THE EFFECT OF REVENUE AND GEOGRAPHIC DIVERSIFICATION ON BANK PERFORMANCE

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ABSTRACT

This paper investigates the effect of revenue and geographic diversification on bank performance using an unbalanced panel dataset of 3,549 observations relative to different categories of Italian banks for the period 2006-2012. Further investigation comes from the analysis of the financial crisis impact on bank performance taking into account both the effect of the 2008 financial crisis and the sovereign debt crisis starting in the 2010. The main results on revenue and geographical diversification play a role that however appear to be different both for the effect of the crisis and for different type of banks. Different business models may imply different functional and geographical bank strategies. Our results suggest during the crisis non-traditional revenue and geographical diversification smooth the negative impact of the financial crisis with a positive effect in terms of risk-adjusted profitability. The diversification benefits appear more evident for the sub-sample of mutual banks traditionally less functionally and geographically diversified.

EFM classification codes: 510, 520, 210

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1. Introduction

The paper addresses the question of diversification in the banking sector. The importance of the topic is linked to the on-going debate as to what the scope of bank activities should be since also theoretical literature does not provide clear evidence.

The transformation of European banking systems in the last three decades has been intense and strictly related to the effects of deregulation and innovation on the competitive environment. The deregulation process has largely been based on the view that income diversification reduces the volatility of bank earnings and makes banks more resilient to financial distress. The evidence suggests however that the expected results often have not been successfully obtained becoming more evident after the financial crisis. The argument gains ground implying the banking industry be less diversified and refocused on lending activities (Vallascas et al., 2012).

Theoretically, the literature on bank diversification primary rests on the assumption that diversification may lead to cost savings or revenue improvements due to spreading of fixed costs, economies of scope from using the same information, customer cost economies (Berger et al., 1987). Moreover banks may also reduce their risks by engaging in both product and geographic diversification strategies (see Diamond, 1984 and Berger and DeYoung, 2001 respectively). Diversification implies also benefits in terms of reduced agency costs of managerial discretion by lowering cash-flow volatility (Stulz, 1990).

The aim of the present paper is, as in previous studies, rather than attempting to measure economies of scope and agency problems directly, investigate whether two types of diversification strategies, i.e. revenue and geographic diversification, may impact on bank performance. Moreover, the paper is aimed at filling the gap in the literature by assessing on the one hand the the risk/return implications of different types of product mixes and on the other by investigating the relative role of product and geographic diversification on bank performance for different size classes and in different time period.

To address these issues, we use consolidated and unconsolidated balance sheets of BHC and individual Italian banks submitted to the Bank of Italy and collected by the Italian Banking Association over the period 2006–2012. The starting date is 2006 since Italian banks report unconsolidated accounting data based on IFRS from that date. This dataset enables us to split commissions and fee activities into different components in order to introduce a more precise definition of bank functional diversification that enables us to disentangle between traditional and non-traditional revenue bearing activities.

With respect to the previous work on bank diversification, our paper represents the first attempt to evaluate the role of different type of product mixes, moreover, we consider a large set of diversification and risk adjusted performance measures at the bank individual level using consolidated balance sheet when available and unconsolidated if not. This latter choice is of particular importance for several reasons principally linked to the fact that banks tend to reserve the making of non-traditional innovative activities to non-banking subsidiaries whose contribution can be more precisely evaluated if consolidated financial statements are available.

Finally, in our empirical analysis we investigate whether certain type of institutions are better able to reap the benefits of diversification focusing on performance implications both for large and small banks which is a major issue regarding diversification. In this sense, the Italian banking system represents an ideal experimental setting since it is characterised by a homogenous group of banks – the mutual ones. Mutual banks are typically small banks traditionally oriented to local lending offering an alternative business model to traditional commercial banks.

We show that revenue and geographical diversification play a role in determining bank performance. The relative effects appear, however, to be different both for the inclusion of the financial crisis structural break and for different categories of banks: mutual vs. non mutual banks.

As for the first effect functionally non-traditional diversification strategies imply greater beneficial effects in terms of risk-adjusted profitability in the post-crisis period. An interesting result comes from the distinction between the two wave of the crisis: the 2008 financial crisis and the subsequent 2010 sovereign debt crisis. While the two break crises dummies impact unequivocally negatively on bank profitability different effects emerge in the case of the Z-score analysis. In this last case coherently with anecdotal evidence Italian bank risk sounds not to be influenced by the first wave of crisis being statistically not significant; differently the sovereign debt crisis increase bank risk.

As for mutual and non-mutual banks our results suggest that functionally and geographical diversification benefit mainly mutual banks which business model is quite traditional and not base on non-traditional activities.

The results sound to robust for alternative measure of diversification, for different performance measures and also for alternative sub-sample used. Finally, they are robust also when controlling for potential endogeneity problem between bank performance and diversification.

The paper is structured as follows. Section 2 reviews the theoretical and empirical literature on the nexus between different type of diversification and bank performance. Section 3 presents the econometric methodology and the data used. Section 4 describes the results and discusses the robustness. Section 5 concludes.

2. Literature Review

In literature, diversification is analysed along two principal dimensions linked to income sources and geographical areas. In the following section we briefly review the principal theoretical and empirical literature developed on the topic.

2.1. Theoretical literature

Theoretically, the literature on bank diversification analyses the benefits and costs associated to the strategy developed. Among the former are the results of the portfolio theory that postulate that as long as the revenue streams from different financial activities are less than perfectly correlated, income diversification should offer banks opportunities to grow their risk-adjusted profits. Thanks to economies of scope, diversification may lead to an increase in performance through cost savings or revenue improvements due to the joint production of a wide range of financial services (Teece, 1982); moreover, diversified banks should realize revenue efficiencies when cross-selling various (fee-based) financial products alongside traditional lending-based services (Herring and Santomero, 1990). Given information asymmetry, banks gain valuable information on their clients by providing a service that might grant advantages in the provision of other services (Diamond, 1984; Stein, 2002). Finally, for some agency theories diversification reduces the agency costs of managerial discretion by lowering cash-flow volatility (Stulz, 1990) or by creating internal capital markets (Stein, 2002).

Alongside the positive effects, adverse implications on performance have been identified. Diversification can intensify agency problems between corporate insiders and small shareholders making it more difficult to design efficient managerial incentive contracts and more difficult to

align the incentives of outsiders with insiders (Stulz, 1990). Increasing the size and scope of a bank's activities introduces the "cost of complexity", which at some point may dominate the benefits that can be achieved (Rajan et al., 2000). Moreover, diversified banks can use their advantage to operate with greater leverage, since several fee-based activities can be performed holding little or no regulatory capital, and to pursue riskier lending. Diversified institutions can be characterized by volatile earnings (i.e.: investment banking activities), lower switching costs for clients (i.e.: non-traditional banking services are based on transaction-based bank-client relationships) and higher operational leverage (given the heavy fixed investments in technology and human resources required) increasing in this way volatility of earnings and hampering risk adjusted performance measures.

As for geographical diversification in banking the literature develops along two lines. On one hand several theories suggest that geographic diversity will enhance efficiency, spread idiosyncratic risk, and reduce agency costs, boosting corporate valuations. Specifically, geographic diversity could enhance market valuations through economies of scale (Berger et al., 1999) and by reducing exposure to idiosyncratic local shocks (Diamond, 1984). On the other hand, theories of corporate governance by Jensen and Meckling (1976) suggest that if small shareholders find it difficult to monitor and govern geographically dispersed corporations then corporate insiders will have greater attitude to extract private benefits from geographically diversified firms with adverse effects on firm valuations. Specific to the topic of geographic diversification, when a bank enters into a new market can incur in higher risk given the adverse selection problems to the extent that existing intermediaries abandon the riskiest and least profitable customers (Salas and Saurina, 2002).

Another variable that exert distinctive effects on firm value and it is related to geographic diversification is the distance (Deng and Elyasiani, 2008). As geographic diversification, distance can be associated with firm value enhancement or value loss. As a bank expands geographically, it reaches new profitable markets but the distance between its headquarters and branches increases, making it harder for senior managers to monitor the branch managers. This may heighten distance-related agency conflicts and harm firm value.

2.2. Empirical literature

Despite extensive research on the economic consequences of diversification, the empirical literature does not provide clear evidence on whether diversification generates net benefits or costs; this could be linked to the fact that it is extraordinarily difficult to unequivocally measure economies of scope or agency problems empirically. Given this, a more recent strand of empirical literature rather than attempting to measure economies of scope and agency problems directly, investigate whether the range of activities conducted by financial institutions influences their performance. This section summarizes the main empirical contributions on the consequences of diversification on bank performance and risk. The first part deals with revenue diversification, i.e. the profile of the diversification between interest and non-interest bearing activities, while the second one rests on the contributions that deal with the topic of geographic diversification.

2.2.1. Product diversification strategies in banking

The empirical analysis centred on the profile of the diversification between interest and non-interest bearing activities has largely concerned commercial banks in the United States, following the implementation of the Gramm Leach Bliley in 1999. With few exceptions, the results conclude that the costs of diversification outweigh the benefits (Stiroh 2004; Stiroh and Rumble, 2006;

Laeven and Levine, 2007; Goddard et al., 2008) and the result is valid both for financial holding companies and for smaller institutions such as credit unions.

Fewer studies deal with European banks. Among them, Mercieca et al. (2007) explores the economic impact of diversification on average profitability by calculating the effect of an increase in the non-interest share on a sample of 755 small European banks for the period 1997–2003. The analysis evidences that an increase in non-interest activities has two main effects, which are a direct impact from shifting into non-interest activities and, an indirect effect arising from changes in diversification. Moreover, a negative net effect for average profitability and a corresponding positive effect on volatility are detected. The results are robust with respect to several controls, suggesting that over the investigated period the higher volatility of net-interest income outweighs diversification benefits. Lepetit et al. (2008) focusing on the relationship between bank risk and product diversification for a set of European banks belonging to 14 countries during the period 1996-2012 find that a shift into non-interest activities involves higher risk and this is particular true for smaller banks and driven by commission and fee activities.

Turning to the Italian situation, Acharya et al. (2006) analyse the relationship between industrial loan diversification and performance using data from 105 Italian banks over the period 1993-1999 concluding that diversification of bank assets is not guaranteed to produce superior performance and/or greater safety for banks. Chiorazzo et al. (2008) using annual data from 85 Italian banks over the period 1993–2003 find that income diversification increases risk-adjusted returns and that diversification gains diminish with bank size. Vallascas et al. (2012) on a sample of 145 Italian banks during the period 2006-2008, using detailed data on the composition of bank income verifies that institutions that were diversified within narrow activity classes before the crisis experienced large declines in performance during the financial crisis. By contrast, diversification across broad activity classes, such as lending and capital market activities, did not cause performance losses during the crisis.

2.2.2. Geographic diversification in banking

Also the empirical literature on geographic diversification is mainly focused on the US banking system and proliferates following the Riegle Neal Act of 1994. As regards the profile of geographic diversification and distance some prior research investigated:

i) the effects that the distance between the bank headquarters and its customers, mainly SMEs, may produce on the loan evaluation process (Stein, 2002; Hauswald and Marquez, 2006; Alessandrini et al., 2009; Jiménez et al., 2009);

ii) to what extent the distance between affiliates and parent organizations may affect bank efficiency (Berger and DeYoung, 2001; Illueca et al., 2009);

iii) whether geographic diversification affects directly or indirectly bank performance (Hirtle, 2007; Deng and Elyasiani, 2008; Goetz et al. 2012).

Focusing on this latter strand of literature, Hirtle (2007) shows how the increase in size of the branch network engenders a downturn in bank performance. Deng and Elyasiani (2008) on a sample of 505 large publicly traded US BHCs over the 1994–2005 period, find that geographic diversification is associated with BHC value enhancement and risk reduction. When controlling for the distance between the headquarters and branches they find that an increased distance between a BHC and its branches is associated with firm value reduction and risk increase. The authors demonstrate that diversification attained in the same country is effective, since a diversified bank achieves on average a better performance than a bank concentrated in just a few

geographic areas; as highlighted in literature, the benefits resulting from a geographical diversification are noticeable when significant economic differences are present in the areas where a bank is located. Goetz et al. (2012) examines the impact of the geographic diversification of bank holding company assets across the United States on their market valuations. They find that increases in geographic diversity due to interstate bank deregulation reduced BHC valuations consistently with the view that an exogenous increase in complexity allows corporate insiders to extract larger private rents with adverse implications on firm value.

2.3. Model specification

The review of the literature provided above suggests the following hypotheses to be tested in the remainder of the paper:

H1 – the existence of a positive relationship between performance and diversification among traditional and non-traditional revenue bearing activities and its principal components;
H2 – the verification of a positive relationship between bank profitability and geographic diversification or similarly negative relationship between distance and bank profitability;
H3 – the evaluation of the relative role of product and geographic diversification on bank performance;

H4 – the effect of the financial crisis distinguishing between the 2008 financial crisis and the 2010 sovereign debt crisis.

With respect to the previous work on bank diversification, our paper represents the first attempt to directly assess the risk/return implications of different types of product mixes; commissions and fee activities are in fact split into different components. Second, a large amount of additonal explanatory variables have been included in the model in order to avoid potential omitted variables bias. Some evidence has been produced distinguishing the effect of the financial crisis between the first and second wave of the crisis, i.e. distinguishing between the 2008 financial crisis and the 2010 sovereign debt crisis. Moreover, in our empirical analysis we investigate whether certain type of institutions are better able to reap the benefits of diversification focusing on performance implications for mutual versus non-mutual banks given that for the first type of banks diversification may play a major issue. Finally, we consider a large set of diversification and risk adjusted performance measures at the bank individual level using consolidated balance sheet when available and unconsolidated if not. This latter choice is of particular importance for several reasons: on one hand banks tend to reserve the making of non-traditional innovative activities to non-banking subsidiaries whose contribution can be more precisely evaluated if consolidated financial statements are available; furthermore, diversification benefits may exist for the institution as a whole and not for the single subsidiary. On the other hand, financial holding company represents the relevant unit of observation for regulators on extremly important topic such as the level of systemic risk (Stiroh and Rumble, 2006).

3. Methodology and data

This section presents the econometric methodology, the data used, along with the measure of banks' diversification and performance.

3.1. Measure of banks' revenue and geographic diversification

3.1.1. Revenue diversification

To determine the degree of bank diversification asset-based measure and/or income-based indicators can be used. Ideally, to measure the diversification of bank activities, detailed data on the degree to which each bank underwrites, operates mutual funds, insurance, etc. should be used. The dataset available do not provide information with this type of detailed information on the different type of activities engaged. So, several authors construct revenue based measure that suffers from larger measurement problems than the asset-based measure (Laeven and Levine, 2007). In fact, loans and in general more traditional activities can yield fee income; in this way the income-based measure could overestimate the degree to which some lending institutions engage in non-lending activities. For instance, DeYoung and Rice (2004) show that payment services linked to traditional banking activities are the largest source of non-interest income for U.S. banks. To mitigate the overestimation problem, we disaggregate fee income in relation to the type of activities developed. Moreover, following DeYoung and Roland (2001), Elsas et al. (2010) and Vallascas et al. (2012), we argue that the use of gross revenues is preferable to net revenues because allocating expenses (especially interest expenses) to different areas of banking is somewhat arbitrary and may lead to biased diversity measures.

In line with our research question, we construct a more precise measure of diversification for traditional and non-traditional revenue-generating activities. First of all, following Vallascas et al. (2012), we divide gross commission revenues along four principal dimensions: A. Traditional Banking Commission (TBC), which comprises commission income from guarantees, collection and payment services, services related to factoring, tax collection services, current accounts management and other services; B. Market and Trading Commission (MKT) fees and commissions revenues from credit derivatives, trading operations of financial instruments and foreign exchange, custody and administration of securities, underwriting operations, servicing of securitisation, placement of securities, multilateral trading facilities management and financial structure consultancy services; C. Asset management (AM) commissions from portfolio management services, depositary bank services and investment consultancy services; and, finally, D. Fee-based revenues from the distribution of third-party products and services (DIS).

Then we define traditional income (TRADT) as the sum of gross interest revenues (INT)[1] and Traditional Banking Commissions (TBC).

Then we specify non-traditional income (NON_TRADT) as the sum of four components: 1. gross market and trading commissions (MKT); 2. asset management commissions; 3. fee-based revenues from the distribution of third-party products and services (DIS); and 4. the absolute value of net results from financial operations (OPFIN)[2].

Finally, total operating revenue (TOP) is the sum of traditional income (TRADT) and non-traditional income (NON_TRADT) or in other words is the sum of the five components (TOP = TRADT+ MKT + AM + DIS + OPFIN).

[1] Gross interest revenues are computed as Interest and similar income – Interest and similar income on Financial assets held for trading – Interest and similar income on Hedging derivatives.

[2] Net results from financial operations include: a. net result from trading activities that principally comprise profits (losses) on trading and interest and similar income on financial assets held for trading; b. net result from hedging activities which includes fair value adjustments in hedge accounting and the net interest income from hedging derivatives; c. profits from sale of activities and repurchase of liabilities which is equal to the profits (losses) on disposal or purchase of loans, of financial assets available for sale and of financial liabilities and d. net results from financial assets and liabilities designated at fair value.

Turning to the diversification measure, the first type of diversification analysed is the one related to the diversification across different sources of income. Traditionally in literature (Stiroh, 2004; Lepetit et al., 2008) one way to capture the degree of diversification of bank activities is to consider the net interest income generated by traditional activities and non-interest income produced by non-traditional ones. To this end, several authors have used an adjusted Herfindahl–Hirshman index (HHI) to account for diversification between major activities (among the others Acharya et al., 2006; Stiroh and Rumble, 2006; Mercieca et al., 2007; Elsas et al., 2010). As the HHI rises, the bank becomes more concentrated and less diversified. To have a direct measure of diversification (DIV) the sum of squared revenue shares have been substracted from unity so that DIV increases in the degree of revenue diversification. Analytically:

$$\mathrm{DIV\_REV} = 1 - \left(\left(\frac{\mathrm{TRADT}}{\mathrm{TOP}} \right)^2 + \left(\frac{\mathrm{MKT}}{\mathrm{TOP}} \right)^2 + \left(\frac{\mathrm{AM}}{\mathrm{TOP}} \right)^2 + \left(\frac{\mathrm{DIS}}{\mathrm{TOP}} \right)^2 + \left(\frac{\mathrm{OPFIN}}{\mathrm{TOP}} \right)^2 \right); \quad (1)$$

where TRADT_TOP is the share of traditional income (gross interest revenues and Traditional Banking Commissions) on total operating income; MKT_TOP is the ratio of gross market and trading commissions to total operating revenue; AM_TOP is the share of asset management commissions on total income; DIS_TOP is the fraction of fee-based revenues from the distribution of third-party products and services on total operating revenue; and OPFIN_TOP is the ratio of the absolute value of net results from financial operations to total operating revenue. These shares illustrate the emphasis of a bank on a particular traditional or different type of non-traditional activity. By definition DIV_REV can take on values between zero (the bank is fully specialized in one business area) and 0.8 (the bank generates a fully balanced revenue mix from the five business areas).

3.1.2. Geographic diversification

To account for geographic diversification of a bank, we adopt a revisited index based on similar Herfindahl-Hirschman Index (HHI_GEO) proposed by Alessandrini et al. (2005 and 2009), Acharya et al. (2006) and Coccorese and Pellecchia (2009).

$$\mathrm{HHI\_GEO}_{it} = \frac{\sum_{z_p=1}^{P_i} \left(\frac{\mathrm{Branches}_{t,i_{zp}}}{\mathrm{Branches}_{t,i}} \right)^2}{P_{t,i}}; \quad (2)$$

where i refers to the bank and z_p to the province where the bank operates. In order to have a direct measure of geographic diversification we compute the variable DIV_GEO which is equal to (1 - HHI_GEO).

As underlined by Deng and Elyasiani (2008) to the extent that geographic diversification and distance go hand in hand, increased distance can confound the assessment of the geographic diversification effects. Therefore, it is important to account for branch distance when gauging the impact of geographic diversification on bank value and risk. To this end, as in Bernini and Brighi (2012) we introduce a measure of functional distance between bank branches and headquarters (DISTANCE) constructed at the municipal level and specified as follows:

$$\text{DISTANCE}_{it} = \frac{\sum_{z_b=1}^{B_i} [\text{Branches}_{itz_b} \times \ln(1+\text{D}_{itz_b})]}{\sum_{z_b=1}^{B_i} \text{Branches}_{tz_b}}; \quad (3)$$

where z_b=1,…,B_i are the municipalities where the i-bank has branches, with i: 1,..,I. $D_{iz_b} = \sqrt{(X_{z_b} - X_{HQ_i})^2 + (Y_{z_b} - Y_{HQ_i})^2}$ is the Euclidean distance between the municipality zb where the branch is located and the municipality where the HQ of the i-bank is located (HQi). The DISTANCE is calculated in respect to municipalities where at least one branch is present.

For each bank holding company, the geographic diversification measures stem from an average computation. First of all, we have calculated the HHI_GEO and DISTANCE measures for all the individual banks belonging to the BHC. Then, we weight it for the contribution of the individual bank total asset to the formation of the BHC total asset.

3.2. Performance measures

Alternative proxies of bank performance are employed to investigate the relation between diversification and bank performance: the return on assets (ROA) defined as the ratio of net results from ordinary activities to total asset[3]. To adjust these measures for risk (volatility), following Stiroh (2004) and Chiorazzo et al. (2008) we compute the ratio between the annual return (ROA) and its standard deviation calculated over the entire sample period. Analytically:

$$\text{SHROA}_{i,t} = \frac{\text{ROA}_{i,t}}{\sigma\text{ROA}_i}; \quad (4)$$

where $\text{SHROA}_{i,t}$ indicate risk-adjusted returns for the bank i in the year t.

Finally, as in Stiroh 2004, we introduce a measure of insolvency risk computed in terms of the Z-score and calculated as follows:

$$\text{Z}-\text{score}_{i,t} = \frac{\left(\text{ROA}_{i,t} + \frac{\text{E}_{i,t}}{\text{TA}_{i,t}}\right)}{\sigma\left(\text{ROA}_{i,t}\right)}. \quad (5)$$

The Z-Score, as a proxy for insolvency risk, is a measure widely used in recent empirical research (Stiroh 2004a, b; Laeven and Levine, 2008; Demirgüç-Kunt and Huizinga, 2010) and is measured by how many standard deviations a firm is away from insolvency. A higher Z-Score indicates improved risk-adjusted performance; in other words, higher values of Z-score imply lower probabilities of failure.

[3] As for mutual banks it is well known that for regulatory reasons they have different rules of provisions as capital reserve that implies that the degree of capitalization is structurally higher than that of other banks. To our purpose it is advisable to use ROA instead of ROE as a proxy of bank performance, also on a risk adjusted basis.

3.3. Control variables

The banking sector all around the world has experienced major transformations in its environment, resulting in significant impacts on its performance. Thereby, both external and internal factors have been affecting the profitability of banks over time. The internal determinants include bank-specific variables. The external variables reflect environmental factors that are expected to affect the profitability of financial institutions. This section describes the control variables that we use in the econometric model distinguishing between bank specific and external determinants.

3.3.1. Bank specific determinants

To capture the effects of bank size we use the continuous variable SIZE which is equal to the Ln (Total Asset), i.e. the natural logarithm of the year-end total asset (Stiroh 2004a, b; Stiroh and Rumble 2006, DeYoung and Rice 2004a, Chiorazzo et al. 2008). The continuous variable such as Ln (Total Asset) is normally expected to be a superior regressor than some arbitrary size dummies, except the case when there is a non-monotonic relationship between size and performance. To control for the potential nonlinear relationship between size and performance, we also include the natural logarithm of the squared term of year-end total asset – SIZE_SQ (Chiorazzo et al., 2008 and Berger et al., 2010).

To measure the effect of operational efficiency on bank profitability, we introduce in the analysis the cost income ratio (C_I) computed as the ratio between personnel and other administrative expenses over intermediation margin. A reduction in a bank's cost-income ratio, driven by improved managerial efficiency, is expected to increase profitability (Goddard et al., 2013).

As a proxy for bank capital we use the total capital ratio defined as the ratio of total regulatory capital over risk weighted asset – RC_RWA.

To proxy bank's credit quality we use two different ratios: the ratio of loan loss provisions to total loans (LLP) and the ratio of non-performing loans to total loans (NPL). The former can be interpreted as an ex ante measure of expected losses, whereas the latter can be interpreted as an ex post measure of actual losses from lending activities (Berger et al., 2010).

3.3.2. External determinants

In addition to the bank-specific variables described above, our analysis includes a set of macroeconomic characteristics.

We introduce a GDP variable that should account for the impact of economic cycles on bank performance as the demand for lending increases during cyclical upswings. The GDP is calculated in respect to the i-bank, weighting the indicator at the province level with the ratio of branches in the province in respect to the total amount of branches of the i-bank. The procedure allows to take into account of the different impact that the macro-indicator has on the bank, in respect to the presence of that bank in that province.

$$GDP_{\mathrm{i}} = \frac{\sum_{z_{\mathrm{p}}=1} \frac{Branches_{iz_p}}{Branches_i} * (GDP)_i}{P_i} \qquad (6)$$

where i refers to the bank and z_p to the province where the bank operates. Also in case of GDP, the variable for bank holding companies has been computed in terms of weighted average of the individual bank score weighted for the contribution of the individual bank total asset to the formation of the group total asset. In the estrimation we take the natural logarith of GDP.

To capture the effect of the financial and sovereign debt crises, we introduce in the analysis two dummy variables. The first one termed FIN_CRISIS equals to one for the years 2008 and 2009 and zero otherwise (2006, 2007, 2010, 2011 and 2012); it has been introduced in order to capture the effect of the financial crisis. The choice of 2008 as the starting year of the crisis in Italy was first justified by Gambacorta and Mistrulli (2011), who clearly demonstrate that the effects of the crisis began during the third quarter of 2008. The other dummy variable named SOVER_CRISIS equals to one for the years 2010 and 2011 and zero otherwise (2006, 2007, 2008, 2009 and 2012). Since the financial crisis developed fatherly in a sovereign debt crisis starting in 2010 we control for this second wave of the crisis. The sovereign debt crisis affected Italian banks in terms of reduced available credit and higher cost of borrowing on markets due to sovereign risk and tightening capital ratios (Cosma and Gualandri, 2014).

3.4. Empirical methodology

We use a general panel model with fixed effects. More precisely, to examine the link between diversification and the level and volatility of the banks' profitability we estimate the following equation:

$$y_{i,t} = \alpha_{i,t} + \beta_1 \text{DIV\_REV}_{i,t} + \beta_2 \text{MKT\_TOP}_{i,t} + \beta_3 \text{AM\_TOP}_{i,t} + \beta_4 \text{DIS\_TOP}_{i,t} + \beta_5 \text{OPFIN\_TOP}_{i,t} + \beta_6 \text{DIV\_GEO}_{i,t} + \beta_7 \text{DISTANCE}_{i,t} + \sum_{s=8}^{16} \beta_s \lambda_{i,t} + \varepsilon_{i,t}; \quad (7)$$

where Y = [ROA, SHROA, Z-Score] is the dependent variable; *i* identifies the individual bank-observation belonging to the sample (*i = 1, 2, 3, ... , 507*); *t* expresses the time variable (*t = 2006, … , 2012*); βs are the parameters to be estimated, λ is a matrix of control variables. Both the constant and the error terms are also indicated in the model.

DIV_REV is revenue diversification, MKT_TOP is the ratio of gross market and trading commissions to total operating revenue; AM_TOP is the share of asset management commissions on total income; DIS_TOP is the fraction of fee-based revenues from the distribution of third-party products and services on total operating revenue; and OPFIN_TOP is the ratio of the absolute value of net results from financial operations to total operating revenue. The other variables control for factors potentially affecting the level and volatility of profits.

As underlined in Chiorazzo et al. (2008) it is important to note that the regression coefficients on the individual component shares in the revenue shares measure the effect of a shift from the omitted category of the component share into an alternative since one component share has to be excluded to avoid perfect collinearity. For instance, in eq. (7), positive values of β_1 indicate that income diversification improved performance. β_2 denotes the effect on performance due to

variations in the share of market and trading fees and commissions holding the effects of diversification (DIV) constant. Positive values of β_2 show that increases in market and trading commissions are associated with higher returns; since the shares sum to one, the coefficient on the included shares (market and trading commissions for instance) shows the impact of a 0.01 change from the omitted share (traditional income share equals to the sum of gross interest revenues and Traditional Banking Commissions) to the included ones.

The coefficients obtained with Eq. (7) are not to be interpreted in a causal sense as we estimate a reduced-form model. Thus, our coefficients show conditional correlations between the various measures of bank performance and the pursued diversification strategies.

A list of the variable used is presented in Table 1.

[Table 1 around here]

3.5. Data

Data are provided by the consolidated and unconsolidated balance sheets of BHC and individual Italian banks submitted to the Bank of Italy and collected by the Italian Banking Association over the period 2006–2012. The starting date is 2006 since Italian banks report unconsolidated accounting data based on IFRS from that date. We exclude banks with missing data on basic accounting variables, including assets, loans, deposits, equity, interest income, non-interest income, commission and trading revenues.

We use an unbalanced panel dataset. However to limit the randomly missing data problems connected to incomplete panels we choose only banks that have at list 4 continous balance-sheet years data (Baltagi 2005).[4] Moreover for each dependent and independent variables we eliminate outlier values.

The final dataset includes 3,549 bank-year o bservations. Differently from Chiorazzo et al. (2008) and Vallascas et al. (2012), we analyze the relationship between diversification strategies and bank performance using consolidated accounting data when available and unconsolidated otherwise.

The coverage of our sample relative to the population of the whole Italian banking system is on average 87.3 per cent in terms of number and 79.6 per cent in terms of total asset. The coverage is quite stable over the analysed period (Table 2).

In the analysis data on macro environmental variables, over the period 2006-2012, affecting banks performance are also used. Information on GDP at the provincial level are provided by ISTAT and by Istituto Tagliacarne. The number of branches (referred to each bank at the municipal level) are taken from the Bank of Italy.

[Table 2 around here]

[4] Differently both Chiorazzo et al. (2008) and Acharya et al. (2006) used a balance panel dataset.

4. Empirical Results

4.1. Descriptive statistics

Descriptive statistics of our sample are reported in Table 3. The average (mean) bank generated more than 90% of its revenues from traditional activities [TRADT_TOP]. Turning to the fees and commission components the majority is represented by market and trading commission (2.3%), while the ratio of net results from financial operation [OPFIN_TOP] contributes for nearly 5% to the formation of the total operating income. Turning to the type of fee and commissions, the vast majority are credit related fees, the so-called traditional banking fee and commission, that contributes for more than two third to the formation of the aggregate. Fees and commissions linked to traditional banking [TBC] represent on average the 11.7% of total operating revenues [TBC_TOP], and when added to gross interest income, represent on average the 13.0% of the total traditional income [TBC_TRADT]; these results testify to their relevance.

[Table 3 around here]

As a preliminary investigation, this subsection examines bank characteristics and bank risk by dividing the whole sample into the two institutional groups analyzed in this paper: mutual vs. non mutual banks (Table 4). This classification is useful to catch the effect of alternative business model we split the sample between mutual banks and others. Mutual banks are a homogenous group of banks offering an alternative business model to traditional commercial banks and are generally considered as relatively less profitable nonetheless characterised by low risk preferences (Iannotta et al., 2007).

[Table 4 around here]

The final dataset that includes, as previously stated, 3,549 bank-year observations corresponds, in the final year to 403 Mutual banks and 104 not mutual.

Mutual banks are on average more profitable and less risky than non mutual banks and more involved into traditional activities, as verified by the higher ratio of interest income and traditional banking fee and commisisons.

Turning to the relationship between bank risks and non-interest income activities, the banks with a higher share of non-interest activities display higher insolvency risk. In sum, these findings seem to be consistent with previous results from univariate mean tests by Lepetit et al. (2008) in that non-interest income is positively associated with bank risk and insolvency risk for European banks.

4.2. Multivariate Analysis

As for product diversification between traditional and the different lines of non-traditional business (DIV_REV) the main results suggest that the diversification implies a negative effect on bank profitability measured both in terms of Return on Asset (ROA – Table 5) and Risk Adjusted Return on Asset (SHROA – Table 6). This result is in line with Goddard et al. (2008) investigating the impact of revenue diversification on financial performance for the period 1993–2004 finding a negative effect both on ROA and SHROA. This result would suggest that for a bank at least in terms of profitability is more convenient focusing on traditional or non traditiona business. In fact for the

risk results suggest that greater diversification implies higher risk for banks even if the result is not statistically significant (Table 7).

To better investigate the effects of income diversification on bank risk and profitability it could be useful to control for the effect of the share of the different non-interest components over the total revenue. As the non-interest component increases, the profitability increases. This is an important result since it suggests that for bank-profitability it is important to invest more in the non-interest component. For the full sample this result is consistent with Stiroh and Rumble (2006) investigating the effect of income diversification on a sample of US financial holding companies over the period 1997-2002.

As for the risk-adjusted profitability results change with respect to the crisis break. Before the crisis the market and trading commissions and the distribution of thrid party products and services play no role in fostering SHROA while after the crisis the effect is not neglectable. In the after crisis period the bank profitability is, in fact, strictly related to the non interest component being the interest margins substantially nil and the volumes drastically reduced. Among the different business lines, the role of the asset management commission components is straightforawrd. Considering the model with the two financial crises break dummies we find that to invest more in the asset management business implies less risk with greater risk-adjusted profitability. As for the pre-crisis period our results are in line with Stiroh (2004), Stiroh and Rumble (2006) and Mercieca et al. (2008).

Having controlled for the revenue diversification dimension the aim of the paper is now to investigate how and in which measure structural variables like geographical diversification, distance and size could impact on bank risk and profitability.

The geographical diversification do not appear to play a relevant role in affecting both risk and profitability except for risk-adjusted profitability analysis (Table 6). A greater geographical diversification implies higher risk-adjusted profitability in particular in the post-crisis period. This result is coherent with the literature on bank risk diversification suggesting that banks geographically diversified could better absorb local systemic risk (Bhattacharya and Gale, 1987). As for distance results suggest that in the post-crisis period to operate distant from the head-quarter implies greater difficulties in terms of screening and monitoring and coherently with the literature on geographical distance (Alessandrini et al., 2009) the risk-adjusted profitability decreases. In this respect, our results suggest that especially in the post-crisis period banks more geographically diversified have been less penalized in terms of risk-adjusted profit however to be distant from the head-quarter could exacerbate the screening evaluations strategy with negative effects on bank profitability.

Finally, as for size results are in line with the literature (DeYoung et al., 2004) suggesting bank size has generally a positive impact on bank profitability. A direct relation between volumes and profitability hold for all the models and over the 2006-2012 investigated period. As for risk results are quite interesting suggesting that as soon as we take into account the crisis break size becomes statistically significative, positively affecting the z-score index. In the post crisis smaller banks appear to be riskier being more exposed to local environmental shocks, strictly linked to traditional interest bearing activities and less geographically diversified.

[Table 5, 6, 7 around here]

As size appears to play an important role both in the profitability determination and in the post-crisis risk analysis, it could be of interest to investigate how our main results, referred to the revenue and geographical diversification variables, are affected by the size dimension. In this sense, the Italian banking system represents an ideal experimental setting since it is characterised by a homogenous group of banks - the mutual ones. Mutual banks are typically small banks with total assets smaller than one billion (Table 4); traditionally oriented to local lending since for statutory reasons they are mainly dedicated to satisfy their member needs both on the lending and funding side, moreover, they can increase their territory of competence following the continuity principle. In this sense, mutual banks offer an alternative business model to traditional commercial banks[5]. For this reason, we further investigate the effect of size splitting our sample among two sub-samples made by mutual and not-mutual banks. Starting from the analysis of the revenue diversification strategy, i.e.: DIV_REV, we first find that as the diversification strategy between traditional and non-traditional bearing generating activities is implemented results appear to be in line both with respect to the full sample and the non-mutual sample being or not statistical significative or presenting the same expected sign. In particular, Table 8 shows that greater diversification implies a positive impact on the risk-adjusted profitability. For the mutual banks tipically concentrated in the lending activity to diversify its activity – particularly after the crisis – could be beneficial in terms of increased profitability. The evidence is in line with previous literature. Stiroh (2004) in fact finds a similar result with reference to small US community banks. The result is also in line with European small banks evidence as shown in Mercieca et al. (2008). In this case our results suggest that for small banks like the mutual ones highly concentrated in traditional business to diversify between interest and non-interest income could be beneficial in terms of profitability even if it could imply more risk[6].

In particular, the great difference between Mutual and Non mutual banks stand in the ability to distribute third party product and services; probably the higher branch density for the non mutual banks enable them to distribute theird party products and services on a greater extent then mutual banks.

Finally the analysis of structural factors like size, geographical diversification and distance suggest at least two interesting features: i) a larger size for mutual banks appear to be beneficial in terms of risk-adjusted profitability as the crisis break is considered. Larger size mutual banks could have the opportunity of greater capitalization to better manage the crisis. ii) as for the geographical diversification effect this category of banks appear to be significatively sensible because also in the case of geographical diversification their area of competence appear to be relatively local and they can have the opportunity to eliminate the local systemic risk if they expand their activities span outside the local burdens; differently from other not-mutual banks for which geographical diversification positively does not statistical affect the risk-adjusted profitability.

[Table 8 around here]

[5] Mutual banks have been widely considered in empirical studies. Among the others, see: Goddard et al., 2008; Battaglia et al., 2010.

[6] The effect on z-score is in fact negative. Results are available upon request to the authors.

4.3. Robustness checks

In this section we first investigate the likely impact of different measures of diversification; then for different measures of bank performance. In our opinion these are the principal reasons for the discrepancy among the results of the different studies reviewed and our contribution. Finally, we control also for potential endogeneity problem between bank performance and diversification.

For a further investigation of the relationship between diversification and performance, first of all we introduce alternative measures of bank diversification (Table 9 columns 1 & 2). We construct the measure DIV_NON which is equal to 1 minus the sum of squared revenue shares where revenue shares are equal to traditional revenues and non-traditional revenues on total operating income. Analytically:

$$\text{DIV\_NON} = 1 - \left(\left(\frac{\text{TRADT}}{\text{TOP}} \right)^2 + \left(\frac{\text{NON\_TRADT}}{\text{TOP}} \right)^2 \right)$$

where TRADT is the sum of gross interest revenue and traditional banking commission, NON_TRADT captures non-interest income (MKT + AM + DIS + OPFIN), and TOP is the sum of the two (TOP = TRADT + NON_TRADT) and NON_TOP measures the share of non traditional component over total operating income. By definition DIV_NON can take on values between zero (the bank is fully specialized in one business area) and 0.5 (the bank generates a fully balanced revenue mix from the two business areas).

As can be seen in Table 9 our major empirical findings remain qualitatively unchanged. As for product diversification between interest and not-interest income the main results suggest that the diversification implies a negative effect on risk adjusted Return on Asset (SHROA). The positive signs of the shares of non-traditional banking fee and commision (Market, Asset Mangement, Distributive and Results from financial operations) implies that a shift towards less traditional fee and commission fosters risk adjusted performance. Also in this case, the financial crisis highlight the role of size and the role of geographic diversification. From the sign and the significance of the term, it seems that larger institutions have been better able to react to the financial crisis; in the after-crisis period as size increases risk decreases with a positive impact on the risk-adjusted profitability. In terms of geographic diversification, it becomes particularly important after the financial crisis when banks geographically diversified show a larger risk-adjusted profitability.

[Table 9 around here]

As a further control, two other measure of bank performance have been employed: the return on equity (ROE) which is the ratio of net profits to equity (columns 3 & 4) and the risk adjusted return on equity (SHROE) computed as the ratio between annual return on equity and its standard deviation calculated over the entire sample period Table 9 (columns 5 & 6). Also in this case, our main empirical results remain unaffected by the change in the measure of bank performance. The main results suggest that the diversification between interest and non interest income implies a negative effect on return on equity also on a a risk adjusted.

Finally, we control also for potential endogeneity problem between bank performance and diversification. In fact, our last robustness check is linked to the fact that our results, and indeed many previous studies, are subject to an endogeneity problem. In order to account with this issue, we run several exercises to control for potential endogeneity between bank performance and diversification.

Following Laeven and Levine (2007) and Elsas et al. (2010), in order to control for selectivity, i.e. the problem that the same characteristics which affect the decision to diversify affect a bank's performance, we estimate a Heckman (1979) treatment effects model by maximum likelihood. The model consists of one equation for the determinants of the performance measure, where a dummy variable (DIVERSIFIED) indicates whether a firm is diversified or not. In our case, the dummy equals one, if the diversification meausre (DIV_REV) exceeds 0.191, i.e. the 75% quantile of the empirical distribution or the value of DIV_GEO is higherthan 0.747, i.e. the 75% quantile of the empirical distribution. The model comprises a simultaneous probit estimation, where the dummy for a diversified bank is explained by variables exogenous to performance measures. In our baseline specification performance measures do not appear to depend on total asset growth and the growth rate of GDP. However, total assets and local GDP growth represent two important external instruments with which banks can manage their corporate portfolio and the scope of their diversification strategy. We use these two variables as exogenous instruments. Table 10 shows the estimation results. Our results are robust to selectivity as well since the coefficient estimates support our main results.

[Table 10 around here]

5. Conclusions

As for product diversification between interest and not-interest income the main results suggest that the diversification implies a negative effect on bank profitability measured also on a risk adjusted basis. This result is shown to be robust for alternative measure of diversification, for alternative performance measures and also for alternative sub-samples used. Finally, they are robust also when controlling for potential selectivity problem in the relationship between bank performance and diversification.

As for revenue diversification, the result sounds to be reversed when the bank implements a more accurate diversification strategy among other financial services. Evidence suggests that greater diversification among different fee and commission components decreases bank risk and increases risk-adjusted profitability. As for SHROA asset management component plays a positive role influencing the bank profitability dimension, fostering at the same time return and lower the risk dimension.

The geographical diversification does not appear to play any relevant role in affecting both risk and profitability except for risk-adjusted profitability analysis. Differently distance affect both return and risk. In particular, we find that when distance between headquarter and local branches increased then the risk-adjusted profitability decreases. This result suggest that as banks become distant from its clientele the screening and monitoring of local clientele become more difficult increasing the risk of a wrong screening with negative effect in terms of risk-adjusted profitability.

The main results suggest that revenue and geographical diversification play a role in determining bank performance. The relative effects appear, however, to be different between mutual and not-mutual banks suggesting different business strategies for different banks. Starting from the analysis of the revenue diversification strategy we first find that in particular in the post-crisis model for small banks like the mutual ones highly concentrated in traditional business to diversify between interest and non-interest income could be beneficial in terms of profitability even if it

could imply more risk. Finally, differently from other not-mutual banks for which geographical diversification does not affect the risk-adjusted profitability, geographical diversification affect mutual banks because they can benefit in enlarging their territory of competence and entering into different areas.

Our analysis also provides an examination of the value of diversification during the recent financial crisis. Our results suggest that both the first wave of the financial crisis and the subsequent sovereign debt crisis implies a negative effect both on the profitability and the risk-adjusted profitability. Differently in the case of the Z-score analysis only the sovereign debt crisis sounds to negatively affect the bank risk perception confirming the anecdotal evidence that Italian banks have better react to the first 2008 financial crisis.

Moreover as for the post-crisis period our results suggest that banks more geographically diversified have been less penalized in terms of risk-adjusted profit however to be distant from the head-quarter could exacerbate the screening evaluations strategy with negative effects on bank profitability.

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Table 1

Variables names and definitions.

Name	Definition
ROA	Net results from ordinary activity over total asset
SHROA	Annual ROA over its standard deviation calculated over the entire sample period
Z_SCORE	$\frac{\left(\text{ROA}_{i,t} + \frac{\text{E}_{i,t}}{\text{TA}_{i,t}}\right)}{\sigma(\text{ROA}_{i,t})}$
DIV_REV	$1-\left(\left(\frac{\text{TRADT}}{\text{TOP}}\right)^2+\left(\frac{\text{MKT}}{\text{TOP}}\right)^2+\left(\frac{\text{AM}}{\text{TOP}}\right)^2+\left(\frac{\text{DIS}}{\text{TOP}}\right)^2+\left(\frac{\text{OPFIN}}{\text{TOP}}\right)^2\right)$
TRADT_TOP	Ratio of traditional income (Gross interest + Traditional Banking Commission) on total operating revenues
NON_TOP	Ratio of non traditional income on total operating revenues
MKT_TOP	Market and trading Commission on total operating revenue
AM_TOP	Share of asset management commission on total operating revenue
DIS_TOP	Ratio of fee based revenues from the distribution of third party products and services on total operating revenue
OPFIN_TOP	Absolute value of Net result from financial operations over total operating revenue
DIV_NON	$\text{DIV\_NON} = 1-\left(\left(\frac{\text{TRADT}}{\text{TOP}}\right)^2+\left(\frac{\text{NON\_TRADT}}{\text{TOP}}\right)^2\right)$
DIV_GEO	$1-\left[\text{HHI\_}GEO_{\text{it}}\right] = 1-\left[\frac{\sum_{z_p=1}^{P_i}\left(\frac{Branches_{t,i_{zp}}}{Branches_{t,i}}\right)^2}{P_{t,i}}\right]$
DISTANCE	$\frac{\sum_{z_b=1}^{B_i}[\text{Branches}_{\text{itz}_b}\times\ln(1+\text{D}_{\text{itz}_b})]}{\sum_{z_b=1}^{B_i}\text{Branches}_{\text{tz}_b}}$
SIZE	Ln (Total Asset)
SIZE_SQ	Ln (Total Asset)^2
C_I	Personnel and other administrative expenses over intermediation margin
RC_RWA	Total capital over Risk Weighted Asset [Total capital ratio]
LLP	Loan loss provisions over Net loans
NPL	Net non-performing loans over net loans
Ln GDP	$\text{Ln}\left[\frac{\sum_{z_p=1}\frac{Branches_{iz_p}}{Branches_i}*(GDP)_i}{P_i}\right]$
FIN_CRISIS	Dummy variable equals to one for the years 2008 and 2009 and equals to zero otherwise (2006, 2007, 2010, 2011 and 2012)
SOVER_CRISIS	Dummy variable equals to one for the years 2010 and 2011 and equals to zero otherwise (2006, 2007, 2008, 2009 and 2012)

Table 2

Sample coverage.

	2006	2007	2008	2009	2010	2011	2012	Average
				Number				
Sample Mutual banks	391	397	402	402	398	398	378	395
Italian mutual banking system	425	430	422	412	406	403	394	413
Coverage Mutual bank	**92.0**	**92.3**	**95.3**	**97.6**	**98.0**	**98.8**	**95.9**	**95.7**
Sample Not Mutual	85	93	101	100	100	100	96	96
Sample BHC	*39*	*44*	*48*	*48*	*50*	*50*	*48*	*47*
Sample Independent	*46*	*49*	*53*	*52*	*50*	*50*	*48*	*50*
National BHC	87	82	81	75	76	77	75	79
National Independent bank	67	73	73	78	70	71	69	72
Coverage BHC	**44.8**	**53.7**	**59.3**	**64.0**	**65.8**	**64.9**	**64.0**	**59.5**
Coverage Independent	**68.7**	**67.1**	**72.6**	**66.7**	**71.4**	**70.4**	**69.6**	**69.5**
Total coverage (mutual and not mutual)	**82.2**	**83.8**	**87.3**	**88.8**	**90.2**	**90.4**	**88.1**	**87.3**
				Total asset [euro millions]				
Sample Mutual banks	126,659	139,670	154,982	167,470	173,827	182,639	199,394	163,520
Sample Not Mutual	1,874,912	2,579,574	2,921,093.03	2,844,717	2,945,482	2,972,900	3,030,669	2,738,478
Sample BHC	*1,820,332*	*2,521,702*	*2,854,200*	*2,777,767*	*2,882,193*	*2,907,407*	*2,963,469*	*2,675,296*
Sample Independent	*54,580*	*57,872*	*66,892*	*66,950*	*63,288*	*65,493*	*67,200*	*63,182*
Total our sample	2,001,571	2,719,245	3,076,075	3,012,188	3,119,310	3,155,539	3,230,063	2,901,999
Total Italian banking system^	2,793,245	3,331,830	3,634,564	3,691,968	3,758,891	4,041,643	4.210.025	3,542,023
Coverage ratio	**71.7**	**81.6**	**84.6**	**81.6**	**83.0**	**78.1**	**76.7**	**79.6**

^ The total is given by the sum of the following categories: BHC + Independent bank + Mutual banks.

Note: This table reports the number of banks and total asset for the different groups, both in the sample and in the population, and the whole Italian banking system for each calendar year. Source: Bank of Italy – Annual Reports and ABI Banking Data set.

Table 3

Summary statistics for all banks, on average over the period 2006-2012.

	obs	Mean	min	p25	p50	p75	max	sd
Performance Measure								
ROA	3,441	0.006	-0.13	0.004	0.007	0.011	0.070	0.010
SHROA	3,447	1.699	-3.59	0.705	1.538	2.709	9.279	1.538
Z-SCORE	3,431	28.357	0.058	16.976	25.694	35.099	120.53	17.429
Revenue Diversification								
DIV_REV	3,454	0.150	0.000	0.075	0.121	0.191	0.742	0.116
Shares of different sources of revenues								
TRADT_TOP	3,454	0.907	0.078	0.896	0.937	0.961	1.000	0.117
NONTRADT_TOP	3,454	0.093	0.000	0.039	0.063	0.104	0.922	0.117
INT_TOP	3,454	0.791	0.004	0.757	0.814	0.859	1.000	0.122
TBC_TOP	3,454	0.117	0.000	0.081	0.113	0.145	0.866	0.057
TBC_TRADT	3,454	0.130	0.000	0.089	0.124	0.160	0.994	0.067
MKT_TOP	3,454	0.023	0.000	0.008	0.014	0.024	0.846	0.043
AM_TOP	3,454	0.010	0.000	0.000	0.000	0.000	0.758	0.058
DIS_TOP	3,454	0.014	0.000	0.002	0.007	0.016	0.813	0.037
OPFIN_TOP	3,454	0.046	0.000	0.012	0.029	0.062	0.805	0.056
Geographic Diversification								
DIV_GEO	3,440	0.366	0.000	0.000	0.000	0.747	1.000	0.398
DISTANCE	3,440	1.919	0.000	1.325	1.923	2.480	8.965	1.116
Control variables								
SIZE	3454	12.877	7.766	11.807	12.693	13.502	20.768	1.606
SIZE_SQ	3454	168.40	60.31	139.39	161.11	182.29	431.30	44.99
C_I	3446	0.724	0.114	0.626	0.700	0.777	4.867	0.236
RC_RWA	3410	0.178	0.001	0.123	0.151	0.195	2.643	0.124
LLP	3448	0.007	-0.016	0.002	0.005	0.008	0.130	0.009
NPL	3449	0.020	0.000	0.007	0.015	0.028	0.163	0.018
Ln GDP	3449	9.475	5.344	9.109	9.587	10.147	10.768	0.825

For a definition of the variables, see Table 1.

Table 4

Descriptive statistics of bank characteristics, on average over the period 2006-2012.

	TA (000)	ROA	SHROA	Z-SCORE	TRADT_TOP	MKT_TOP	AM_TOP	DIS_TOP	OPFIN_TOP	C_I	RC_RWA	NPL
Not Mutual [96]												
Mean	28,244,108	0.006	1.457	23.371	0.800	0.052	0.050	0.028	0.069	0.734	0.183	0.016
Std	114,490,327	0.015	1.730	16.101	0.217	0.089	0.122	0.080	0.089	0.403	0.193	0.017
Mutual [395]												
Mean	369,278	0.007	1.758	29.575	0.934	0.015	0.001	0.010	0.040	0.722	0.177	0.021
Std	350,018	0.008	1.481	17.527	0.045	0.012	0.003	0.011	0.043	0.171	0.099	0.018
All [491]												
Mean	5,881,295	0.006	1.699	28.357	0.907	0.023	0.01	0.014	0.046	0.724	0.178	0.020
Std	52,080,314	0.01	1.538	17.429	0.117	0.043	0.058	0.037	0.056	0.236	0.124	0.018

^ In square bracket the average number of the sample over the period 2006-2012

For a definition of the variables, see Table 1.

Table 5

Revenue Diversification, Geographic diversification and Performance. All banks in the sample.

	ROA (1)	ROA (2)	ROA (3)	ROA (4)
Constant	-0.036**	-0.042**	-0.036**	-0.055***
	(0.016)	(0.017)	(0.016)	(0.016)
DIV_REV	-0.023***		-0.023***	-0.025***
	(0.004)		(0.004)	(0.003)
MKT_TOP	0.046***		0.046***	0.049***
	(0.006)		(0.006)	(0.006)
AM_TOP	0.043***		0.043***	0.049***
	(0.006)		(0.006)	(0.006)
DIS_TOP	0.081***		0.081***	0.088***
	(0.006)		(0.006)	(0.006)
OPFIN_TOP	0.042***		0.042***	0.043***
	(0.005)		(0.005)	(0.005)
DIV_GEO		0.001	0.001	0.001
		(0.001)	(0.001)	(0.001)
DISTANCE		-0.001*	-0.001*	-0.000
		(0.000)	(0.000)	(0.000)
SIZE	0.014***	0.016***	0.014***	0.016***
	(0.003)	(0.003)	(0.003)	(0.003)
SIZE_SQ	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
C_I	-0.026***	-0.026***	-0.026***	-0.023***
	(0.001)	(0.001)	(0.001)	(0.001)
RC_RWA	-0.000	-0.000	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
LLP	-0.528***	-0.516***	-0.518***	-0.542***
	(0.012)	(0.013)	(0.012)	(0.012)
NPL	-0.037***	-0.034***	-0.038***	-0.029***
	(0.007)	(0.008)	(0.008)	(0.007)
Ln GDP	0.001**	0.000	0.001*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
FIN_CRISIS				-0.002***
				(0.000)
SOVER_CRISIS				-0.003***
				(0.000)
Observations	3,388	3,377	3,377	3,377
R-squared	0.684	0.650	0.674	0.699
Adj. R-squared	0.627	0.587	0.614	0.644

***, **, * indicates statistical significance at the 1%, 5% and 10% respectively.

Note: This table reports the results of a panel data regression fixed effect. Regression coefficients are reported with standard error in parenthesis. The dependent variable is the measure of performance (ROA). DIV_REV measures revenue diversification between traditional and the different lines of non-traditional income. MKT_TOP, AM_TOP, DIS_TOP and OPFIN_TOP measure respectively, the share of market and trading commission, asset management commission, fee from the distribution of third party product and the net results from financial operations in total operating revenues. DIV_GEO measures geographic diversification. Distance measures the functional distance between bank branches and its headquarter. The following bank specific controls are included in the regression: SIZE is the natural logarithm of Total Asset in thousands of euro, SIZE_SQ is the natural logarithm of squared Total assets, C_I is the ratio between personnel and other administrative expenses over intermediation margin, RC_RWA is the total capital ratio, LLP is the ratio of loan loss provisions to net loans, NPL is the ratio of non-performing loans to net loans. Three macroeconomic controls are included as follows; Ln GDP is the natural log of GDP weighted for branches and provinces; FIN_CRISIS is a dummy variable equals to one for the years 2008 and 2009 and zero otherwise; SOVER_CRISIS is a dummy variable equals to one for the years 2010 and 2011 and zero otherwise. For a definition of the variables, see Table 1. The observation period is 2006–2012.

Table 6

Revenue Diversification, Geographic diversification and Performance. All banks in the sample.

	SHROA (1)	SHROA (2)	SHROA (3)	SHROA (4)
Constant	-2.018	-1.487	-1.561	-6.260**
	(2.667)	(2.682)	(2.672)	(2.463)
DIV_REV	-2.074***		-2.009***	-2.488***
	(0.538)		(0.537)	(0.493)
MKT_TOP	1.298		1.246	2.077**
	(1.011)		(1.010)	(0.929)
AM_TOP	3.240***		3.180***	4.181***
	(0.957)		(0.955)	(0.881)
DIS_TOP	0.993		0.994	2.360**
	(1.000)		(0.998)	(0.923)
OPFIN_TOP	2.566**		2.497**	2.932***
	(0.802)		(0.800)	(0.735)
DIV_GEO		0.340**	0.290*	0.350**
		(0.157)	(0.157)	(0.144)
DISTANCE		-0.207***	-0.195**	-0.133**
		(0.061)	(0.061)	(0.056)
SIZE	2.160***	2.029***	2.068***	2.445***
	(0.430)	(0.430)	(0.429)	(0.395)
SIZE_SQ	-0.141***	-0.134***	-0.136***	-0.137***
	(0.017)	(0.017)	(0.017)	(0.016)
C_I	-2.730***	-2.727***	-2.736***	-2.195***
	(0.081)	(0.081)	(0.081)	(0.078)
RC_RWA	-0.315*	-0.402**	-0.329**	-0.381**
	(0.164)	(0.164)	(0.164)	(0.151)
LLP	-39.584***	-41.171***	-41.069***	-46.697***
	(1.927)	(2.018)	(2.017)	(1.871)
NPL	-11.146***	-11.263***	-10.587***	-8.650***
	(1.232)	(1.237)	(1.244)	(1.165)
Ln GDP	0.244***	0.268***	0.260***	0.240***
	(0.048)	(0.053)	(0.053)	(0.049)
FIN_CRISIS				-0.384***
				(0.027)
SOVER_CRISIS				-0.645***
				(0.029)
Observations	3,391	3,380	3,380	3,380
R-squared	0.542	0.537	0.542	0.614
Adj. R-squared	0.460	0.454	0.459	0.544

***, **, * indicates statistical significance at the 1%, 5% and 10% respectively. *Note*: This table reports the results of a panel data regression fixed effect. Regression coefficients are reported with standard error in parenthesis. The dependent variable is the measure of risk adjusted performance (SHROA). DIV_REV measures revenue diversification between traditional and the different lines of non-traditional income. MKT_TOP, AM_TOP, DIS_TOP and OPFIN_TOP measure respectively, the share of market and trading commission, asset management commission, fee from the distribution of third party product and the net results from financial operations in total operating revenues. DIV_GEO measures geographic diversification. Distance measures the functional distance between bank branches and its headquarter. The following bank specific controls are included in the regression: SIZE is the natural logarithm of Total Asset in thousands of euro, SIZE_SQ is the natural logarithm of squared Total assets, C_I is the ratio between personnel and other administrative expenses over intermediation margin, RC_RWA is the total capital ratio, LLP is the ratio of loan loss provisions to net loans, NPL is the ratio of non-performing loans to net loans. Three macroeconomic controls are included as follows; Ln GDP is the natural log of GDP weighted for branches and provinces; FIN_CRISIS is a dummy variable equals to one for the years 2008 and 2009 and zero otherwise; SOVER_CRISIS is a dummy variable equals to one for the years 2010 and 2011 and zero otherwise. For a definition of the variables, see Table 1. The observation period is 2006–2012.

Table 7

Revenue Diversification, Geographic diversification and Performance. All banks in the sample.

	Z-SCORE (1)	Z-SCORE (2)	Z-SCORE (3)	Z-SCORE (4)
Constant	64.023***	64.897***	65.190***	55.945***
	(11.140)	(11.180)	(11.167)	(10.895)
DIV_REV	-2.256		-2.196	-3.036
	(2.245)		(2.243)	(2.183)
MKT_TOP	-3.298		-3.516	-0.320
	(4.222)		(4.219)	(4.110)
AM_TOP	5.916		5.684	9.912**
	(3.996)		(3.991)	(3.896)
DIS_TOP	-2.773		-2.812	2.967
	(4.175)		(4.170)	(4.082)
OPFIN_TOP	2.909		2.766	3.455
	(3.347)		(3.343)	(3.251)
DIV_GEO		0.471	0.283	0.181
		(0.654)	(0.655)	(0.638)
DISTANCE		-0.638**	-0.609**	-0.476*
		(0.256)	(0.255)	(0.249)
SIZE	3.002*	2.815	2.934	3.799**
	(1.795)	(1.794)	(1.795)	(1.747)
SIZE_SQ	-0.434***	-0.418***	-0.426***	-0.429***
	(0.073)	(0.073)	(0.073)	(0.071)
C_I	-3.682***	-3.568***	-3.638***	-2.465***
	(0.338)	(0.337)	(0.337)	(0.344)
RC_RWA	12.109***	11.780***	12.014***	11.972***
	(0.684)	(0.683)	(0.685)	(0.666)
LLP	-63.304***	-62.900***	-63.390***	-78.081***
	(8.988)	(9.080)	(9.104)	(8.931)
NPL	-34.948***	-35.963***	-34.513***	-23.285***
	(5.214)	(5.186)	(5.227)	(5.184)
Ln GDP	0.077	0.056	0.026	-0.215
	(0.199)	(0.222)	(0.223)	(0.218)
FIN_CRISIS				-0.058
				(0.118)
SOVER_CRISIS				-1.532***
				(0.128)
Observations	3,380	3,370	3,370	3,370
R-squared	0.474	0.471	0.475	0.504
Adj. R-squared	0.379	0.376	0.379	0.413

***, **, * indicates statistical significance at the 1%, 5% and 10% respectively. *Note*: This table reports the results of a panel data regression fixed effect. Regression coefficients are reported with standard error in parenthesis The dependent variable is the measure of bank insolvency risk (Z-Score). DIV_REV measures revenue diversification between traditional and the different lines of non-traditional income. MKT_TOP, AM_TOP, DIS_TOP and OPFIN_TOP measure respectively, the share of market and trading commission, asset management commission, fee from the distribution of third party product and the net results from financial operations in total operating revenues. DIV_GEO measures geographic diversification. Distance measures the functional distance between bank branches and its headquarter. The following bank specific controls are included in the regression: SIZE is the natural logarithm of Total Asset in thousands of euro, SIZE_SQ is the natural logarithm of squared Total assets, C_I is the ratio between personnel and other administrative expenses over intermediation margin, RC_RWA is the total capital ratio, LLP is the ratio of loan loss provisions to net loans, NPL is the ratio of non-performing loans to net loans. Three macroeconomic controls are included as follows; Ln GDP is the natural log of GDP weighted for branches and provinces; FIN_CRISIS is a dummy variable equals to one for the years 2008 and 2009 and zero otherwise; SOVER_CRISIS is a dummy variable equals to one for the years 2010 and 2011 and zero otherwise. For a definition of the variables, see Table 1. The observation period is 2006–2012.

Table 8

Mutual and Non Mutual Banks - Dependent variable: SHROA

	SHROA Mutual	SHROA Mutual	SHROA Non Mutual	SHROA Non Mutual
Constant	11.061**	-3.541	-11.632**	-10.395**
	(4.530)	(4.343)	(3.718)	(3.509)
DIV_REV	-5.691***	-6.769***	-0.365	-0.674
	(1.477)	(1.393)	(0.784)	(0.740)
MKT_TOP	9.058**	11.857***	0.225	0.684
	(3.318)	(3.160)	(1.179)	(1.116)
AM_TOP	22.745**	13.597*	2.569**	3.250**
	(7.471)	(7.089)	(1.081)	(1.028)
DIS_TOP	0.675	4.871	2.196*	2.789**
	(3.309)	(3.159)	(1.151)	(1.095)
OPFIN_TOP	9.220***	10.330***	1.123	1.590*
	(2.362)	(2.226)	(0.940)	(0.887)
DIV_GEO	0.571***	0.561***	0.032	0.367
	(0.153)	(0.144)	(0.418)	(0.398)
DISTANCE	-0.064	-0.083	-0.072	-0.079
	(0.096)	(0.090)	(0.102)	(0.096)
SIZE	0.695	2.569***	3.342***	2.858***
	(0.738)	(0.702)	(0.594)	(0.563)
SIZE_SQ	-0.115***	-0.171***	-0.159***	-0.134***
	(0.030)	(0.029)	(0.024)	(0.023)
C_I	-3.946***	-3.233***	-1.458***	-1.244***
	(0.102)	(0.104)	(0.128)	(0.123)
RC_RWA	-0.585**	-0.358*	-0.223	-0.363
	(0.209)	(0.197)	(0.262)	(0.247)
LLP	-41.210***	-44.939***	-44.228***	-51.387***
	(1.944)	(1.841)	(5.707)	(5.533)
NPL	-6.803***	-6.375***	-8.695**	-6.588*
	(1.202)	(1.146)	(3.603)	(3.549)
Ln GDP	0.347***	0.323***	0.091	0.130
	(0.060)	(0.057)	(0.097)	(0.092)
FIN_CRISIS		-0.313***		-0.402***
		(0.027)		(0.069)
SOVER_CRISIS		-0.515***		-0.566***
		(0.031)		(0.073)
Observations	2,719	2,719	661	661
R-squared	0.650	0.691	0.456	0.518
Adj. R-squared	0.587	0.635	0.340	0.413

***, **, * indicates statistical significance at the 1%, 5% and 10% respectively. *Note*: This table reports the results of a panel data regression fixed effect. Regression coefficients are reported with standard error in parenthesis The dependent variable is the measure of risk adjusted performance (SHROA). DIV_REV measures revenue diversification between traditional and the different lines of non-traditional income. MKT_TOP, AM_TOP, DIS_TOP and OPFIN_TOP measure respectively, the share of market and trading commission, asset management commission, fee from the distribution of third party product and the net results from financial operations in total operating revenues. DIV_GEO measures geographic diversification. Distance measures the functional distance between bank branches and its headquarter. The following bank specific controls are included in the regression: SIZE is the natural logarithm of Total Asset in thousands of euro, SIZE_SQ is the natural logarithm of squared Total assets, C_I is the ratio between personnel and other administrative expenses over intermediation margin, RC_RWA is the total capital ratio, LLP is the ratio of loan loss provisions to net loans, NPL is the ratio of non-performing loans to net loans. Three macroeconomic controls are included as follows; Ln GDP is the natural log of GDP weighted for branches and provinces; FIN_CRISIS is a dummy variable equals to one for the years 2008 and 2009 and zero otherwise; SOVER_CRISIS is a dummy variable equals to one for the years 2010 and 2011 and zero otherwise. For a definition of the variables, see Table 1. The observation period is 2006–2012.

Table 9

Revenue Diversification, Geographic diversification and Performance - Robustness chek.

	SHROA	SHROA	ROE	ROE	SHROE	SHROE
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-1.821	-6.680**	0.166	-0.009	7.507**	2.729
	(2.678)	(2.466)	(0.154)	(0.148)	(2.882)	(2.682)
DIV_REV			-0.097**	-0.116***	-2.331***	-2.807***
			(0.031)	(0.030)	(0.579)	(0.537)
MKT_TOP			0.028	0.063	1.347	2.274**
			(0.059)	(0.057)	(1.090)	(1.013)
AM_TOP			0.070	0.130**	2.414**	3.567***
			(0.056)	(0.054)	(1.031)	(0.960)
DIS_TOP			0.125**	0.198***	0.483	2.062**
			(0.058)	(0.056)	(1.077)	(1.005)
OPFIN_TOP			0.192***	0.209***	2.889***	3.311***
			(0.046)	(0.044)	(0.863)	(0.800)
DIV_NON	-1.636***	-2.282***				
	(0.412)	(0.379)				
NON_TOP	1.733**	2.385***				
	(0.590)	(0.542)				
DIV_GEO	0.330**	0.376**	-0.006	-0.004	0.295*	0.341**
	(0.157)	(0.144)	(0.009)	(0.009)	(0.169)	(0.157)
DISTANCE	-0.200**	-0.136**	-0.008**	-0.006*	-0.218***	-0.155**
	(0.061)	(0.056)	(0.003)	(0.003)	(0.066)	(0.061)
SIZE	2.065***	2.485***	0.016	0.030	0.210	0.604
	(0.429)	(0.395)	(0.025)	(0.024)	(0.463)	(0.430)
SIZE_SQ	-0.135***	-0.138***	-0.001	-0.001	-0.047**	-0.049**
	(0.017)	(0.016)	(0.001)	(0.001)	(0.019)	(0.017)
C_I	-2.710***	-2.163***	-0.151***	-0.127***	-2.675***	-2.119***
	(0.081)	(0.078)	(0.005)	(0.005)	(0.087)	(0.085)
RC_RWA	-0.366**	-0.408**	0.009	0.006	-0.231	-0.280*
	(0.164)	(0.150)	(0.009)	(0.009)	(0.177)	(0.164)
LLP	-40.865***	-46.633***	-4.292***	-4.547***	-40.117***	-46.011***
	(2.021)	(1.873)	(0.131)	(0.127)	(2.176)	(2.037)
NPL	-10.779***	-8.697***	-0.517***	-0.404***	-13.257***	-10.804***
	(1.246)	(1.167)	(0.072)	(0.071)	(1.342)	(1.269)
Ln GDP	0.267***	0.243***	0.005*	0.003	0.248***	0.214***
	(0.053)	(0.049)	(0.003)	(0.003)	(0.057)	(0.054)
FIN_CRISIS		-0.385***		-0.013***		-0.344***
		(0.027)		(0.002)		(0.029)
SOVER_CRISIS		-0.651***		-0.027***		-0.672***
		(0.029)		(0.002)		(0.032)
Observations	3,380	3,380	3,369	3,369	3,373	3,373
R-squared	0.540	0.613	0.505	0.545	0.469	0.544
Adj. R-squared	0.457	0.542	0.415	0.461	0.373	0.461

***, **, * indicates statistical significance at the 1%, 5% and 10% respectively. Note: This table reports the results of a panel data regression fixed effect. Regression coefficients are reported with standard error in parenthesis. The dependent variable is the ROA risk adjusted (SHROA) in columns (1 & 2), ROE in column (3 & 4). and ROE risk adjusted (SHROE) in column (5 & 6). Model 1 – 6 comprises all the banks in the sample. DIV_REV measures revenue diversification between traditional and the different lines of non-traditional income. MKT_TOP, AM_TOP, DIS_TOP and OPFIN_TOP measure respectively, the share of market and trading commission, asset management commission, fee from the distribution of third party product and the net results from financial operations in total operating revenues. DIV_GEO measures geographic diversification. Distance measures the functional distance between bank branches and its headquarter. The following bank specific controls are included in the regression: SIZE is the natural logarithm of Total Asset in thousands of euro, SIZE_SQ is the natural logarithm of squared Total assets, C_I is the ratio between personnel and other administrative expenses over intermediation margin, RC_RWA is the total capital ratio, LLP is the ratio of loan loss provisions to net loans, NPL is the ratio of non-performing loans to net loans. Three macroeconomic controls are included as follows; Ln GDP is the natural log of GDP weighted for branches and provinces; FIN_CRISIS is a dummy variable equals to one for the years 2008 and 2009; SOVER_CRISIS is a dummy variable equals to one for the years 2010 and 2011. For a definition of the variables, see Table 1. The observation period is 2006–2012.

Table 10

Revenue Diversification, Geographic diversification and Performance. Selectivity Issue.

VARIABLES	(1) ROA	(2) SHROA	(3) Z-Score
Constant	0.053***	4.575***	32.288**
	(0.004)	(1.043)	(14.276)
DIVERSIFIED	-0.005***	-1.082***	-4.912*
	(0.000)	(0.206)	(3.150)
SIZE	-0.002***	0.162	1.335
	(0.001)	(0.138)	(1.909)
SIZE_SQ	0.000**	-0.009*	-0.063
	(0.000)	(0.005)	(0.066)
C_I	-0.025***	-3.027***	-19.041***
	(0.001)	(0.118)	(1.548)
RC_RWA	0.004***	1.185***	36.119***
	(0.001)	(0.237)	(3.250)
LLP	-0.546***	-60.085***	-479.238***
	(0.012)	(2.698)	(41.650)
NPL	-0.025***	-14.940***	-81.319***
	(0.006)	(1.314)	(18.417)
Ln GDP	-0.000***	-0.000*	0.000***
	(0.000)	(0.000)	(0.000)
FIN_CRISIS	-0.001***	-0.365***	-1.045
	(0.000)	(0.053)	(0.726)
SOVER_CRISIS	-0.003***	-0.692***	-1.159
	(0.000)	(0.054)	(0.743)
Simultaneous probit estimation (DIVERSIFIED as dependant)			
Constant	-0.215***	-0.272***	-0.278***
	(0.027)	(0.027)	(0.028)
TA GROWTH	0.294**	0.496***	0.506**
	(0.132)	(0.134)	(0.155)
GDP GROWTH	-0.367***	-0.306***	-0.253**
	(0.064)	(0.068)	(0.077)
LR-test of independent equations	29.35	9.27	1.05

***, **, * indicates statistical significance at the 1%, 5% and 10% respectively.

Note: The table shows regression results for the regression of banks' performance on a set of explanatory variables, including a proxy for the degree of diversification as robustness tests of our results in Table 5, 6 and 7. The estimation technique is Heckman (1979) treatment effects model by maximum likelihood. The first row denotes the dependent variable. DIVERSIFIED is a dummy variable that indicates whether a firm is diversified or not. The dummy equals one, if the measure (DIV_REV) exceeds 0.191 ratio OR the value of DIV_GEO is higher than 0.747. The following bank specific control are included in the regression: SIZE is the natural logarithm of Total Asset in thousands of euro, SIZE_SQ is the squared term of SIZE, C_I is the ratio between personnel and other administrative expenses over intermediation margin, RC_RWA is the total capital ratio, LLP is the ratio of loan loss provisions to net loans, NPL is the ratio of non-performing loans to net loans. Three macroeconomic controls are included as follows; Ln GDP is the natural log of GDP weighted for branches and provinces; FIN_CRISIS is a dummy variable equals to one for the years 2008 and 2009 and zero otherwise; SOVER_CRISIS is a dummy variable equals to one for the years 2010 and 2011 and zero otherwise. TA GROWTH is the yearly total asset growth; GDP GROWTH is the annual growth rate of GDP weighted for branches and provinces. For a definition of the variables, see Table 1. The observation period is 1996–2012.