively speaking. The focus on GIIPS banks is relevant in three ways. First, GIIPS banks experienced more funding difficulties than other banks during the sovereign debt crisis, as these banks hold larger shares of GIIPS sovereign debt (home bias)[23] and were thus more affected than other banks when this debt decreased in value. Since the incentive to risk-shift grows with the deterioration of a banks' financial health, such banks are more likely to risk-shift. Second, GIIPS banks attracted most of the LTRO funding, so when banks used the LTRO funds to risk-shift, these countries should do so the most. Lastly, as I explain in the first paragraph of this section, GIIPS debt especially qualifies as a potential risk-shifting asset for domestic banks.

[21] Dependence of the error term and either time or any of the independent variables is allowed within banks and countries, as such effects are captured by χ_j and η_k.
[22] As I only use three periods in my sample, the effects of autocorrelation would arguably be limited anyway.
[23] GIIPS banks portray even bigger home bias than non-GIIPS banks, as described by Horváth et al. (2015)

Similarly, a positive and significant value for β_9 suggests that GIIPS banks with a large degree of government control, in the form of many government officials in their board, increased their domestic sovereign debt holdings more than other banks after the LTROs, which is an indication of the presence of moral suasion. GIIPS governments are more likely to perform moral suasion, as funding possibilities for these countries largely dried during the sovereign debt crisis, as a result of the increased perceived risk of the debt that they issued. GIIPS banks are thus more likely to be subjected to moral suasion by their domestic sovereigns. Both coefficients may simultaneously be positive, as the channels are not mutually exclusive. My null hypothesis is that both coefficients are not statistically discernible form zero (or H_0*:* β_4, $\beta_9 = 0$). Thus, to confirm the hypotheses that I present in subsection 2.1 and subsection 2.3, I should reject my null hypothesis of no risk-shifting (H_0*:* β_4*=0*) and fail to reject the null hypothesis of no moral suasion (H_0*:* β_9*=0*).

Significant values for the remaining coefficients have various implications. A positive value for β_1 suggests that overall, home bias among banks increases, regardless of whether a bank is a GIIPS bank or not, and regardless of the year in the sample. Such an effect contradicts risk-shifting and moral suasion, as it suggests that an increase in home-bias is widespread among banks, and is thus not driven by financial distress and high upside potential (non-peripheral government debt yields are relatively low). The addition of this parameter simultaneously ensures that a possible significant effect for β_4 is not actually driven by an overall increase in home-bias throughout my sample, rather than that it is concentrated in GIIPS countries. Similarly, the addition of the term $Dom_{jk} \times GIIPS_j$ is necessary to avoid capturing any risk-shifting among GIIPS banks that is not concentrated directly after the LTROs, in β_4. Conversely, the coefficient β_3 captures any increase in home bias that directly follows the LTROs, but is not concentrated among GIIPS banks, which would contradict the risk-shifting hypothesis. The same reasoning can be applied to the coefficients β_5, β_6, β_7 and β_8, regarding moral suasion.

3.2 Probability analysis of bank behavior

Using the dependent variable from (4), $\Delta Exposure_{jkt}$, it is possible to identify banks that portray behavior that is consistent with risk-shifting or moral suasion, namely the substantial increase of exposure to domestic sovereign debt. The data used for the analysis described in subsection 3.1 allows me to perform an additional bank-level analysis using bank-level data and bank identifiers based on the banks' changes in exposures to their respective sovereigns. Specifically, I estimate probit regressions to verify whether certain types of banks are more likely to engage in behavior that is typical for risk-shifting than others. Also, I add a factor of government control to assess whether banks are potentially pressed by their governments to increase their domestic sovereign debt exposures (moral suasion).

To determine the banks that substantially increase their domestic sovereign debt exposures and that thus qualify as risk-shifting banks, I first determine the change in domestic government bond holdings per bank, per period:

$$\Delta Domestic\ Exposure_{jt} = \sum_{k} \Delta Exposure_{jkt} \times Dom_{jk} \tag{5}$$

To identify those banks that increase their domestic sovereign exposure, thus with positive values for (5), I construct the following indicator variable:

$$Domestic\ Positive\ Indicator_{jt} = \begin{cases} 1, & \text{if } \Delta Domestic\ Exposure_{jt} > 0 \\ 0, & \text{otherwise} \end{cases} \tag{6}$$

Finally, I qualify a bank as risk-shifting in period t, when it increases it's domestic sovereign debt exposure by more than all banks that do so:

$$RS\ Indicator_{jt} = \begin{cases} 1, & \text{if } \Delta Domestic\ Exposure_{jt} > \widetilde{\Delta Domestic\ Exposure_{t}} \\ 0, & \text{otherwise} \end{cases} \tag{7}$$

Where, $\widetilde{\Delta Domestic\ Exposure_{t}}$ is the median of all nonzero values of $\Delta Domestic\ Exposure_{jt} \times Domestic\ Positive\ Indicator_{jt}$. In words, the variable in (7) is equal to one for all banks that have increased their domestic exposure with a relatively higher amount than the median of all banks that increased their domestic sovereign exposure in year t.

To identify banks that are potentially susceptible to moral suasion, I define an indicator variable that groups banks into one of two categories: banks that have one or more government officials as board members and banks that have none. Formally, this indicator is defined as:

$$MS\ Indicator_{jt} = \begin{cases} 1, & \text{if } Gov\ Control_{jt} > 0 \\ 0, & \text{otherwise} \end{cases} \tag{8}$$

Using the variable in (7) as a dependent variable, I now estimate the following probit regression:

$$\begin{aligned} RS\ Indicator_{jt} = \alpha &+ \beta_1 \times GIIPS_j + \beta_2 \times LTRO_t + \beta_3 \times GIIPS_j \times LTRO_t \\ &+ \beta_4 \times MS\ Indicator_{jt-1} + \beta_5 \times MS\ Indicator_{jt-1} \times GIIPS_j \\ &+ \beta_6 \times MS\ Indicator_{jt-1} \times LTRO_t \\ &+ \beta_7 \times MS\ Indicator_{jt-1} \times GIIPS_j \times LTRO_t \\ &+ \gamma_1 \times \Xi_{jt-1} + \gamma_2 \times \Lambda_{jt-1} \end{aligned} \tag{9}$$

, where Ξ_{jt-1} is the same vector with bank level control variables as in (4). The vector Λ_{jt-1} contains the same variables as the vector Φ_{kt-1} in (4), but the country level variables are defined for the bank j's country of incorporation rather than for the sovereign exposure country k. This vector thus captures the economic prospects of the bank's home country (in the form of GDP growth) and the credit rating of it's sovereign debt, defined in the same way as before. The GDP growth in a bank's home country may influence it's propensity and incentive to expand its sovereign debt portfolio, as a growing economy may both improve the bank's financial outlook, and thus propensity to invest, and increase bank demand for its debt[24]. Furthermore, the credit rating in a country may have an impact on the bank's risk-shifting incentive, since a country's credit rating and sovereign debt yield are largely correlated, thus influencing debt demand. By controlling for the risk associated with the debt, I implicitly correct for regular demand-side factors. As in (4), the control variables and $MS\ Indicator_{jt-1}$ are one period lags, to avoid potential endogeneity.

Hypotheses

A positive and significant value for β_3 suggests that GIIPS banks risk-shifted during the period after the LTROs, by more than other banks and more than they themselves did in other periods. My null hypothesis is that I find no such effect, or H_0*:* $\beta_3 = 0$. As before, confirming my hypothesis from subsection 2.3 requires me to reject this null hypothesis. In addition, the presence of moral suasion following the LTROs, requires the coefficient β_7 to be positive and significant. Such a positive value would indicate that GIIPS banks with government officials on their board increase their domestic bond holdings more than other GIIPS banks following the LTROs. Again, my null hypothesis is that the beta is not discernible from zero (H_0*:* $\beta_7 = 0$), which I should fail to reject to be consistent with my hypothesis in subsection 2.3. The remaining coefficients capture effects such as the increase of home bias by non-GIIPS banks following the LTROs (β_2) and an increase in home-bias by GIIPS banks in other years that the one following the LTROs (β_1). Similarly, β_5 and β_6 capture such effects for moral suasion.

[24] A growing economy may have a positive impact on sovereign debt value.

3.3 Real effects of banks' use of the LTROs

If banks used the LTROs to expand their sovereign exposure to risk-shift or due to moral suasion, they may have crowded out corporate lending in the process. I follow the approach of Acharya et al. (2015) and use firm-level data from the syndicated loan market to test whether bank behavior, such as risk-shifting and as a consequence of moral suasion, influences firm performance. The use of firm-level data allows me to differentiate between supply- and demand-side effects, by controlling for firm specific characteristics that may influence a firm's demand for bank loans.

Firm dependence on inefficient banks

To define a firm's indirect exposure to banks that show behavior consistent with risk-shifting, I construct a variable similar to the one presented by Acharya et al. (2015), using (7). An observation in the data on the syndicated loan market is recorded as a loan l, supplied by lead arranging bank j to firm i. The variable is defined as:

$$RS\ Dependence_{it} = \frac{\sum_{l \in L_{it}} \frac{\sum_{j \in l} RS\ Indicator_{jt}}{\#\ Lead\ Arrangers_l} \times Loan\ Amount_l}{Total\ Borrowing_{it}} \tag{10}$$

In the numerator of (10), the term $\sum_{j \in l} RS\ Indicator_{jt}$ represents the number of lead arranging banks j in syndicated loan l that are indicated as portraying behavior consistent with risk-shifting. This term is then divided by the number of lead arrangers in the loan l to arrive at the percentage of lead arranging banks in the loan l that have a value of one for the variable defined in (7). The percentage is subsequently multiplied by the amount of loan l to be summed up for all syndicated loans l, in the company i's syndicated loan portfolio L_{it} at time t. Lastly this amount is divided by the total amount of syndicated loans that company i has outstanding at time t to arrive at the percentage of the company i's syndicated loan portfolio that is supplied by banks that risk-shifted in period t[25]. Only lead arrangers are considered in (10), since ordinary arrangers often only supply a minor part of a syndicated loan and are not essential to the existence of the loan.

As GIIPS banks are the largest recipients of LTRO funds, firms that are dependent on such banks that also risk-shift, may experience more adverse effects than firms that are not. This is a group of firms in which I am thus especially interested. To compute a firm's dependence on GIIPS banks that are also classified as banks that risk-shifted according to (7), I construct a variable similar to (10):

$$RS\ GIIPS\ Dependence_{it} = \frac{\sum_{l \in L_{it}} \frac{\sum_{j \in l} RS\ Indicator_{jt} \times GIIPS_j}{\#\ Lead\ Arrangers_l} \times Loan\ Amount_l}{Total\ Borrowing_{it}} \tag{11}$$

[25] This is statement is true under the assumption that all lead arrangers are responsible for equal parts of the syndicated loan. Since no data on the exact division of funds within a syndicated loan is available, I consider this the best approach.

This variable thus measures the percentage of a firm i's syndicated loan portfolio that is arranged by GIIPS banks that are also classified as risk-shifting banks according to (7).

Similar to firms that are exposed to banks that portray behavior that is consistent with risk shifting, I construct a variable that indicates the level of dependence of a firm on banks that are susceptible to moral suasion. Combining the variables defined in (7) and (8) allows me to construct the following variable for firm dependence on banks that are susceptible to moral suasion through the syndicated loan channel:

$$MS\ Dependence_{it} = \frac{\sum_{l \in L_{it}} \frac{\sum_{j \in l} MS\ Indicator_{jt} \times RS\ Indicator_{jt}}{\#\ Lead\ Arrangers_l} \times Loan\ Amount_l}{Total\ Borrowing_{it}} \tag{12}$$

This variable thus defines the percentage of a firm i's syndicated loans that are arranged by banks that substantially increased their domestic sovereign bond holdings and had government officials on their board of directors at time t. Just as in the case of risk-shifting, I wish to investigate whether banks increased their domestic exposure due to moral suasion and did so at the time of the LTROs. To this end, I once more define a variable similar to (11) to capture a firm's sensitivity to GIIPS banks that simultaneously have government board members and increase their domestic bond holdings. This variable is:

$$MS\ GIIPS\ Dependence_{it} = \frac{\sum_{l \in L_{it}} \frac{\sum_{j \in l} MS\ Indicator_{jt} \times RS\ Indicator_{jt} \times GIIPS_j}{\#\ Lead\ Arrangers_l} \times Loan\ Amount_l}{Total\ Borrowing_{it}} \tag{13}$$

The variables defined in (10), (11), (12) and (13) are firm level variables that describe a firm's dependence on certain types of banks. The aim of my firm-level analysis is to find out whether these dependences have consequences for performance of firms during and surrounding the LTROs. To this

end, I estimate the following fixed effects model:

$$
\begin{aligned}
y_{it} = \; & \alpha_i + \beta_1 \times \textit{GIIPS Dependence}_{it-1} \\
& + \beta_2 \times \textit{GIIPS Dependence}_{it-1} \times LTRO_{t-1} \\
& + \beta_3 \times \textit{RS Dependence}_{it-1} \\
& + \beta_4 \times \textit{RS GIIPS Dependence}_{it-1} \\
& + \beta_5 \times \textit{RS Dependence}_{it-1} \times LTRO_{t-1} \\
& + \beta_6 \times \textit{RS GIIPS Dependence}_{it-1} \times LTRO_{t-1} \\
& + \beta_7 \times \textit{MS Dependence}_{it-1} \\
& + \beta_8 \times \textit{MS GIIPS Dependence}_{it-1} \\
& + \beta_9 \times \textit{MS Dependence}_{it-1} \times LTRO_{t-1} \\
& + \beta_{10} \times \textit{MS GIIPS Dependence}_{it-1} \times LTRO_{t-1} \\
& + \gamma_1 \times \Psi_{it-1} + \gamma_2 \times \Lambda_{it-1} + \theta_i + \epsilon_{it}
\end{aligned}
\tag{14}
$$

Dependent variables

The regression in (14), is performed using four different dependent variables for y_{it}. The following firm characteristics are in turn used as a dependent variable: $EBIT_{it}$, $\textit{Rev Growth}_{it}$, $CAPEX_{it}$ and $\Delta \textit{Loans (lt)}_{it}$. All independent variables one period lags compared to the dependent variables, as in (4), motivated by the fact that bank decisions are likely to affect firm performance with a delay, given that they do so in the first place. Again this lagging simultaneously deals with a potential endogeneity issue. The variable $\textit{GIIPS Dependence}_{it-1}$ is identical to the "GIIPS Bank Dependence" variable defined by Acharya et al. (2015). This variable measures the dependence of a firm on GIIPS banks and is constructed in a manner similar to (10). This variable represents the balance sheet hit channel in my analysis, as banks in GIIPS countries have a large probability of becoming financially constrained during the crisis. If firms that depend on such banks experience decreased performance, this is an indication that firms may be contaminated by bank distress. The interaction term of $\textit{GIIPS Dependence}_{it-1}$ and $LTRO_{t-1}$ represents the same channel right after the LTROs. If the LTROs relieved the tension on bank funding markets, the negative effect of GIIPS bank dependence should disappear in the period following the LTROs.

$EBIT_{it}$ represents firm earnings before interest and taxes (EBIT) scaled by total assets. Firm profitability may be impaired by it's dependence on banks that allocate LTRO funds inefficiently and in the process either crowd out loans altogether, or lead to more restricting covenants. Furthermore, I use

pre-tax and -interest earnings, because, as in (4), these earnings do not reflect the differences in tax regulations between the firms' countries of incorporation, which cannot be affected by bank dependence, but may distort the results. I exclude interest, since a difference in interest is possibly a direct consequence of a change in loan conditions as a consequence of bank dependence, but may also change due to other factors. To avoid including external interest rate determining factors in my analysis, I don't include it here and use $EBIT_{it}$ to analyze the effect of bank dependence on a firm's operating profit[26]. Operating profit may be impaired by bank dependence when a firm's debt capacity decreases, leaving it with less investment opportunities and lower earnings as a result.

Another measure that captures a firm's operational performance is $Rev\ Growth_{it}$, which represents firm revenue growth from period $t-1$ to t. Just as with $EBIT_{it}$, bank dependence may have a negative impact on revenue growth through for example the investment channel. I use the variable $CAPEX_{it}$, capital expenditures, to capture firm investment. Firm investment may decline when banks increase their sovereign debt exposures and crowd out lending in the process. Firms that are dependent on such banks may face funding constraints, lowering their investment opportunities, which is reflected in lower CAPEX. Finally, $\Delta Loans\ (lt)_{ikt}$ is the change in total borrowing by firm i at time t[27]. I use the change in borrowing instead of the total borrowing amount, since the initial borrowing amounts should not be captured in the analysis; I am merely interested in the behavior of banks after the LTROs and thus the changes in amounts they lend to corporations. Altogether, regressions using these characteristics as dependent variables provide me with a detailed and comprehensive idea of the consequences of bank dependence in context of the LTROs and the real consequences that banks' investment decisions may have.

Control variables

The vector Ψ_{it-1} is a set of firm-specific characteristics. This is the set of variables with which I correct for any demand-side effects. The first variable included in the vector is a one-period lag of firm profitability, or $EBIT_{it-1}$ (which is excluded in the regression using $EBIT_{it}$ as a dependent variable), scaled by total firm assets at time $t-1$. Profitability may influence revenue growth and investment, as profitable firms generally have more investment opportunities, generating revenue growth. In addition, I control for firm size with total firm assets; $Assets_{it-1}$. One reason why firm size may drive changes in firm performance is that large firms can benefit from economies of scale, lowering costs and thus boosting performance. The third variable included in the vector is $Leverage_{it-1}$, which is the leverage ratio of the firm (this variable is excluded from the regression using $\Delta Loans\ (lt)_{it}$ as a dependent variable). Leverage

[26] Despite minor differences in the way EBIT and operating profit are considered under Generally Accepted Accounting Principles (GAAP), I consider them to be identical here

[27] Formally the variable is written as: $\Delta Loans\ (lt)_{ikt} = Loans\ (lt)_{ikt} - Loans\ (lt)_{ikt-1}$

influences firm performance, as high leverage implies a large amount of interest payments, constituting a risk to the firm. High leverage firms can be interpreted as being more risky and demanding higher return than firms without leverage[28]. The last variable included in the vector is $Cash_{it-1}$, which is the firm's cash on hand in period $t-1$. Cash on hand in one period may increase performance in the next, as it allows for investments, without the need of attracting additional (debt) financing. Any individual firm decisions or characteristics that may drive firm performance are captured by the firm fixed effects, θ_i. The vector Λ_{it-1} is identical to the one used in (9), with the exception that the vector is defined for a firm's incorporation country[29].

Supply-side channels and hypotheses

The balance sheet hit channel is captured by the coefficients β_1 and β_2, while the risk-shifting and moral suasion channels after the LTROs are captured by the coefficients, β_6 and β_{10} respectively. My hypothesis, is that, as concluded by Acharya et al. (2015), GIIPS bank dependence is negatively related to firm performance and adding to their research, I expect that the LTROs alleviated this effect, boosting performance for GIIPS dependent firms in the period following the LTROs. As before, my null hypothesis is that I find no statistical evidence of such effects. Specifically, this yields the null hypothesis H_0*:* $\beta_1 = 0$*,* $\beta_2 = 0$*,* $\beta_6 = 0$*,* $\beta_{10} = 0$. Note that a significantly negative value for either of the coefficients β_6 or β_{10} is an indication that firm performance decreased as a result of bank dependence, resulting from inefficient bank allocation of funds. The hypothesis that I present in subsection 2.1 and subsection 2.3, requires me to reject these null hypothesis in favor of my alternative hypothesis: H_α*:* $\beta_1 < 0$*,* $\beta_2 > 0$*,* $\beta_6 < 0$, which are consistent with an initial adverse effect of GIIPS bank dependence and a counter-effect following the LTROs due to increased funding, and an adverse effect due to risk-shifting. Also, I should fail to reject my null hypothesis of no moral suasion following the LTROs ($\beta_{10} = 0$).

A significant adverse effect of dependence on non-GIIPS banks that increase their domestic sovereign debt exposures would suggest that although sovereign debt investments by banks may crowd out corporate lending, such effects are not attributable to risk-shifting. The reason for this is that interest rates on non-GIIPS sovereign debt are relatively low and thus increased exposure to such assets yields limited upside potential. Furthermore, any adverse effect of GIIPS banks in periods other than the one following the LTROs suggests that the LTROs may have alleviated the negative effects of risk-shifting, by effectively replacing interbank funding. These two effects are captured by the coefficients β_3 and β_4 respectively. Using similar reasoning, the remaining coefficients capture effects that I do not wish to

[28] Naturally, leverage may differ largely per industry and business model, which I here capture using firm fixed effects.

[29] Although both Ψ_{it-1} and Λ_{it-1} are defined on a firm level and could be aggregated in a single vector, I choose to separate the two here for consistency purposes.

capture in my coefficients of interest.

As before, I assume that ϵ_{it}, the error term, is independent of both the independent- and control variables outside the firm dimension. Furthermore the nature of the fixed effects model requires me to assume that all independent variables have nonzero variances over time within groups.

4 Data

The analysis in this thesis comprises two datasets, respectively consisting of bank- and firm-level data. In turn, I here discuss the operations that I perform to shape and prepare the data for the regression analyses. In addition, I provide summary statistics and address concerns such as correlation between independent variables. As a preliminary test, I compare the variables in the datasets across groups, based on indicator variables that are included in the regressions that I perform. I take this approach, because in two of the regressions, the regressions defined in (4) and (9), the independent variable is a bivariate indicator variable, grouping the observations into two groups. Descriptives on such variables are not much informative, hence I compare the means of the groups created by these indicators, which provides an insight into the characteristics of the groups (and thus of the indicators themselves).

4.1 Sovereign exposures and other bank-level data

In this subsection I first describe the actions that I perform to shape my bank-level data, after which I present descriptives and preliminary findings consisting of tables presenting correlations between variables.

Data preparation: bank-level data

The main variable of interest in my bank-level analysis is the sovereign debt exposure of EU banks per country of issuance. To obtain this data, I download the results of the European stress tests, conducted by the European Banking Authority in 2011 and 2014[30]. To complement the stress test data, I merge these datasets with the results of the EU Capital Exercise of 2012 and the EU-wide transparency exercise of 2013. The resulting dataset contains sovereign exposure information of 90 banks. To match the periodicity of the EBA data with my firm- and country-specific data, I keep the exposure data that are defined at the end of each year in my dataset. The dates covered are: December 31, 2010, December 31, 2011, December 31, 2012 and December 31, 2013. Due to the varying selection of banks included in the EBA analyses, as well as the dismantling and new incorporation of certain banks during the investigated time period, only 57 banks are represented on all dates throughout the sample. Besides bank exposures to sovereign debt, the EBA registers several other bank characteristics in the different tests, of which I include the tier 1 ratio in my data. Next, I merge this dataset with data on the following bank characteristics gathered from Compustat's quarterly database: total assets, earnings before taxes (EBT) and total equity. To obtain the appropriate Compustat identifier for the banks included in the EBA dataset (I use Compustat's GVKEY), I hand-match the sample of 90 banks in my sovereign

[30]The results of the 2010 stress test are not downloadable from the website and I thus exclude this year from my analysis

exposure dataset to the Compustat database, and subsequently merge the two datasets. Limited overlap of the two data sources results in a sample containing 6762 bank-country exposures for 63 different banks, spread over 4 time periods. To adequately match the Compustat data, which are denominated in local currency, to the EBA data, denominated in Euro, I divide the Compustat variables by their respective exchange rates, which I obtain from the World Bank.

Some of the banks in the sample are not included in the EBA Capital Exercise of 2012, and thus no data is available on their exposures at the time of the LTROs. As this is the period in the data in which I am particularly interested, I remove all banks that do not have any available data for the year 2012, resulting in a dataset that contains data on 58 banks, none of which are Greek, as all Greek banks were excluded from the 2012 Capital Exercise[31].

To construct the variable defined in (3), I gather data on the number of board members who also fulfill significant public functions for all banks in my sample. Gathering this data requires downloading a file on board affiliations from Boardex, for each individual bank. Boardex contains data on all board-level individuals within a bank that have fulfilled or currently fulfill major private- or public functions besides their board function in the respective bank[32]. I filter the data per bank to portray overlapping functions only, as I am interested in government officials that exert influence over a bank while they simultaneously hold a public office. I download these files per bank and merge them into one data file, which contains the names and bank board functions of all board members per bank, as well as their overlapping functions, the type of overlapping function (private, public etc.), the organization with which the dual function was held and the begin and end date of both board- and overlapping functions. Since I am interested in overlapping functions with governments only, I remove all board members that do not have an overlapping function that classifies as 'public'. Next I remove all the data points for board members who did not fulfill their board position within the time period of my sample, as well as for individuals that did not hold executive- or supervisory board positions (upper management for instance) within the bank. To arrive at a file that contains only individuals that hold positions at influential government departments such as ministries or the lower- or upper house, I identify such departments from the list of organizations in the data and remove individuals not connected to such institutions[33]. Lastly, I inspect the data for individuals that hold relevant although non-domestic government positions and remove those from the sample, to arrive at a final list of 102 overlapping positions[34]. I add the number of individuals that hold an overlapping public position, yielding $\#Government\ Board\ Seats_{jt}$.

[31] I refer to this subset as "GIIPS banks", regardless of whether Greek banks are included or not, for the sake of consistency.
[32] Boardex contains board information on non-bank corporations as well, but I refer to banks only here to avoid confusion.
[33] Specifically, I identify the following terms that when appearing in the name of the overlapping organization qualify as relevant: 'Ministry', 'Government', 'House', 'Federal', 'Treasury', 'State', 'City', 'Parliament', 'Department', 'Council' and 'Minister'.
[34] Some individuals hold more than one overlapping position at a time, thus the total number of individuals is slightly lower than this.

To arrive at the variable in (3), I subsequently divide the obtained number of government officials per bank by the total current number of board positions per bank[35]. I use the current number of board members due to limited data availability on board size throughout time. This results in a reliable approximation of (3) conditional on the fact that board size is relatively stable over time. To complete the dataset, I download the credit ratings per country from Tradingeconomics and keep those ratings issued by S&P, Fitch and Moody's. Subsequently, I identify the rating of each country in my sample in each of the years 2010, 2011 2012 and 2013 and assign numerical values to the ratings, as described in subsection 3.1. To arrive at the variable *Credit Rating*$_{kt}$, I take the average of the rating values of the three agencies per country per year. For countries where one or more ratings are missing, I take the average of the values for which there is an available rating[36]. I add country-level GDP growth to this file, which I download from the World Bank website[37], after which I add the variables to my dataset, based on the exposure countries.

Descriptive statistics: bank-level data

Table 1 presents descriptive statistics on key variables from (4). The total number of observations is 4526, spread over 3 periods; observations are recorded annually starting at December 31, 2011 and ending at December 31, 2013[38]. The dependent variable, $\Delta Exposure$, is the change in a bank's exposure to sovereign debt of a certain country, scaled by total assets. The maximum change is 14 percent, meaning that for this observation the bank in question increased its exposure to that particular country with a value constituting 14 percent of its total assets in that particular time period. Bank size is particularly skewed, since it's standard deviation exceeds its mean. To correct for this skewness, I use the natural logarithm of assets as a control variable in the regression defined in (4) instead of the total amount of assets. Furthermore, average bank income is negative in my sample, reflecting bad bank performance during the sovereign debt crisis.

Preliminary analysis: bank-level data

A first analysis of the differences in key variables for different groups of observations is presented in Table 7 in Appendix A. This table displays the means and standard deviations of the variables included in Table 1, for different groups of observations. In the first panel of the table, I group observations into bank-country pairs that qualify as domestic (observations that have a value of one for the variables

[35] Where the current number of board members is unavailable due to for example a termination of business, I use the last available number of board members.
[36] All of the countries in the sample are covered by at least one rating agency for all of the sample years
[37] the World Bank does not report any figures for the Republic of China (Taiwan). I download the data on GDP growth for this country from the website of its central bank.
[38] The year 2010 does not appear in the dataset as I merely use this period to calculate the dependent variable: $\Delta Exposure$.

Table 1: Descriptive statistics: bank sovereign debt exposures

Descriptive statistics for bank-level data on sovereign exposures and bank characteristics. Every observation is a bank-exposure country pair. Bank-level control variables are defined for every bank in a particular period and thus independent of the exposure country. Conversely country-level control variables are defined for an exposure country and are thus independent of the bank. ΔExposure is the change in sovereign exposure over the last period scaled by total assets in percentages. Bank Size is measured by total assets. Pre-Tax Income, and Tier 1 Ratio are scaled by total assets. The variable Credit Rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent rating, 2 for AA+ or equivalent etc.) and taken the average. GDP Growth is measured in percentages and is defined yearly. Data on sovereign exposures and tier 1 ratios are obtained from the EBA stress tests, data on Bank income (pre-tax) and total assets are obtained from Compustat's quarterly database. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Observations are recorded semiannually in the years 2011-2013. The statistics recorded are the mean, standard deviation, minimum and maximum values and the 5th and 95th percentiles.

	Mean	SD	Min	Max	p5	p95
Dep var						
Δ Exposure (% of Assets)	-0.01	0.63	-16.96	14.14	-0.14	0.11
Control vars (bank-lvl)						
Bank Size	5.73e+11	7.80e+11	5.32e+09	3.49e+12	3.10e+10	2.01e+12
Pre-Tax Income (% of Assets)	-0.06	1.56	-8.31	2.51	-3.08	1.21
Tier 1 Ratio (% of Assets)	12.32	4.16	0.56	36.38	8.20	18.38
Control vars (country-lvl)						
Credit Rating	5.47	4.31	1.00	19.33	1.00	12.00
GDP Growth	1.13	2.84	-9.13	7.86	-3.79	5.99
N	4526					

defined in (2)) and those that don't. Subsequently, I compare bank-country pairs that could be subject to moral suasion with those that are unlikely to be. To be able to make the desired division in the data, I construct the following indicator variable using (3):

$$Govt\ Control\ Yes\ /\ No_{jkt} = \begin{cases} 1, & \text{if } Gov\ Control_{jt} > 0,\ Dom_{jk} = 1 \\ 0, & \text{otherwise} \end{cases} \tag{15}$$

Observations with a value of one for (15) then qualify as observations that could potentially be subject to moral suasion (these are banks' exposures to domestic sovereign debt, where the bank has one or more government board members). Table 7 shows that both bank-country pairs that qualify as risk-shifting and pairs that qualify as moral suasion potentials are associated with significantly better exposure country credit ratings (lower value in the table). It turns out that this observation stems from the fact that the sample includes exposure countries outside of the EU. Naturally, none of the banks in the sample are incorporated in any of the non-EU countries meaning that the variable Dom_{jk} is zero for all of these observations and these are all grouped in the "No" group in the split on "Domestic Yes / No". These countries have on average worse credit ratings and higher GDP growth than EU countries, explaining the observed difference. No difference is observed between any of the groups regarding the dependent variable: $\Delta Exposure$. This is a first indication that across the whole sample, no difference in change in exposure is found for the different groups, contradicting the risk-shifting and moral suasion theories for

the entire sample. Estimating (4) allows for differentiation between different sub-groups (for instance GIIPS vs. non-GIIPS banks) and complements this first indication.

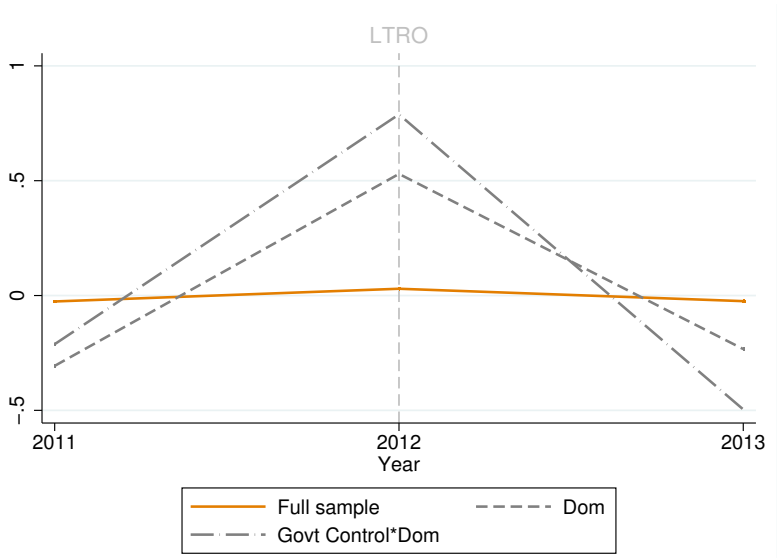

Figure 1: Changes in sovereign exposure by exposure type

Graph displaying the changes in sovereign debt exposures of banks in the years 2012-2013, as a percentage of total bank assets. Two groups of exposures are distinguished: exposures that were the largest bank exposure on December 31, 2011, represented by the graph "Largest Exposure", and domestic exposures where the exposed bank simultaneously has government officials in its board, represented by the graph "Govt Control*Domestic".

As a complementary analysis, I plot the changes in exposure, $\Delta Exposure$ in Figure 1, again differentiating between the groups identified in Table 7. The advantage of such plots over the analysis in Table 7 is that the data are displayed on a yearly basis, allowing for differentiation between values for different time periods. As is reflected in the figure, banks increase their domestic exposures more than other exposures right after the LTROs (in the year 2012). This result is more pronounced for domestic exposures among banks that are subject to government control. This is a first indication of the presence of both risk-shifting and moral suasion in the period following the LTROs.

Lastly, to assess the possibility of multicollinearity between dependent variables and to provide a rough indication of potential correlation between dependent and independent variables, I construct a correlation matrix, which is displayed in Table 10. The key variables that I include in the table are: $\Delta Exposure$, the dependent variable in (4), *Dom*, as defined in (2) and the interaction term $Gov\ Control \times Dom$. Negative and significant correlation is present between the dependent variable and $Gov\ Control \times Dom$, indicating the existence of an opposite relation then predicted by the moral suasion hypothesis, indicating once more that over the entire sample, moral suasion is unlikely to have occurred. In addition, correlation exists between the two independent variables, with a correlation coefficient of 0.44. Such correlation is not surprising, as both variables are based on the same indicator variable: *Dom*. The magnitude of correlation does not raise the concern of multicollinearity, as the correlation can be considered moderate.

4.2 Bank aggregates: data for probit analysis

Using the data on bank exposures and the bank- and country-level variables described in the previous section, I generate indicator variables that identify banks as being either banks that risk-shift or portray behavior that is consistent with moral suasion by their domestic governments, according to (7) and (8)[39]. As neither these indicators, nor the bank characteristics are dependent on the bank exposure country, I remove all exposure country-specific data, including all sovereign exposures from the dataset, leaving only bank-level data. The resulting dataset contains information on 138 banks over three years: 2011, 2012 and 2013. Since the country-level control variables in (9), *Credit Rating* and *GDP Growth*, are based on the bank's country of incorporation instead of an exposure country, I remove these variables from the dataset and re-match them based on the bank's incorporation country.

Descriptive statistics: probit data

The resulting bank-level dataset is described in Table 2. With the exception of the dependent variable, Δ*Domestic Exposure*, the table displays the same variables as Table 1. This is reflected in the descriptives for the bank-level control variables, as these are nearly identical in both tables. The minimal differences are due to the fact that some banks are overrepresented in the dataset described in Table 1, as some banks feature more often in the dataset than others (some banks have more records of sovereign exposures). As with the bank exposure-level data, I use the natural logarithm of assets in the regression analyses described in (9), to account for the skewness of the variable. The differences between the descriptives of the country-level control variables in Table 1 and Table 2 are due to the fact that I dropped the exposure countries in which no bank in the dataset is domiciled, which on average have worse credit ratings and higher GDP growth than the countries of incorporation of the banks in the dataset. This is reflected in the better credit rating and lower GDP growth in the bank-level sample.

The mean of Δ*Domestic Exposure* is defined in (5) and is similar to Δ*Exposure* in Table 1, in that both represent a change in sovereign exposure, the difference being that Δ*Domestic Exposure* is equal to the change in a bank's domestic sovereign debt exposure. Once more comparing Table 1 and Table 2, I note that the mean of Δ*Domestic Exposure* is slightly above the mean of Δ*Exposure*, which is a rough indication that banks increase their largest sovereign exposures more than other exposures during the sample years. I formally test this observation with the analysis described in (4).

Preliminary analysis: probit data

As in the preceding subsection, I compare the data on the described variables for different groups, based

[39] banks that portray behavior that is consistent with moral suasion are banks with positive values for $MS\ Indicator_{jt} \times RS\ Indicator_{jt}$ (so banks with values of one for the variables defined in (7) and (8) simultaneously) as is used in (12).

Table 2: Descriptive statistics: bank-level data probit analysis

Descriptive statistics for bank-level data. ΔDomestic Exposure is a variable that measures a bank's change in domestic sovereign exposure, as a percentage of total bank assets. Bank Size is measured by total assets. Pre-Tax Income, and Tier 1 Ratio are presented as a percentage of total assets. The variable Credit Rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent rating, 2 for AA+ or equivalent etc.) and taken the average. GDP Growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a bank's country of incorporation. Data on sovereign exposures and tier 1 ratios are obtained from the EBA stress tests, data on bank income (pre-tax) and total assets are obtained from Compustat's quarterly database and data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Observations are recorded annually in the years 2011-2013. The statistics recorded are the mean, standard deviation, minimum and maximum values and the 5th and 95th percentiles.

	Mean	SD	Min	Max	p5	p95
Dep var						
Δ Domestic Exposure (% of Assets)	-0.00	2.45	-10.04	10.98	-4.09	3.87
Control vars (bank-lvl)						
Bank Size	5.72e+11	7.82e+11	5.32e+09	3.49e+12	3.10e+10	2.01e+12
Pre-Tax Income (% of Assets)	-0.05	1.57	-8.31	2.51	-3.08	1.21
Bank Tier 1 Ratio (% of Assets)	12.31	4.17	0.56	36.38	8.20	18.38
Control vars (country-lvl)						
Credit Rating	4.08	3.90	1.00	15.33	1.00	11.33
GDP Growth	1.04	2.13	-4.03	5.99	-2.69	4.08
N	146					

on the independent variables in (9): $GIIPS$ and *MS Indicator*, respectively. The descriptive statistics and the t-stats on equality of the means of the different groups are presented in Table 8. The variable Δ*Domestic Exposure* does not differ for GIIPS- or non GIIPS banks in a statistically significant sense, suggesting that GIIPS banks did not increase their domestic exposures more than other banks did[40]. Table 8 shows that GIIPS banks are on average smaller, have lower earnings and a lower tier 1 ratio than non-GIIPS banks. The results for income and tier 1 ratio reflect the bad state of the banking system in GIIPS countries. In addition, GIIPS countries have, on average, worse credit ratings and lower GDP growth than other countries in the sample, reflecting the poor economic performance of these countries during the sovereign debt crisis. As with GIIPS banks, banks with government officials in their board do not change their largest- or domestic sovereign debt exposures more than other banks, as indicated by the bottom panel in Table 8. Banks under some degree of government control are larger than other banks, which indicates that larger banks may be more susceptible to moral suasion than smaller ones.

As in the preceding section, I plot the dependent variable in Table 8, Δ*Domestic Exposure*, against time in Figure 2. While Table 8 shows no significant difference in terms of Δ*Domestic Exposure* between GIIPS and other banks, the graph in Figure 2 reveals that in the year following the LTROs, GIIPS banks increased their 2011 largest exposures more than other banks, which is consistent with banks' usage of the LTRO funds to risk-shift. I provide a formal analysis of this notion by performing the regression defined in (9). Banks under government control do not increase their domestic government bond holdings more than others, contradicting moral suasion using LTRO funds.

[40]Again, I formally investigate this notion by performing the regressions described in (9).

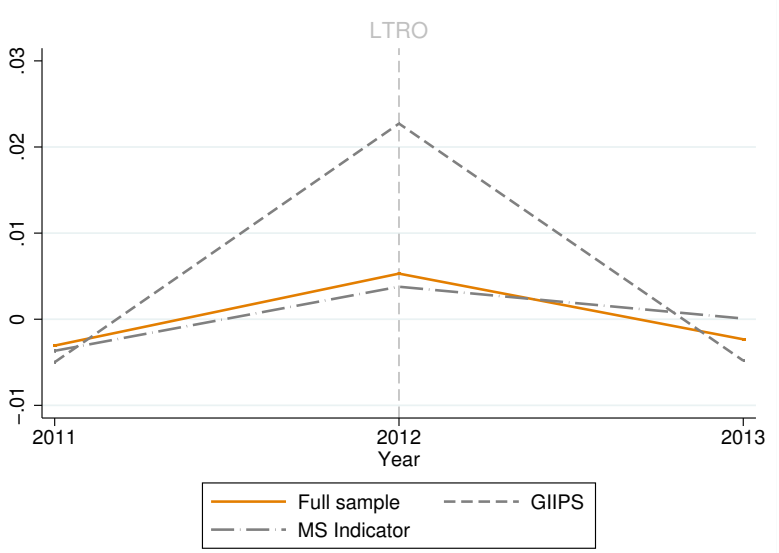

Figure 2: Change in banks' largest exposures by bank type

Graph displaying the change in banks' domestic sovereign debt exposures on December 31, 2011 in the years 2011-2013 (or Δ*Domestic Exposure*, as defined in (5)). Two groups of banks are distinguished: GIIPS banks (dashed line in graph) and banks with one or more government members on their board (dash-dotted line in graph).

As before, I compute a correlation matrix, which includes the dependent- and independent variables of (9), which is displayed in Table 11. Two of the variables in the table are significantly correlated: *RS Indicator* and *GIIPS*. The correlation between the two dependent variables indicates that a GIIPS banks are often also banks that risk-shift, suggesting that risk shifting is concentrated among GIIPS banks.

4.3 Firm exposures to European banks and other firm-level data

As in subsection 4.1, I here first present the steps that I take to shape my firm-level data and subsequently provide both descriptive statistics and a preliminary analysis.

Data preparation: firm-level data

To conduct my firm-level analysis, I download all available syndicated loan data in the Dealscan database, which amounts to over 300,000 syndicated loans, which I then merge with a dataset consisting of all banks that take part in each loan, resulting in a file containing over 1,7 million firm-lender pairs. To adequately match this file to my bank-level data containing bank sovereign exposures, I define indicator variables for the years 2010-2013. These indicators are equal to one for a particular year when simultaneously, the loan start date is before the 30th of June of that year, the end date is later than the 30th of June of the same year, and the loan's maturity is longer than 12 months. I then remove all loans that do not have a value of one for any of the dummy variables, thus I only keep those loans that are active for at least half a year during 2010-2013. Furthermore, to ensure that I only consider lead arranging banks

in my analysis, I remove all banks that do not qualify as lead arrangers according to "A Guide to the European Loan Market", by Standard&Poors (2013)[41]. To arrive at the number of lead arrangers, # *Lead Arrangers*, as in (10), (11), (12) and (13), I count the number of remaining banks per loan.

The resulting file contains information on syndicated loan amounts and the identity of the banks that arrange the loan. Next, I merge this file with the Compustat linking table provided by Chava and Roberts (2008), to obtain GVKEYs (Compustat's identifier) for all companies in the dataset. I then download data on all dependent and firm-level control variables included in (14) from Compustat's quarterly database and merge the resulting file with my dataset containing loan-level data. To arrive at the total amount of syndicated lending per company, or *Total Borrowing* in (10), (11), (12) and (13), I sum up all syndicated loan amounts per period, per unique GVKEY. This is equivalent to aggregation at the ultimate parent level.

To complete the dataset, I hand-match the lead arranger names in the firm- and loan-level dataset to the list of banks included in the dataset described in subsection 4.2. This results in a list of 651 bank names as mentioned in the firm- and loan-level dataset, linked to their ultimate parent, represented by the bank name as included in the EBA stress tests. Based on these bank-name pairs, I merge the datasets described in this section and subsection 4.2 to arrive at a dataset that contains information on loans, the lending firms and the banks that arrange the loan. I then construct the firm-level variables defined in (10), (11), (12) and (13), and subsequently remove all loan-level data, resulting in a dataset that contains 756 observations on 317 firms, spread over 3 periods; the years 2011-2013[42]. Since in (14) the country level control variables are based on the firm's country of incorporation instead of the bank's, I again re-match the variables *Credit Rating* and *GDP growth* to reflect the adequate incorporation countries.

Descriptive statistics: firm-level data

Descriptive statistics for the resulting dataset are provided in Table 3. This table shows that, on average, firms in the dataset have earnings of 5% of total assets, with a maximum of 41% and a minimum of -58% of total assets. Sales growth is 0.1% on average, reflecting the low economic growth in the sample years. Change in long-term lending is -1% of total assets on average for the firms in the sample, with a maximum of 125%. A value of more than 100% is only possible when equity has a negative value, suggesting poor financial health. As before, firm size (measures by total assets) varies largely and is highly skewed. Again I use the natural logarithm of assets to account for this skewness in my regressions. Leverage is different from long-term loans, as it also includes short term lending. Again the maximum of this variable is larger than 100%, reflecting the fact that some firms in the dataset have negative total equity. I drop

[41] Specifically, I keep those lenders that are described as either "Bookrunner", "Lead Arranger", "Mandated Lead Arranger", "Mandated Arranger", "Sole Lender" or "Lead Manager".

[42] I do not include the year 2010 in the dataset, as no information on changes in bank exposures is available for this year.

Table 3: Descriptive statistics: firm-level data

Descriptive statistics for firm-level data. EBIT is a company's pre-interest and -tax income, Sales growth is revenue growth in a particular year, CAPEX are a firm's Capital Expenditures and Δ Loans (lt) is the change in a firm's total long-term loans. Size is equal to total assets, Leverage is defined as 1-total equity, scaled by total assets and Cash is a firm's cash on hand, scaled by total assets. Country-level control variables are defined based on a firm's country of incorporation. The variable Credit Rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent rating, 2 for AA+ or equivalent etc.) and taken the average. GDP Growth is measured in percentages and is defined yearly. Data on the dependent variables and firm-level control variables are obtained from Compustat's quarterly database and are recorded in Euro. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Observations are recorded annually in the years 2011-2013. The statistics recorded are the mean, standard deviation, minimum and maximum values and the 5th and 95th percentiles.

	Mean	SD	Min	Max	p5	p95
Dep vars						
EBIT (% of Assets)	5.04	7.80	-58.48	40.76	-4.58	14.85
Sales growth (%)	0.10	1.27	-2.45	29.23	-0.27	0.36
CAPEX (% of Assets)	4.15	3.45	0.03	30.79	0.62	10.04
Δ lt Loans (% of Assets)	-0.76	17.09	-261.01	125.13	-15.79	14.33
Control vars (bank-lvl)						
Size	3.67e+10	1.79e+11	1.78e+07	2.16e+12	1.47e+08	1.22e+11
Leverage (% of Assets)	69.13	27.75	3.68	428.94	40.77	96.94
Cash (% of Assets)	7.74	6.60	-49.14	41.50	1.19	19.89
Control vars (country-lvl)						
Credit rating	3.91	3.63	1.00	19.33	1.00	10.00
GDP growth (%)	0.54	2.11	-9.13	9.96	-2.82	3.66
N	756					

all observations for which leverage if above 100%, as such leverage implies negative equity, which may spark economically irrational firm choices, that I do not wish to record. Dropping these values results in a dataset that contains 726 observations[43].

Preliminary analysis: firm-level data

A comparison of different groups of firms according to the independent variables in (14), is provided in Table 9 in Appendix A. Specifically, I define groups based on whether the firms are dependent on banks that portray certain types of behavior or not. First, I compare firms that are exposed to banks that risk-shifted in a particular year with firms that are not exposed to such banks. Thus, I compare firms for which *RS Dependence*, as defined in (10), is larger than zero, with firms for which it is equal to zero. As shown in the table, the two groups of firms do not significantly differ in terms of any of the dependent or firm-level control variables, with the exception of *Leverage*, which is higher for firms that are dependent on risk-shifting banks. This indicates that these firms have less equity at their disposal to cover any potential decrease in lending, and may thus be more vulnerable to funding contractions by banks.

In addition, firms that are exposed to risk-shifting banks are incorporated in countries with significantly lower GDP growth and worse credit ratings than others. This is consistent with the risk-shifting

[43] the observations with changes in lending above 100% are simultaneously excluded from the sample with the removal of all firms with leverage levels of more than 100% of total assets.

hypothesis, which states that only banks facing imminent financial distress risk-shift. Since banks in countries with lower economic performance (lower GDP growth) arguably experience more financial difficulties, and firms are usually most exposed to banks in their country of incorporation, firm exposure to risk-shifting banks and GDP growth may be negatively correlated (the same holds for credit ratings).

Second, I compare firms that are exposed to banks that portray behavior consistent with moral suasion to firms that are not. Specifically, this means that I compare firms with a positive value for *MS Dependence*, as defined in (12) to firms for which this variable is zero. As with exposure to risk-shifting banks, firms that are exposed to banks susceptible to moral suasion do not differ along the dimensions of the dependent and firm-level control variables from others, again with the exception of *Leverage*. The reasoning applicable to dependence on risk-shifting banks can also be applied here, as banks that are incorporated in low-growth countries are also more susceptible to moral suasion.

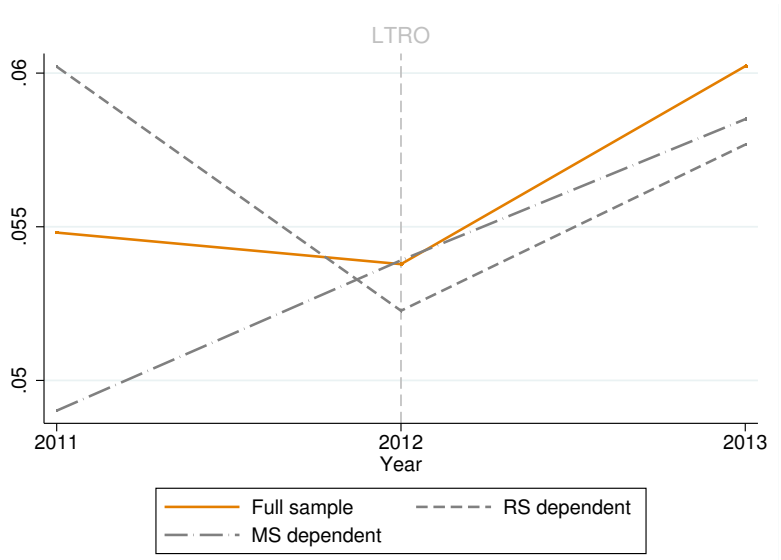

Figure 3: EBIT development by firm type

Graph displaying the average firm development of earnings before interest and tax as a percentage of assets in the years 2011-2013. Two groups of firms are compared: firms that are dependent on risk-shifting banks (dashed line in graph) and firms that are dependent on banks susceptible to moral suasion (dash-dotted line in graph). Risk-shifting dependent firms have a positive value for the variable defined in (10) and firms dependent on banks susceptible to moral suasion have a positive value for the variable defined in (12).

To complement the analysis in the preceding paragraph, I plot data on the different dependent variables, again split by the groups as defined in Table 9. The plots for EBIT of the sample firms are presented in Figure 3. These plots show that earnings for firms dependent on banks susceptible to moral suasion or banks that qualify as risk-shifting are lower than those of other firms in the year 2012. This is consistent with a crowding out of firm lending by banks that use the LTRO funds to increase their sovereign debt exposures, either to increase their upside potential (risk-shifting) or due to government pressure (moral suasion). The result is more pronounced for firms dependent on risk-

shifting banks. The fact that firms dependent on risk-shifting banks have higher earnings in 2011 may be driven by dependence on non-GIIPS banks. I address the differentiation between GIIPS and other banks performing the regression in (14). The low earnings in 2011 for firms dependent on banks susceptible to moral suasion may similarly be an indication of the adverse effects of moral suasion in that year. Again I investigate this notion by performing (14).

The graphs displaying similar plots for the remaining dependent variables used in (14) are displayed in Appendix B. For the remaining dependent variables, the results are less pronounced than for EBIT. Revenue growth seems to be approximately equal for all types of firms in the year following the LTROs. CAPEX are slightly lower for both firms dependent on risk-shifting banks directly following the LTROs, which suggests that risk-shifting may have led to lower CAPEX in that year. Furthermore, Δ Lending (lt) even exceeds the sample average for firms dependent on risk-shifting banks. Firms dependent on banks that exhibit behavior that is consistent with moral suasion have higher long term lending throughout the sample. The above results are subjected to thorough investigation in the regression analysis described in (14)[44].

The correlation matrix for the key dependent variables and independent variables in (14) is presented in Table 12 in Appendix A. As depicted in the table, neither *RS Dependence*nor *RS Dependence* are negatively correlated with any of the dependent variables, suggesting that bank dependence does not have negative consequences for firm performance across the whole sample. In fact, *RS Dependence* is positively correlated with *Sales Growth*, suggesting some positive impact of dependence on risk-shifting banks. Furthermore, a high degree of correlation exists between the two independent variables. The result is likely caused by the definitions of (12) and (10), as they both involve the term *Dom*, and thus both measure firm dependence on banks that increase their domestic sovereign debt exposure. Considering the magnitude of the correlation, concerns of multicollinearity may arise when performing the regression in (14). To avoid any potential issues of multicollinearity, I split the regression into two parts, containing *RS Dependence* and *MS Dependence* respectively[45].

[44]The results of this regression are presented in subsection 5.3
[45]Along with the interaction terms of the respective variables.

5 Results

Using the data in section 4, I estimate the regression equations described in (4), (9) and (14), the results of which I describe in this section. The regression equations in the methodology section are presented as single functions, containing several independent variables at once. In practice, I estimate several regressions, adding one or more independent variables in turn, which allows me to determine the impact of the addition of certain variables and the interdependence of terms of the regression equations. I present the results of the different analyses that I perform in regression tables and interpret the results accordingly. In Appendix A, I present the results of several robustness tests and alternative analyses, for which I provide the reasoning and interpretation in this section as well.

5.1 Banks' sovereign debt exposures after the LTROs

Estimating the regression equation in (4) yields the results as presented in Table 4. All the regressions shown include bank- and exposure country-level fixed effects. Standard errors are clustered at the bank-level, which corrects for the heteroskedasticity that is present in all of the estimated regressions (see the bottom panel in Table 4 for the p-values of a modified Wald test where the null-hypothesis is homoskedasticity). As a robustness check, I perform a regression identical to the one displayed in column 8, where standard errors are clustered at the level of the country of incorporation of the respective banks. This is relevant as correlation between error terms may exist within groups on the highest level of aggregation, which in this case is the country of incorporation of the banks in the sample. The regressions in columns 8 and 9 of Table 4 are equivalent to the equation in (4).

Column 2, indicates that GIIPS banks increase their largest exposures by more than others and more than their other exposures. As the changes in sovereign exposure are scaled by total assets, the coefficient for $Dom \times GIIPS$ indicates that GIIPS banks increase their domestic sovereign debt exposures by 0.6% of their total assets more than others. Given average GIIPS bank assets of €332 billion (see Table 8), this means that, on average, the sovereign bond holdings of GIIPS banks shifted towards their largest exposures by €2.0 billion. This does not necessarily mean that GIIPS banks increased their largest exposures by this amount, since it is a relative number, so it may also mean that GIIPS banks decreased their largest sovereign exposures less than other banks (and other exposures for that matter). Nevertheless, this reflects an increasing home bias among GIIPS banks, which is consistent with risk-shifting theory. The addition of the interaction term $Dom \times GIIPS \times LTRO$, as displayed in column 4, reveals that the previously identified effect is concentrated in the period following the LTROs. As the largest recipients of LTRO funds, GIIPS banks might thus have used these funds to increase their bias towards sovereign debt to which they were largely exposed in the first place, as reflected by the positive

Table 4: Risk-shifting and moral suasion

Regression results, where the dependent variable is Δ Exposure, or the change in the exposure of a bank to a particular country, obtained from the EBA. The independent variables are: Dom, an indicator variable equal to one when a sovereign exposure country is identical to a bank's country of incorporation and Govt Control, the percentage of government officials on the board of a bank, obtained from Boardex. GIIPS and LTRO are indicator variables equal to one for banks incorporated in GIIPS (Greece, Italy, Ireland, Portugal and Spain) countries and for the year 2012, respectively. Data on the bank-level control variables are obtained from Compustat's quarterly database. These variables are: Bank Size; the natural logarithm of total assets, Pre-Tax Income (earnings before tax, year-to-date) and the tier 1 ratio. The country-level control variables are: Credit Rating and GDP Growth and are defined based on the exposure country. The variable Credit Rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent rating, 2 for AA+ or equivalent etc.) and taken the average. GDP Growth is measured in percentages and is defined yearly and the data are obtained from the World Bank. The time interval is a annual starting at December 31, 2011 and ending at December 31, 2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at either the bank- or bank incorporation country-level. All regressions include bank- and exposure country fixed effects.

	(1) Δ Exposure	(2) Δ Exposure	(3) Δ Exposure	(4) Δ Exposure	(5) Δ Exposure	(6) Δ Exposure	(7) Δ Exposure	(8) Δ Exposure	(9) Δ Exposure
Dom	0.000	-0.002	-0.004	-0.002	-0.001	-0.001	-0.000	0.000	0.000
	(0.07)	(-0.83)	(-1.40)	(-0.50)	(-0.16)	(-0.19)	(-0.00)	(0.03)	(0.03)
Dom × GIIPS		0.006*	0.006*	-0.003	-0.003	-0.003	-0.002	-0.003	-0.003
		(1.78)	(1.78)	(-0.66)	(-0.68)	(-0.62)	(-0.59)	(-0.69)	(-0.65)
Dom × LTRO			0.008	0.000	-0.000	-0.000	-0.002	-0.003	-0.003
			(1.47)	(0.02)	(-0.02)	(-0.02)	(-0.31)	(-0.36)	(-0.34)
Dom × GIIPS × LTRO				0.027**	0.027**	0.027**	0.028**	0.030**	0.030***
				(2.56)	(2.58)	(2.60)	(2.59)	(2.12)	(2.99)
Govt Control					-0.006*	-0.006*	-0.006*	-0.006*	-0.006
					(-1.99)	(-2.00)	(-1.77)	(-1.73)	(-1.57)
Govt Control × Dom					-0.016	-0.014	-0.025	-0.027	-0.027
					(-1.01)	(-0.81)	(-1.08)	(-1.12)	(-1.10)
Govt Control × Dom × GIIPS						-0.011	-0.015	-0.002	-0.002
						(-0.25)	(-0.34)	(-0.03)	(-0.04)
Govt Control × Dom × LTRO							0.039	0.047	0.047
							(1.07)	(1.22)	(1.17)
Govt Control × Dom × GIIPS × LTRO								-0.039	-0.039
								(-0.36)	(-0.54)
Bank size	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
	(0.78)	(0.78)	(0.65)	(0.90)	(0.39)	(0.39)	(0.42)	(0.43)	(0.52)
Income (pre-tax)	-0.020	-0.020	-0.018	-0.014	-0.009	-0.009	-0.009	-0.009	-0.009
	(-1.24)	(-1.24)	(-1.17)	(-1.04)	(-0.84)	(-0.87)	(-0.83)	(-0.82)	(-0.77)
Tier 1 ratio	0.001	0.001	0.001	-0.001	0.001	0.002	0.001	0.001	0.001
	(0.22)	(0.22)	(0.16)	(-0.19)	(0.34)	(0.36)	(0.33)	(0.34)	(0.58)
Credit rating	0.000**	0.000**	0.000**	0.000*	0.000*	0.000*	0.000*	0.000*	0.000*
	(2.45)	(2.42)	(2.14)	(1.88)	(1.84)	(1.84)	(1.87)	(1.79)	(1.82)
GDP growth	0.000*	0.000*	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(1.84)	(1.83)	(1.55)	(1.59)	(1.44)	(1.44)	(1.42)	(1.41)	(1.35)
α	-0.033	-0.032	-0.027	-0.031	-0.011	-0.011	-0.012	-0.012	-0.012
	(-0.80)	(-0.80)	(-0.67)	(-0.91)	(-0.40)	(-0.40)	(-0.43)	(-0.44)	(-0.52)
N	4048	4048	4048	4048	4048	4048	4048	4048	4048
R^2	0.006	0.012	0.023	0.051	0.054	0.055	0.057	0.057	0.057
Heteroskedasticity (p)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustering: bank-level	YES	YES	YES	YES	YES	YES	YES	YES	NO
Clustering: country-level	NO	NO	NO	NO	NO	NO	NO	NO	YES

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

value for the coefficient of $Dom \times GIIPS \times LTRO$. The value for the coefficient is larger than for $Dom \times GIIPS$ in column two, with a value of 0.027, or 2.7% of total bank assets. This constitutes a relative increase in bias towards the 2011 largest exposure of roughly €9.0 billion, when compared to other exposures[46]. No increase in bias is observed for the remaining countries, nor for GIIPS countries in other periods, emphasizing the relevance of the result and the potential influence of the LTROs on bank behavior.

The addition of the interaction terms for *Govt Control* to the regression, do not substantially alter the magnitude or significance of the coefficient of $Dom \times GIIPS \times LTRO$, suggesting that the observed bias is not enforced by government suasion. The significant and negative value of the coefficient for *Govt Control* indicates that, overall, bank changes in exposure to government bonds and the degree of government control are negatively related. This suggests that banks that are under government control scale back their government debt portfolios, however it does not reveal any details on the types of government bonds to which exposure is decreased. Such a result thus neither confirms nor contradicts the risk-shifting and moral suasion hypotheses.

Another result drawn from Table 4 is that the factor for country credit rating is positively related to the change in sovereign debt exposure. Since a high value for the variable *Credit Rating* implies a low average credit rating (see the definition of the factor in subsection 4.1), this result implies that a worse credit rating attracts bank investment in sovereign debt. This effect persists alongside the independent variables for domestic bonds and government control, suggesting that the effect is not merely driven by risk-shifting incentives or moral suasion. An explanation for the result may be that banks had substantial trust in the survival of the Eurozone and the convergence of bond yields in due time. Such an effect is described by Acharya and Steffen (2015), who find that Eurozone banks actively engaged in what they refer to as "carry trade behavior", characterized by investments by banks in long-term risky government debt, funded by short-term (interbank) borrowing. If such an effect was indeed widespread among Eurozone banks, rising bank risk, represented by a higher factor for the variable *Credit Risk* in Table 4, may indeed be positively correlated to the change in sovereign exposure by the banks in my sample.

Robustness tests

To formally investigate the influence of government control on sovereign debt exposures, I re-run the regression in (4), where I include the government control terms first in the build-up of the regressions. The results of this robustness test are provided in Table 13[47]. The significance of the coefficient of

[46] The amount of €9.0 billion is a rough indication based on the average amount of total assets of GIIPS banks of €332 billion.

[47] I suppress control variables here for the sake of brevity. None of the control variables have values substantially deviating from Table 4.

Govt Control $\times$ *Dom* $\times$ $GIIPS \times LTRO$ in column 5 suggests that GIIPS banks under government control increased their domestic bond holdings more than others. However with the addition of the terms containing *Largest Exposure*, this significance disappears, indicating that this result is actually driven by the fact that domestic exposures are often a banks' largest exposures and not by the level of government control. In column 4, the significance of the coefficient for *Govt Control* disappears following the addition of the variable *Govt Control* $\times$ *Dom* $\times LTRO$. Simultaneously a significant coefficient for *Govt Control* $\times$ *Dom* appears, suggesting some form of multicollinearity between the two variables. The significance of both terms is not robust to the inclusion of the variable *Govt Control* $\times$ *Dom* $\times GIIPS \times LTRO$.

As an additional robustness test, I investigate is whether the results presented in Table 4 hold when *Govt Control* is replaced by *Govt Control (fed)*, which represents the percentage of federal government officials on the board of a bank. Addition of this variable may be relevant, as federal government officials determine national policy and thus have more influence on bank behavior than local government officials. The results of this regression are presented in column 1 of Table 14 and are largely similar to the results thus far observed.

Altogether, I fail to find any indication of moral suasion following the LTROs, meaning that I fail to reject my null hypothesis ($\beta_8 = 0$) for this variable from subsection 3.1. This is in line with what I expected and thus confirms my hypothesis of the absence of any moral suasion. Conversely, the positive and significant value for the coefficient of *Dom* $\times GIIPS \times LTRO$ means that I reject my null hypothesis that in (4), $\beta_4 = 0$. Summarizing, I find evidence that suggests risk-shifting but not moral suasion in the period following the LTROs, which is consistent with my expectations. This finding is an extension of Drechsler et al. (2016) and Acharya and Steffen (2015) who find that risk-shifting occurs among GIIPS banks during the sovereign debt crisis. My result indicates that during 2011-2013, this effect is concentrated in the period directly following the LTROs, suggesting that the ECB funding program facilitates risk-shifting.

5.2 The banks that risk-shift and succumb to moral suasion

The results of performing the probit regression in (9) are presented in Table 5. The first four columns of this table display the results of the regression analysis described in (9), with *RS Indicator* as a dependent variable. The results of this regression are consistent with the findings presented in the previous section. The positive and significant value for $GIIPS \times LTRO$ indicates that GIIPS banks are more likely to increase their domestic sovereign debt exposures following the LTROs which is once more consistent with the presence of risk-shifting immediately following the LTROs. The result is robust to the clustering of

Table 5: Bank-level probit regressions

Regression results, where the dependent variable is RS Indicator, which is an indicator variable equal to one for banks that increase domestic sovereign debt exposure by more than the median of all banks that do so. The main independent variables are: GIIPS, LTRO, and MS Indicator, which are indicator variables equal to one for banks incorporated in GIIPS (Greece, Italy, Ireland, Portugal and Spain) countries, for the year 2012 and for banks with one or more government officials on their board, respectively. The remaining independent variables are interaction terms of these variables. Data on the control variables are obtained from Compustat's quarterly database. These variables are: Bank Size, represented by the natural logarithm of total assets, Pre-Tax Income (earnings before tax, year-to-date) and the Tier 1 Ratio. Credit Rating is an average of the country's credit ratings of S&P, Moody's and Fitch, obtained from Tradingeconomics. To arrive at this number, I assign numerical values to ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and take the average. GDP Growth, obtained from the World Bank is measured in percentages and is defined yearly. Country-level control variables are based on a bank's country of incorporation. Observations are recorded on a yearly basis in 2011-2013. Standard erros are clustered on either the bank- or country-level.

	(1) RS Indicator	(2) RS Indicator	(3) RS Indicator	(4) RS Indicator	(5) RS Indicator	(6) RS Indicator	(7) RS Indicator	(8) RS Indicator	(9) RS Indicator
GIIPS	-0.233	-0.236	-0.631	-0.631	-0.632	-0.623	-0.651	-0.685	-0.685*
	(-0.71)	(-0.71)	(-1.51)	(-1.40)	(-1.49)	(-1.34)	(-1.44)	(-1.45)	(-1.66)
LTRO		0.265	-0.138	-0.138	-0.138	-0.138	-0.495	-0.543	-0.543
		(0.95)	(-0.42)	(-0.46)	(-0.41)	(-0.41)	(-1.34)	(-1.44)	(-1.49)
GIIPS × LTRO			1.199**	1.199**	1.209**	1.207**	1.293**	1.420**	1.420**
			(1.96)	(2.35)	(1.97)	(1.96)	(2.08)	(1.98)	(2.28)
MS Indicator					0.065	0.072	-0.182	-0.215	-0.215
					(0.24)	(0.19)	(-0.42)	(-0.46)	(-0.49)
MS Indicator × GIIPS						-0.022	0.006	0.106	0.106
						(-0.04)	(0.01)	(0.16)	(0.19)
MS Indicator × LTRO							0.821	0.927	0.927*
							(1.43)	(1.33)	(1.75)
MS Indicator × GIIPS × LTRO								-0.353	-0.353
								(-0.29)	(-0.40)
Bank size	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*
	(-1.71)	(-1.73)	(-1.78)	(-1.72)	(-1.85)	(-1.88)	(-1.88)	(-1.86)	(-1.81)
Income (pre-tax)	-16.258*	-15.753*	-17.434**	-17.434**	-17.073**	-17.097**	-16.679**	-16.652**	-16.652**
	(-1.90)	(-1.93)	(-2.12)	(-2.34)	(-2.01)	(-2.02)	(-2.00)	(-2.00)	(-2.22)
Tier 1 ratio	1.465	1.357	0.826	0.826	0.685	0.683	0.892	0.890	0.890
	(0.70)	(0.67)	(0.40)	(0.35)	(0.33)	(0.32)	(0.44)	(0.45)	(0.37)
Credit rating	0.091*	0.084*	0.081*	0.081	0.080*	0.080*	0.082*	0.081*	0.081
	(1.90)	(1.74)	(1.70)	(1.58)	(1.69)	(1.66)	(1.71)	(1.69)	(1.62)
GDP growth	-0.020	-0.038	-0.032	-0.032	-0.034	-0.034	-0.042	-0.042	-0.042
	(-0.30)	(-0.52)	(-0.43)	(-0.42)	(-0.45)	(-0.44)	(-0.58)	(-0.58)	(-0.55)
N	145	145	145	145	145	145	145	145	145
Fixed effects	NO	NO	NO	NO	NO	NO	NO	NO	NO
Clustering: bank-level	YES	YES	YES	NO	YES	YES	YES	YES	NO
Clustering: country-level	NO	NO	NO	YES	NO	NO	NO	NO	YES

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

standard errors at the bank- as well as the country level. Due to the nature of probit models, I include no fixed effects[48]. As before, the result does not hold for non-GIIPS banks after the LTROs, reflected by the absence of a statistically significant value for *LTRO*. The quantitative interpretation of probit coefficients is less straightforward than for linear regressions, which is why I refrain from an interpretation of the magnitude of the coefficient here. Any quantification of the relationship between the dependent and independent variable would only be relevant conditional on the remaining variables in the regression, thus requiring the computation of the marginal effects of each coefficient (Angrist and Pischke, 2009)[49]. Independent from whether the bank is a GIIPS bank or not, small firms are also more likely to increase their domestic sovereign debt exposures, a finding that is consistent across the different regressions. This result exists alongside the result for GIIPS banks following the LTROs and is thus not attributable to risk-shifting (non-peripheral sovereign debt does not carry substantial risk, thus does not qualify as an asset that can be used to risk-shift). The result may instead be driven by increasing uncertainty on the European market, to which small non-peripheral banks respond by a "flight to safety" into low-risk domestic sovereign debt. A proper investigation of this notion requires estimating separate regressions, where a distinction is made in the type of government debt that banks load up on in this sample period and the type of banks that do so, which is beyond the scope of this thesis.

Another result from the regressions in Table 5 is that banks with lower income are more likely to increase their sovereign debt portfolio home bias. This result is consistent with both risk-shifting and moral suasion, as low income firms are more vulnerable and will have a greater incentive to bet on certain assets (risk-shifting) and are easier targets for governments to persuade into buying risky government debt. In accordance with the results presented in Table 4, banks in countries with lower credit ratings are more likely to increase their domestic government debt, represented by the positive and significant coefficient for the variable *CreditRating* in Table 5.

The results of the addition of the variable *MS Indicator* to the regression are shown in columns 5-9 of Table 5. I find no significant values for any of the interaction terms of *MS Indicator*, except for a positive coefficient for *MS Indicator*$\times LTRO$ when standard errors are clustered at the level of the bank's incorporation country, but this effect is not robust to controlling for standard errors at the bank level.

Once more, I fail to reject my null hypothesis of the absence of moral suasion, as defined in subsection 3.2, or H_0*:* $\beta_7 = 0$, confirming my expectations. Government pressure does not seem to increase sovereign debt home bias among banks that absorb LTRO funding. The data do portray indications that risk-shifting has taken place promptly after the start of the LTROs. This finding does not hold for non-GIIPS countries, who did not experience the level of impairment of their balance sheet that GIIPS

[48] probit models are non-linear, which leads to unfeasible results when using fixed effects.
[49] Angrist and Pischke elaborate on the calculation of marginal effects from probit outcomes on page 104 of "Mostly Harmless Econometrics".

banks did and (consequently) did not absorb as much LTRO funding. Although the question of whether GIIPS banks actually used the LTRO funding to increase their sovereign exposures remains unanswered, as data on the specific recipients of these funds are not published by the ECB, I can safely reject my null hypothesis that GIIPS banks are not more likely than others to display risk-shifting behavior after the LTROs. Or, I reject my null hypothesis specified in subsection 3.2: H_0*:* $\beta_3 = 0$.

5.3 The side-effects of bank bets

Due to high correlation between the variables *MS Dependence* and *RS Dependence*, as described in subsection 4.3, I split the analysis defined in (14) into two parts: one regression containing *RS Dependence* and all its interaction factors and another regression with *MS Dependence* and all corresponding interactions. The results of the first part of this analysis using $EBIT$ as a dependent variable are provided in Table 6 and the results of the second part in Table 15 in Appendix A. In Table 6, the coefficient for the factor *GIIPS Dependence* $\times$ $LTRO$ is negative and significant in column 5. However, after inclusion of *RS GIIPS Dependence* $\times$ $LTRO$, for which the coefficient is larger in (absolute) magnitude and statistically significant, the coefficient for *GIIPS Dependence* $\times$ $LTRO$ is no longer significant. This observation suggests that a negative relation between EBIT and dependence on GIIPS banks that risk-shifted during the LTROs. This is an addition to the findings of Acharya et al. (2015), who find that GIIPS bank dependence during the sovereign debt crisis has negative real effects for firms, whereas my findings suggest that such an effect is rooted in risk-shifting by such banks. Also, this is consistent with the crowding out of firm lending or the tightening of debt covenants by banks that use LTRO funding to bet on risky sovereigns.

The negative and significant coefficient for *RS GIIPS Dependence* $\times$ $LTRO$ is not robust to the clustering of standard errors at the country level, however this may be due to high correlation between this factor and *GIIPS Dependence* $\times$ $LTRO$. Also the coefficient remains statistically significant at the 15 percent level. The appearance of a negative and significant term for *RS Dependence* in column 6, may be a sign of the existence of some degree of multicollinearity between this variable and *RS GIIPS Dependence* $\times$ $LTRO$. To investigate whether inclusion of different interaction terms influences the obtained result, I first exclude the interaction terms of *GIIPS Dependence* from the regression, after which I in turn exclude the terms involving *RS Dependence GIIPS* and *RS Dependence*[50], the results of which are presented in Table 16 in Appendix A. Column 1 shows that the exclusion of *GIIPS Dependence* means that the significant result for *RS GIIPS Dependence* $\times$ $LTRO$ resurfaces and that the result is robust to clustering of standard errors at the country-level (column 2). Due to the exclusion of the interaction

[50] these sets of terms are no subsets of one another as the former is defined as the dependence on risk-shifting GIIPS banks and the latter on risk-shifting banks in general.

terms of *RS Dependence* the magnitude of the coefficient for *RS GIIPS Dependence* $\times$ *LTRO* decreases in column 4, suggesting that at least some form of multicollinearity is present among the variables. The magnitude of the coefficient for *RS GIIPS Dependence* $\times$ *LTRO* suggests that a one percent increase in a firm's dependence on risk-shifting, GIIPS banks in the period following the LTROs, leads to a decrease of EBIT of 0.03% of total assets[51].

A result that is persistent throughout all regressions involving EBIT is that firm leverage and EBIT are positively related, which is consistent with finance theory. Firms with attractive growth prospects attract leverage to make investments, boosting income at the cost of the interest and risk of default on the debt.

The results of the regressions that use *MS Dependence* as an independent variable along with several interaction terms between this variable and a set of indicators, are displayed in Table 15 in Appendix A. In the regression in column 3, the variable *GIIPS Dependence* $\times$ *LTRO* has a coefficient with a negative and significant value, as it does in column 5 of Table 6. Once more, the significance disappears after the addition of another variable, in this case *MS GIIPS Dependence* $\times$ *LTRO*. The coefficient for of the variable *MS GIIPS Dependence* $\times$ *LTRO* is negative and significant, when clustering standard errors at the firm- as well as the incorporation country-level. As before, I subject this result to further investigation by re-running the regression, in turn excluding potentially correlated sets of independent variables, the results of which are presented in columns 5-8 of Table 16. The results are similar to the ones presented in columns 1-4 and indicate that firms dependent on GIIPS banks that increase their domestic sovereign debt exposures and have government officials on their board have lower EBIT than others in the year following the LTROs.

Alternative dependent variables

To fully grasp the effects of bank behavior on firm performance, I perform the regression in (14) using 3 alternate dependent variables, listed in subsection 3.3. For the sake of brevity, I present the results of these regressions without a stepwise build-up, in Table 17 and Table 18. The second columns of both tables display the results for the regressions that use *Rev Growth*, or revenue growth, as a dependent variable. Revenue growth is neither affected by dependence on risk-shifting- nor dependence on banks displaying behavior consistent with moral suasion. In addition, revenue growth is not affected by GIIPS bank dependence in my sample, contradicting the result obtained by Acharya et al. (2015), who find that GIIPS bank dependence is negatively related to firm revenue growth. The difference in findings may be explained by the sample that I use. While, Acharya et al. (2015) take the sovereign debt crisis as a period of investigation, I focus on the three years surrounding the LTROs. Their result is applicable

[51] When regarded in isolation, as in column 4 of Table 16.

Table 6: Firm-level regressions: EBIT and risk-shifting

Regression results using firm-level data. The dependent variable is: EBIT, a company's pre-interest and -tax income. The independent variables are: GIIPS- and RS Dependence. GIIPS Dependence is the proportion of a firm's syndicated lending that is arranged by GIIPS banks. RS Dependence is the percentage of a firm's total syndicated ledning that is arranged by banks that substantially increase their domestic sovereign debt exposure. LTRO is an indicator variable equal to one for the year 2012. The control variables are: Size (equal to total assets) and Leverage (defined as 1-total equity divided by total assets). The variable Credit Rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and taken the average. GDP Growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a firm's country of incorporation. Data on the dependent variables and firm-level control variables are obtained from Compustat's quarterly database and are recorded in Euro. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Data on syndicated loans are obtained from Dealscan and sovereign exposure data are obtained from the EBA stress tests. All independent- and control variables are lagged one period. Observations are recorded annually in the years 2011-2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at either the firm- or firm incorporation country-level. All regressions include firm-fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1
GIIPS dependence	-0.029	-0.027	-0.027	-0.024	-0.021	-0.025	-0.025
	(-1.26)	(-1.17)	(-1.10)	(-0.93)	(-0.82)	(-0.99)	(-1.15)
GIIPS Dependence × LTRO		-0.015	-0.015	-0.012	-0.025*	-0.001	-0.001
		(-1.59)	(-1.52)	(-1.31)	(-1.66)	(-0.06)	(-0.08)
RS Dependence			-0.001	0.008	-0.014	-0.034*	-0.034
			(-0.08)	(0.38)	(-0.87)	(-1.79)	(-1.65)
RS GIIPS Dependence				-0.021	-0.014	0.043	0.043
				(-0.90)	(-0.66)	(1.35)	(1.66)
RS Dependence × LTRO					0.037	0.071	0.071
					(1.19)	(1.61)	(1.47)
RS GIIPS Dependence × LTRO						-0.110*	-0.110
						(-1.76)	(-1.61)
Firm size	0.016	0.015	0.015	0.014	0.016	0.019	0.019
	(0.46)	(0.45)	(0.45)	(0.43)	(0.48)	(0.55)	(0.53)
Leverage	0.148**	0.148**	0.149**	0.148**	0.152**	0.152**	0.152**
	(1.98)	(1.97)	(2.06)	(2.06)	(2.06)	(2.08)	(2.10)
Credit rating	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.72)	(-0.53)	(-0.50)	(-0.46)	(-0.20)	(-0.30)	(-0.27)
GDP growth	0.001	0.000	0.000	-0.000	0.000	0.001	0.001
	(0.48)	(0.06)	(0.05)	(-0.01)	(0.25)	(0.93)	(1.38)
α	-0.379	-0.372	-0.373	-0.354	-0.400	-0.459	-0.459
	(-0.49)	(-0.48)	(-0.49)	(-0.47)	(-0.52)	(-0.59)	(-0.56)
N	719	719	719	719	719	719	719
R^2	0.028	0.031	0.031	0.033	0.038	0.046	0.046
Heteroskedasticity (p)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed effects	YES	YES	YES	YES	YES	YES	YES
Clustering: firm-level	YES	YES	YES	YES	YES	YES	NO
Clustering: country-level	NO	NO	NO	NO	NO	NO	YES

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

to the years 2009-2012, while I investigate the years 2011-2013.

The second alternative independent variable that I use is CAPEX, representing firm investment. Column 2 of Table 17 shows that GIIPS dependence is negatively related to CAPEX and that this result is not solely concentrated with firms dependent on GIIPS banks that also risk-shift. Besides the effects of risk-shifting, I formally test the effects of increasing domestic sovereign debt exposures by banks under government control (moral suasion) on CAPEX. The results of this analysis are displayed in column two of Table 18. Unsurprisingly, *GIIPS Dependence* is negatively related to CAPEX, which is consistent with the result presented in Table 17 and Acharya et al. (2015). The coefficient of one other variable is statistically significant, namely of *MS Dependence* $\times$ $LTRO$. I subject this result to further scrutiny in Table 19, where I once more disjoin the independent variables in various ways. The result is not robust to the exclusion of several other independent variables and only appears in combination with certain other variables. I thus conclude that moral suasion is unlikely to be related to firm investment in my sample, a conclusion that is supported by the result that I obtain in my bank-level analysis.

The control variables $EBIT$ and $CASH$ are positively related to CAPEX in all regressions involving CAPEX, which is unsurprising, as profitable firms and firms with excess cash do not need to rely on (costly) debt or equity financing to fund investments and may do so more readily.

The final dependent variable in my analysis is Δ*Loans (lt)*, for which I provide the regression results in the third columns of Table 17 and Table 18. Long term borrowing is not correlated with either *MS Dependence* or *RS Dependence*, as noted in the tables. This result is surprising, given the observed relationships of these variables with EBIT. The straightforward channel through which bank behavior in the form of risk-shifting influences firm performance such as EBIT is through a change in lending by banks, as they face funding constraints and choose to crowd out corporate lending in favor of sovereign debt (a similar pattern applies to investment choices driven by moral suasion). This mechanism implies that adverse effects of such behavior initially appear on firms' balance sheets in the form of decreased loans. My results contradict that suggestion. A notion that I have explored before is that adverse effects can be passed on to firms in the form of restricting debt covenants. This would limit earnings. The effect of bank behavior on debt covenants may be hard to quantify and requires substantial additional research to determine, which is out of scope for this thesis. The negative coefficients for *GIIPS Dependence* in both tables (significant at the 15 percent level), echo the findings of Acharya et al. (2015) and reflect the loan reductions implemented by GIIPS banks during the sovereign debt crisis. The result simultaneously suggests that GIIPS-bank dependent firms fail to raise substitute funding (as a negative effect would fail to show up in such an instance), which is consistent with the findings of Peek and Rosengren (2000). Besides confirmation with results found in the literature, the absence of a significantly positive coefficient for *GIIPS Dependence* $\times$ $LTRO$ implies that the LTROs did not counteract the effect of GIIPS bank

dependence.

Regarding my statistical hypotheses defined in subsection 3.3, I fail to reject my null hypothesis of the alleviation of the adverse effect of GIIPS bank dependence on firm performance for all of my dependent variables, or $H_0 : \beta_2 = 0$. The conclusions of my remaining hypotheses are somewhat more ambiguous. Negative GIIPS bank dependence shows up in some of the regressions that I perform, although usually for subsets of this variable (such as for the years following the LTROs). Therefore I fail to reject my null hypothesis of no impact of GIIPS dependence on firm performance, $H_0 : \beta_1 = 0$, for all of my dependent variables with the exception of Δ*Loans (lt)*, for which I accept my alternative hypothesis, $H_\alpha : \beta_1 < 0$[52]. Regarding risk-shifting , I find robust implications of the adverse effects of risk-shifting by GIIPS banks following the LTROs, in terms of EBIT. I thus reject $H_0 : \beta_6 = 0$ for $EBIT$ and fail to do so for *Rev Growth*, $CAPEX$ and Δ*Loans (lt)*. Considering the results I obtain in my bank-level analyses, I regard the effects of moral suasion on firm performance unlikely, although statistically, I do reject $H_0 : \beta_{10} = 0$, for EBIT. Summarizing, I find evidence that is consistent with real effects of risk-shifting on firm performance, in the form of lower EBIT, and that this effect is concentrated in the year following the LTROs. This confirms my hypothesis of a negative effect of risk shifting on firm performance after the increased supply in funding by the ECB (see subsection 2.3). An explanation for such a result is that banks not only risk-shift using LTRO funds, but also that the existence of such funds create an additional incentive for banks to engage in risk-shifting, which further crowds out corporate lending. Although such a statement cannot easily be shown to hold, as no public data on the quantity and destination of ECB funds is available, the presence of negative effects of dependence on risk-shifting banks following the LTROs emphasize the potential consequences of limited ECB supervision on the use of the LTRO funds. My result thus stresses the importance of ECB monitoring of banks' (ab)use of the funds from open market operations.

[52]This hypothesis is marginally accepted, at the 15 percent level.

6 Conclusion

The results in this thesis suggest that at least some GIIPS banks actively increased risky domestic sovereign debt exposures, directly after the implementation of large ECB funding programs (the LTROs). This result supports the risk-shifting hypothesis that is presented by Crosignani (2015) and Acharya et al. (2015), stating that banks purposely decrease diversification of their asset portfolio in the direction of high yield government debt, to bet on the survival of such governments. Such a bet is optimal for banks that face imminent financial distress and are protected under limited liability in the form of government bailout guarantees. Risk-shifting by banks now generates a negative feedback loop between bank- and sovereign risk, as banks increase risky domestic sovereign debt exposures, followed by higher bailout guarantees and consequently higher sovereign risk, which in turn makes risk-shifting more attractive (Acharya and Steffen, 2015). The concentration of risk-shifting in the period following the LTROs suggests that ECB loans are to some extent used to fund such a loop, constituting a potential cost to Eurozone sovereigns in the form of sovereign bailout programs, necessitated by increased default probabilities of periphery economies.

Extending the research of Acharya et al. (2015) to the context of the LTROs, I find that firms that are dependent on banks that risk-shift through their outstanding syndicated loans have worse performance than their non-dependent counterparts, irrespective of leverage or profitability. Specifically, I find that firms with high risk-shifting bank dependence have lower earnings (EBIT) than other firms. This result is unique to the period following the LTROs, again underlining the potential adverse effects of the LTROs on the real economy[53]. I fail to statistically separate the negative effects of risk-shifting from those of potential moral suasion, due to the similarity of the actions that stem from both kinds of behavior (both risk-shifting and moral suasion are characterized by increases in domestic sovereign debt exposures). Combining this result with my earlier finding that supports risk-shifting by banks and not moral suasion, I conclude that risk-shifting is more likely than moral suasion to be the cause of the observed pattern in firm performance. The presence of a negative relation between risk-shifting by banks and firm earnings in the context of the LTROs then represents an additional cost of the LTRO funding for Eurozone economies: decreased investment and firm earnings.

Contrary to my hypothesis, I do not find any evidence that supports a decrease in firm lending as a result of dependence on risk-shifting banks, although I do find that firm dependence on GIIPS banks is negatively related to performance and that this result is not counterbalanced by the LTROs, which is consistent with Popov and van Horen (2013). The fact that firm lending is seemingly not effected by risk-shifting is contradictory to the theory posited by Acharya et al. (2015); that firm performance is

[53] I do not claim that the overall effect of the LTROs has been economically negative, but rather that besides its obvious positive effect of restoring liquidity in debt markets, negative effects may exist.

affected by bank dependence through the bank lending channel. An alternative explanation that I explore is that risk-shifting banks may tighten debt covenants, to limit corporate funding risk, compensating for the increased risk in their sovereign debt portfolio. This is a notion that I do not formally test and may be the topic of future research, which would provide the channel through which risk-shifting affects firm performance.

The findings in this thesis suggest that (not all) LTRO funding contributes to its stated goal: "To support bank lending and liquidity in the Euro area money market"[54]. Instead, some of the funding is likely to be used to further increase already risky sovereign debt exposures by banks in GIIPS countries. This kind of behavior has negative financial and real effects. In this light, it may be desirable for the ECB to discourage this type of bank behavior, hence safeguarding the positive effect of its open market operations. A way of achieving this is to limit the possibility of EU banks to post risky sovereign debt as collateral when applying for ECB funding, thus limiting the possibility for banks to borrow ECB money with which they acquire risky sovereign debt, which they subsequently post as collateral to acquire even more funding, resulting in a vicious cycle of increasing bank risk. The fact that such behavior is probable is reflected by the findings of Drechsler et al. (2016), who find that badly capitalized banks are more likely to put up risky sovereign debt as collateral to obtain ECB funding.

In conclusion, I find evidence that supports the hypothesis that banks use ECB funding to increase their balance sheet risk, in the form of a bet on the survival of risky sovereigns, at the cost of lower performance of firms dependent on these banks. Although I do not directly find a connection between ECB fund use and risk-shifting, I do find that at least some banks risk-shift in the year following the LTROs and that firms dependent on such banks experience adverse effects. To avoid that banks use ECB funds to risk-shift, which implies that the ECB may be facilitating such behavior and its negative effects, bank supervision regarding the use of ECB funds may be required. Bank bets may be inevitable, but the ECB can do more to make them tougher and less lucrative.

[54] 2011 press release, European Central Bank.

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A Complementary tables

In this appendix, I present tables that are complementary to the tables presented in the main text of this thesis. The tables are presented here due to their size and to restrict the quantity of tables presented in the main text.

Table 7: Descriptive statistics: bank sovereign debt exposures (grouped observations)

Descriptive statistics for bank-level data on sovereign exposures and bank characteristics. Every observation is a bank-exposure country pair. Bank-level control variables are defined for every bank in a particular period and thus independent of the exposure country. Conversely country-level control variables are defined for an exposure country and are thus independent of the bank. ΔExposure is the change in sovereign exposure over the last period scaled by total assets in percentages. Bank Size is measured by total assets. Pre-Tax Income and Tier 1 Ratio are scaled by total assets. The variable Credit rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or an equivalent rating, 2 for AA+ or equivalent etc.) and taken the average. GDP growth is measured in percentages and is defined yearly. Data on sovereign exposures and tier 1 ratios are obtained from the EBA stress tests, data on Bank income (pre-tax) and total assets are obtained from Compustat's quarterly database. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Observations are recorded semiannually in the years 2011-2013. The observations are compared across groups, where they either belong to the group (indicated by the column"Yes" in the table) or don't ("No" in the table). I split the observations according to two different qualifications: "Domestic" and "Government Control & Domestic". For the qualification "Domestic", an observation is grouped in the "Yes" category when the exposure country is identical to the bank's incorporation country. For the qualification "Government Control & Domestic" an observation is grouped in the "Yes" category when the exposure country is identical to the bank's country of incorporation and the bank had government members on its board. T-stats are provided in the last column. Stars indicate significance according to: $*p < .10, **p < .05, ***p < .01$.

	Yes		No		Difference	
	Mean	SD	Mean	SD	Diff	tstat
Domestic Yes/No						
Dep var						
Δ Exposure (% of Assets)	-0.00	2.45	-0.01	0.46	-0.00	-0.02
Control vars (bank-lvl)						
Bank Size	5.72e+11	7.82e+11	5.73e+11	7.80e+11	2.4e+08	0.00
Pre-Tax Income (% of Assets)	-0.05	1.57	-0.06	1.56	-0.00	-0.03
Tier 1 Ratio (% of Assets)	12.31	4.17	12.32	4.15	0.01	0.03
Control vars (country-lvl)						
Credit Rating	4.08	3.90	5.52	4.32	1.44***	4.39
GDP Growth	1.04	2.13	1.14	2.86	0.10	0.52
N	146		4380		4526	
Govt Control & Domestic Yes/No						
Dep var						
Δ Exposure (% of Assets)	-0.02	2.14	-0.01	0.59	0.02	0.06
Control vars bank-lvl						
Bank Size	7.42e+11	8.34e+11	5.70e+11	7.79e+11	-1.71e+11	-1.57
Pre-Tax Income (% of Assets)	-0.24	1.79	-0.06	1.56	0.19	0.80
Tier 1 Ratio (% of Assets)	12.74	5.49	12.31	4.13	-0.43	-0.60
Control vars (country-lvl)						
Credit Rating	4.07	3.86	5.49	4.31	1.42**	2.80
GDP Growth	1.08	2.14	1.13	2.85	0.05	0.19
N	59		4467		4526	

Table 8: Descriptive statistics: bank-level data probit analysis (grouped observations)

Descriptive statistics for bank-level data. ΔDomestic Exposure is a variable that measures a bank's change in domestic sovereign debt, as a percentage of total assets. Bank Size is measured by total assets. Pre-Tax Income and Tier 1 Ratio are scaled by total assets. The variable Credit rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent rating, 2 for AA+ or equivalent etc.) and taken the average. GDP growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a bank's country of incorporation. Data on sovereign exposures and tier 1 ratios are obtained from the EBA stress tests, data on Bank income (pre-tax) and total assets are obtained from Compustat's quarterly database and data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Observations are recorded annually in the years 2011-2013. The observations are compared across groups, where they either belong to the group (indicated by the column"Yes" in the table) or don't ("No" in the table). I split the observations according to two different qualifications: "GIIPS bank" and "Government Control". "GIIPS bank" indicates whether a bank is incorporated in any of the countries; Greece, Ireland, Italy, Portugal or Spain. For the qualification "Government Control" an observation is grouped in the "Yes" category when the bank has one or more government board members in the particular year. T-stats are provided in the last column. Stars indicate significance according to: $*p < .10, **p < .05, ***p < .01$.

	Yes		No		Difference	
	Mean	SD	Mean	SD	Diff	tstat
GIIPS bank Yes/No						
Dep var						
Δ Domestic Exposure	0.43	2.62	-0.17	2.37	-0.60	-1.25
Control vars (bank-lvl)						
Bank size	3.32e+11	3.59e+11	6.76e+11	8.87e+11	3.44e+11**	3.33
Pre-Tax Income (% of Assets)	-0.86	2.13	0.29	1.10	1.15**	3.40
Tier 1 ratio (% of Assets)	10.61	2.86	13.04	4.44	2.43***	3.94
Control vars (country-lvl)						
Credit rating	8.38	2.49	2.22	2.76	-6.16***	-13.25
GDP growth	-0.73	1.86	1.81	1.75	2.54***	7.70
N	44		102		146	
Government Control Yes/No						
Dep vars						
Δ Domestic Exposure	-0.02	2.14	0.01	2.66	0.03	0.08
Control vars (bank-lvl)						
Bank size	7.42e+11	8.34e+11	4.57e+11	7.27e+11	-2.84e+11*	-2.13
Pre-Tax Income (% of Assets)	-0.24	1.79	0.07	1.40	0.32	1.14
Tier 1 ratio (% of Assets)	12.74	5.49	12.01	2.95	-0.74	-0.94
Control vars (country-lvl)						
Credit rating	4.07	3.86	4.08	3.95	0.00	0.00
GDP growth	1.08	2.14	1.01	2.13	-0.07	-0.19
N	59		87		146	

Table 9: Descriptive statistics: firm-level data (grouped observations)

Descriptive statistics for firm-level data. EBIT is a company's pre-interest and -tax income, Sales growth is revenue growth in a particular year, CAPEX are a firm's Capital Expenditures and Loans (lt) are a firm's total long-term loans. Size is equal to total assets, Leverage is defined 1-total equity, scaled by total assets and Cash is a firm's cash on hand, scaled by total assets. The variable Credit rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent rating, 2 for AA+ or equivalent etc.) and taken the average. GDP growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a bank's country of incorporation. Data on the dependent variables and firm-level control variables are obtained from Compustat's quarterly database and are recorded in Euro. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Observations are recorded annually in the years 2011-2013. The observations are compared across groups, where they either belong to the group (indicated by the column"Yes" in the table) or don't ("No" in the table). I split the observations according to two different qualifications: "RS Dependent" and "MS Dependent". For the qualification "RS Dependent", an observation is grouped in the "Yes" category when a firm is exposed to banks that qualify as risk-shifting banks in that particular period (so, the value of that observation for the variable defined in (10) is larger than zero). For the qualification "MS dependent" an observation is grouped in the "Yes" category when the firm is exposed to banks that portray behavior consistent with moral suasion (so, the value of that observation for the variable defined in (12) is larger than zero). The means of those groups are compared, for which t-stats are provided in the last column. Stars indicate significance according to: $*p < .10, **p < .05, ***p < .01$.

	Yes		No		Difference	
	Mean	SD	Mean	SD	Diff	tstat
RS dependent Yes/No						
Dep vars						
EBIT (% of Assets)	5.64	6.31	5.59	6.57	-0.05	-0.10
Sales growth (%)	0.16	1.76	0.05	0.27	-0.12	-1.27
CAPEX (% of Assets)	4.06	3.56	4.30	3.26	0.24	0.89
Δ lt Loans (% of Assets)	0.12	9.58	-0.33	16.49	-0.45	-0.44
Control vars (firm-lvl)						
Size	4.41e+10	2.00e+11	3.16e+10	1.61e+11	-1.25e+10	-0.93
Leverage (% of Assets)	67.16	15.62	63.86	16.01	-3.30**	-2.81
Cash (% of Assets)	7.61	5.39	8.12	6.58	0.51	1.05
Control vars (country-lvl)						
Credit rating	4.22	3.73	3.35	3.28	-0.87***	-3.35
GDP growth (%)	0.35	2.11	0.89	2.01	0.54***	3.54
N	373		353		726	
MS dependent Yes/No						
Dep vars						
EBIT (% of Assets)	5.53	6.62	5.67	6.33	0.14	0.28
Sales growth (%)	0.14	1.80	0.09	0.82	-0.05	-0.44
CAPEX (% of Assets)	4.06	3.34	4.25	3.46	0.19	0.69
Δ lt Loans (% of Assets)	0.44	10.05	-0.42	15.02	-0.86	-0.92
Control vars (firm-lvl)						
Size	5.34e+10	2.32e+11	2.88e+10	1.43e+11	-2.46e+10	-1.57
Leverage (% of Assets)	67.38	15.52	64.46	16.02	-2.92*	-2.43
Cash (% of Assets)	7.87	5.68	7.85	6.18	-0.02	-0.04
Control vars (country-lvl)						
Credit rating	4.00	3.54	3.68	3.55	-0.31	-1.15
GDP growth (%)	0.01	1.72	0.98	2.19	0.97***	6.63
N	271		455		726	

Table 10: Correlation matrix: bank sovereign debt exposures

Pearson correlation coefficients for the dependent and independent variables used in the exposure level analysis. ΔExposure is the dependent variable and is defined as the change in a bank's exposure to a particular sovereign. Dom is an indicator variable with a value of 1 when a sovereign exposure country is identical to a bank's country of incorporation. *Govt Control* is the percentage of banks' board members that also hold a government position. Sovereign exposure data are obtained from the EBA stress tests and board member data from Boardex. Stars indicate significance according to: $*p < .10, **p < .05, ***p < .01$.

	Δ Exposure	Dom	Govt Control × Dom
Δ Exposure	1.00		
Dom	0.00	1.00	
Govt Control × Dom	-0.05**	0.52***	1.00
N	4526		

Table 11: Correlation matrix: bank-level data

Pearson correlation coefficients for the independent- and dependent variables used in the bank-level probit analysis. RS Indicator is an indicator variable with a value of 1 when bank increased it's domestic sovereign debt exposure and did so by more than the median of all banks that did so. GIIPS and LTRO are indicators that are equal to one for banks incorporated in Greece, Italy, Ireland, Portugal or Spain, and when the year is 2012, respectively. MS Indicator is equal to one when a bank has one or more government officials on its board. Sovereign exposure data are obtained from the EBA stress tests and board member data from Boardex. Stars indicate significance according to: $*p < .10, **p < .05, ***p < .01$.

	RS Indicator	GIIPS	LTRO	MS Indicator
RS Indicator	1.00			
GIIPS	0.21*	1.00		
LTRO	0.08	-0.01	1.00	
MS Indicator	-0.01	-0.02	-0.03	1.00
N	146			

Table 12: Correlation matrix: firm-level data

Pearson correlation coefficients for the independent- and dependent variables used in the firm-level analysis. EBIT is a company's pre-interest and -tax income, Sales growth is revenue growth in a particular year, CAPEX are a firm's Capital Expenditures and Δ Loans (lt) are a firm's total long-term loans. RS Dependence is an independent variable that is defined as the percentage of a firm's total syndicated lending that is arranged by banks that substantially increase their domestic sovereign bond holdings. Similarly, MS Dependence is the percentage of syndicated loans of a firm that is arranged by banks that substantially increase their domestic sovereign debt exposure and that simultaneously have government officials on their board. Data on the dependent variables are obtained from Compustat's quarterly database, data on syndicated loans are obtained from Dealscan and sovereign exposure data are obtained from the EBA stress tests. Stars indicate significance according to: $*p < .10, **p < .05, ***p < .01$.

	EBIT	Sales growth	CAPEX	Loans (lt)	RS Dependence	MS Dependence
EBIT	1.00					
Sales Growth	0.09*	1.00				
CAPEX	0.21***	0.13**	1.00			
Δ Loans (lt)	0.02	0.13***	0.09*	1.00		
RS Dependence	-0.04	0.08*	-0.08	0.00	1.00	
MS Dependence	-0.03	0.05	-0.03	0.01	0.87***	1.00
N	726					

Table 13: Alternative regressions: moral suasion

Regression results, where the dependent variable is Δ Exposure, or the change in the exposure of a bank to a particular country. The independent variables are: Dom, an indicator variable equal to one when a sovereign exposure country is identical to a bank's country of incorporation and and Govt Control, the percentage of government officials on the board of a bank obtained from Boardex. Data on sovereign exposures are obtained from the European Banking Authority. GIIPS and LTRO are indicator variables equal to one for banks incorporated in GIIPS (Greece, Italy, Ireland, Portugal and Spain) countries and for the year 2012, respectively (non-GIIPS is one when GIIPS is zero and vice versa). Data on the control variables are obtained from Compustat's quarterly database. These variables are: Bank Size, represented by the natural logarithm of total assets, Pre-Tax Income (earnings before tax, year-to-date) and the Tier 1 Ratio. Credit Rating is an average of the country's credit ratings of S&P, Moody's and Fitch, obtained from Tradingeconomics. To arrive at this number, I assign numerical values to ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and take the average. GDP growth, obtained from the World Bank is measured in percentages and is defined yearly. All control variables are suppressed in this table for the sake of brevity. The time interval annual starting at December 31, 2011 and ending at December 31, 2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at either the bank- or bank incorporation country-level. All regressions include bank- and exposure country fixed effects.

	(1) Δ Exposure	(2) Δ Exposure	(3) Δ Exposure	(4) Δ Exposure	(5) Δ Exposure	(6) Δ Exposure
Govt Control	-0.007**	-0.007**	-0.007**	-0.006	-0.006*	-0.006*
	(-2.31)	(-2.07)	(-2.04)	(-1.64)	(-1.82)	(-1.73)
Govt Control × Dom		-0.013	-0.017	-0.033*	-0.026	-0.027
		(-0.88)	(-1.12)	(-1.82)	(-1.42)	(-1.12)
Govt Control × Dom × GIIPS			0.020	0.016	-0.026	-0.002
			(0.42)	(0.35)	(-0.43)	(-0.03)
Govt Control × Dom × LTRO				0.061**	0.033	0.047
				(2.36)	(1.66)	(1.22)
Govt Control × Dom × GIIPS × LTRO					0.136*	-0.039
					(1.86)	(-0.36)
Dom						0.000
						(0.03)
Dom × GIIPS						-0.003
						(-0.69)
Dom × LTRO						-0.003
						(-0.36)
Dom × GIIPS × LTRO						0.030**
						(2.12)
α	-0.011	-0.011	-0.012	-0.011	-0.011	-0.012
	(-0.34)	(-0.34)	(-0.37)	(-0.34)	(-0.36)	(-0.44)
N	4048	4048	4048	4048	4048	4048
R^2	0.008	0.009	0.010	0.018	0.024	0.057
Heteroskedasticity (p)	0.000	0.000	0.000	0.000	0.000	0.000
Fixed effects	YES	YES	YES	YES	YES	YES
Clustering: bank-level	YES	NO	NO	NO	NO	NO
Clustering: country-level	NO	YES	YES	YES	YES	YES
Control variabel: bank-lvl	YES	YES	YES	YES	YES	YES
Control variables: country-lvl	YES	YES	YES	YES	YES	YES

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

Table 14: Sovereign-level regressions: robustness tests

Regression results, where the dependent variable is Δ Exposure, or the change in the exposure of a bank to a particular country. The independent variables are: Dom, an indicator variable equal to one when a sovereign exposure country is identical to a bank's country of incorporation and Govt Control and Govt Control (fed), the percentage of (federal) government officials on the board of a bank obtained from Boardex. Data on sovereign exposures are obtained from the European Banking Authority. GIIPS, LTRO and LTRO-6m are indicator variables equal to one for banks incorporated in GIIPS (Greece, Italy, Ireland, Portugal and Spain) countries, for the year 2012 and for the first 6 months of 2012, respectively. Data on the control variables are obtained from Compustat's quarterly database. These variables are: Bank Size, represented by the natural logarithm of total assets, Pre-Tax income (pre-tax) (earnings before tax, year-to-date) and the Tier 1 Ratio. Credit Rating is an average of the country's credit ratings of S&P, Moody's and Fitch, obtained from Tradingeconomics. To arrive at this number, I assign numerical values to ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and take the average. GDP growth, obtained from the World Bank is measured in percentages and is defined yearly. All control variables are suppressed in this table for the sake of brevity. The time interval is annual starting at December 31, 2011 and ending at December 31, 2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at the bank-level . The regression includes bank- and exposure country fixed effects.

	(1) Δ Exposure
Dom	0.000
	(0.02)
Dom × GIIPS	-0.002
	(-0.52)
Dom × LTRO	-0.003
	(-0.33)
Dom × GIIPS × LTRO	0.028**
	(2.10)
Govt Control (fed)	-0.008**
	(-2.25)
Govt Control (fed) × Dom	-0.031
	(-0.89)
Govt Control (fed) × Dom × GIIPS	-0.024
	(-0.33)
Govt Control (fed) × Dom × LTRO	0.050
	(1.05)
Govt Control (fed) × Dom × GIIPS × LTRO	-0.002
	(-0.01)
α	-0.009
	(-0.39)
N	4048
R^2	0.059
Heteroskedasticity (p)	0.000
Fixed effects	YES
Clustering: bank-level	YES
Clustering: country-level	NO
Control variabel: bank-lvl	YES
Control variables: country-lvl	YES

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

Table 15: Firm-level regressions: EBIT and moral suasion

Regression results using firm-level data. The dependent variable is: EBIT, a company's pre-interest and -tax income. The independent variables are: GIIPS- and MS Dependence. GIIPS Dependence is the proportion of a firm's syndicated lending that is arranged by GIIPS banks. MS Dependence is the percentage of syndicated loans of a firm that is arranged by banks that substantially increases their domestic sovereign debt exposure and that simultaneously had government officials on their board. LTRO is an indicator variable equal to one for the year 2012. The control variables are: Size (equal to total assets), Leverage (defined as 1-total equity divided by total assets) and Cash, a firm's cash on hand, scaled by total assets. The variable Credit rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and taken the average. GDP growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a firm's country of incorporation. Data on the dependent variables and firm-level control variables are obtained from Compustat's quarterly database and are recorded in Euro's. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Data on syndicated loans are obtained from Dealscan and sovereign exposure data are obtained from the EBA stress tests. All independent- and control variables are lagged one period. Observations are recorded annually in the years 2011-2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at either the firm- or firm incorporation country-level. All regressions include firm-fixed effects.

	(1)	(2)	(3)	(4)	(5)
	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1
GIIPS dependence	-0.027	-0.023	-0.021	-0.027	-0.027
	(-1.15)	(-0.96)	(-0.85)	(-1.10)	(-1.26)
GIIPS Dependence × LTRO	-0.015	-0.013	-0.022*	-0.005	-0.005
	(-1.59)	(-1.48)	(-1.72)	(-0.36)	(-0.52)
MS Dependence	0.000	0.015	-0.012	-0.047	-0.047
	(0.01)	(0.58)	(-0.53)	(-1.50)	(-1.53)
MS GIIPS Dependence		-0.035	-0.024	0.051	0.051
		(-1.30)	(-1.01)	(1.31)	(1.52)
MS Dependence × LTRO			0.036	0.086	0.086
			(1.03)	(1.57)	(1.50)
MS GIIPS Dependence × LTRO				-0.132**	-0.132*
				(-2.04)	(-1.88)
Firm size	0.015	0.014	0.016	0.019	0.019
	(0.45)	(0.42)	(0.47)	(0.56)	(0.53)
Leverage	0.148**	0.146**	0.151**	0.151**	0.151**
	(2.05)	(2.03)	(2.02)	(2.05)	(2.12)
Credit rating	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.50)	(-0.42)	(-0.17)	(-0.25)	(-0.20)
GDP growth	0.000	0.000	0.000	0.001	0.001
	(0.07)	(0.10)	(0.11)	(0.60)	(0.86)
α	-0.372	-0.346	-0.394	-0.464	-0.464
	(-0.49)	(-0.46)	(-0.51)	(-0.59)	(-0.56)
N	719	719	719	719	719
R^2	0.031	0.035	0.038	0.049	0.049
Heteroskedasticity (p)	0.000	0.000	0.000	0.000	0.000
Fixed effects	YES	YES	YES	YES	YES
Clustering: firm-level	YES	YES	YES	YES	NO
Clustering: country-level	NO	NO	NO	NO	YES

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

Table 16: EBIT regressions: robustness tests

EBIT Regression results using firm-level data. The dependent variable is: EBIT, a company's pre-interest and -tax income. The independent variables are: RS Dependence and MS Dependence. RS Dependence is the percentage of a firm's total syndicated lending that is arranged by banks that substantially increase their domestic sovereign debt exposure. MS Dependence is the percentage of syndicated loans of a firm that is arranged by banks that substantially increases their domestic sovereign debt exposure and that simultaneously had government officials on their board. LTRO is an indicator variable equal to one for the year 2012. The control variables are: Size (equal to total assets), Leverage (defined as 1-total equity divided by total assets) and Cash, a firm's cash on hand, scaled by total assets. The variable Credit rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and taken the average. GDP growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a firm's country of incorporation. Data on the dependent variables and firm-level control variables are obtained from Compustat's quarterly database and are recorded in Euro's. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Data on syndicated loans are obtained from Dealscan and sovereign exposure data are obtained from the EBA stress tests. All independent- and control variables are lagged one period. Observations are recorded annually in the years 2011-2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at either the firm- or firm incorporation country-level. All regressions include firm-fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1	EBIT t+1
RS Dependence	-0.034*	-0.034	-0.013					
	(-1.81)	(-1.66)	(-1.31)					
RS Dependence × LTRO	0.071	0.071	0.015					
	(1.61)	(1.47)	(0.70)					
RS GIIPS Dependence	0.040	0.040		-0.001				
	(1.45)	(1.62)		(-0.04)				
RS GIIPS Dependence × LTRO	-0.110**	-0.110*		-0.034**				
	(-2.14)	(-1.98)		(-2.00)				
MS Dependence					-0.045	-0.045	-0.015	
					(-1.48)	(-1.53)	(-1.12)	
MS Dependence × LTRO					0.085	0.085	0.022	
					(1.57)	(1.48)	(0.75)	
MS GIIPS Dependence					0.050	0.050		-0.000
					(1.34)	(1.50)		(-0.03)
MS GIIPS Dependence × LTRO					-0.138**	-0.138**		-0.050**
					(-2.26)	(-2.12)		(-2.36)
Firm size	0.019	0.019	0.017	0.015	0.019	0.019	0.017	0.015
	(0.55)	(0.53)	(0.49)	(0.45)	(0.56)	(0.54)	(0.49)	(0.44)
Leverage	0.149**	0.149*	0.149**	0.146*	0.148**	0.148**	0.148**	0.144*
	(2.06)	(2.03)	(2.03)	(1.95)	(2.02)	(2.04)	(1.99)	(1.92)
Credit rating	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.21)	(-0.20)	(-0.52)	(-0.47)	(-0.21)	(-0.18)	(-0.50)	(-0.50)
GDP growth	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000
	(0.95)	(1.30)	(0.69)	(0.07)	(0.74)	(0.97)	(0.69)	(0.10)
α	-0.462	-0.462	-0.407	-0.374	-0.467	-0.467	-0.411	-0.370
	(-0.59)	(-0.56)	(-0.53)	(-0.48)	(-0.60)	(-0.57)	(-0.53)	(-0.48)
N	719	719	719	719	719	719	719	719
R^2	0.045	0.045	0.027	0.032	0.047	0.047	0.028	0.033
Heteroskedasticity (p)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Clustering: firm-level	YES	NO	YES	YES	YES	NO	YES	YES
Clustering: country-level	NO	YES	NO	NO	NO	YES	NO	NO

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

Table 17: Firm-level regressions: alternative dependent variables and risk-shifting

Regression results using firm-level data. The dependent variables are: Rev growth; a company's annual sales growth, CAPEX; a firm's capital expenditures for the year and Δ Lending (lt); the change in long term lending of a company compared to the previous year. All indepedent- and control variables are one period lags. The independent variables are: GIIPS- and RS Dependence. GIIPS Dependence is the proportion of a firm's syndicated lending that is arranged by GIIPS banks. RS Dependence is an independent variables that is defined as the percentage of a firm's total syndicated lending that is arranged by banks that substantially increase their domestic sovereign debt exposures. LTRO is an indicator variable equal to one for the year 2012. The control variables are: Firm size (equal to total assets), Leverage (defined as 1-total equity divided by total assets), EBIT and Cash, a firm's cash on hand, scaled by total assets. The variable Credit Rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and taken the average. GDP Growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a firm's country of incorporation. Data on the dependent variables and firm-level control variables are obtained from Compustat's quarterly database and are recorded in Euro's. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Data on syndicated loans are obtained from Dealscan and sovereign exposure data are obtained from the EBA stress tests. Observations are recorded annually in the years 2011-2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at either the firm- or firm incorporation country-level. All regressions include firm-fixed effects.

	(1) Rev growth t+1	(2) CAPEX t+1	(3) Δ Lending (long-term)
GIIPS dependence	0.192	-0.026**	0.154
	(0.70)	(-2.37)	(1.64)
GIIPS Dependence × LTRO	0.192	0.001	-0.023
	(0.94)	(0.13)	(-0.31)
RS Dependence	-0.234	-0.001	0.132
	(-0.70)	(-0.16)	(1.56)
RS GIIPS Dependence	-0.112	0.014	-0.151
	(-0.26)	(0.77)	(-1.16)
RS Dependence × LTRO	1.626	0.011	-0.079
	(0.92)	(0.94)	(-0.82)
RS GIIPS Dependence × LTRO	-1.635	-0.030	-0.001
	(-0.79)	(-1.17)	(-0.01)
Firm size	-3.147***	-0.009***	0.020
	(-3.98)	(-3.02)	(0.17)
Leverage	-2.767**	-0.011	
	(-2.07)	(-0.52)	
EBIT	-1.678	0.033*	-0.162
	(-1.28)	(1.81)	(-0.70)
Cash	-1.761	0.065***	-0.181
	(-0.50)	(2.71)	(-0.77)
Credit rating	0.010	0.001	0.009
	(0.93)	(1.36)	(1.04)
GDP growth	0.027	0.001	-0.010
	(1.56)	(1.65)	(-1.19)
α	70.761***	0.228***	-0.473
	(3.89)	(3.39)	(-0.18)
N	608	625	608
R^2	0.195	0.055	0.021
Heteroskedasticity (p)	0.000	0.000	0.000
Fixed effects	YES	YES	YES
Clustering: bank-level	YES	YES	YES
Clustering: country-level	NO	NO	NO

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

Table 18: Firm-level regressions: alternative dependent variables and moral suasion

Regression results using firm-level data. The dependent variables are: Rev growth; a company's annual sales growth, CAPEX; a firm's capital expenditures for the year and Δ Lending (lt); the change in long term lending of a company compared to the previous year. All indepedent- and control variables are one period lags. The independent variables are: GIIPS- and MS Dependence. GIIPS Dependence is the proportion of a firm's syndicated lending that is arranged by GIIPS banks. MS Dependence is the percentage of syndicated loans of a firm that is arranged by banks that substantially increases their domestic sovereign debt exposure and that simultaneously had government officials on their board. LTRO is an indicator variable equal to one for the year 2012. The control variables are: Firm size (equal to total assets), Leverage (defined as 1-total equity divided by total assets), EBIT and Cash, a firm's cash on hand, scaled by total assets. The variable Credit Rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and taken the average. GDP Growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a firm's country of incorporation. Data on the dependent variables and firm-level control variables are obtained from Compustat's quarterly database and are recorded in Euro's. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Data on syndicated loans are obtained from Dealscan and sovereign exposure data are obtained from the EBA stress tests. Observations are recorded annually in the years 2011-2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at either the firm- or firm incorporation country-level. All regressions include firm-fixed effects.

	(1) Rev growth t+1	(2) CAPEX t+1	(3) Δ Lending (long-term)
GIIPS dependence	0.114	-0.027**	0.156
	(0.43)	(-2.47)	(1.65)
GIIPS Dependence × LTRO	0.115	-0.005	-0.080
	(0.75)	(-0.65)	(-1.07)
MS Dependence	-0.725	-0.015	-0.002
	(-1.32)	(-1.58)	(-0.01)
MS GIIPS Dependence	0.496	0.028	-0.067
	(0.83)	(1.45)	(-0.41)
MS Dependence × LTRO	2.202	0.024**	0.038
	(1.23)	(2.09)	(0.22)
MS GIIPS Dependence × LTRO	-2.147	-0.028	0.042
	(-1.05)	(-1.20)	(0.23)
Firm size	-3.102***	-0.008***	0.030
	(-3.90)	(-2.71)	(0.24)
Leverage	-2.720**	-0.008	
	(-2.02)	(-0.38)	
EBIT	-1.760	0.032*	-0.176
	(-1.39)	(1.72)	(-0.79)
Cash	-1.816	0.061**	-0.186
	(-0.51)	(2.53)	(-0.77)
Credit rating	0.009	0.001	0.010
	(0.88)	(1.40)	(1.08)
GDP growth	0.027	0.001	-0.010
	(1.53)	(1.57)	(-1.07)
α	69.759***	0.204***	-0.693
	(3.81)	(3.06)	(-0.25)
N	608	625	608
R^2	0.196	0.057	0.019
Heteroskedasticity (p)	0.000	0.000	0.000
Fixed effects	YES	YES	YES
Clustering: bank-level	YES	YES	YES
Clustering: country-level	NO	NO	NO

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

Table 19: Firm-level regressions: risk-shifting and CAPEX

Regression results using firm-level data. The dependent variable is: CAPEX, a company's capital expenditures. The independent variables are: GIIPS- and MS Dependence. GIIPS Dependence is the proportion of a firm's syndicated lending that is arranged by GIIPS banks. MS Dependence is the percentage of syndicated loans of a firm that is arranged by banks that substantially increases their domestic sovereign debt exposure and that simultaneously had government officials on their board. LTRO is an indicator variable equal to one for the year 2012. The control variables are: Size (equal to total assets), Leverage (defined as 1-total equity divided by total assets) and Cash, a firm's cash on hand, scaled by total assets. The variable Credit Rating is an average of the country credit ratings of S&P Moody's and Fitch. To arrive at this number, I have assigned numerical values to the ratings (1 for a AAA or equivalent, 2 for AA+ or equivalent etc.) and taken the average. GDP Growth is measured in percentages and is defined yearly. Country-level control variables are defined based on a firm's country of incorporation. Data on the dependent variables and firm-level control variables are obtained from Compustat's quarterly database and are recorded in Euro's. Data on credit ratings and GDP growth are obtained from Tradingeconomics and the World Bank, respectively. Data on syndicated loans are obtained from Dealscan and sovereign exposure data are obtained from the EBA stress tests. All independent and control variables are one period lags. Observations are recorded annually in the years 2011-2013. Heteroskedasticity (in the form of a modified Wald test) tests are performed on the regressions and the p-values of these test are reported in the bottom panel. Standard errors are clustered at either the firm- or firm incorporation country-level. All regressions include firm-fixed effects.

	(1) CAPEX t+1	(2) CAPEX t+1	(3) CAPEX t+1	(4) CAPEX t+1	(5) CAPEX t+1	(6) CAPEX t+1	(7) CAPEX t+1	(8) CAPEX t+1	(9) CAPEX t+1	(10) CAPEX t+1
GIIPS dependence	-0.024**	-0.024**	-0.025**	-0.026**	-0.025**	-0.027**	-0.027**			
	(-2.21)	(-2.13)	(-2.27)	(-2.38)	(-2.34)	(-2.47)	(-2.21)			
GIIPS Dependence × LTRO		-0.005	-0.005	-0.005	-0.008	-0.005	-0.005			
		(-0.97)	(-1.00)	(-1.02)	(-1.21)	(-0.65)	(-0.66)			
MS Dependence			0.006	0.003	-0.005	-0.015	-0.015*	-0.013	0.004	
			(1.01)	(0.38)	(-0.39)	(-1.58)	(-1.87)	(-1.35)	(0.36)	
MS GIIPS Dependence				0.006	0.010	0.028	0.028*	0.025		0.011
				(0.49)	(0.83)	(1.45)	(1.71)	(1.28)		(0.69)
MS Dependence × LTRO					0.010	0.024**	0.024***	0.022*	0.001	
					(0.77)	(2.09)	(2.94)	(1.92)	(0.10)	
MS GIIPS Dependence × LTRO						-0.028	-0.028	-0.033		-0.011
						(-1.20)	(-1.50)	(-1.58)		(-0.65)
Firm size	-0.009***	-0.009***	-0.009***	-0.009***	-0.009***	-0.008***	-0.008**	-0.008***	-0.009***	-0.009***
	(-3.65)	(-3.73)	(-3.64)	(-3.58)	(-3.03)	(-2.71)	(-2.07)	(-2.72)	(-3.23)	(-3.59)
Leverage	-0.009	-0.010	-0.012	-0.011	-0.009	-0.008	-0.008	-0.012	-0.014	-0.014
	(-0.44)	(-0.49)	(-0.56)	(-0.54)	(-0.43)	(-0.38)	(-0.35)	(-0.55)	(-0.63)	(-0.64)
EBIT	0.032*	0.032*	0.032*	0.031*	0.031*	0.032*	0.032***	0.034*	0.033*	0.033*
	(1.81)	(1.78)	(1.79)	(1.69)	(1.69)	(1.72)	(3.42)	(1.88)	(1.92)	(1.84)
Cash	0.066***	0.066***	0.065***	0.064***	0.063***	0.061**	0.061**	0.061**	0.064***	0.062***
	(2.69)	(2.72)	(2.67)	(2.63)	(2.60)	(2.53)	(2.40)	(2.54)	(2.62)	(2.61)
Credit rating	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(1.36)	(1.43)	(1.41)	(1.40)	(1.49)	(1.40)	(1.53)	(1.58)	(1.57)	(1.50)
GDP growth	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001*	0.001*	0.001
	(1.55)	(1.09)	(1.43)	(1.41)	(1.37)	(1.57)	(1.51)	(1.83)	(1.78)	(1.59)
α	0.242***	0.247***	0.249***	0.244***	0.228***	0.204***	0.204**	0.203***	0.239***	0.236***
	(4.01)	(4.10)	(4.03)	(3.97)	(3.32)	(3.06)	(2.45)	(3.03)	(3.52)	(3.93)
N	625	625	625	625	625	625	625	625	625	625
R^2	0.048	0.050	0.052	0.053	0.054	0.057	0.057	0.045	0.040	0.041
Heteroskedasticity (p)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustering: firm-level	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES
Clustering: country-level	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO

t statistics in parentheses
* p¡.10, ** p¡.05, *** p¡.01

B Graphs

In this appendix I present the graphs that are mentioned in subsection 4.3.

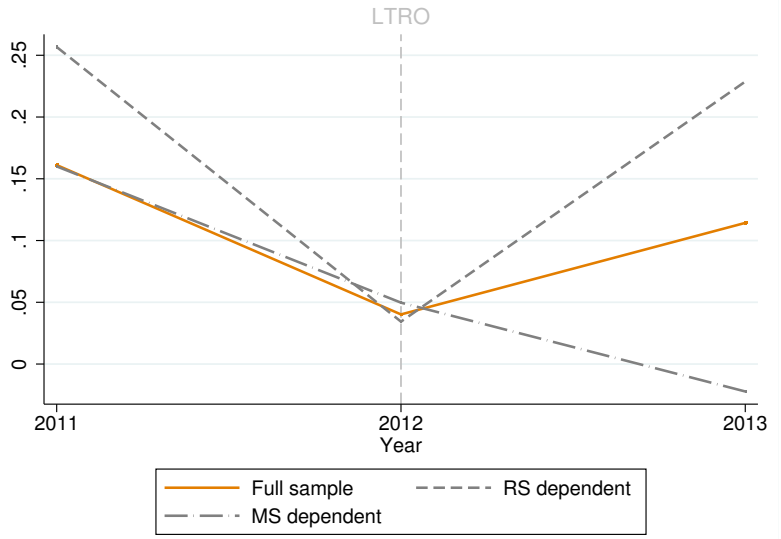

Figure 4: Revenue growth development by firm type

Graph displaying the average firm development of revenue growth in the years 2011-2013. Two groups of firms are compared: firms that are dependent on risk-shifting banks (dashed line in graph) and firms that are dependent on banks susceptible to moral suasion (dash-dotted line in graph). Risk-shifting dependent firms have a positive value for the variable defined in (10) and firms dependent on banks susceptible to moral suasion have a positive value for the variable defined in (12).

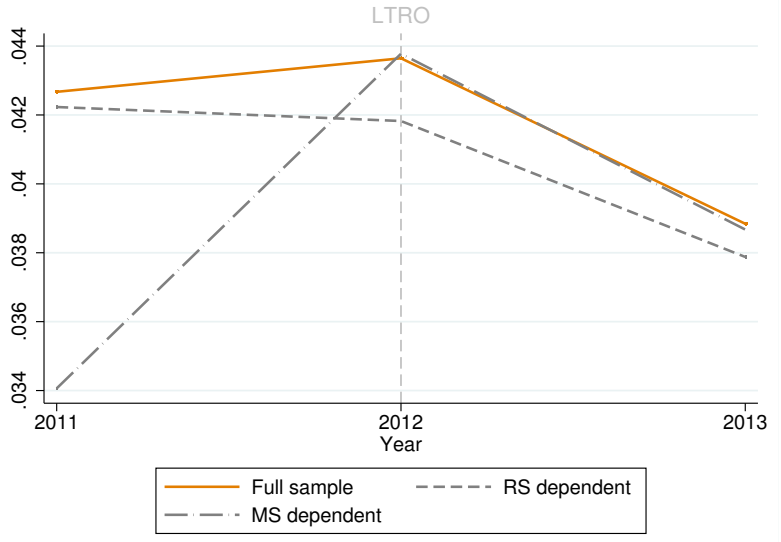

Figure 5: CAPEX development by firm type

Graph displaying the average firm development of capital expenditures in the years 2011-2013. Two groups of firms are compared: firms that are dependent on risk-shifting banks (dashed line in graph) and firms that are dependent on banks susceptible to moral suasion (dash-dotted line in graph). Risk-shifting dependent firms have a positive value for the variable defined in (10) and firms dependent on banks susceptible to moral suasion have a positive value for the variable defined in (12).

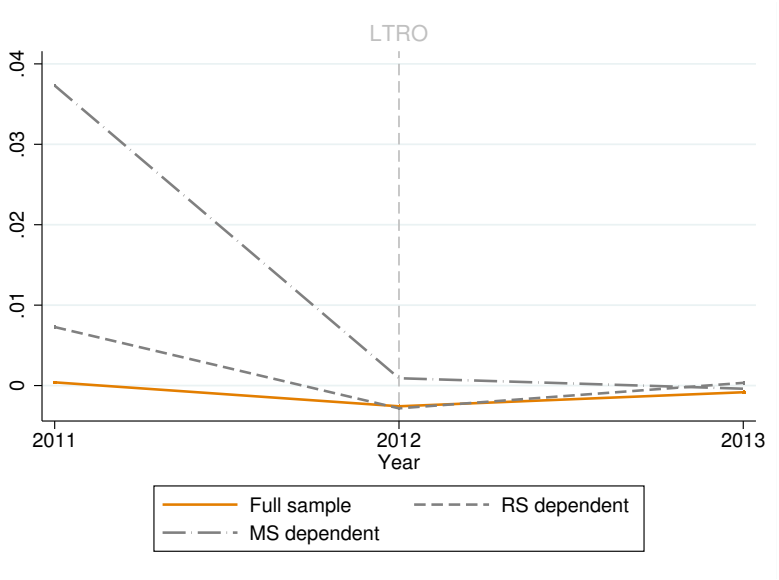

Figure 6: Long-term lending development by firm type

Graph displaying the average firm development of the change in long-term lending in the years 2011-2013. Two groups of firms are compared: firms that are dependent on risk-shifting banks (dashed line in graph) and firms that are dependent on banks susceptible to moral suasion (dash-dotted line in graph). Risk-shifting dependent firms have a positive value for the variable defined in (10) and firms dependent on banks susceptible to moral suasion have a positive value for the variable defined in (12).