Focus versus diversification: does the breadth of ownership structure matter?

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This draft: June 14, 2013

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Abstract

This paper empirically tests whether the breadth of ownership structure shapes the relationship between bank risk and product diversification. Using a sample of 707 European commercial banks over the 2002-2010 period, I find that the effect of diversification on risk depends on the degree of ownership disparity. Specifically, the results indicate that banks with initial broader ownership structure reduce risk and improve their solvency when they expand their scope to non-traditional activities. These diversification benefits are attributed to both large and small banks. Moreover, I show that regulators reduce these diversification gains when they impose stringent activity restrictions on banks with enough ownership breadth. These results suggest that the same regulation might have different effects on the bank's riskiness and solvency depending on the degree of its ownership disparity. As countries reevaluate their post-crisis regulatory framework, my findings have important implications for policy makers who set rules to encourage and/or to discourage the diversification in the banking industry.

JEL Classification: G21, G28, G32, G33

Keywords: breadth of ownership, income diversification, bank risk, European banking

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1. Introduction

The global financial crisis of 2008 has reignited considerable debates on the bright and the dark sides of bank diversification. Academics and policy makers question whether non-traditional activities such as securities brokerage, insurance sales, venture capital and asset securitization can be considered as one of the root causes of the recent global financial crisis. Hence, the question of whether policy makers should restrict bank activities or allow banks to engage in diverse activities is still a debatable policy issue.

The academic literature has well addressed the implications of focus and diversification on bank performance but no consensus has been achieved yet. Some studies dedicated to the U.S. banking industry (DeLong 2001; Laeven and Levine 2007) find that the market rewards focused banks. However, the diversification discount observed in U.S. banks might not be generalized to banks located in other countries because organizational aspect and especially the ownership structure can be different. Indeed, ownership structure is not only known to be more concentrated outside the United States but also more complex (Faccio and Lang, 2002). For instance, owners can achieve control of a particular bank through a chain of shareholding relations (La Porta et al. 1999; Claessens et al. 2000). Within this kind of multilayer ownership structure, several shareholders are involved in decision making of a particular bank. Moreover, these controlling shareholders can be of different types: banks, industrial companies[3], mutual funds, insurance companies and so forth. This diversity and disparity in the set of powerful shareholders involved in the bank's decision making, qualified in this paper as *breadth of ownership*, can provide the bank initial exposure and background and therefore sufficient ability and expertise to easily diversify. Hence, diversification into non-traditional activities can improve performance for banks with already broader exposure of ownership structure.

More precisely, in this paper I take into account the disparity of ownership structure in assessing the relationship between product diversification and bank risk. Banks with diverse powerful shareholders can benefit from an initial background and knowledge allowing them to engage in modern activities without bearing high diversification costs. Hence, diversification into non-traditional activities might improve performance for banks with initial disparity of ownership. More precisely, the main hypothesis I test in this paper is that a shift towards non-traditional activities might reduce risk and improve the solvency of a bank the more diverse is its ownership structure.

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[3] Unlike the United States, industrial companies can own ownership stakes in banks.

To test this hypothesis, I use unique data on a broad set of 707 commercial banks across 17 European countries over the 2002-2010 period. To assess the breadth of bank ownership, I build the control chain (shareholding relations) for each bank. I capture the extent of bank ownership breadth by the distance between each bank and the last (ultimate) owner in the constructed control chain. The higher this distance the higher is the potential for heterogeneous set of shareholders involved in decision making and therefore the broader is the bank's ownership. A bank with sufficient initial ownership breadth might have enough expertise in new lines of businesses to which it is expanding. Hence, I differentiate banks according to their ownership broadness (banks with high- versus low-ownership breadth) and test separately whether the effect of product diversification on risk is different between banks with high- and low-ownership breadth.

This paper is related to and contributes to the literature in two ways. First, I contribute to the current literature investigating the implications of bank diversification on bank performance. To my best of knowledge, I am the first to investigate how the effect of product diversification on bank risk might be different depending on the extent of ownership breadth. Instead of investigating the effect of public versus private and domestic versus foreign dimensions of ownership as in previous studies (Berger et al. 2010, Pennathur et al. 2012), I consider the disparity of ownership structure. I investigate not only how risk effects of diversification might depend on the initial level of ownership breadth, but also the interaction between regulatory bank activity restrictions and ownership structure disparity. I thereby shed light on how more stringent activity restrictions might lead to unintended effects depending on bank ownership structure and on how these effects might be stronger for large banks. Second, by considering how the ownership organizational aspect might interact with diversification of bank activities in European countries this study highlights that the results outlined in previous studies (DeLong 2001; Laeven and Levine 2007) on the U.S. banks cannot be generalized to banks in other countries because of the differences in ownership structure. In other words, this study asserts that ignoring ownership structure when assessing the effect of product diversification on bank performance might lead to fallacious conclusions.

I find that diversification into non-traditional sources of income does not impact banks with high- and low-ownership breadth uniformly. The results indicate that while an increased share of non-interest income involves higher risk and higher insolvency risk for banks with low ownership disparity, an expansion into non-interest income generating activities reduces risk and improves the solvency of banks with high ownership breadth. Among banks with low

ownership disparity, diversification increases risk and default risk mainly for small banks expanding towards commissions and fee-based activities rather than trading income sources. However, among banks with high ownership disparity, diversification benefits are attributed to both large and small banks, regardless of whether they expand to commissions and fee-based activities or trading activities. Third, regulatory activity restrictions affect the risk of banks with high- and low-ownership breadth differently so that such an effect may change the sign depending on the extent of ownership breadth. Specifically, I find that more stringent regulatory activity restrictions are associated with lower risk and lower insolvency risk for banks with low ownership diversity, but such restrictions reduce the diversification benefits and in turn increase risk and insolvency risk in banks with high-ownership breadth in most of the cases. This study suggests that ignoring bank ownership structure might lead to fallacious decisions regarding the diversification effects on bank's riskiness and solvency.

The remainder of the paper is organized as follows. Section 2 provides a brief review of the literature on bank diversification and performance. Section 3 describes the data, defines the variables and provides some descriptive statistics. In section 4, I present the model and discuss the empirical results. In section 5, I carry out the robustness of the results. Section 6 concludes the paper.

2. Literature review

The issue of focus versus diversification is well documented in the literature, although a general consensus has not been achieved yet.

Some studies find that increased involvement in non-interest activities leads to higher profitability but also to higher risk because of the increased volatility of non-interest activities. Studies dedicated to the US banking industry (Stiroh 2004a, Stiroh 2004b, Stiroh 2006, Stiroh and Rumble 2006) find that a shift towards non-interest activities worsens the risk return trade-off. By investigating European banks, Lepetit et al. (2008) find that banks expanding into non-interest income generating activities display higher risk and higher insolvency risk. This finding is mainly attributed to smaller banks and is essentially driven by commission and fee-based activities. Similarly, Mercieca et al. (2007) find an inverse relationship between non-interest income and performance for small European banks.

Besides, some recent studies show that differences in diversification effects on the risk return trade-off are mainly driven by differences in ownership structures. Berger et al. (2010) investigate the effects of focus versus diversification on Chinese banks' performance over the

1996-2006 period. They find evidence of a diversification discount which is stronger for domestic banks than for foreign banks. Similarly, Pennathur et al. (2012) examine the impact of ownership on income diversification and risk for Indian banks over the 2001-2009 period for public sector, private domestic and foreign banks. They find that public sector banks are significantly less involved in non-interest activities. They also document that a shift to fee-based income benefits public sector banks by reducing risk and default risk.

3. Data, variables and descriptive statistics

3.1. Sample

The dataset used in this study spans the 2002-2010 period and consists of commercial banks established in 17 Western European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Bank level accounting data used in this sample are retrieved from BankScope database. For each bank, I use unconsolidated data if available, otherwise I use consolidated data instead. I identify in BankScope 1020 banks with more than three subsequent years of time series observations to accurately compute the standard deviations of some risk indicators. I also remove 313 banks for which detailed data on direct ownership[6] are not available in the annual financial statement (217 banks) or for which I fail to track backward the control chain[7] until the end (96 banks). This gives rise to a final sample of 707 European commercial banks, 130 of which are listed banks (see Table A1 in Appendix A for a breakdown of these banks by country and Table A2 for general descriptive statistics). I winsorize all bank level variables at the 1 percent and 99 percent levels to mitigate the impact of outliers[8]. To collect country level variables used in this study, I also refer to other sources such as the World Bank database. To gauge the representativeness of the final sample, I compare the aggregate total assets of the sample banks in a given country to the aggregate assets of all the banks covered by BankScope in the same country (see Table A1 in Appendix A). The mean data coverage of the final sample lies at almost 82 percent.

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[6] I define a bank to have sufficient direct ownership data if I can collect at least 50 percent of the stocks held by the shareholders or if I can ascertain that all major shareholders are in the data.
[7] See below the procedure of building the control chains.
[8] Note that I do not winsorize the variable reflecting bank age.

3.2. Ownership variables

The aim of this study is to test whether the breadth of ownership structure shapes the relationship between risk and product diversification. In this subsection, I first explain how I build the control chains of the sampled banks and then I define a measure of the breadth of ownership.

3.2.1. Building of control chains

To measure the disparity of bank ownership, I draw the control chain for each bank for the years 2004, 2006 and 2010. Building the control chains for only three years of the sample period (2004, 2006 and 2010) is not a serious restriction of the paper since ownership structure tends to be relatively stable during a short period, as noted by previous studies (e.g. La Porta et al. 1999). To build the control chains, I need to fix a control threshold which sets a minimum percentage for effective control over the intermediate and the final corporations involved in the control chain. Following previous studies (e.g. La Porta et al. 1999), I principally use a control threshold of 10 percent and I check the sensitivity of the results by increasing the control threshold to 20 percent. For a given control threshold of 10 percent, I first identify the principal shareholders (i.e. those controlling 10 percent or more) of each bank by gathering information on direct ownership from BankScope and complete it from annual reports available on the banks' web site. According to the banks' owners found at this stage, I classify the bank as controlled if it has at least one shareholder with an ownership stake equal or greater than 10 percent, otherwise the bank is said to be widely-held. To track backward the control chains and identify the ultimate controlling shareholders of the banks classified as controlled, I analyze the ownership structure of all the major shareholders (controlling 10 percent or more) identified at this first tier of the control chain. If the major shareholder is independent, i.e. she/he is not controlled by another shareholder (such as a family or a state), I consider her/him as the ultimate owner of the votes and in this case the control chain is composed from one tier. If, however, some of the major shareholders identified at this first layer of the control chain are themselves financial or non-financial corporations, I go further and search for indirect control chains to identify the ultimate owners. Since BankScope provides ownership information only on financial institutions, I use the Amadeus database as a primary source still considering data from 2004, 2006 and 2010 and complete it with information from annual reports to get ownership information on non-banking firms found as major shareholders at the intermediate tiers.

3.2.2. *Measuring the breadth of ownership structure*

After drawing the control chains of the sampled banks I define the distance between the largest ultimate controlling owner and the bank within the control chain as the rank of the tier where the bank inhabits within the multilayer structure (*POSITION*). If the bank is widely-held the variable *POSITION* takes on a value of zero. If the bank is held through one chain, directly or indirectly, the distance between the ultimate owner and the bank is equal to the rank of the tier to which the bank belongs within the control chain. In this case, the variable *POSITION* is equal to one if it is direct ownership and it takes on a value greater or equal to two if it is indirect ownership. If the bank is held through multiple chains (at least two), indirectly or both directly and indirectly, the variable *POSITION* is computed as the sum of the rank of the tiers to which the bank belongs in each chain, multiplied by the importance of this latter in terms of the cash-flow rights the ultimate owner receives; that is the proportion of cash-flow rights in a particular chain in the aggregate cash-flow rights of the ultimate owner. The cash-flow rights (CFR) are calculated as the product of all the percentages held along the control chain (La Porta et al. 1999). Formally, the variable *POSITION* is computed as follows:

$$POSITION_{it} = \sum_{k=1}^{K} RANK_{kit} \times \frac{CFR_{kit}}{CFR_{it}} \tag{1}$$

Where subscripts i, t and k refer respectively to bank, year (2004, 2006 or 2010) and the kth control chain through which the ultimate owner controls the bank. RANK is the rank of the tier where the bank inhabits (RANK=1 if the bank belongs to the first tier, RANK=2 if the bank inhabits the second tier and so on). The variable POSITION is used as a proxy for the extent of bank's ownership breadth. The farther is the bank from its ultimate owner (high value of the variable POSITION) the more diverse is the set of controlling shareholders involved in the bank's decision making and therefore the broader is the bank's ownership structure.

Figure 1 reports a simple example of a control chain to illustrate how I compute the variable POSITION. The control chain reported in this figure consists of an ultimate owner who holds a set of three banks and two industrial firms. This ultimate owner holds bank1 directly, bank2 indirectly and holds bank3 both directly and indirectly through bank1. Bank1 is situated in the first tier, therefore the distance between bank1 and the ultimate owner is equal to one (POSITION=1). As bank2 is held indirectly through one indirect chain and it inhabits the second tier of the indirect control chain, the distance between this bank and the

ultimate owner is equal to 2. As bank3 is controlled directly and indirectly (through two chains), the distance between the ultimate owner and bank3 is computed as follows. If I only consider the direct chain to Bank3, I would allocate it to the first tier and its position is equal to 1, but if I only consider the indirect chain to this bank, I would say that Bank3 belongs to the second tier and its position is equal to 2. To overcome this problem and compute the variable *POSITION* I weigh each chain (direct and indirect) by its importance in terms of the cash-flow rights the ultimate owner receives from bank3. The aggregate cash-flow rights of the ultimate owner in Bank3 are equal to 25 percent representing the sum of direct ownership (15 percent) and the product of the percentages of shares held along the indirect chain going from Bank3 to the ultimate owner (0.5*0.2=10 percent). Hence the POSITION of Bank3 is equal to $\text{POSITION}_{\text{Bank3}} = 1 \times \frac{0.15}{0.25} + 2 \times \frac{0.10}{0.25} = 1.4$.

Table 1 reports the distribution of the observations according to the distance between the bank and its ultimate owner. The data show that the ownership of European banks is substantially deep; the median value of the variable *POSITION* is equal to 3. The table also shows a substantial cross-sectional variation in ownership breadth of the banks in the sample. For example, 27.52 percent of[10] the observations refer to banks that belong to the tiers for which the rank is equal or greater than three but lower than six, and 23.27 percent of the observations relate to banks that are situated in a tier equal or greater than 6. The deeper multilayer structure of European commercial banks reaches 8. This suggests that European banks are most of the time owned through many intermediate firms between the bank and the ultimate owner. This heterogeneity in ownership structure allows me to accurately conduct the empirical analysis.

After computing the variable *POSITION*, I classify the sampled banks into two groups: banks with low breadth of ownership (low values of the variable POSITION, noted thereafter banks with low-ownership breadth) and banks with high breadth of ownership (high values of the variable POSITION, noted thereafter banks with high-ownership breadth). A bank is classified as one with high-ownership breadth (low-ownership breadth) if it is located in the tier equal or greater (lower) than three which is the median value of the variable POSITION.

I now move to define the product diversification variables used in this study and compare the degree of involvement in non-lending activities between banks with low- and high-ownership breadth.

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[10] This percentage is obtained by adding 10.40, 9.86 and 7.26.

3.3. Product diversification variables

Following previous studies (e.g. DeYoung and Roland 2001, Stiroh 2004b, Lepetit et al. 2008), I capture the degree of product diversification using bank income structure. I define the variable NNII as the share of net non-interest income to net operating income. Net non-interest income is equal to the difference between non-interest income and non-interest expenses; net operating income is the sum of net non-interest income and net interest income. To go deeper, I also disaggregate the variable NNII into two components: commission and fee income and trading income (e.g. DeYoung and Roland 2001, Stiroh 2004b, Lepetit et al. 2008). I define the variable COM as the ratio of net commission and fee income to net operating income and the variable TRAD as the ratio of net trading income to net operating income.

Table 2 reports the descriptive statistics on income structure for the full sample of European commercial banks and for the subsamples of banks with low- and high-ownership breadth. Considering the full sample, the data show that over the 2002-2010 period, the share of net non-interest income in net total operating income is, on average, 36 percent. Most of net non-interest income comes from commissions and fee-based activities (30.18 percent) rather than trading activities (5.81 percent). The data also show that the degree of involvement in non-interest activities is different according to the extent of bank ownership disparity. The data indicate that banks with low-ownership disparity have on average higher net non-interest income to operating income than banks with high-ownership disparity. When I focus on the different sources of non-traditional income, the result holds for fee-based income as well as for trading activities. The data also show sufficient heterogeneity in the diversification variables within the subsamples of banks with low- and high-ownership breadth, allowing me to accurately conduct the analysis.

I now move to define the measures used to capture bank riskiness and the regulatory environment, compare risk-taking between banks with low- and high-ownership breadth for a given level of product diversification and a given degree of regulatory activity restrictions.

3.4. Risk and Regulatory variables

I consider different measures of asset risk and default risk commonly used in the literature. Using annual accounting data, I calculate three measures of asset risk for each bank throughout the period 2002-2010: (i) 3 year-rolling window standard deviation of the return

on average assets (SDROA), (ii) 3 year-rolling window standard deviation of the return on average equity[13] (SDROE), (ii) the ratio of loan loss provisions to net loans (LLP). Higher values of these measures indicate higher risk. As default risk measures, I firstly compute the Z-score (Z) as proposed by Boyd and Graham (1986)[14]. As an alternative measure of default risk, I also compute ZP score as in Goyeau and Tarazi (1992) and Lepetit et al. (2008) as well as its two additive components (ZP1 and ZP2)[15]. ZP1 is a measure of portfolio risk and ZP2 is a measure of leverage risk. Higher values of these measures indicate lower probability of failure.

Table 3 reports the descriptive statistics of accounting risk variables for the full sample of European commercial banks and for the subsamples of banks with low- and high-ownership breadth. On the whole, the data show that banks high-ownership breadth are more risky than banks with low-ownership breadth whatever the risk-taking proxy I use.

Table 4 reports the mean values of accounting risk measures by income diversification and the degree of ownership breadth. I divide the subsamples of banks with low- and high-ownership breadth into the top (Q_{75}) and the bottom (Q_{25}) quartiles of each product diversification variable; that is NNII, COM and TRAD. For each quartile, I report and compare the level of accounting risk and insolvency risk for each considered subsample. The data show strong evidence on how the degree of ownership breadth affects the relationship between income diversification and bank risk. I observe marked differences of the impact of diversification on bank risk in the subsamples of banks with low- and high-ownership breadth. Banks with low-ownership breadth display higher risk and higher insolvency risk when they expand to non-interest income generating activities (NNII). This high level of risk is mainly driven by the increased reliance on fee-based activities (COM). However, this relationship between diversification and risk is reversed in the subsample of banks with high-ownership breadth. The statistics show that a shift to non-traditional activities reduces risk and insolvency risk for banks with high-ownership breadth. As shown in Table 4, this result is implied by increased involvement in both commissions and fee-based activities or trading activities.

To measure the regulatory restrictions on banks' ability to engage in non-traditional activities I use the index from Barth et al. (2007) database, noted thereafter RESTRICT. This

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[13] I compute average assets and average equity at time t as (amount outstanding at time t + amount outstanding at time t-1)/2.

[14] Z=(100+average ROE)/SDROE, where ROE and SDROE are expressed in percentages.

[15] $ZP = ZP1 + ZP2 = \frac{\text{average ROA}}{\text{SDROA}} + \frac{\text{average equity/average assets}}{\text{SDROA}}$

index measures regulatory impediments to banks to engage in the following activities (1) securities market activities, (2) insurance business, (3) to conduct real estate activities, or to (4) own non-financial firms. This database classifies the degree of supervisory restrictions for each activity into four categories: unrestricted, permitted, restricted and prohibited. To construct the index, I convert the degree of restriction to a range of values from 0 to 3. For each activity, I assign a value of 0 if it is unrestricted, a value of 1 if it is permitted, a value of 2 if it is restricted and finally a value of 3 if it is prohibited. Then I add the obtained values across the four activities to get an aggregate index (RESTRICT) for each country included in the sample. Given this definition, higher values of the index will indicate that banks face more stringent restriction to undertake non-traditional activities. The obtained index ranges from 0 (the United Kingdom) to 8 (Italy and Portugal) with a median value of 4.

Table 5 reports the mean values of accounting risk measures by the degree of activity restrictions and ownership structure. I divide the subsamples of banks with low- and high-ownership breadth according to the median value of activity restrictions index (RESTRICT). I report and compare the level of accounting risk and insolvency risk for above- and below-median values of the index in each considered subsample. The table indicates that banks with low-ownership breadth headquartered in countries with below-median value of activity restrictions index (RESTRICT) have a significantly higher risk and higher default risk than banks with low-ownership breadth located in countries with above-median value of activity restrictions index, involving that more stringent activity restrictions reduce risk and insolvency risk in banks with low-ownership breadth. However, banks with high-ownership breadth established in countries with below-median value of activity restrictions significantly exhibit lower risk and lower default risk than banks with high-ownership breadth situated in countries with above-median value of activity restrictions index, suggesting that unlike banks with low-ownership breadth, more stringent activity restrictions increase risk and insolvency risk in banks with high-ownership breadth.

I now move to test how the degree of ownership breadth might shape the relationship between bank diversification and risk.

4. Method and results

In this section, I first present the empirical model used in this study. Then I test whether the impact of income diversification and the effect of regulatory activity restrictions on bank risk depend on the degree of ownership breadth. Finally, to take the investigation further, I also examine the effect of bank size on both relationships.

4.1. Model

To test whether the effect of diversification on risk depends on the degree of disparity of ownership structure, I run regressions separately on the subsamples of banks with low-and high-ownership breadth. For this purpose, I specify the following model:

$$RISK_{it} = \beta_0 + \beta_1 DIVERS_{it} + \beta_4 RESTRICT_c + \alpha\, CONTROLS$$
$$+ \sum_{t=2}^{8} \varphi_t \tau_t + \varepsilon_{it} \tag{2}$$

Where $RISK_{it}$ is a measure of risk (SDROA, SDROE or LLP) or default risk (Z, ZP, ZP1 or ZP2); $DIVERS_{it}$ is a measure of each income diversification (NNII, COM and TRAD); $RESTRICT_c$ is the index of regulatory restrictions on bank activities in a given country. $CONTROLS_{it}$ is a collection of control variables[16], either at the bank level or at the country level, including the following: $LnTA_{it}$ is the natural logarithm of total assets; ROE_{it} is the return on equity; $OEQTA_{it}$ is the ratio of equity to total assets orthogonalized[17] with $LnTA_{it}$; $GRTA_{it}$ is the annual growth rate of total assets; $LnAGE_{it}$ is the natural logarithm of bank age; $LISTED_{it}$ is a dummy variable which is equal to one if the banks is listed, and zero otherwise; $STATE_{it}$ is a dummy variable which is equal to one if the bank's ultimate owner is a government, and zero otherwise; the regulatory capital stringency index (CAPINDEX); the deposit insurance coverage ratio (DEPCOV) and the growth rate of real GDP (GDPG)[18]. τ_t is a set of year dummies. ε_{it} is the error term.

I estimate Equation (2) using random effects model with robust standard errors since according to the Fischer test data are not homogenous in the individual dimension and as the Hausman test accepts the null hypothesis of exogeneity of the regressors.

4.2. Breadth of ownership structure, product diversification and bank risk

Tables 6 and 7 report the results for subsamples of banks with low- (426 banks) and high-ownership breadth (446 banks) when the diversification variables are respectively NNII or COM and TRAD. The results reveal that for banks low-ownership breadth (Table 6), an increase in the share of non-interest income (NNII) is associated with higher risk; the coefficient on the independent variable NNII is significant with a positive sign when the dependent variable is a risk indicator (SDROA, SDROE or LLP) and it is significant with a

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[16] See Table A3 in Appendix A for the definition of the variables.
[17] See Table A4 in Appendix A for the correlation among the variables.
[18] Note that I do not include the anti-director index (RIGHTS) computed in La porta et al. (1998) because in my sample this index is highly correlated with CAPINDEX and DEPCOV.

negative sign when the dependent variable is an insolvency risk measure (Z, ZP or ZP2). This result is consistent with previous studies (Lepetit et al. 2008). Based on the specification with the standard deviation of ROA as the dependent variable (SDROA), a one standard deviation increase (27.95) in the share of non-interest income (NNII) increases the risk-taking proxy by almost 27.05 percent of its mean (from 0.62 to 0.79) for banks with low-ownership breadth[21]. Regarding insolvency risk measures, the economic impact of non-interest income activities on the Z-score (Z) is also important; a one standard deviation increase in the ratio of non-interest income (NNII) reduces the Z-score by 7.60 percent of its mean (from 82.76 to 76.47) for banks with low-ownership breadth, involving higher risk of default. The results in Table 6 also show that for banks with high-ownership breadth the coefficient of the independent variable $NNII_{it}$ is significant whatever the dependent variable I consider. In all the regressions, this coefficient has a sign opposite to the one of the share of non-interest income (NNII) in the subsample of banks with low-ownership breadth. It is negative when the dependent variable is a risk indicator (SDROA, SDROE or LLP) and positive when the dependent variable is an insolvency risk indicator (Z, ZP, ZP1 or ZP2). These results suggest that unlike banks with low-ownership breadth, expansion into non-traditional activities reduces risk and improves the solvency of banks with high-ownership breadth. Considering the specification where the risk-taking proxy is the standard deviation of ROA (SDROA), a one standard deviation (27.86) increase in the share of non-interest income (NNII) decreases the risk-taking proxy by 48.59 percent of its mean (from 0.86 to 0.44) for banks with high-ownership breadth. The increase in the Z-score (Z) amounts to 13.37 percent of its mean (from 61.46 to 69.68).

The results also indicate that more stringent regulatory restrictions on bank activities is traduced by lower risk and lower default risk for banks with low-ownership breadth; the coefficient associated to the independent variable RESTRICT is significant (at least at the 10% confidence level) and negative when the dependent variable is a risk indicator and positive when the dependent variable is a default risk measure. For example, the specification where the risk-taking proxy is the volatility of the return on assets (SDROA) suggests that the risk of a bank with low-ownership breadth decreases by almost 20.84 percent of its mean (from 0.62 to 0.49) if there is a one standard deviation increase in activity restrictions index (2.19). Similarly, the regression where the risk-taking is Z-score suggests that the risk-taking proxy (Z) of a bank with low-ownership breadth increases by almost 11.92 percent of its

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[21] The calculation is as follows: $\frac{\partial \text{SDROA}}{\partial \text{NNII}} = 0.006 \times 27.95 \approx 0.17$

mean (from 82.76 to 92.62) if there is a one standard deviation increase in activity restrictions index (2.19), involving an improvement in its solvency. However, the sign of the relation between regulatory activity restrictions index and risk is reversed for banks with high-ownership breadth. As indicated in Table 6, it is significant and positive when the risk proxy is a risk indicator (SDROA) and negative when bank risk is measured by Z-score (Z). This means that while policy makers in many countries attempt to reduce bank risk by restricting banks from engaging in non-traditional activities, this study suggests that this regulation might have an unexpected effect as it eliminates the potential diversification benefits on the risk of banks with high-ownership breadth. Considering the regression where the dependent variable is the volatility of the return on assets, a one standard deviation increase in regulatory activity restrictions index (2.19) is associated with an increase in the risk-taking proxy (SDROA) by almost 33.61 percent of its mean (from 0.86 to 1.15). Similarly, a one standard deviation increase in regulatory activity restrictions index (2.19) is associated with a decrease in the insolvency risk proxy (Z) by 6.80 percent of its mean (from 61.46 to 65.64).

When investigating the impact of detailed breakdown of fee-based and trading activities (Table 7) on risk, I find that the increased risk for banks with low-ownership breadth is mainly driven by commission and fee activities. The coefficient on trading income (TRAD) turns out to be non-significant in some regressions (SDROE and Z) and when it is significant its magnitude is lower than that associated to the variable reflecting commission and fee-based income (COM). This result is also consistent with the finding of Lepetit et al. (2008) which find that the increased risk implied by the expansion into non-traditional activities is mainly attributed to commission and fee activities. Based on the specification with the standard deviation of ROA as the dependent variable (SDROA), a one standard deviation increase (23.44) in the share of fee-based income (COM) increases the risk-taking proxy by 22.68 percent of its mean (from 0.62 to 0.76) for banks with low-ownership breadth whereas this increase amounts only 11.14 of its mean for a one standard deviation (17.27) increase in the share of trading activities (TRAD). In the regression where risk is measured by Z-score, a one standard deviation increase in COM decreases the Z-score (Z) by 6.72 percent of its mean (from 82.76 to 77.20). Similarly, the decrease in risk-taking for banks with high-ownership breadth is mainly implied by the increase in the share of fee-based activities; the coefficient reflecting the impact of trading activities carries the same sign as that associated to fee-based activities (COM) but it is statistically non-significant in some regressions, except when the risk proxy is SDROA, LLP or Z. In terms of economic importance, considering the

specification where the risk-taking is measured by the standard deviation of ROA (SDROA), a one standard deviation (24.23) increase in commission and fee-based income (COM) reduces the risk-taking proxy by 30.99 percent of its mean (from 0.86 to 0.59) for banks with high-ownership breadth. Similarly, when I focus on the regression where the Z-score is the insolvency risk proxy, a one standard deviation increase in the share of commission and fee-based income (COM) is traduced by an increase in the Z-score proxy (Z) by 9.58 percent of its mean (from 61.46 to 67.35).

On the whole, these results suggest that the impact of product diversification on bank risk is different according to the bank's ownership breadth, specifically on whether the bank is situated near or far with regards to its ultimate owner. Hence, while a shift towards non-traditional activities increases bank risk and the likelihood to default for banks with low ownership disparity, an increase in the share of non-interest income leads to a reduction in the riskiness and an improvement in the solvency of banks with high breadth of ownership. The results have shown that the increase and the decrease in bank risk for respectively banks with low and high ownership disparity are mainly driven by the increased reliance on commissions and fee-based activities rather than trading activities. The results also indicate that more stringent regulatory restrictions on bank activities are associated with significantly lower risk and insolvency risk when the bank has low initial background in terms of ownership openness but with significantly greater risk if the bank starts with sufficient ownership breadth. This result suggests that the same regulation on activity restrictions might have different effects according to the degree of initial ownership disparity and therefore ignoring bank ownership might lead to unintended effects of the regulation that policymakers are setting.

To be consistent with previous studies documenting that bank size might affect the relationship between diversification and risk; I below investigate the effect of bank size.

4.3. Large versus small banks: the impact of bank size

To take my investigation deeper, I also run the regressions separately for subsamples of large and small banks. For this purpose, I divide the subsamples of banks with low- and high-ownership breadth into large and small banks according to the median value of total assets in each considered subsample[22]. The results are reported in Table 7 for both product diversification variables (NNII, COM and TRAD). The results reveal that the impact of non-interest activities on bank risk is different for large and small banks. Specifically, the results

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[22] See the descriptive statistics on large and small banks in Table A5 in Appendix A.

indicate that for large banks with low-ownership breadth, an increase in the share of non-interest activities, either when it is measured by the aggregate variable NNII or when it is disaggregated into its both components (COM and TRAD), does not significantly affect bank risk and its solvency in almost all the regressions regardless of the risk proxy. However, large banks with high-ownership breadth still benefit from portfolio diversification by reducing their risk and improving their solvency. The size effect on the relationship between diversification and risk is reversed for small banks depending on the degree of their ownership disparity. Small banks with low ownership disparity are exposed to higher risk (SDROA, SDROE and LLP) and to higher default risk (Z, ZP, ZP1 and ZP2) when they shift to non-traditional activities. While the effect on bank risk indicators (SDROA, SDROE and LLP) is only driven by the increased reliance on commission and fee-based activities, the increased default risk for these banks is attributed to both components; commission and fee-based activities and trading activities, but with a relatively higher economic effect of trading activities (the coefficient magnitude). Turning to small banks with great ownership disparity, the results show that an expansion towards non-traditional activities reduces bank risk measured by SDROA, SDROE and LLP and improves the solvency although the effect on default risk is marginally significant. The decrease in bank risk is induced by both commission and fee-based activities and trading activities but the improvement in solvency is mainly attributed to commission and fee-based activities. These results suggest that provided high initial ownership breadth of the bank, an expansion towards non-traditional activities benefits both large and small banks.

5. Robustness Checks

The results support the conjecture that the diversification effect on bank risk is different depending on the breadth of bank ownership structure. In this section, I check the robustness of the results by performing some sensitivity analyses. The estimations results are reported in Appendix B.

First, I change the control threshold and use 20 percent instead of 10 percent. This robustness allows me to check whether the results are sensitive to the control cutoff used to build the control chains. The increase in the control threshold quantitatively and qualitatively modifies the database. Hence, when I recalculate the variables with a minimum cutoff of 20 percent for the voting rights instead of 10 percent, not only the proportion of banks that are considered as widely-held increases, but also the proportions of the type of the largest

ultimate controlling owner change. Considering this new control threshold does not affect the main conclusions at a threshold of 10 percent (see Table B1 in Appendix B).

Third, instead of using country-level variables as previously done; I here capture county specificities using country dummies. Considering these alternative control variables leads to similar results (see Table B2 in Appendix B).

Finally, I exclude from the initial sample widely-held banks. The results, almost similar to those previously found, are reported in Table B3 in Appendix B.

6. Conclusion

In this paper, I empirically test whether the degree of ownership breadth affects the relationship between risk and product diversification using an unbalanced panel of 707 commercial banks established in 17 Western European countries over the 2002-2010 period.

The results show that the diversification effect on bank risk is different according to the extent of ownership disparity. Specifically, while banks with low-ownership disparity expanding towards non-traditional activities exhibit higher risk and higher insolvency risk, increased reliance on non-interest income generating activities reduces risk and improves the solvency of banks with high-ownership breadth. Furthermore, the impact of regulatory restrictions on bank activities depends substantially on the bank's ownership structure disparity. Indeed, the effect of the same level of regulatory restrictions on activities on a bank's risk-taking can be positive or negative depending on whether the bank has an initial low- or high-ownership breadth. I find that more stringent regulatory activity restrictions reduce risk and improve the solvency of banks for which ownership is not as broader, but such restrictions reduce the diversification benefits and consequently they increase risk and insolvency risk for banks with enough ownership disparity. The results are robust even when conditioning for several bank and country levels variables.

This study suggests that ignoring bank ownership structure might lead to erroneous conclusions regarding the diversification effects on bank's riskiness and solvency. My analysis provides some perspectives to help the policy makers in the discussion of policies regarding the debatable issue of whether banks should be diversified or focused.

References

Barth, J. R., G. C. Jr. and R. Levine (2001) The Regulation and Supervision of Banks Around the World: A New Database. World Bank Database

Barth, J. R., G. C. Jr. and R. Levine (2007) Bank regulation and supervision. World Bank Database

Berger, A. N., I. Hasan and M. Zhou (2010) The effects of focus versus diversification on bank performance: Evidence from Chinese banks. Journal of Banking & Finance, 34, 1417-1435.

Boyd, J. H. and S. L. Graham (1986) Risk, regulation, and bank holding company expansion into nonbanking. Quarterly Review, spring 2-17

Claessens, S., Djankov, S., and Lang, L.H.. (2000). The separation of ownership and control in East Asian corporations. J. Financ. Econ. 58, 81–112.

DeLong, G.L. (2001). Stockholder gains from focusing versus diversifying bank mergers. Journal of Financial Economics 59, 221–252.

DeYoung, R. and T. Rice (2004) Noninterest Income and Financial Performance at U.S. Commercial Banks. The Financial Review, 39, 101-127.

DeYoung, R. and K. P. Roland (2001) Product Mix and Earnings Volatility at Commercial Banks: Evidence from a Degree of Total Leverage Model. Journal of Financial Intermediation, 10, 54-84.

Faccio, M. and L. H. P. Lang (2002) The ultimate ownership of Western European corporations. Journal of Financial Economics, 65, 365–395.

La Porta, R., Florencio Lopez de Silanes, Andrei Shleifer and Robert W. Vishny (1998) Law and Finance. Journal of Political Economy, 106, 1113-1155.

La Porta, R., F. Lopez-de-Silanes and A. Shleifer (1999) Corporate Ownership around the World. Journal of Finance, 54, 471-517.

Laeven, L., and Levine, R. (2007). Is there a diversification discount in financial conglomerates? Journal of Financial Economics 85, 331–367.

Lepetit, L., E. Nys, P. Rous and A. Tarazi (2008) Bank income structure and risk: An empirical analysis of European banks. Journal of Banking & Finance, 32, 1452-1467.

Pennathur, A. K., V. Subrahmanyam and S. Vishwasrao (2012) Income diversification and risk: Does ownership matter? An empirical examination of Indian banks. Journal of Banking & Finance, 36, 2203-2215.

Stiroh, K. (2004a) Do Community Banks Benefit from Diversification? Journal of Financial Services Research, 25, 135-160.

Stiroh, K. (2004b) Diversification in banking: is noninterest income the answer? Journal of Money, Credit, and Banking, 36, 853-882.

Stiroh, K. (2006) New Evidence on the Determinants of Bank Risk. Journal of Financial Services Research, 30, 237-263.

Stiroh, K. J. and A. Rumble (2006) The dark side of diversification: The case of US financial holding companies. Journal of Banking & Finance, 30, 2131-2161.

Figure 1: Example of a control chain (control threshold of 10%)
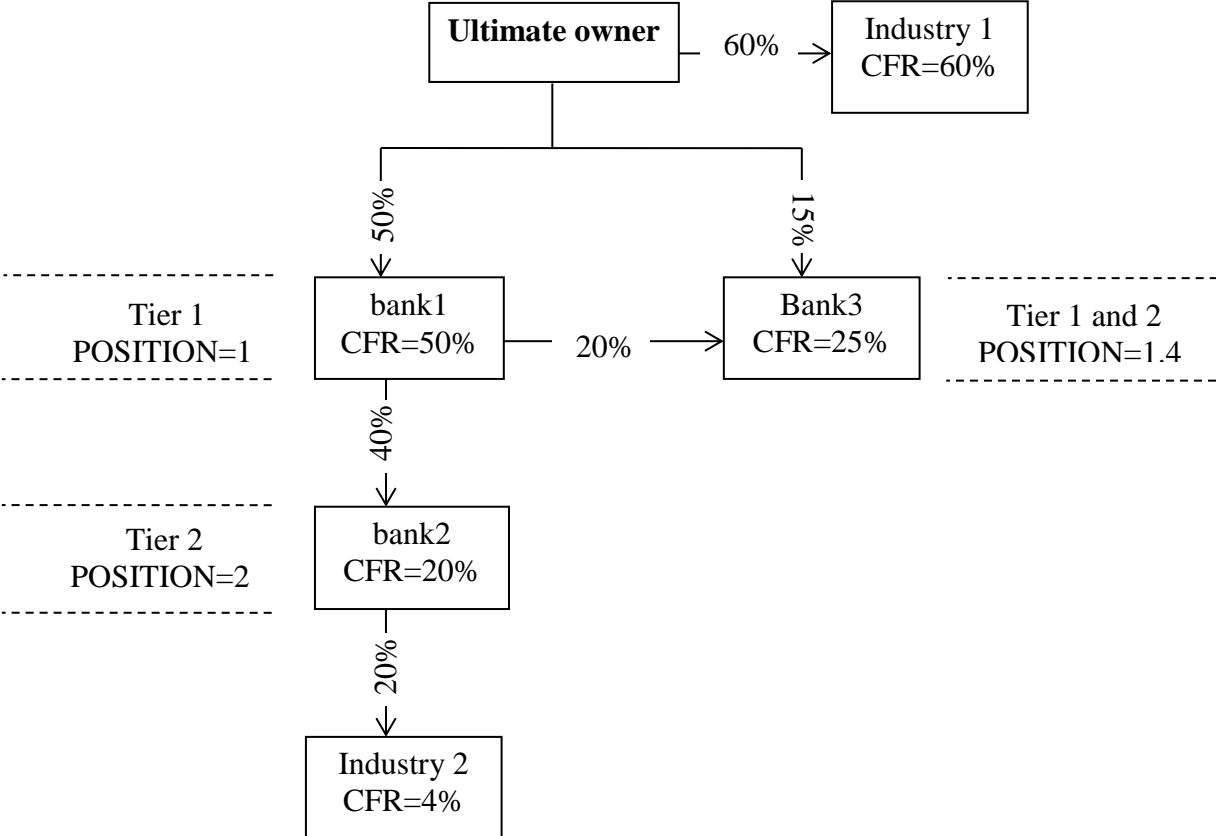
Variables definition: CFR=the cash-flow rights of the bank' ultimate owner; POSITION=the distance between the ultimate owner and the bank.

Table 1. Distribution of the sample according to the banks' locations in the control chain (10% control threshold) for the years 2004, 2006 and 2010

Tiers	[0,1[	[1,2[	[2,3[	[3,4[	[4,5[	[5,6[	[6,7[	[7,8[	Tier 8
Number of observations	474	859	659	421	399	294	304	327	311
Percentage of observations	11.71	21.22	16.28	10.40	9.86	7.26	7.51	8.08	7.68

10% is the control threshold used to build the control chains.

Table 2: Income diversification by ownership breadth, on average, over the 2002-2010 period

	NNII	TRAD	COM
Full sample (4,048 year observations)			
Mean	36	5.81	30.18
Median	33.33	1.33	26.95
Standard deviation	27.95	16.05	23.86
Minimum	-53.27	-42.82	-37.50
Maximum	104.76	100	100
Banks with low-ownership breadth (1,992 year observations)			
Mean	37.65	6.42	31.17
Median	33.33	2.04	26.92
Standard deviation	27.95	17.27	23.44
Minimum	-53.27	-42.82	-37.50
Maximum	104.76	100	100
Banks with high-ownership breadth (2,056 year observations)			
Mean	34.40	5.22	29.22
Median	33.33	0.60	27.04
Standard deviation	27.86	14.74	24.23
Minimum	-53.27	-42.82	-37.50
Maximum	98.22	99.32	95.24
T-statistics of the mean test of banks with low- vs. high-ownership breadth	3.71***	2.39**	2.60***

T-statistics test for the null: "The degree of product diversification is not different between the subsamples of banks with low- and high-ownership breadth". ***, ** and * indicate significance, respectively, at the 1%, 5% and 10% levels for a bilateral test.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definition: NNII = ratio of net non-interest income to net operating income; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income.

Table 3: Accounting risk measures by ownership, on average, over the 2002-2010 period

	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
Full sample (4,048 year observations)							
Mean	0.74	6.25	0.77	71.94	67.87	6.38	63.83
Median	0.23	2.78	0.29	35.52	32.57	2.70	28.96
Standard deviation	2.46	14.26	2.12	97.44	94.73	14.98	92.92
Minimum	0.01	0.05	-3.09	1.08	0.42	-9.87	0.04
Maximum	57.07	191.53	16.87	409.11	396.11	199.49	398.57
Banks with low-ownership breadth (1,992 year observations)							
Mean	0.62	6.01	0.76	82.76	81.86	7.39	77.51
Median	0.21	2.66	0.41	41.66	38.87	3.31	34.89
Standard deviation	1.38	13.55	2.43	105.86	104.92	16.23	103.55
Minimum	0.01	0.05	-3.09	1.14	0.42	-9.87	0.04
Maximum	14	191.53	16.87	409.11	396.11	199.49	398.57
Banks with high-ownership breadth (2,056 year observations)							
Mean	0.86	6.50	0.79	61.46	54.33	5.39	50.57
Median	0.24	2.90	0.14	30.12	25.64	2.18	22.72
Standard deviation	3.17	14.91	1.74	87.28	81.45	13.60	79.10
Minimum	0.01	0.05	-3.09	1.08	0.44	-4.88	0.04
Maximum	57.07	191.53	16.87	409.11	396.11	199.49	398.57
T-statistics of the mean test of banks with low- vs. high-ownership breadth	-3.09***	-1.09	-1.06	6.99***	9.34***	4.25***	9.31***

T-statistics test for the null: "Risk is not different between the subsamples of banks with low- and high-ownership breadth".
***, ** and * indicate significance, respectively, at the 1%, 5% and 10% levels for a bilateral test.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definition: SDROA = standard deviation of the return on average assets; SDROE = standard deviation of the return on average equity; LLP =ratio of loan loss provisions to net loans; Z = Z-score; ZP = ZP-score; ZP1= measure of bank portfolio risk; ZP2 = measure of leverage risk.

Table 4: Accounting risk measures and income diversification by ownership breadth, on average, over the 2002-2010 period

	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
Banks with low-ownership breadth (1,992 year observations)							
NNII> Q_{75} (498 observations)	1.20	8.89	1.54	73.41	68.29	5.83	64.08
NNII< Q_{25} (498 observations)	0.45	5.51	1.01	97.95	98.50	8.60	94.70
T-statistics of the mean test	7.04[***]	3.24[***]	2.70[***]	-3.49[***]	-4.39[***]	-2.74[***]	-4.50[***]
COM > Q_{75} (498 observations)	1.18	8.62	1.72	72.44	66.78	5.57	62.88
COM < Q_{25} (498 observations)	0.52	6.32	0.98	99.26	99.51	9.14	95.50
T-statistic of the mean test	5.83[***]	2.04[**]	3.66[***]	-3.76[***]	-4.76[***]	-3.48[***]	-4.78[***]
TRAD > Q_{75} (498 observations)	0.79	6.20	0.87	68.43	65.31	6.80	60.93
TRAD < Q_{25} (498 observations)	0.64	6.50	1.15	75.59	76.22	6.58	72.80
T-statistics of the mean test	1.56	-0.35	-1.89[*]	-1.16	-1.66[*]	0.23	-1.95[*]
Banks with high-ownership breadth (2,056 year observations)							
NNII> Q_{75} (514 observations)	0.67	4.38	0.10	65.99	51.82	5.55	47.63
NNII< Q_{25} (514 observations)	1.77	9.42	0.87	45.76	27.07	2.61	24.25
T-statistic of the mean test	-4.46[***]	-4.66[***]	-8.64[***]	4.19[***]	6.80[***]	5.13[***]	6.80[***]
COM > Q_{75} (514 observations)	0.64	4.61	0.09	65.18	54.24	5.99	49.83
COM < Q_{25} (514 observations)	1.55	8.07	0.71	47.60	31.36	3.06	28.92
T-statistic of the mean test	-4.53[***]	-3.67[***]	-6.31[***]	3.62[***]	5.82[***]	4.23[***]	5.57[***]
TRAD > Q_{75} (514 observations)	0.72	5.45	0.25	62.51	57.25	5.37	53.44
TRAD < Q_{25} (514 observations)	1.28	8.98	0.86	49.00	44.20	3.54	40.95
T-statistics of the mean test	-2.60[***]	-3.52[***]	-5.08[***]	2.67[**]	2.75[***]	3.26[***]	2.72[***]

T-statistics test for the null: "Risk or Insolvency risk is not different between the top (Q75) and the bottom (Q25) quartiles of product diversification in each considered subsample". ***, ** and * indicate significance, respectively, at the 1%, 5% and 10% levels for a bilateral test.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definition: NNII = ratio of net non-interest income to net operating income; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income; SDROA = standard deviation of the return on average assets; SDROE = standard deviation of the return on average equity; LLP =ratio of loan loss provisions to net loans; Z = Z-score; ZP = ZP-score; ZP1 = measure of bank portfolio risk; ZP2 = measure of leverage risk.

Table 5: Accounting risk measures and regulatory activity restrictions by ownership breadth, on average, over the 2002-2010 period

	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
Banks with low-ownership breadth (1,992 year observations)							
RESTRICT< Q_{50} (883 observations)	0.62	6.36	1.29	72.97	72.00	6.42	67.64
RESTRICT>= Q_{50} (1109 observations)	0.62	5.72	0.76	90.55	89.70	8.17	85.36
T-statistic of the mean test	0.01	1.05	4.83[***]	-3.69[***]	-3.75[***]	-2.39[**]	-3.81[***]
Banks with high-ownership breadth (2,056 observations)							
RESTRICT< Q_{50} (969 observations)	0.95	6.10	0.46	59.78	54.65	9.85	50.96
RESTRICT>= Q_{50} (1087 observations)	0.76	6.94	0.67	62.96	34.04	5.87	44.23
T-statistics of the mean test	1.39	1.28	-2.83[***]	-0.82	5.16[***]	4.69[***]	2.21[**]

T-statistics test for the null: "Risk or Insolvency risk is not different between the below (< Q50) and the above (> Q50) median values of regulatory activity restrictions index in each considered subsample". ***, ** and * indicate significance, respectively, at the 1%, 5% and 10% levels for a bilateral test.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definition: RESTRICT=regulatory restrictions index; SDROA = standard deviation of the return on average assets; SDROE = standard deviation of the return on average equity; LLP =ratio of loan loss provisions to net loans; Z = Z-score; ZP = ZP-score; ZP1 = measure of bank portfolio risk; ZP2 = measure of leverage risk.

Table 5: Breadth of ownership, income diversification and bank risk (2002-2010)

Model: $RISK_{it} = \beta_0 + \beta_1 NNII_{it} + \beta_2 RESTRICT_c + \alpha\,CONTROLS + \sum_{t=2}^{8}\varphi_t\tau_t + \varepsilon_{it}$

| | Banks with low-ownership breadth (426 and 1,992 year observations) | | | | | | | Banks with high-ownership breadth (446 banks and 2,056 year observations) | | | | | | |
| | Risk measures | | | Default risk measures | | | | Risk measures | | | Default risk measures | | | |
	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
NNII	0.006***	0.061**	0.008***	-0.225**	-0.283**	-0.020	-0.283***	-0.015***	-0.073***	-0.008***	0.295***	0.274***	0.023***	0.258***
	(0.00)	(0.01)	(0.00)	(0.04)	(0.01)	(0.13)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
RESTRICT	-0.059*	-0.543**	-0.107*	4.503**	6.463***	0.523*	6.374***	0.132**	0.397	-0.045	-1.910**	-1.185	-0.105	-1.094
	(0.07)	(0.05)	(0.10)	(0.03)	(0.00)	(0.06)	(0.00)	(0.04)	(0.40)	(0.20)	(0.03)	(0.38)	(0.57)	(0.39)
LnTA	-0.087***	0.290	-0.127***	-2.500*	-1.592	0.236	-1.836	-0.262***	-0.358	0.000	-0.448	-0.019	0.095	-0.026
	(0.00)	(0.19)	(0.01)	(0.08)	(0.27)	(0.24)	(0.20)	(0.00)	(0.24)	(0.99)	(0.73)	(0.99)	(0.52)	(0.98)
ROE	-0.016*	-0.202*	-0.059***	-0.164	-0.158	0.119***	-0.299**	-0.005	-0.141**	-0.030***	0.227**	0.236**	0.119***	0.126
	(0.07)	(0.10)	(0.00)	(0.27)	(0.24)	(0.00)	(0.03)	(0.60)	(0.05)	(0.00)	(0.03)	(0.01)	(0.00)	(0.16)
OEQTA	0.397***	-0.142	0.194	-0.191	-0.540	-1.169***	0.003	0.048	-1.344**	-0.087**	5.072	6.728**	0.023	6.949**
	(0.00)	(0.79)	(0.31)	(0.96)	(0.87)	(0.00)	(1.00)	(0.47)	(0.01)	(0.04)	(0.12)	(0.01)	(0.94)	(0.01)
GRTA	0.002	-0.016	-0.000	-0.114	-0.152**	-0.017	-0.161**	0.000	-0.042*	-0.003	0.032	-0.035	-0.010	-0.038
	(0.16)	(0.19)	(0.89)	(0.12)	(0.02)	(0.13)	(0.01)	(0.93)	(0.09)	(0.14)	(0.50)	(0.45)	(0.10)	(0.40)
LnAGE	-0.012	-0.187	0.057	-0.719	-1.967	-0.433	-2.298	-0.002	0.522	-0.008	-3.347	-1.776	-0.058	-2.150
	(0.70)	(0.52)	(0.38)	(0.81)	(0.48)	(0.29)	(0.41)	(0.99)	(0.22)	(0.84)	(0.19)	(0.44)	(0.87)	(0.35)
LISTED	0.105	0.259	0.005	-17.731*	-8.640	0.619	-9.086	0.241	2.930	0.192	-3.045	0.585	1.724	0.315
	(0.49)	(0.79)	(0.98)	(0.07)	(0.37)	(0.54)	(0.34)	(0.34)	(0.11)	(0.28)	(0.78)	(0.96)	(0.28)	(0.98)
STATE	0.096	3.187	0.302	-1.040	-7.946	0.388	-7.310	-0.239	-0.312	-0.000	-2.131	1.522	0.616	1.100
	(0.70)	(0.32)	(0.45)	(0.95)	(0.60)	(0.88)	(0.63)	(0.24)	(0.82)	(1.00)	(0.81)	(0.84)	(0.62)	(0.88)
CAPINDEX	0.063*	0.604**	-0.008	2.877	5.358**	0.837**	5.484**	-0.065	-0.110	-0.003	6.927***	3.201**	0.365**	2.995*
	(0.05)	(0.05)	(0.87)	(0.27)	(0.04)	(0.02)	(0.03)	(0.48)	(0.80)	(0.93)	(0.00)	(0.04)	(0.05)	(0.05)
DEPCOV	0.095**	0.706	0.072	-10.514***	-12.840***	-1.326***	-12.610***	0.306*	-0.332	-0.026	-10.875***	-10.499***	-1.068***	-9.734***
	(0.04)	(0.14)	(0.37)	(0.00)	(0.00)	(0.01)	(0.00)	(0.07)	(0.58)	(0.62)	(0.00)	(0.00)	(0.01)	(0.00)
GDPG	-0.026	-0.669	-0.031	1.636	2.661*	0.432**	2.439*	0.052	-0.397	-0.131***	-1.752	-2.164	-0.157	-1.699
	(0.43)	(0.17)	(0.52)	(0.23)	(0.07)	(0.05)	(0.09)	(0.59)	(0.41)	(0.01)	(0.31)	(0.17)	(0.47)	(0.28)
INTERCEPT	1.002***	3.591	2.111***	88.733***	68.121***	0.530	67.637***	2.893***	12.872***	1.407***	43.961***	50.064***	1.642	48.330***
	(0.00)	(0.27)	(0.00)	(0.00)	(0.00)	(0.86)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.45)	(0.00)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.196	0.064	0.170	0.093	0.110	0.080	0.114	0.047	0.066	0.155	0.071	0.062	0.060	0.059

P-values are shown in parentheses; ***, ** and * indicate significance, respectively, at the 1%, 5% and 10% levels.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than two.

Variables definition: SDROA= standard deviation of the return on average assets; SDROE= standard deviation of the return on average equity; Z= Z-score; ZP= ZP-score; ZP1= measure of bank portfolio risk; ZP2 = measure of leverage risk; NNII = ratio of net non-interest income to net operating income; LnTA = natural logarithm of total assets; ROE=return on equity; OEQTA=ratio of total equity to total assets orthogonalized with LnTA ; GRTA=annual growth rate of total assets; LnAGE=natural logarithm of bank age; LISTED= dummy that is equal to one if the bank is listed, and zero otherwise; STATE= dummy that is equal to one if the bank is ultimately state-owned, and zero otherwise; RESTRICT=regulatory restrictions index; CAPINDEX= Regulatory capital stringency index; DEPCOV= deposit insurance coverage to GDP per capita ratio; GDPG= growth rate of real GDP.

Table 6: Breadth of ownership, income diversification and bank risk (2002-2010)

Model: $\text{RISK}_{it} = \beta_0 + \beta_1 \text{COM}_{it} + \beta_2 \text{TRAD}_{it} + \beta_3 \text{RESTRICT}_c + \alpha\,\text{CONTROLS} + \sum_{t=2}^{8} \varphi_t \tau_t + \varepsilon_{it}$

| | Banks with low-ownership breadth (426 and 1,992 year observations) | | | | | | | Banks with high-ownership breadth (446 banks and 2,056 year observations) | | | | | | |
| | Risk measures | | | Default risk measures | | | | Risk measures | | | Default risk measures | | | |
	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
COM	0.006**	0.069**	0.006	-0.322**	-0.436***	-0.034**	-0.424***	-0.011**	-0.059***	-0.006***	0.243***	0.278***	0.024**	0.262***
	(0.02)	(0.03)	(0.15)	(0.02)	(0.00)	(0.02)	(0.00)	(0.02)	(0.00)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)
TRAD	0.004*	0.023	0.007**	-0.076	-0.291***	-0.031**	-0.276**	-0.019**	-0.049	-0.009***	0.153*	0.146	0.002	0.151
	(0.06)	(0.43)	(0.01)	(0.53)	(0.01)	(0.03)	(0.01)	(0.03)	(0.21)	(0.01)	(0.06)	(0.19)	(0.85)	(0.14)
RESTRICT	-0.059*	-0.558**	-0.103	4.697**	6.833***	0.560**	6.713***	0.120**	0.374	-0.051	-1.852**	-1.267	-0.119	-1.162
	(0.09)	(0.04)	(0.11)	(0.02)	(0.00)	(0.04)	(0.00)	(0.05)	(0.46)	(0.17)	(0.05)	(0.36)	(0.53)	(0.38)
LnTA	-0.086***	0.340	-0.132***	-2.865**	-1.989	0.206	-2.211	-0.252***	-0.375	0.005	-0.316	0.273	0.134	0.232
	(0.00)	(0.13)	(0.00)	(0.05)	(0.16)	(0.31)	(0.11)	(0.00)	(0.22)	(0.86)	(0.81)	(0.81)	(0.39)	(0.83)
ROE	-0.016*	-0.197	-0.058***	-0.181	-0.146	0.122***	-0.290**	-0.004	-0.141**	-0.030***	0.229**	0.232**	0.120***	0.121
	(0.08)	(0.11)	(0.00)	(0.22)	(0.27)	(0.00)	(0.04)	(0.67)	(0.05)	(0.00)	(0.03)	(0.01)	(0.00)	(0.18)
OEQTA	0.401***	-0.113	0.203	-0.072	-0.020	-1.100***	0.458	0.052	-1.360**	-0.084*	5.186	6.912**	0.047	7.110***
	(0.00)	(0.83)	(0.28)	(0.98)	(0.99)	(0.00)	(0.89)	(0.44)	(0.01)	(0.05)	(0.12)	(0.01)	(0.87)	(0.01)
GRTA	0.002	-0.015	-0.000	-0.115	-0.143**	-0.016	-0.154**	0.000	-0.043*	-0.003	0.034	-0.033	-0.009	-0.037
	(0.14)	(0.23)	(0.93)	(0.11)	(0.02)	(0.16)	(0.01)	(0.92)	(0.09)	(0.14)	(0.47)	(0.48)	(0.12)	(0.42)
LnAGE	-0.011	-0.187	0.062	-0.626	-1.782	-0.414	-2.133	-0.006	0.529	-0.010	-3.400	-1.935	-0.077	-2.292
	(0.74)	(0.52)	(0.35)	(0.83)	(0.52)	(0.32)	(0.44)	(0.96)	(0.19)	(0.80)	(0.18)	(0.41)	(0.83)	(0.32)
LISTED	0.115	0.426	0.005	-18.596*	-9.298	0.591	-9.743	0.253	3.052	0.199	-3.591	0.156	1.680	-0.074
	(0.44)	(0.65)	(0.98)	(0.06)	(0.34)	(0.56)	(0.31)	(0.32)	(0.10)	(0.26)	(0.74)	(0.99)	(0.29)	(0.99)
STATE	0.098	3.275	0.298	-1.543	-8.867	0.295	-8.166	-0.197	-0.056	0.023	-3.222	0.650	0.524	0.292
	(0.70)	(0.32)	(0.46)	(0.93)	(0.56)	(0.91)	(0.60)	(0.34)	(0.97)	(0.86)	(0.72)	(0.93)	(0.67)	(0.97)
CAPINDEX	0.067**	0.637**	-0.001	2.884	5.647**	0.875**	5.731**	-0.079	-0.180	-0.011	7.212***	3.323**	0.374**	3.109**
	(0.05)	(0.04)	(0.98)	(0.27)	(0.03)	(0.01)	(0.02)	(0.40)	(0.70)	(0.78)	(0.00)	(0.04)	(0.04)	(0.04)
DEPCOV	0.092*	0.692	0.061	-10.686***	-13.364***	-1.383***	-13.075***	0.330*	-0.224	-0.016	-11.304***	-10.679***	-1.073***	-9.904***
	(0.05)	(0.15)	(0.44)	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.72)	(0.77)	(0.00)	(0.00)	(0.01)	(0.00)
GDPG	-0.026	-0.671	-0.031	1.684	2.838*	0.452**	2.601*	0.054	-0.389	-0.131***	-1.789	-2.191	-0.159	-1.723
	(0.43)	(0.17)	(0.52)	(0.22)	(0.05)	(0.04)	(0.07)	(0.58)	(0.42)	(0.01)	(0.30)	(0.16)	(0.47)	(0.28)
INTERCEPT	0.980***	2.958	2.157***	93.073***	72.683***	0.860	71.975***	2.823***	12.725***	1.362***	44.315***	48.961***	1.481	47.350***
	(0.00)	(0.35)	(0.00)	(0.00)	(0.00)	(0.77)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.50)	(0.00)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.196	0.064	0.168	0.096	0.115	0.084	0.119	0.046	0.062	0.152	0.070	0.061	0.059	0.057

P-values are shown in parentheses; ***, ** and * indicate significance respectively at the 1%, 5% and 10% levels.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definition: SDROA= standard deviation of the return on average assets; SDROE= standard deviation of the return on average equity; Z= Z-score; ZP= ZP-score; ZP1= measure of bank portfolio risk; ZP2= measure of leverage risk; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income; LnTA = natural logarithm of total assets; ROE=return on equity; OEQTA=ratio of total equity to total assets orthogonalized with LnTA ; GRTA=annual growth rate of total assets; LnAGE=natural logarithm of bank age; LISTED= dummy that is equal to one if the bank is listed, and zero otherwise; STATE= dummy that is equal to one if the bank is ultimately state-owned, and zero otherwise; RESTRICT=regulatory restrictions index; CAPINDEX= Regulatory capital stringency index; DEPCOV= deposit insurance coverage to GDP per capita ratio; GDPG= growth rate of real GDP.

Table 16: Breadth of ownership, income diversification and bank risk (2002-2010): the impact of bank size

	Risk measures			Default risk measures				Risk measures			Default risk measures			
	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
Large banks with low-ownership breadth (996 year observations, 211 banks)								Small banks with low-ownership breadth (996 year observations, 250 banks)						
NNII	0.005***	0.060**	0.003	-0.021	-0.074	-0.012	-0.073	0.012***	0.090**	0.010**	-0.480**	-0.625***	-0.049*	-0.622***
	(0.01)	(0.04)	(0.25)	(0.89)	(0.59)	(0.58)	(0.58)	(0.00)	(0.01)	(0.04)	(0.02)	(0.00)	(0.09)	(0.00)
RESTRICT	-0.050	-0.458	-0.177*	0.548	3.844	0.340	3.718	-0.048	-0.640**	-0.039	6.429	7.789**	0.343	7.738**
	(0.22)	(0.22)	(0.06)	(0.82)	(0.17)	(0.45)	(0.17)	(0.47)	(0.05)	(0.63)	(0.11)	(0.03)	(0.51)	(0.03)
R2	0.171	0.135	0.177	0.050	0.071	0.073	0.071	0.245	0.082	0.215	0.171	0.185	0.101	0.190
COM	0.003	0.034	-0.004	-0.242	-0.336*	-0.048**	-0.311*	0.013***	0.109**	0.013**	-0.383*	-0.563***	-0.060*	-0.564***
	(0.36)	(0.35)	(0.32)	(0.21)	(0.06)	(0.02)	(0.07)	(0.00)	(0.01)	(0.01)	(0.09)	(0.01)	(0.06)	(0.01)
TRAD	0.004**	0.041	0.006**	0.145	-0.151	-0.029	-0.135	0.008	0.029	-0.002	-0.714***	-0.801***	-0.004	-0.785***
	(0.03)	(0.21)	(0.01)	(0.31)	(0.28)	(0.16)	(0.32)	(0.14)	(0.53)	(0.84)	(0.00)	(0.00)	(0.92)	(0.00)
RESTRICT	-0.046	-0.410	-0.165*	0.815	4.311	0.411	4.137	-0.049	-0.648**	-0.040	6.455	7.878**	0.337	7.826**
	(0.28)	(0.27)	(0.07)	(0.74)	(0.13)	(0.36)	(0.13)	(0.46)	(0.05)	(0.62)	(0.11)	(0.03)	(0.51)	(0.03)
R2	0.169	0.133	0.180	0.056	0.078	0.078	0.077	0.244	0.081	0.225	0.170	0.185	0.102	0.190
Large Banks with high-ownership breadth (1,028 year observations, 214 banks)								Small banks with high-ownership breadth (1,028 year observations, 280 banks)						
NNII	-0.010**	-0.066***	-0.008***	0.437***	0.430***	0.047***	0.399***	-0.023**	-0.086***	-0.010***	0.194*	0.243**	0.018	0.232**
	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.09)	(0.01)	(0.15)	(0.01)
RESTRICT	-0.054	-0.200	-0.029	-2.501	-1.756	-0.032	-1.633	0.432**	1.381	-0.045	-2.767	-3.106	-0.452	-2.843
	(0.10)	(0.55)	(0.58)	(0.19)	(0.26)	(0.88)	(0.27)	(0.04)	(0.19)	(0.35)	(0.28)	(0.17)	(0.22)	(0.20)
R2	0.079	0.140	0.255	0.085	0.130	0.110	0.124	0.069	0.048	0.105	0.090	0.072	0.057	0.070
COM	-0.008**	-0.034**	-0.003	0.429***	0.515***	0.054***	0.476***	-0.016**	-0.085**	-0.009***	0.140	0.172	0.011	0.165
	(0.04)	(0.04)	(0.33)	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)	(0.02)	(0.00)	(0.30)	(0.13)	(0.45)	(0.12)
TRAD	-0.008	-0.038	-0.009**	0.123	0.138	0.017	0.144	-0.059**	-0.108*	-0.012*	0.348	0.485**	0.031	0.463**
	(0.15)	(0.35)	(0.04)	(0.14)	(0.26)	(0.20)	(0.20)	(0.02)	(0.05)	(0.09)	(0.14)	(0.02)	(0.22)	(0.03)
RESTRICT	-0.059	-0.285	-0.049	-2.521	-2.062	-0.059	-1.899	0.425**	1.399	-0.044	-2.691	-3.015	-0.439	-2.761
	(0.12)	(0.47)	(0.40)	(0.19)	(0.20)	(0.77)	(0.20)	(0.05)	(0.20)	(0.37)	(0.29)	(0.19)	(0.23)	(0.21)
R2	0.073	0.134	0.248	0.076	0.123	0.108	0.116	0.073	0.050	0.105	0.092	0.075	0.057	0.073

P-values are shown in parentheses; ***, ** and * indicate significance respectively at the 1%, 5% and 10% levels.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definition: SDROA= standard deviation of the return on average assets; SDROE= standard deviation of the return on average equity; LLP =ratio of loan loss provisions to net loans; Z= Z-score; ZP= ZP-score; ZP1= measure of bank portfolio risk; ZP2= measure of leverage risk; NNII = ratio of net non-interest income to net operating income; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income. CONTROLS include the same set of control variables as in Table 10 but I do not report them to save space. For the definition of these variables see Table A3 in Appendix A.

Table A1. Distribution of European commercial banks and representativeness of the final sample

Country	All Banks	Listed Banks	Percentage of total assets [a]
Austria	46	4	41.90
Belgium	19	1	96.69
Denmark	46	36	98.50
Finland	5	1	96.88
France	89	12	82.38
Germany	75	10	77.11
Greece	14	9	99.56
Ireland	9	4	60.51
Italy	90	17	79.00
Luxembourg	59	4	84.48
Netherlands	19	4	60.44
Norway	7	3	85.26
Portugal	15	3	97.35
Spain	34	8	84.72
Sweden	13	2	83.99
Switzerland	97	6	91.56
United Kingdom	70	6	74.95
Total/Mean	707	130	82.07

[a] Percentage of total assets of the sample banks in a given country to the aggregate total assets of all commercial banks provided by Bankscope in the same country over the 2002-2010 period.

Table A2. General descriptive statistics for the final sample (707 banks), on average, over the 2002-2010 period

	TA	GRTA	DEPTA	LOTA	LLP	EQTA	NII	NNII	ROA	ROE
Mean	42,323.73	11.95	49.65	52.85	0.89	9.96	63.04	36.96	0.67	7.91
Med.	1,688.20	7.64	51.67	58.48	0.36	7.30	66.67	33.33	0.56	7.81
Std.	143,274.24	27.31	25.68	26.99	2.33	8.92	28.63	28.63	1.31	13.64
Min.	35	-44.90	0.15	0.97	-3.09	1.34	-4.76	-53.27	-5.13	-58.75
Max.	933,073	165.36	92.82	97.28	16.87	56.51	153.27	104.76	6.36	54.09
Observations	4,048	4,048	4,048	4,048	4,048	4,048	4,048	4,048	4,048	4,048

Variables definition: All variables are expressed in percentages except TA which is in million Euros. TA=total assets; GRTA=annual growth rate of total assets; DEPTA= ratio of customer deposits to total assets; LOTA=ratio of net loans to total assets; LLP =ratio of loan loss provisions to net loans; EQTA=ratio of total equity to total assets; NII= ratio of net interest income to net operating income; NNII=ratio of net non-interest income to net operating income; ROA=return on assets; ROE=return on equity.

Table A3. Description of the variables, on average, over the period 2002-2010

Variable	Description	Source[*]	Mean	Std.	Min.	Max.	Obs
Risk variables							
SDROA	The three-year rolling window standard deviation of the return on average assets (ROA) (%)		0.74	2.46	0.01	57.07	4,048
SDROE	The three-year rolling window standard deviation of the return on average equity (ROE) (%)		6.25	14.26	0.05	191.53	4,048
LLP	Ratio of loan loss provisions to net loans (%)		0.77	2.12	-3.09	16.87	4,048
Z	Z-score computed as: Z= (100+average ROE)/SDROE, where ROE is the return on equity (%)		71.94	97.44	1.08	409.11	4,048
ZP	ZP-score computed as: (average ROA + average(equity/assets))/SDROA (%)		67.87	94.73	0.42	396.11	4,048
ZP1	Measure of bank portfolio risk computed as: (average ROA/SDROA) (%)		6.38	14.98	-9.87	199.49	4,048
ZP2	Measure of leverage risk computed as: average(equity/assets))/SDROA (%)		63.83	92.92	0.04	398.57	4,048
Diversification variables							
NNII	Ratio of net non-interest income to net operating income (%)		36	27.95	-53.27	104.76	4,048
COM	Ratio of net commission income to net operating income (%)		30.18	23.86	-37.50	100	4,048
TRAD	Ratio of net trading income to net operating income (%)		5.81	16.05	-42.82	100	4,048
Bank level variables							
LnTA	Natural logarithm of total assets (million euros)		7.80	2.29	3.56	13.75	4,048
ROE	Return on equity (%)		7.91	13.64	-58.75	54.09	4,048
EQTA	Ratio of total equity to total assets (%)		9.96	8.92	1.34	56.51	4,048
GRTA	Annual growth rate of total assets (%)		11.95	27.31	-44.90	165.36	4,048
LnAGE	Natural logarithm of bank age (years)		3.20	1.39	1.10	6.29	4,048
LISTED	Dummy that is equal to 1 if the bank is listed		0.21	0.41	0	1	4,048
STATE	Dummy that is equal to 1 if the bank is state-owned, and zero otherwise	Bankscope, Amadeus, Annual Reports and author's calculations	0.12	0.32	0	1	4,048
Country level variables							
RESTRICT	Regulatory activity restrictions index. The restrictions are classified into four categories to which I assign a value to indicate the degree of regulatory impediment to conduct such activity (unrestricted=0, permitted=1, restricted=2 and prohibited=3). The index considers the following four activities: (1) What are the conditions under which banks can engage in securities activities? 4 categories (2) What are the conditions under which banks can engage in insurance activities? 4 categories (3) What are the conditions under which banks can engage in real estate activities? 4 categories (4) Can banks own voting shares in nonfinancial firms? 4 categories. The aggregate index is then computed as the sum of the values assigned to each activity for each country.	(Barth et al. 2007) and author's calculations	4.15	2.19	0	8	4,048

Variable	Description	Source	Mean	SD	Min	Max	N
CAPINDEX	Regulatory capital stringency index. This index is the total number of affirmative answers to the following questions: (1) Is the minimum capital ratio requirement in line with the Basel guidelines? (2) Does the minimum ratio vary as a function of market risk? (3) Does the minimum ratio vary as a function of credit risk? (4) Does the minimum ratio vary as a function of operational risk? (5) Is there a simple leverage ratio required? (6) Are market values of loan losses not realized in accounting books deducted from capital? (7) Are unrealized losses in securities portfolios deducted? (8) Are unrealized foreign exchange losses deducted? (9) Are accounting practices for banks in accordance with International Accounting Standards?	Barth et al. (2007) and author's calculations	6.83	1.46	3	9	4,048
DEPCOV	Deposit insurance coverage to GDP per capita ratio	Barth et al. (2001)	1.88	1.47	0.40	5.97	4,048
GDPG	Growth rate of real GDP (%)	World Bank Database	1.22	2.60	-8.20	6.64	4,048

*All the variables are taken from Bankscope and author's calculations, unless otherwise specified.

Table A4: Correlations among the main variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LnTA (1)	1														
ROE (2)	0.076	1													
EQTA (3)	-0.504	-0.076	1												
LLP (4)	-0.107	-0.278	0.140	1											
GRTA (5)	0.037	0.074	-0.073	-0.059	1										
LnAGE (6)	0.220	0.043	-0.137	-0.007	-0.044	1									
LISTED (7)	0.304	0.024	-0.096	-0.004	-0.002	0.196	1								
STATE (8)	0.118	-0.074	-0.028	0.047	-0.038	0.069	-0.042	1							
NNII (9)	-0.151	0.144	0.165	0.049	0.028	0.025	-0.060	-0.128	1						
COM (10)	-0.287	0.114	0.192	0.087	0.003	0.016	-0.134	-0.113	0.787	1					
TRAD (11)	0.145	0.088	0.010	-0.042	0.054	0.018	0.082	-0.031	0.459	-0.052	1				
RESTRICT (12)	0.004	0.035	-0.058	-0.103	0.024	-0.106	-0.018	-0.152	0.036	0.068	-0.030	1			
CAPINDEX (13)	-0.008	0.062	0.016	0.004	-0.039	0.069	-0.211	0.117	0.109	0.110	0.020	-0.191	1		
DEPCOV (14)	0.097	-0.019	-0.065	-0.050	0.028	0.036	0.102	-0.089	-0.088	-0.098	-0.011	0.597	-0.004	1	
GDPG (15)	-0.040	0.236	0.002	-0.176	0.131	-0.003	-0.031	-0.003	0.048	0.049	0.015	-0.104	0.071	-0.231	1

Variables definition: LnTA= natural logarithm of total assets; ROE=return on equity; EQTA=ratio of total equity to total assets; LLP =ratio of loan loss provisions to net loans; GRTA=annual growth rate of total assets; LnAGE= natural logarithm of bank age; LISTED= dummy that is equal to 1 if the bank is listed; STATE= dummy that is equal to 1 if the bank is state-owned; NNII = ratio of net non-interest income to net operating income; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income; RESTRICT=regulatory restrictions index; CAPINDEX= Regulatory capital stringency index; DEPCOV= deposit insurance coverage to GDP per capita ratio; GDPG= growth rate of real GDP.

Table A5: Descriptive statistics by bank size, on average, over the period 2002-2010

		TA	GRTA	DEPTA	LOTA	EQTA	ROA	ROE	NII	NNII	TRAD	COM	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
Banks with low-ownership breadth (1,992 year observations)																			
Large banks: TA>1,504.391 (211 banks)	Mean	101817.13	13.72	47.72	56.01	7.03	0.56	9.01	65.98	34.02	7.14	26.83	0.46	6.50	0.81	70.77	71.51	7.18	66.65
	Std.	226084.80	26.10	21.12	24.73	5.12	0.89	11.42	27.10	27.10	21.56	20.67	1.17	15.12	1.98	91.20	93.93	14.20	91.39
Small banks: TA<=1,504.391 (250 banks)	Mean	510.85	11.08	58.34	53.34	13.99	0.91	7.28	58.71	41.29	5.71	35.51	0.78	5.51	1.18	94.75	92.20	7.60	88.37
	Std.	393.31	25.38	23.53	26.60	10.43	1.60	13.16	28.32	28.32	11.46	25.19	1.55	11.76	2.81	117.54	113.98	18.03	113.44
	T-stat	-14.14***	-2.28**	10.59***	-2.31**	18.9***	6.01***	-3.13***	-5.84***	5.84***	-1.85*	8.40***	5.13***	-1.64	3.41***	5.08***	4.42***	0.58	4.70***
Banks with high-ownership breadth (2,056 year observations)																			
Large banks: TA>1,913.4 (214 banks)	Mean	66840.93	11.16	42.62	51.70	5.97	0.45	8.29	67.65	30.43	6.59	23.74	0.61	6.70	0.63	55.07	50.26	5.56	46.43
	Std.	154604.83	27.34	25.84	27.54	4.22	0.95	14.63	28.98	27.22	18.07	21.77	1.81	12.75	1.67	78.61	75.55	12.57	72.70
Small banks: TA<=1,913.4 (280 banks)	Mean	676.40	11.88	50.13	50.47	12.89	0.76	7.08	59.76	38.37	3.84	34.70	1.11	6.29	0.49	67.85	58.40	5.22	54.72
	Std.	499.06	30.06	28.89	28.59	10.78	1.59	14.93	29.04	27.95	10.22	25.32	4.09	16.81	1.81	94.77	86.80	14.56	84.85
	T-stat	-13.72***	0.56	6.21***	-0.99	19.16***	5.37***	-1.84*	-6.16***	6.52***	-4.24***	10.52***	3.60***	-0.63	-1.86*	3.32***	2.26**	-0.56	2.37**

T-stat test for the null: "Financial characteristics are not different between the subsamples of small and large banks in each considered sample". ***, ** and * indicate significance, respectively, at the 1%, 5% and 10% levels for a bilateral test.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definition: All variables are expressed in percentages except TA which is in million Euros. TA= total assets; GRTA=annual growth rate of total assets; DEPTA= ratio of customer deposits to total assets; LOTA=ratio of net loans to total assets; EQTA=ratio of total equity to total assets; ROA=return on assets; ROE=return on equity; NII= ratio of net interest income to net operating income; NNII = ratio of net non-interest income to net operating income; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income; SDROA= standard deviation of the return on average assets; SDROE= standard deviation of the return on average equity; LLP =ratio of loan loss provisions to net loans; Z= Z-score; ZP= ZP-score; ZP1= measure of bank portfolio risk; ZP2= measure of leverage risk.

Table B1: Breadth of ownership, income diversification and bank risk (2002-2010): control threshold of 20%

Model 1: $\text{RISK}_{it} = \beta_0 + \beta_1 \text{NNII}_{it} + \beta_2 \text{RESTRICT}_c + \alpha \text{ CONTROLS} + \sum_{t=2}^{8} \varphi_t \tau_t + \varepsilon_{it}$

Model 2: $\text{RISK}_{it} = \beta_0 + \beta_1 \text{COM}_{it} + \beta_2 \text{TRAD}_{it} + \beta_3 \text{RESTRICT}_c + \alpha \text{ CONTROLS} + \sum_{t=2}^{8} \varphi_t \tau_t + \varepsilon_{it}$

| | Banks with low-ownership breadth (444 and 2,061 year observations) | | | | | | | Banks with high-ownership breadth (435 banks and 1,987 year observations) | | | | | | |
| | Risk measures | | | Default risk measures | | | | Risk measures | | | Default risk measures | | | |
	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
Diversification variable is NNII (Model 1)														
NNII	0.003	0.039	0.007***	-0.173	-0.243**	-0.022	-0.248**	-0.012**	-0.049**	-0.006**	0.273***	0.254***	0.019**	0.243***
	(0.39)	(0.16)	(0.01)	(0.10)	(0.02)	(0.11)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.00)	(0.02)	(0.00)
RESTRICT	-0.013**	-0.169	-0.096	3.711*	5.661***	0.458*	5.615***	0.012**	-0.206	-0.051	-0.925**	-0.493	-0.095	-0.416
	(0.04)	(0.66)	(0.13)	(0.06)	(0.01)	(0.09)	(0.00)	(0.04)	(0.27)	(0.15)	(0.05)	(0.73)	(0.60)	(0.76)
R2	0.116	0.065	0.162	0.084	0.105	0.084	0.109	0.053	0.068	0.114	0.064	0.050	0.057	0.049
Diversification variable are COM and TRAD (Model 2)														
COM	0.002	0.040	0.005	-0.309**	-0.397***	-0.035**	-0.388***	-0.009**	-0.036**	-0.004	0.270***	0.281***	0.020*	0.267***
	(0.63)	(0.27)	(0.22)	(0.02)	(0.00)	(0.04)	(0.00)	(0.02)	(0.02)	(0.17)	(0.01)	(0.00)	(0.04)	(0.00)
TRAD	0.002	0.014	0.007**	0.002	-0.231**	-0.030**	-0.224**	-0.016**	-0.045	-0.008**	0.110	0.115	-0.000	0.124
	(0.36)	(0.64)	(0.01)	(0.98)	(0.03)	(0.04)	(0.03)	(0.04)	(0.21)	(0.04)	(0.18)	(0.30)	(0.99)	(0.23)
RESTRICT	0.014	-0.170	-0.091	3.997**	6.032***	0.490*	5.952***	0.012*	-0.237	-0.058	-1.007**	-0.639	-0.110	-0.543
	(0.83)	(0.67)	(0.15)	(0.05)	(0.00)	(0.07)	(0.00)	(0.06)	(0.27)	(0.11)	(0.05)	(0.66)	(0.55)	(0.70)
R2	0.115	0.065	0.161	0.091	0.115	0.085	0.118	0.053	0.065	0.114	0.063	0.049	0.056	0.048

P-values are shown in parentheses; ***, ** and * indicate significance respectively at the 1%, 5% and 10% levels.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definitions: SDROA= standard deviation of the return on average assets; SDROE= standard deviation of the return on average equity; LLP =ratio of loan loss provisions to net loans; Z= Z-score; ZP= ZP-score; ZP1= measure of bank portfolio risk; ZP2= measure of leverage risk; NNII = ratio of net non-interest income to net operating income; BOTTOM= dummy that is equal to one if the bank is located in a tier greater than three, and zero otherwise; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income; RESTRICT=regulatory restrictions index. CONTROLS include the same set of control variables as in Table 10 but I do not report them to save space. For the definition of these variables see Table A3 in Appendix A.

Table B2: Breadth of ownership, income diversification and bank risk (2002-2010): use of country dummies as control variables at the country level

Model 1: $RISK_{it} = \beta_0 + \beta_1 NNII_{it} + \beta_2 RESTRICT_c + \alpha\ CONTROLS + \sum_{c=2}^{17}\alpha_c\delta_c + \sum_{t=2}^{8}\varphi_t\tau_t + \varepsilon_{it}$

Model 2: $RISK_{it} = \beta_0 + \beta_1 COM_{it} + \beta_2 TRAD_{it} + \beta_3 RESTRICT_c + \alpha\ CONTROLS + \sum_{c=2}^{17}\alpha_c\delta_c + \sum_{t=2}^{8}\varphi_t\tau_t + \varepsilon_{it}$

	Banks with low-ownership breadth (426 and 1,992 year observations)							Banks with high-ownership breadth (446 banks and 2,056 year observations)						
	Risk measures			Default risk measures				Risk measures			Default risk measures			
	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
Diversification variable is NNII (Model 1)														
NNII	0.007***	0.065**	0.008***	-0.342***	-0.383***	-0.030**	-0.383***	-0.015***	-0.071***	-0.009***	0.253***	0.269***	0.016**	0.254***
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)
R2	0.220	0.121	0.171	0.179	0.182	0.114	0.186	0.079	0.089	0.179	0.106	0.109	0.080	0.103
Diversification variable are COM and TRAD (Model 2)														
COM	0.007**	0.075**	0.005	-0.481***	-0.573***	-0.047***	-0.561***	-0.012**	-0.054***	-0.008***	0.191**	0.273***	0.018*	0.259***
	(0.01)	(0.02)	(0.17)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.05)	(0.00)	(0.07)	(0.00)
TRAD	0.004**	0.026	0.007**	-0.132	-0.329***	-0.035**	-0.315***	-0.020**	-0.050	-0.010**	0.115	0.133	-0.007	0.138
	(0.05)	(0.39)	(0.02)	(0.29)	(0.00)	(0.02)	(0.00)	(0.03)	(0.23)	(0.01)	(0.17)	(0.25)	(0.61)	(0.21)
R2	0.220	0.121	0.169	0.183	0.193	0.117	0.196	0.078	0.085	0.176	0.106	0.108	0.079	0.102

P-values are shown in parentheses; ***, ** and * indicate significance respectively at the 1%, 5% and 10% levels.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definitions: SDROA= standard deviation of the return on average assets; SDROE= standard deviation of the return on average equity; LLP =ratio of loan loss provisions to net loans; Z= Z-score; ZP= ZP-score; ZP1= measure of bank portfolio risk; ZP2= measure of leverage risk; NNII = ratio of net non-interest income to net operating income; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income. CONTROLS include the same set of control variables as in Table 10 but I do not report them to save space. For the definition of these variables see Table A3 in Appendix A.

Table B3: Breadth of ownership, income diversification and bank risk by subsamples (2002-2010): excluding widely-held banks

Model 1: $\text{RISK}_{it} = \beta_0 + \beta_1 \text{NNII}_{it} + \beta_2 \text{RESTRICT}_c + \alpha \text{ CONTROLS} + \sum_{t=2}^{8} \varphi_t \tau_t + \varepsilon_{it}$

Model 2: $\text{RISK}_{it} = \beta_0 + \beta_1 \text{COM}_{it} + \beta_2 \text{TRAD}_{it} + \beta_3 \text{RESTRICT}_c + \alpha \text{ CONTROLS} + \sum_{t=2}^{8} \varphi_t \tau_t + \varepsilon_{it}$

	Banks with low-ownership breadth (352 and 1,518 year observations)							Banks with high-ownership breadth (446 banks and 2,056 year observations)						
	Risk measures			Default risk measures				Risk measures			Default risk measures			
	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2	SDROA	SDROE	LLP	Z	ZP	ZP1	ZP2
Diversification variable is NNII (Model 1)														
NNII	0.007***	0.071**	0.008**	-0.113	-0.211*	-0.012	-0.205*	-0.015***	-0.073***	-0.008***	0.295***	0.274***	0.023***	0.258***
	(0.00)	(0.02)	(0.02)	(0.39)	(0.08)	(0.46)	(0.08)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
RESTRICT	-0.065**	-0.509*	-0.139*	3.301**	5.657**	0.598*	5.524**	0.132**	0.397	-0.045	-1.910**	-1.185	-0.105	-1.094
	(0.04)	(0.09)	(0.06)	(0.05)	(0.02)	(0.08)	(0.02)	(0.05)	(0.40)	(0.20)	(0.03)	(0.38)	(0.57)	(0.39)
R2	0.174	0.060	0.160	0.073	0.083	0.071	0.083	0.047	0.066	0.155	0.071	0.062	0.060	0.059
Diversification variable are COM and TRAD (Model 2)														
COM	0.006**	0.082**	0.007	-0.211	-0.355**	-0.023	-0.346**	-0.011**	-0.059***	-0.006***	0.243***	0.278***	0.024**	0.262***
	(0.04)	(0.03)	(0.14)	(0.21)	(0.02)	(0.13)	(0.02)	(0.02)	(0.00)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)
TRAD	0.005**	0.037	0.005	0.024	-0.145	-0.006	-0.136	-0.019**	-0.049	-0.009***	0.153*	0.146	0.002	0.151
	(0.05)	(0.39)	(0.15)	(0.89)	(0.27)	(0.73)	(0.29)	(0.03)	(0.21)	(0.01)	(0.06)	(0.19)	(0.85)	(0.14)
RESTRICT	-0.064*	-0.535*	-0.138*	3.513**	5.993**	0.625*	5.853**	0.120**	0.374	-0.051	-1.852**	-1.267	-0.119	-1.162
	(0.06)	(0.08)	(0.07)	(0.03)	(0.01)	(0.07)	(0.01)	(0.05)	(0.46)	(0.17)	(0.05)	(0.36)	(0.53)	(0.38)
R2	0.173	0.059	0.161	0.075	0.088	0.071	0.088	0.046	0.062	0.152	0.070	0.061	0.059	0.057

P-values are shown in parentheses; ***, ** and * indicate significance respectively at the 1%, 5% and 10% levels.

Subsamples definition: the subsample of "banks with low-ownership breadth" includes banks located in a tier lower than three; and the subsample of "banks with high-ownership breadth" includes banks located in a tier that is equal or greater than three.

Variables definitions: SDROA= standard deviation of the return on average assets; SDROE= standard deviation of the return on average equity; LLP =ratio of loan loss provisions to net loans; Z= Z-score; ZP= ZP-score; ZP1= measure of bank portfolio risk; ZP2= measure of leverage risk; NNII = ratio of net non-interest income to net operating income; COM = ratio of net commission income to net operating income; TRAD = ratio of net trading income to net operating income; RESTRICT=regulatory restrictions index. CONTROLS include the same set of control variables as in Table 10 but I do not report them to save space. For the definition of these variables see Table A3 in Appendix A.