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**Alternative classifications of Italian banks:  
Do different grouping rules mislead results on the risk profile of banks?**

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## **Abstract**

The Italian banking system is under the scrutiny of both the monitoring authority and public opinion after the bankruptcy of some important banks. Among other reasons, analysts underline the riskier attitude of specific types of banks (e.g., cooperative banks). Cooperative banks represent the largest proportion of banks under the commissioner. The label “cooperative banks” includes both *banche popolari* and credit cooperative banks, which might be similar from the ownership point of view but differ in many other aspects. As a result, the list of intermediaries facing financial distress includes local, cooperatively owned and small banks. However, the regulator intervention functions under the institutional classification, not the banks’ actual behaviour.

This paper tests whether banks are adequately classified through their usual institutional tags (i.e., *banche di credito cooperativo*, *banche popolari*, commercial or savings banks) or whether other features provide a better description of banks’ attitude towards risks. For this reason, alternative classifications are introduced and compared. The main finding is that more than the institutional classification, the ownership and the *de facto* operating pattern are the aspects that characterise the risk behaviour of Italian banks.

Keywords: G20, G21, G28

JEL Classification: financial stability, z - score, cooperative banks

## *Highlights*

- We study the risk behaviour of Italian banks through alternative classifications.
- We run GMM and POLS models on a sample of banks to compare various grouping rules.
- Our analysis contributes to the understanding of heterogeneity across bank types.
- Ownership and operating patterns explain risk behaviour more than institutional tags.

## 1. Introduction

Even though it has always been a strategic goal for the banking system, financial stability<sup>1</sup> has become a crucial issue, especially after the financial turmoil started in 2007. In the beginning of the 1990s, the banking sector went through a phase of liberalisation, aimed at increasing the competition and the efficiency of the banks. However, once the financial crisis emerged, one of the priorities of governments has been to strengthen their control over the financial market and the banking industry. Particularly in Europe, the supervisory bodies have increased their power, new centralised bodies have been formed and increased capital requirements<sup>2</sup> have been included in the Basel Accords. The rationale behind the Basel Accords is to make banks more aware of their risks by using their own equities for investment purposes (Behr et al., 2009). Basel II has placed rigorous boundaries on the capital requirements, in line with what the “more sophisticated banks would have adopted on their own” (Goodhart, 2005: 119). The expected result should have been a trickle-down effect for the less sophisticated banks. However, the regulatory measurements’ effectiveness in controlling the risky attitude of banks is controversial (Gale, 2010).

Together with the capital requirements, competition and market concentration are elements that impact financial stability. Two opposite views describe the relation between competition and financial stability: (i) The “competition-fragility” perspective underlines how a higher level of competition among banks erodes their margins and moves towards a more risk-taking behaviour. (ii) The “competition-stability” approach considers how the higher interest rates applied whenever the number of intermediaries is low intensify the moral hazard and the adverse selection issues (Berger et al., 2009). During the liberalisation process, the leading idea was to enhance competition among banks to increase the overall efficiency and to avoid riskier behaviour by reducing the state’s role and giving more responsibility to shareholders.

Financial stability is also related to a bank’s size. On one hand, a bank’s size is linked to its competitive edge; the larger the bank, the more likely will it have an advantage over others. The above-mentioned pros and cons arguments apply. On the other hand, larger banks have (i) a more complex structure with more sophisticated tools to manage risks (i.e., by managing *hard information*) and (ii) economies of scale to be more efficient on the market. However, they lack the tools that would

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<sup>1</sup> The term *financial stability* refers to a financial system’s ability to (i) efficiently allocate the economic resources and processes; (ii) manage risks in terms of price, allocation, evaluation and assessment; and (iii) maintain a high performance level within the functions described above, mainly through self-correcting mechanisms (Schinasi, 2004). Financial stability is mainly related to three characteristics of the financial environment – the regulatory frame, the size of the banking system and its degree of concentration and competition.

<sup>2</sup> A minimum threshold for the capital requirement is one of the three legs of the macroprudential regulation. The larger capital should reduce a bank’s vulnerability and thus the risk of contagion (Gale, 2010).

have allowed them to collect information about the opaque borrowers and to analyse the creditworthiness of small and new enterprises. Small and local banks are more likely to exploit the relationship-banking technology to provide credit. They reduce the asymmetry of information but suffer from the limited diversification of risk.

Following the new institutional approach, banks are mainly studied according to their institutional classification or grouping based on size. Among other reasons, this method is due to the manner in which the dataset is collected and the micro-data is classified. The nature of a bank (i.e., its institutional classification) plays a role in studying its risk profile. Following this approach, Hesse and Cihak (2007) conclude that cooperative banks are more stable than commercial banks because of the use of customer surplus in weaker periods. Furthermore, Chiamonte et al. (2015: 494) find that banking systems with a high presence of cooperative banks face the phases of financial distress in a better way and maintain confidence in the banking industry. However, will these conclusions tell the whole story? In some cases, cooperative banks might behave more similarly to the largest commercial banks (e.g., the largest *banche popolari* [BP]). In other cases, smaller and local commercial banks play the same role as that of cooperative banks in their area.

The institutional classification might limit a deeper understanding of the business patterns that are common to banks belonging to different groups. Financial intermediaries could belong to the same group but behave more similarly across groups than within their own group. In other words, there could be a disconnection between the *de jure* classification and the *de facto* behaviour.

This paper aims to test whether the commonly used classification is sufficient to compare the risk behaviour of banks or whether alternative grouping rules account for similarities in a better way. The focus is on the Italian case for three main reasons: (i) The Italian banking system is an interesting mix of various and numerous intermediaries. (ii) The turmoil that started in 2007 has deeply affected Italy's banking market first and its economy afterwards, more than in other European countries. (iii) As a reaction, the Italian government has started a process of reforming cooperative banks (both BPs and *banche di credito cooperative*, that is, credit cooperative banks [CCBs]).

This paper is structured as follows: Section 2 investigates the main literature concerning financial stability. Section 3 introduces the Italian banking industry. Section 4 discusses the methodological approach and the data. Section 5 reports the main results. Finally, Section 6 presents the conclusions.

## **2. Literature review**

The literature on bank stability has been developed from various perspectives. The results are contradictory, and it is difficult to formalise standard behaviour mechanisms. The first strand of the literature focuses on the role of legal requirements in the risk-taking behaviour of banks. To guarantee

financial stability, rules and norms have been introduced, especially regarding the capital requirements. The Basel II Accords, signed before the emergence of the financial crisis, set the capital standards to guard against financial and operational risks. Basel III was negotiated and agreed on in 2013. It further reinforces the capital sufficiency by increasing bank liquidity and reducing bank leverage. Many scholars criticise the effectiveness of the Basel Accords, considering the capital requirements inadequate and underlining the need for revised banking supervision.

According to Keeley (1990), banks with more market power hold more capital relative to assets and have lower default risks. Gale (2010) shows that an increase in the capital assets above the laissez-faire threshold reduces the banks' stability. Higher requirements increase the cost of funding and might lead to riskier loans. After considering direct and indirect impacts on the charter value, the net effect is a heightened riskiness of the bank's portfolio. However, in his conclusion, Gale (2010) discusses the contradiction of the results and underlines the need for more tools in addition to the capital requirements in order to avoid banks' bankruptcy and financial crises. Cioli and Giannozzi's (2013) study measures the Italian banks' degree of adequacy in meeting the new requirements imposed by Basel III and the relationship between financial stability and bank size. In the light of their findings, Italian banks generally have adequate capital. However, differentiating the sample by size reveals how medium and small banks are more stable than larger ones.

Focusing on the institutional classification of banks, Barth et al. (1999) emphasise how crises occur more frequently when the banking system is characterised by a larger share of publicly owned banks. Particularly, the role played by cooperative banks in the banking industry is still under discussion since contradictory results have been found. According to Goodhart (2004), cooperative banks increase the system's fragility due to their non-profit mission that reduces their profitability level. As a proof, the risk assumed by the cooperative banks increases with their capital, leading to the deterioration of the solvency indicators. Moreover, some authors claim that cooperative banks have more difficulties in reacting to adverse conditions or in case of high variability of risks. Studying the Swedish crisis of the early 1990s, Brunner, Decressin, Hardy and Kudela (2004) report a high mortality rate of cooperative banks due to the high cost of capital and their limited flexibility in adjusting to adverse economic phases, contradicting the anti-cyclic behaviour hypothesis. Fonteyne (2007) suggests that European cooperative banks may be highly vulnerable to sudden changes in the credit quality and the interest rates. The main reason for this weakness is the banks' greater focus on the traditional financial intermediation whose profitability is related to the interest margins. Cooperative banks are then more exposed to the credit and the interest rate risks.

While it seems that cooperative banks are structurally riskier, they show prudential behaviour by being less willing to take risks, according to some authors. Such is the case of the US mutualistic

financial institutions studied by Hansmann (1996) and Chaddad and Cook (2004). According to these scholars' results, these banks tend to adopt less risky strategies and are more stable. Analysing both developed countries and emerging economies, Hesse and Čihák (2007) empirically demonstrate that cooperative banks report Z-score values greater than those of commercial banks, confirming the financial stability hypothesis. This result can be explained by the lower volatility of the returns of cooperative banks, which acts as a countervailing factor for the lower levels of profitability and capitalisation of cooperative banks. Analysing the behaviour of cooperative banks during periods of severe financial and economic turbulence, Groeneveld and de Vries (2009) show greater stability of the financial system where cooperative banks are present. This phenomenon is due to the banks' higher Tier-1 ratio, more stable profit growth and more solid balance sheet structure during the pre-crisis period, as well as their gain in efficiency during the crisis. Similar results have been achieved by Lang and Welzel (1996), Garcia-Marco and Roblez-Fernandez (2008), Beck, Hesse, Kick and von Westernhagen (2009) and the European Association of Co-operative Banks (2010). Innotta, Nocera and Sironi (2007) also validate the higher banking stability hypothesis, thanks to cooperative banks, observing the impacts of different ownership models in 15 European countries. Their analysis shows how cooperative banks take lower risks compared to the private-sector banks. Finally, focusing on the Italian case, Filotto (2013) and Chiaramonte, Poles and Oriani (2015) empirically analyse the relationship between cooperative banks and financial stability and obtain results in favour of the stability hypothesis.

Similar to Cioli and Giannozzi (2013), other scholars introduce size classifications to gain a better understanding of the peculiarities of banks. The relation between competition and bank size is a focal point in the ongoing debate on banks' stability. The processes of globalisation and deregulation have weakened the boundaries separating nations and have enhanced cross-border and interstate banks (Boot and Thakor, 2000). Theoretical and empirical studies find contradictory results on the effects of competition and concentration on banks' stability. Analysing the impact of increased competition on the lending technology chosen by each bank, Boot and Thakor (2000) conclude that a higher concentration tends to result in credit rationing. According to their arguments, banks will move towards less relationship lending, favouring fewer high-quality investments that increase the returns of individual investments and promote financial stability. In the analysis proposed by Boyd, De Nicolò and Smith (2004), they argue that bank mergers might increase profits and reduce financial fragility because of the high capital investment that protects them from exogenous macroeconomic and liquidity shocks. Finally, Bikker, Shaffer and Spierdijk (2009) and Corvoisier and Gropp (2006) underline the larger banks' greater capacity to absorb negative shocks from the lower profitability and the higher volatility of economic returns.

Other studies shed light on contra arguments to support the hypothesis that larger banks lead to lower market stability. Larger banks with expected higher profits might lead managers to adopt riskier behaviours (Keeley, 1990). Uhde and Heimeshoff (2009) find that the merger and acquisition processes that took place in Europe from 1997 to 2005 had negative impacts on the European banking stability. Using the Z-score as a proxy for the banks' bankruptcy, they explain the negative relationship between the banks' concentration and the market stability as mainly due to the higher volatility of larger banks' return on average assets (ROAA). Schaeck and Čihák (2007) perform a similar exercise using data on European banks during the 1999–2004 period. Particularly, they do not find a significant relation between banking competition and risk behaviour. They emphasise the banks' tendency to maintain a high level of capital when operating in a more competitive environment. De Nicolò, Bartholomew, Zaman and Zephirin (2004) empirically test the link between banks' concentration and the systemic risks. Their conclusions show a positive relation due to an increase in the market concentration, which lowers the capital held by shareholders and increases the bank's leverage. Moreover, the increase in size and the emergence of banking groups might lead to the spread of financial conglomerates that are too complex and difficult to manage. They face high agency costs and conflicts of interest, while their level of transparency is lower. The financial crisis exacerbates the issues of the bank size and the complexity of the banking groups, turning the “*too big to fail*” claim into the “*too big to save*” problem (Bronzetti, 2011: 18).

Studies that use the institutional classification of banks do not lead to conclusive results; the same holds true for research that focuses solely on bank size. Transversal classification by applying common grouping rules might have a more significant impact in terms of assessing banks' risk attitude.

This paper tests the hypothesis on whether the institutional classification, normally used in the literature, is sufficient to assess banks' risk behaviour. Alternative grouping rules are introduced to check whether similar patterns can be shared across traditional groups. Moreover, for a broader view on the insolvency risk, the analysis adds the demand-side elements to the bank-specific variables to control for the local economic impact on banks' stability.

### **3. The Italian banking industry**

The Italian banking industry, evaluated in terms of financial assets, is small in size (2.6 times the country's gross domestic product). The concentration of the banking sector is in line with that of other European countries, with 40% of the total assets belonging to the five largest banks in 2013. Effective in 2015, a new law has removed the democratic “one member one vote” mechanism from the BPs whose assets exceed 8 billion euros, transforming these banks into limited companies. In 2016, the



reform of the second-level network of CCBs was passed. The creation of a banking group consisting of CCBs aims at promoting access to the capital market and greater integration among these banks (Banca d'Italia, 2015).

The crisis that started in 2007 has affected the industry structure by reducing the number of banks and their operating costs. Particularly, between 2008 and 2014, the number of banks had been decreased by 17%, branches by 9% and employees by 5.6%. Before the crisis broke out, the Italian banking industry had bestowed credit principally in the north and the central regions, with the liquidity indicator particularly high in Alto Adige and Emilia Romagna (176.42% and 131.03%, respectively). This measure also applied to the credit risk exposure.

With the emergence of the financial crisis, an increase in loans rather than deposits has occurred. This dynamic has been at work in particular CCBs, especially in Trentino with a ratio of 173.85%, while in Alto Adige, the entire industry has raised the ratio to 195.84%. The counterpart of this political move is the weakening of efficiency due to increased costs. The search for a reduction in the operating costs has been more relevant for the five major banking groups, which in turn have significantly reduced their market shares. On the contrary, CCBs finance the economy by lending to the local market despite the rising costs of liquidity and the reduced efficiency.

In 2014, the number of intermediaries under extraordinary administration procedures (seven cooperative banks and five joint-stock companies, while for the other two cooperative banks, the liquidation procedure was initiated) became a signal of the difficulties faced by the Italian banking industry. To cope with the turmoil, efficiency and reduction of costs have since then been encouraged by the regulatory reforms towards a high level of equity and a reduction of profits, together with further diversification of the investments. Particular attention has been devoted to cooperative banks.

### *3.1. Classification of Italian banks*

According to the banking law, Italian banks can be divided into four legal forms: (i) *banche spa* (limited company banks, which include commercial and savings banks, CBs), (ii) BPs, (iii) CCBs (also called mutual banks) and (iv) *filiati di banche estere* (branches of foreign banks). According to ownership characteristics, it is possible to group the intermediaries into two sets: (i) the privately owned banks, which correspond to the limited company banks, and (ii) the members' owned banks (i.e., BPs<sup>3</sup> and CCBs. However, given the increase in their size and in the complexity of their operational structure, some BPs, particularly those included in banking groups, behave in a way that is closer to limited company banks than to cooperative banks. On the contrary, independent and

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<sup>3</sup> Since the data used for this paper ends in 2013, the classification is not affected by the reform passed in 2015 for the BPs, according to which they can become limited company banks if their assets reach a certain threshold.

smaller commercial banks follow a business model based on relational banking, typical of local and cooperative banks. Moreover, in the sets of banks owned by banking groups, differences can be found between the five largest groups and smaller banking groups (see Table 2).

### 3.2. Methodology and data

To verify the impact of the banks' classification on the analysis of their risk behaviour, the relevant data will have been obtained by Bankscope. The dataset<sup>4</sup> collects information from 375 CCBs, 55 commercial banks, 43 BPs and 36 saving banks,<sup>5</sup> totalling 509 banks. The CCBs comprise the most common type of bank and are the most widespread among the Italian regions (Table 1).

The measure introduced to assess the insolvency risk is the Z-score (Boyd and Graham, 1986; Hannan and Hanweck, 1988; Boyd et al., 1993). The Z-score is taken as an indicator of banking and financial stability, due to the relative simplicity of its computation based on accountability data<sup>6</sup> (Hesse and Čihák, 2007; Groeneveld, 2011; Strobel, 2011). It links the bank size to the risk of incurring bank failure, using the bank's assets (Equation 1):

$$Z - score = \frac{ROAA + E/A}{\delta ROAA} \quad (1)$$

The index increases with the growth of the ROAA and the capital asset ratio (E/A), while it decreases with the increase of the volatility of the returns ( $\delta$  ROAA). The higher the Z-score index is, the higher the bank's stability becomes and the lower the probability of insolvency is.

Comparing this value among bank groups shows how cooperative banks (both CCBs and BPs) have a Z-score value higher than those of other types of banks. Considering the values in 2005 and 2013,

<sup>4</sup> The Bankscope database defines commercial banks as mainly active in a combination of retail, wholesale and private banking, belonging neither to cooperative banks nor to savings banks. Cooperative banks are those under cooperative ownership. Savings banks are mainly active in retail banking, either profit or non-profit oriented and with a shared ownership model (Chiaromonte et al., 2015). Since the analysis of this paper refers to the Italian case only, branches of foreign banks, as well as online banks, have not been analysed. The BPs have been detached from CCBs.

<sup>5</sup> After the Ciampi-Amato reform (1998–1999), a savings bank can be considered a commercial bank, either owned by a foundation or a member of a banking group. For the purpose of the descriptive analysis, savings banks have been considered separately since among the banks under commissioners, it is interesting to highlight their behaviour. However, the result of a t-test on the Z-score mean shows no statistically significant difference from commercial banks, as shown below. For this reason, savings banks have been included in the group of commercial banks for the econometric analysis.

Group	Observations	Mean
Commercial banks	402	2.895478
Savings banks	308	2.88995
diff = mean(0) - mean(1)		t = 0.0905
Pr(T < t) = 0.5360	Pr( T  >  t ) = 0.9279	Pr(T > t) = 0.4640

<sup>6</sup> The goodness of the Z-score as a forecasting measure can be verified by comparing its past trend among the banks that are now under the control of commissioners by the Bank of Italy. Most of them show Z-score values below the dataset average. The worsening process of this indicator has been faster for commercial banks and savings banks. It has to be noted how, starting in 2010, CCBs have registered smoother negative dynamics.

CCBs decreased their Z-score by 6.4 percentage points, while BPs decreased theirs by only 2.7. Dividing the overall period into three phases – the pre-crisis (2005–2007), the financial crisis (2008–2010) and the economic crisis (2011–2013) – reveals that BPs were able to improve this indicator during the financial crisis, while during the economic crisis phase, all banks weakened their Z-scores. The lower value is registered for commercial banks during the economic crisis.

These trends could be better understood by separately analysing the Z-score components: (i) the ROAA<sup>7</sup> and (ii) the capital assets ratio (see Table 3). The ROAA describes the profitability of a bank's assets and performance, together with its operational efficiency. Due to their lower profits, all banks reported a contraction in their ROAA values throughout the period under study. In 2005, commercial banks showed the highest ROAA; at the end of 2013, it had been reduced by 16.7% yearly. The CCBs had less reduction in their ROAA values during the second phase of the crisis. Considering the variation of ROAA values, CCBs and BPs reported the highest values during the period analysed. Before the turmoil, these banks could have been considered less risky compared to commercial banks, due to the higher quality of their credits. However, during the crisis, the higher impacts of the non-performing loans and the lower margins on the intermediation affected the banks' profitability.

The capital asset ratio describes the financial independence of a bank, computing the ratio between the internal financing sources over the external ones. When examining the data, CCBs show the highest value of the capital asset ratio for the overall period. A possible explanation is related to their obligation of allocating 70% of their profits to reserves, while for other banks, this bond is reduced to 5%. Generally, all banks suffered during the economic crisis phase when their capital asset ratios reached the lowest values.

To sum up, the CCBs' insolvency risk during the turmoil was mainly related to the volatility of their profits. For BPs, their good performance in terms of stability in the first phase of the crisis was mainly due to their increased equity ratio and lower volatility. Finally, the insolvency risk increased for commercial banks in 2011–2013 because of a reduction in their profitability and capital asset ratios, but their volatility decreased as well.

When banks are grouped into local banks versus banks belonging to banking groups, it reveals how the Z-scores decrease over time for both. Independent local banks show higher Z-scores compared to non-local banks. Moreover, considering only the members of banking groups, those who have joined the five major groups show lower Z-scores compared to the banks in smaller groups.<sup>8</sup>

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<sup>7</sup> The ROAA is used instead of ROA since the ratio between the net income and the average assets takes into account the fluctuations of the period, and it results in a better measure for evaluating a bank's performance.

<sup>8</sup> Table 3 shows the t-test performed on the means. Each group is first compared with all the other banks and then with the subgroups. As a result, the Z-score of CCBs is not statistically different from that of other local banks or other cooperative banks. The other comparisons show statistically significant differences in the means.

#### 4. The model

This paper mainly tested two hypotheses: (i) An alternative classification of bank groups can better explain the risk behaviour of banks compared to the institutional classification. (ii) According to the types of banks, the elements that characterise the probability of insolvency are different. To verify the first hypothesis, a POLS estimator is used; for the second, a GMM Arellano Bond regression is performed. The dependent variable is the Z-score index in both cases. The model includes both bank-specific variables, which summarise the strategic choices of each intermediary (the *supply* side), and province-level variables (the *demand* side). The various classifications are included in the POLS regression as bank-specific elements, consistent with the method adopted by other authors (cf. Filotto, 2013; Chiamonte et al., 2015). The Arellano Bond estimation is performed for each group of banks separately to capture their peculiarities in a better way.

##### 4.1. Bank-specific variables

The bank-specific variables are obtained from Bankscope, and they mainly include balance sheet data. Table 4 summarises their definitions and predicted signs. The total assets value is interpreted as a proxy for a bank's size. The direction of the relation is unpredictable because an increase in size might lead to an increase in efficiency and a diversification of the business, which should reduce the insolvency risk (positive relationship). However, larger banks can have incentives to increase their risks due to the *too big to fail* option (Chiamonte et al., 2015). The large bank failures are feared because of their significant macroeconomic impacts. Demirguc-Kunt and Huizinga (2010) prefer the expression *too big to save*, meaning that the larger banks are too huge to be saved by the government (negative relationship).

The liquidity indicator is given by the ratio between the net loans and the deposits and short-term funding. The higher the ratio is, the more risky the bank is since its portfolio consists of short-term resources. The impact on the Z-score should have a negative sign because an increase in the short-term resources that is not balanced by an increase in the liquidity might result in a financial contraction and a higher possibility of the bank's failure.

The net loan to total assets ratio is taken as a measure of the bank's lending behaviour and credit risk exposure. The ratio provides a measure of a company's financial position, including its ability to meet financial requirements for outstanding loans. A high value describes a situation in which the bank has a low level of liquidity. Given the risky nature of the credit for the bank's business, a negative relation is forecasted.

The cost to income ratio is commonly used as an operational efficiency measure. Regarding the total assets, in this case also, the direction of the relationship is uncertain. The negative sign is related to the incentive for inefficient banks to take more risks to improve profitability. It could be argued that

the cost to income ratio affects the Z-score according to a bank's specificities. For instance, CCBs are non-profit intermediaries that might prefer to reduce profits in order to offer lower priced services to their customers. In this case, the competing banks might lessen their profitability to match their rivals' offers (Chiaramonte et al., 2015). However, it might also be possible that once their profitability margins become insufficient, banks could decide to follow a low-risk business model with less risky investments and a growing level of capital (Filotto, 2013).

Finally, the business model is characterised by the diversification of a bank's activities due to its dependence on the intermediation profits. The proxy is computed as the ratio between non-interest income and gross revenues, and it measures the proportion of the total revenues generated by the bank revenues' net of interest activities (i.e., revenues from trading, services and other financial transactions). The sign is once again uncertain. On one hand, diversification should reduce the risks, and the bank should be less dependent on its lending activities. On the other hand, diversification could be risky if it concentrates on an area where the bank lacks a deeper and longer relationship (Chiaramonte et al., 2015). For example, the profitability of local banks is usually related to the interest rates' margins. This is partly due to their stronger capacity to know the local area and partly due to their lower levels of knowledge and resources in operating on the non-traditional market (i.e., the intermediation market).

To determine the institutional form's impact on a bank's risk behaviour, the econometric model accounts for three dummies, each taking the value of one, whether the bank is a CCB, a BP or a commercial or a savings bank. Different from a purely institutional approach, the idea of this paper is to underline the bank's *de facto* behaviour, not only related to its *de jure* nature. For this reason, further classifications are introduced in this analysis (Figure 3). First, the dummy named *cooperative* describes the ownership structures of banks<sup>9</sup> (i.e., CCBs and BPs). Second, the dummy named *local* defines local independent banks. Under this label, the list includes all CCBs and those BPs and commercial or savings banks that are not part of a banking group.<sup>10</sup> Third, the *five biggest groups* dummy refers to banks belonging to the five major Italian banking groups. This variable is used to differentiate among banking groups those who have the strongest relevance in both economic and political terms. Finally, the dummy *Banks under commissioners* controls for banks under commissioners to clean the results of these anomalous situations.

#### 4.2. Demand-side variables

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<sup>9</sup> As reported in Table 3, CCBs show no statistically significant difference in the Z-score mean compared to BPs.

<sup>10</sup> This dummy also takes into account the changes over time (e.g., a previous independent bank that joined a banking group in the analysed period).

To control for the demand side, variables have been borrowed by the ISTAT and the Bank of Italy datasets. On one hand, the idea is to take into account the economic dynamics of the province where a bank operates.<sup>11</sup> The value added per capita is one of the most common macroeconomic indicators of economic activity. The sign of this variable is uncertain. In richer areas, banks should face less risks since the higher level of the demand leads productivity factors to be better utilised and the firms' efficiency to increase. This should reduce the banks' risks of insolvency and bankruptcy. However, in an expansion phase, it is also possible to face the banks' over-optimism on borrowers' ability to repay loans. The banks' lower level of attention to evaluating the effective risks of firms can increase the probability of the banks' insolvency.

To account for competition, the share of branches per type of bank is taken as a proxy. The higher the share of branches is, the higher the monopoly power of a bank in a particular province becomes. The monopoly reduces the behaviour towards risks. According to Barth et al. (1999) and Goodhart (2004), the presence of cooperative banks has a negative impact on the financial system since they are non-profit maximising banks, and their level of competition in the market is low. On the contrary, Rajan (1994) and Hansman (1996) emphasise the positive impact of cooperative banks since they usually adopt safer strategies. The impact on the Z-score is unclear, particularly for cooperative banks. The financial turmoil that started in 2007 has particularly affected the real estate sector. The link between the real estate industry and the banking system seems to be the basis of the instability and the increase in the insolvency ratio of many banks. Italian CCBs have suffered from the crisis in the real estate sector due to their investments in it before 2007. The share of real estate firms in a province can give an idea of the composition of the economic environment where banks operate, and it clarifies whether the higher relevance of real estate has affected the performance of banks. The share of cooperative enterprises has been introduced among the demand-side variables to check for the different behaviour of cooperative banks compared to others. Usually, cooperative banks tend to finance cooperative firms more than other intermediaries. Similar to CCBs, cooperative firms are non-profit maximising enterprises and are expected to follow less risky strategies. Their presence might enrich their area. However, their growth follows an anti-cyclical trend, and it could be argued that their higher share could signal a non-profitable and stable economic area. Finally, for the POLS estimation (Equation 2), dummies have been introduced to control for the five macro geographic areas, while in both models, dummies are used to measure the crisis impact per phase (see Table 4). The estimated equations are as follows:

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<sup>11</sup> Here, the province refers to the area where the bank's headquarters are based. Unfortunately, while this measure is quite appropriate for local banks, it might be biased against bank groups that operate in provinces other than those where their headquarters are based.

POLS estimation

$$\ln\_z_{b,t} = c + \sum_{b=1}^B \beta_n X_{b,t} + \sum_{b=1}^B \delta_n D_b + \sum_{p=1}^P \beta_z E_{p,t} + \sum_{a=1}^5 \delta_g D_a + \sum_{t=2005}^{2013} \delta_h D_t + \delta_6 \text{crisisphase}_1 + \delta_7 \text{crisisphase}_2 + \mu_{b,t} \quad (2)$$

and GMM Arellano Bond

$$\ln\_z_{b,t} = c + \ln\_z_{b,t-1} + \sum_{b=1}^B \beta_n X_{b,t} + \sum_{p=1}^P \beta_z E_{p,t} + \delta_6 \text{crisisphase}_1 + \delta_7 \text{crisisphase}_2 + \mu_{b,t}, \quad (3)$$

where  $\ln\_z_{b,t}$  is the measure of the each bank's stability at time  $t$ , with  $b = 1 \dots B$  refers to each bank;  $c$  is the constant variable; and  $X_{b,t}$  are the bank-specific variables, while  $E_{p,t}$  groups the province's economic variables. The variables  $D_b$ ,  $D_t$  and  $D_a$  are the dummies respectively describing the banks' classification, years and the bank's location. In the Arellano Bond specification (Equation 3), the lagged variable for the Z-score has been introduced, while the estimator omits time-invariant variables. Finally,  $\mu_{b,t}$  is the idiosyncratic error. Table 5 shows the pair-wise correlation among the variables.

## 5. Results

Table 6 summarises the POLS results, while Table 7 reports the findings of the GMM models. In the first four columns of Table 5 [Models (a), (b), (c) and (d)], the models include only the bank-specific variables, while the other specifications add the demand-side controls [(e), (f), (g) and (h)]. To verify the differences related to the grouping rules, the following alternative classifications are introduced: (i) institutional classification, (ii) the ownership division between cooperatives and non-cooperatives, (iii) the *de facto* local versus non-local banks and (iv) the five largest banking groups' specification. The stability of banks is inversely related to their size, in line with Cioli and Giannozzi's (2013) findings, underlining how smaller banks take less risks than larger ones. Observed from an opposite perspective, larger banks have a more destabilising impact on the banking industry, supporting the *too big to save* hypothesis (Bronzetti, 2011). The sign of the efficiency variable supports the hypothesis that less efficient banks take more risks, worsening their Z-score indicator. A higher level of diversification increases the instability of the banks. This result could be associated with certain banks' detachment from their business core. The liberalisation process might have given a boost in this direction. As emphasised by Chiaramonte et al. (2015), poor knowledge of the geographic and economic area could be the origin of the riskier behaviour of managers who attempt to enlarge their respective banks' business models.

In general, the crisis negatively affected the banking industry's stability. While during the financial crisis, the insolvency probability increased by 7%, in the second phase, the instability grew by 20%. Not the breaking out of the crisis, but its persistence seems to be one of the most dangerous destabilising elements of the Italian banking industry.

The previous results are robust to the inclusion of the demand-side variables. Once those variables are introduced, it is possible to add to the list of the stabilising variables, the share of cooperative firms in a particular province and the value added per capita. Particularly, the richness of an area remarkably helps improve the stability of the banking industry. The same is true for the presence of cooperative firms, which might guarantee a less risky economic environment even though the magnitude is lower. In contrast, a higher share of real estate firms is negatively linked to the stability of banks, confirming how real estate has been a critical element in the spread of the crisis, causing troubles for the financial intermediaries.

The core of the analysis is to investigate the bank types' effect on the insolvency risk. Once the institutional classification is used, BPs constitute the only type of bank that shows a significant and positive coefficient. This is in line with the findings described in Section 4 regarding the evolution of the Z-score during the overall period. Since the t-test shows no relevant difference in the means of CCBs and BPs, once the cooperative dummy is taken into account, the analysis reports a positive relation to stability. These results are partially in line with those of Filotto (2013) and Chiaramonte et al. (2015). Filotto reports a significant and positive coefficient for CCBs only in 2011. Chiaramonte et al. find that cooperative banks have a stabilising power only during crisis and above a certain share of market power. A similar result occurs when local banks are considered even though the coefficient is never significant. Analysing the impact of the banks that are part of the five largest banking groups, the negative and statistically significant sign confirms how banks belonging to smaller groups have a stabilising impact on the economic environment.

To sum up, localism and members' ownership seem to play important roles in the stabilisation of the banking industry. The traditional classification might not be enough to disentangle peculiar behaviours more similarly among than within commonly used classifications (Table 3).

Even though the POLS estimator allows dummy variables to control for banks' features, the econometric analysis might be improved by the GMM Arellano Bond estimator. Table 6 shows the results of the model, which includes the bank-specific variables, the demand-side regressors and the lagged value of the Z-score to describe a time-dependency pattern. Since the classification dummies would be omitted, regressions have been run for each type of bank group.



The GMM and the POLS estimators return similar results for the bank-specific variables once the analysis is performed on the overall dataset, while they differ once the dataset is split according to bank groups.

A common result is that the stability of banks increases with their smaller sizes, while it decreases for less efficient intermediaries. Regardless of the nature of the bank and against the forecast, the higher the credit risk taken, the higher the Z-score value becomes. A higher share of net loans on total assets increases the profitability of banks. These profits are related more to the traditional banking activities in which financial intermediaries have a deeper know-how.

Comparing results related to the diversification coefficients shows that for CCBs, local banks and cooperative banks, values are significant and positive. For these banks, it is important to diversify their businesses from the interest rate margins in order to increase their profitability and reduce their insolvency risks.

While the first phase of the crisis was irrelevant, banks generally worsened their Z-scores during the economic crisis phase. This period had greater impacts on commercial banks and banks that belonged to the five largest groups, whereas for CCBs, cooperative banks and local banks, even this second phase had a relatively low effect on their stability.

When analysing the results for the demand-side variables, other differences emerge. A higher presence of cooperative banks' branches improves the stability of commercial banks. A higher presence of commercial banks' branches improves the stability of CCBs and cooperative and local banks. It could be argued that the presence of a more variegated system (i.e., the presence of branches of other types of banks) is healthier for the banking industry, supporting the competitive hypothesis. Cooperative banks and local banks report a negative relation to the share of cooperative firms in their particular province, while the banks belonging to the five largest groups have a positive coefficient. The presence of cooperative firms weakens the stability of banks that use relationship lending as a strategy, possibly because these intermediaries have less tools to assess the creditworthiness of cooperatives. Considering the share of real estate firms, only banks in the largest groups show a significant and negative coefficient. Finally, the economic performance of a certain area is important for banks that are deeply rooted in the area that is more subject to idiosyncratic risks than for banks whose branches are spread over the entire country (i.e., commercial banks and banks in the five largest groups).

## **6. Conclusions**

This paper has aimed to compare the peculiarities in the risk behaviour of Italian banks, beyond their institutional classification in terms of their risk profile. First, while bank-specific variables have

similar impacts on different banks' groups, more differences emerge once demand-side variables are considered, related to local economic aspects. The insolvency risk increases with the larger size of the banks and their lower level of efficiency, regardless of the type of bank considered. The diversification of their businesses is more powerful for local and cooperative banks that are usually not focused on the intermediation margins. In a period where loans are not so remunerative and deposits are costly, the search for more profitable businesses can be beneficial for these banks, at least until their resources are able to manage the risks taken. According to the analysis performed, in the second phase of the turmoil, banks have become riskier.

More differences emerge, relative to the demand-side variables. The BPs can be considered the most peculiar case. For them, the level of insolvency is related to bank-specific elements, while the economic environment does not seem to play a role. The same is true for commercial banks. In this aspect, BPs and commercial banks are similar, and BPs differ from other cooperatively owned banks, for which the variables related to the local environment increase stability. Moreover, compared to commercial banks, cooperative and local banks react differently to external inputs, while they are quite similar in managing the internal variables. Particularly, the level of the competition has impacts in the opposite direction for these banks. In a sense, it seems that the heterogeneity in a province, measured by the higher presence of branches of the other types of banks (i.e., cooperative branches of commercial banks and vice versa), has a stabilising effect. Cooperative and local banks gain an important benefit (measured by the magnitude of the coefficient) from the higher presence of commercial banks' branches, while the competition within the same bank type is not significant. This result supports the critics' argument for the cooperative system related to the intra-group competition. It also underlines the importance of a non-homologation of the economic environment. Banks with different goals and strategies but work in the same area increase the health of the economic environment. Finally, CCBs and cooperative and local banks are dependent on the economic performance of their area. In this sense, the reform of the CCBs and the creation of a larger group could help the banks that struggle because their reference area is poorer.

The hypothesis on a different behaviour related to the different grouping of banks is partially verified. Particularly, BPs seem to be closer to commercial banks in some aspects, while local banks are similar to CCBs. The classification based on the institutional features is not the only relevant one. More differences can be found when either the ownership classification or the *de facto* operating pattern of the banks is taken into account. It is important to go beyond the usual vision of banks' behaviour given by their classification since it might narrow down diverse patterns. Deeper efforts should be made in the direction of understanding the actual behaviour of financial intermediaries to improve the assessment of policies.

Banks' diversity is a significant resource for the industry. It is important to preserve the peculiarities of each typology since the banks' behaviours can compensate one another and strengthen the entire industry.

## References

- Banca d'Italia, 2015. *Relazione Annuale 2015*. Banca d'Italia, Roma.
- Barth, J.R., Caprio Jr., G., Levine, R., (2001). Banking systems around the globe: Do regulations and ownership affect performance and stability? In: Mishkin, F.S. (Ed.), *Prudential Supervision: What Works and What Doesn't*. Univ. of Chicago Press, pp. 31–88.
- Beck, T., Hesse, H., Kick, T., von Westernhagen, N. (2009). Bank Ownership and Stability: Evidence from Germany. *Bundesbank Working Paper* .
- Behr, P., Schmidt, R. H., Xie, R.. (2010). Market Structure, Capital Regulation, and Bank Risk Taking. *Journal of Financial Services Research*, 37, pp. 131–158.
- Berger, A. N., Klapper, L. F., R.Turk-Ariss (2009). Bank Competition and Financial Stability, *Journal of Financial Services Research*, Volume 35 (2), pp. 99-118.
- Bikker, J. A., Shaffer, S., Spierdijk, L. (2009). Assessing competition with the Panzar-Rosse model: the role of scale, costs, and equilibrium. *Discuss Paper Series* , 09-27.
- Boot, A. A., Thakor, A. V. (2000). Can relationship banking survive competition? *The Journal Finance* , 55 (2), pp. 679-713.
- Boyd, H. J., Graham, L. S. (1986). Risk, Regulation, and Bank Holding Company Expansion into Nonbanking. *Quarterly Review, Federal Reserve of Minneapolis* , 10 (2), pp. 2-17.
- Boyd, J. H., De Nicolò, G., & Smith, B. D. (2004). Crises in competitive versus monopolistic banking systems. *Credit and Banking* , 36, pp. 487-506.
- Boyd, J. H., Runkle, D. E. (1993). Size and performance of theory. *Journal of Monetary Economics* , 31 (1), pp. 47-67.
- Bronzetti, A. (2011). Concentrazione bancaria: da mito a incubo? Il ruolo della regolamentazione rispetto alla forma del gruppo, forma del gruppo, vol. 6 , Ospedaletto-Pisa, Pacini Editore, pp. 1-143.
- Brunner, A., Decressin, J., Hardy, D., & Kudela, B. (2004). Germany's Three - Pillar Banking System - Cross-country Perspective in Europe. *International Monetary Fund Occasional Paper*, 233.
- C. A.E. Goodhart (2005) Financial Regulation, Credit Risk and Financial Stability *National Institute Economic Review*, 1, pp. 118-127.
- Chaddad, F. R., Cook, M. L. (2004). The Economics of Organization Structure Changes: A US Perspective on Demutualization. *Annals of Public and Cooperative* , 75 (4), pp. 575-94.
- Chiaromonte, L., Poli, F., Oriani, M. E. (2013). Cooperative banking and financial stability. Evidence from the recent financial crisis in some European countries. *Bancaria*, 5, pp. 33-49.
- Cioli, V., Giannozzi, A. (2013). Basilea 3 e la stabilità finanziaria delle banche: quale relazione con la dimensione della banca? *Economia e diritto del terziario*, 2.
- Corvoisier, S., Gropp, R. (2002). Bank concentration and retail interest rates. *Journal of Banking and Finance*, 26, pp. 2155-2189.
- De Nicolò, G., Bartholomew, P., Zaman, J., Zephirin, M. (2004). Bank Consolidation, Internationalization, and Conglomeration: Trends and Implications for Financial Risk. *IMF Working Papers*, 03/158.
- Demirgüç-Kunt, A., Huizinga, H. (2010). Are Banks too big to fail or too big to save? International evidence from equity prices and CDS spreads. *Journal of Banking & Finance* (37), pp. 875-894.

- European Association of Co-operative Banks. (2010). *European co-operative banks in the financial and economic turmoil: First assessments*. European Association of Co-operative Banks.
- Filotto, U. (2013). Banche di credito cooperativo e stabilità finanziaria. Un'analisi comparata con le banche commerciali. *AIDEA Bicentenary Conference*. Bancaria.
- Fonteyne, W. (2007). Cooperative Banks in Europe— Policy Issues. *International Monetary Fund* 159.
- Gale, D. (2010). The effects of bank capital on lending: What do we know, and what does it mean?. *International Journal of Central Banking*, 6 (34), pp. 187-204.
- Garcia-Marco, T., Roblez-Fernandez, M. (2008). Risk taking Behavior and Ownership in the Banking Industry: The Spanish Evidence. *Journal of Economic and Business*, 60, pp. 332-354.
- Goodhart, C. (2004). Some New Directions for Financial Stability. *The Per Jacobsson Lecture*.
- Groeneveld, H., de Vries, B. (2009). European Banks: First Lessons of the Subprime Crisis. *International Journal of Co-operative Management* , 4 (2), pp. 8-21.
- Groeneveld, J. M. (2011). Morality and integrity in cooperative banking. *Ethical Perspectives* , 18 (4), pp. 515-54.
- Hannan, T. H., Hanweck, G. A. (1988). Bank insolvency risk and the market for large certificates of deposit. *Journal of Money, Credit and Banking* (20), pp. 203-11.
- Hansmann, H. (1996). *The ownership of enterprise*. Harvard University Press.
- Hesse, H., & Čihák, M. (2007). Cooperative Banks and Financial Stability. *International Monetary Fund* (2).
- Innotta, G., Nocera, G., Sironi, A. (2007). Ownership Structure, Risk and Performance in the European Banking Industry. *Journal of Banking and Finance* , 31 (7), pp. 2127-2149.
- Keeley, M. (1990). Deposit insurance, risk and market power in banking. . *American Economic Review* , 80, pp. 1113-1155.
- Lang, G., Welzel, P. (1996). Efficiency and technical progress in banking. Empirical results for a panel of German cooperative banks. *Journal of Banking and Finance* , 20, pp. 1003-1023.
- Rajan, R. G. (1994). Why bank credit policies fluctuate: A theory and some evidence. *The Quarterly Journal of Economics*, pp. 399-441.
- Roy, A. D. (1952). Safety first and the holding of assets. *Econometrica: Journal of the Econometric Society*, pp. 431-449.
- Schaeck, K., Čihák, M. (2007). Banking Competition and Capital Ratios. *International Monetary Fund* , 7 (216).
- Schinasi, G. J. (2004). Defining Financial Stability. *International Monetary Fund* , 4/187.
- Strobel, F. (2011). Bank insolvency risk and different approaches to aggregate Z-score measures: a note. *Applied Economics Letters* (18), pp. 1541-1543.
- Uhde, A., & Heimeshoff, U. (2009). Consolidation in banking and financial stability in Europe: Empirical evidence. *Journal of Banking & Finance* , 33, pp. 1299-1311.

Table 1

## Geographical distribution of banks by types

	CCBs	Banche Popolari	Commercial banks	Saving banks	Total
<b>CENTRE</b>	<b>75</b>	<b>9</b>	<b>11</b>	<b>14</b>	<b>109</b>
LAZIO	23	4	4	3	34
MARCHE	20	1	2	4	27
TOSCANA	29	3	5	5	42
UMBRIA	3	1	0	2	6
<b>ISLANDS</b>	<b>25</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>33</b>
SARDEGNA	2	0	3	0	5
SICILIA	23	4	1	0	28
<b>NORTH-EAST</b>	<b>158</b>	<b>13</b>	<b>14</b>	<b>11</b>	<b>196</b>
ALTO ADIGE	47	1	0	1	49
EMILIA ROMAGNA	21	5	8	7	41
FRIULI V. G.	15	2	1	1	19
TRENTINO	43	0	2	0	45
VENETO	32	5	3	2	42
<b>NORTH-WEST</b>	<b>51</b>	<b>7</b>	<b>17</b>	<b>8</b>	<b>83</b>
LIGURIA	0	0	3	2	5
LOMBARDIA	42	7	10	0	59
PIEMONTE	8	0	4	6	18
VALLED'AOSTA	1	0	0	0	1
<b>SOUTH</b>	<b>66</b>	<b>10</b>	<b>9</b>	<b>3</b>	<b>88</b>
ABRUZZO	8	0	0	3	11
BASILICATA	4	0	0	0	4
CALABRIA	10	1	1	0	12
CAMPANIA	20	5	6	0	31
MOLISE	1	1	0	0	2
PUGLIA	23	3	2	0	28
<b>TOTAL</b>	<b>375</b>	<b>43</b>	<b>55</b>	<b>36</b>	<b>509</b>

Source: Bankscope

Table 2

## T - Test on Z-score means by Bank's typologies

		Observations	Mean	Test	Coefficient of variation (%)	
Comparison between each bank's type and the full sample	Commercial	710	2.893	Ha: difference not equal to 0	27.9	
	Others	3606	3.337		19.3	
	CCBs	3274	3.334	Ha: difference not equal to 0	18.8	
	Others	1042	3.046		27.2	
	BPs	332	3.374	Ha: difference not equal to 0	23.2	
	Others	3984	3.255		21.0	
	Cooperatives	3606	3.338	Ha: difference not equal to 0	19.3	
	Others	710	2.893		27.9	
	Local	3767	3.316	Ha: difference not equal to 0	19.9	
	Others	549	2.908		27.4	
	Big groups	199	2.616	Ha: difference not equal to 0	23.7	
	Others	4117	3.296		20.7	
	Comparison between subgroups of banks	CCBs	3274	3.334	Ha: difference not equal to 0	
		Other local banks	628	3.047		
Local BPs		171	3.344	H0: difference not significant		
Other local banks		3731	3.285			
Local Commercial		322	3.123	Ha: difference not equal to 0		
Other local banks		3580	3.302			
CCBs		3274	3.334	H0: difference not significant		
Other cooperative banks		332	3.374			
Big groups Other banks in banking groups	188 361	2.577 3.081	Ha: difference not equal to 0			

Table 3

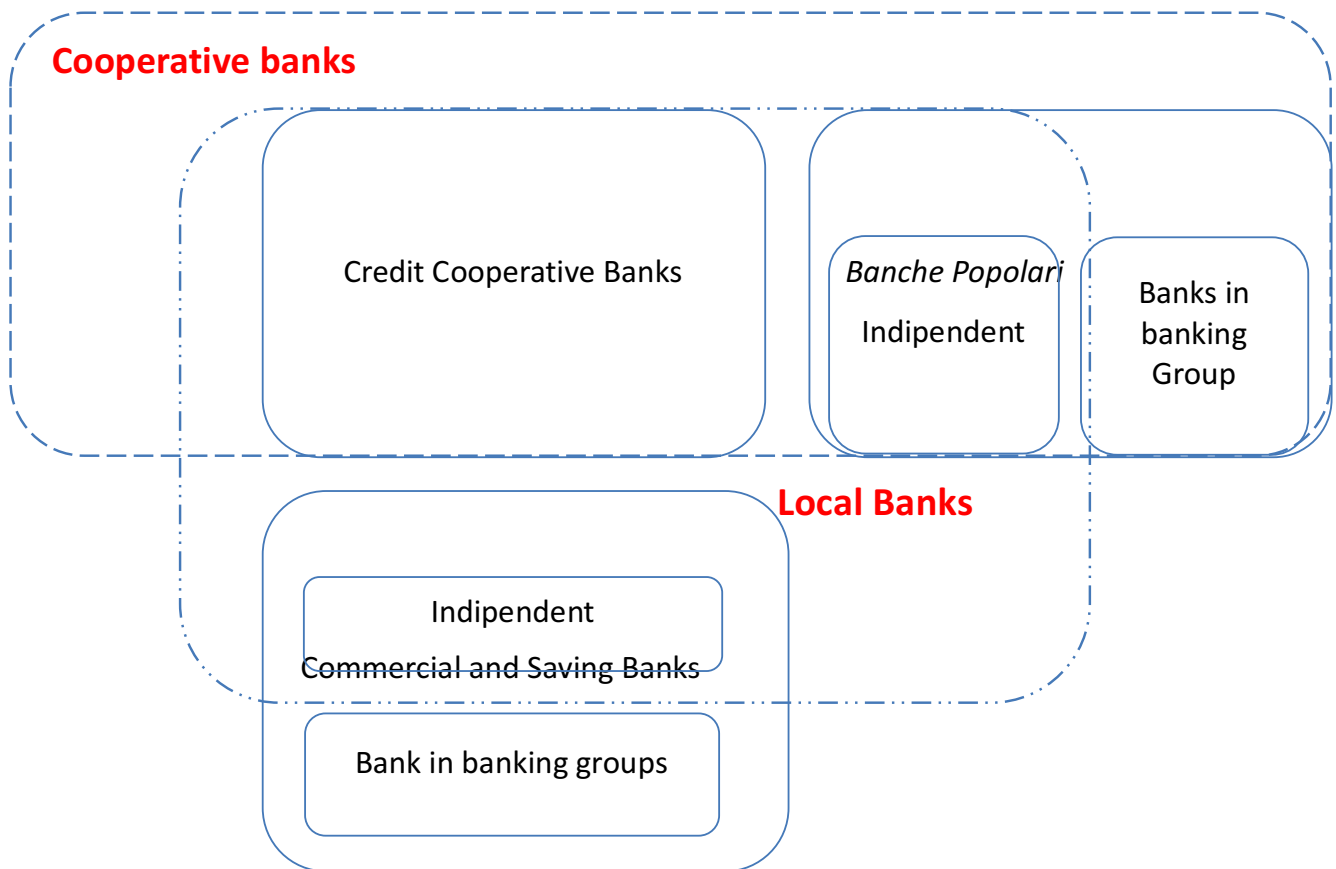
Z-score (logaritm)	CCBs	Banche Popolari	Commercial Banks	Saving banks
2005-2013	3,334	3,374	2,835	2,895
2005-2007	3,447	3,370	2,940	3,001
2008-2010	3,343	3,424	2,909	2,888
2011-2013	3,214	3,319	2,694	2,794
<b>ROAA</b>				
2005-2013	0,526	0,332	0,264	0,487
2005-2007	0,883	0,685	1,005	0,809
2008-2010	0,470	0,391	0,190	0,513
2011-2013	0,234	-0,019	-0,195	0,129
<b>ROAA (coefficient of variation)</b>				
2005-2013	1,806	0,966	0,253	0,064
2005-2007	0,676	0,663	1,410	0,384
2008-2010	1,341	1,346	0,378	1,016
2011-2013	3,400	4,906	1,791	1,208
<b>Capital asset ratio</b>				
2005-2013	11,963	10,251	11,459	8,346
2005-2007	12,783	10,463	10,642	8,813
2008-2010	12,138	10,694	13,643	8,238
2011-2013	10,992	9,611	9,992	7,985
<b>ST dev ROAA</b>				
2005-2013	0,673	0,639	1,968	0,633
2005-2007	0,603	0,455	1,550	0,309
2008-2010	0,492	0,428	1,961	0,456
2011-2013	0,661	0,727	1,628	0,736

Source: Bankscope



Figure 1

Banks classification



	Number of banks			Cooperative Banks			Local Banks			Banks in the five largest groups		
	CBs	Bps	CCBs	CBs	Bps	CCBs	CBs	Bps	CCBs	CBs	Bps	CCBs
2005	91	43	375	0	43	375	56	26	375	17	1	0
2006	91	43	375	0	43	375	53	26	375	18	1	0
2007	91	43	375	0	43	375	48	24	375	22	2	0
2008	91	43	375	0	43	375	44	24	375	22	2	0
2009	91	43	375	0	43	375	43	23	375	22	2	0
2010	91	43	375	0	43	375	42	23	375	22	2	0
2011	91	43	375	0	43	375	42	23	375	21	2	0
2012	91	43	375	0	43	375	39	23	375	21	2	0
2013	91	43	375	0	43	375	39	23	375	21	2	0

Source: Classification based on Bankscope data

Table 4

## Explanatory variables and predicted signs

	Variable	Measure	Expected Sign
Bank specific variables	Size	Natural Logarithm of Total assets	Positive/negative
	Liquidity	Net loans and deposits/short term funding	Negative
	Credit risk Exposure	Net loans/total assets	Negative
	Efficiency	Costs/Net income	Positive/negative
	Diversification	Non-interest income/gross revenues	Positive/negative
Demand side variables	Economic activity	Added value pro capite	Positive/negative
	Competition	Share of branches per type of banks	Positive/negative
	Composition of the local economy	Real estate firms' share	Negative
		Cooperative firms' share	Positive/negative
	Crisis Phase 1	Equal to 1 if years are in between 2008 and 2010	Negative
Crisis Phase 2	Equal to 1 if years are in between 2011 and 2013	Negative	

Table 5

Z_score	1															
Size	-0.2696*	1														
Liquidity	0.0227	0.1350*	1													
Credit risk	-0.0564*	0.2590*	0.7735*	1												
Efficiency	-0.0644*	-0.2293*	-0.0852*	-0.1286*	1											
Diversification	-0.2068*	0.3551*	-0.1326*	-0.0457*	-0.1093*	1										
Share of CCBs branches	0.2860*	-0.2510*	0.2462*	0.1981*	-0.0383*	-0.1697*	1									
Share of CBS branches	-0.1989*	0.1559*	-0.1342*	-0.1180*	0.0149	0.0704*	-0.7877*	1								
Banks under commissioners	-0.1651*	0.0360*	0.0106	0.0197	0.0262	-0.0090	-0.0631*	0.0596*	1							
Share of cooperative firms	0.1513*	-0.2899*	-0.4254*	-0.4298*	0.0594*	-0.1776*	0.0143	-0.0214	-0.0200	1						
Share of real estate firms	-0.1196*	0.3277*	0.1063*	0.1538*	-0.0195	0.2294*	-0.1379*	-0.0415*	-0.0572*	-0.3627*	1					
Pro-capite added value	0.0624*	0.2369*	0.3987*	0.4135*	-0.0710*	0.1170*	0.3909*	-0.4211*	-0.0948*	-0.4908*	0.6693*	1				
Crisis Phase1	0.0175	0.0034	0.2571*	0.1275*	0.0854*	-0.1674*	-0.0032	0.0959*	-0.0000	-0.0264	0.0220	0.0085	1			
Crisis Phase 2	-0.1202*	0.0749*	-0.3893*	-0.1086*	-0.0425*	0.1641*	0.0284	-0.2130*	-0.0000	0.1067*	0.0809*	0.0515*	-0.5000*	1		
CCBs	0.1776*	-0.6373*	0.0524*	-0.0900*	0.0369*	-0.3339*	0.3157*	-0.2614*	-0.0835*	0.0891*	-0.0938*	0.0053	0.0000	0.0000	1	
BPs	0.0456*	0.3218*	0.0229	0.0943*	-0.0307*	0.1286*	-0.1727*	0.0465*	0.0459*	-0.0182	-0.0517*	-0.0907*	-0.0000	-0.0000	-0.5082*	1
CBS	-0.2378*	0.5042*	-0.0769*	0.0362*	-0.0205	0.2930*	-0.2379*	0.2667*	0.0627*	-0.0892*	0.1453*	0.0598*	0.0000	0.0000	-0.7805*	-0.1417*

Significance level: .05\*

Table 6

	Insolvency Risk (ln z-score)							
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Size	-.115***	-.074***	-.091***	-.074***	-.102***	-.058**	-.064***	-.056***
Liquidity	-.0004	-.001	-.0004	-.001	-.001	-.001	-.001	-.001*
Credit risks	-.004	-.003	-.004	-.002	-.004	-.003	-.003	.002
Efficiency	-.004***	-.004***	-.004***	-.004***	-.004***	-.004***	-.004***	-.004***
Diversification	-.008***	-.007***	-.008***	-.008***	-.005*	-.003	-.004*	-.004*
Crisis Phase 1	-.061***	-.063***	-.065***	-.068***	-.061***	-.059***	-.059***	-.066***
Crisis Phase 2	-.176***	-.198***	-.181***	-.200***	-.211***	-.238***	-.238***	-.250***
Banks under commissioners	-.671***	-.661***	-.681***	-.711***	-.635***	-.627***	-.663***	-.689***
CCBs	.041				.083			
Banche Popolari	.485***				.562***			
Cooperative banks		.185**				.235***		
Local Banks			.029				.141	
5 biggest group				-.361***				-.416***
Geographic area dummies	yes	yes	yes	yes	yes	yes	yes	yes
Share of CCBs branches					.568**	.323	.252	.390
Share of commercial banks' branches					.231	.070	-.062	.014
Share of cooperative firms					.172***	.182***	.173**	.185***
Share of real estate firms					-.020*	-.028***	-.027**	-.024**
Pro-capite added value					.674***	.708***	.675***	.608**
Constant	5.575	4.896	5.339	5.034	7.809	7.533	7.679	7.242
R-squared	.193	.171	.165	.174	.247	.223	.214	.225
Observation	4307	4307	4307	4307	3800	3800	3800	3800

Significance level: .01 \*\*\*, .05\*\*, .1\*  
Error terms have been clustered by banks

Table 7

	All (a)	CCBs (b)	Banche popolari (c)	Commercial Banks (d)	Cooperative Banks (e)	Local Banks (f)	Big Groups (g)
<b>Insolvency Risks</b>							
Lag of insolvency risk	.170**	.262***	-.116	.158	.229***	.151	.153
Size	-.346***	-.302***	-.219*	-.378***	-.305***	-.398***	-.117
Liquidity	.0001	.0003	-.0005	.001	.0002	.0001	.001
Credit risks	.003***	.002**	.009**	.005**	.002***	.003***	.005
Efficiency	-.002***	-.002***	-.006***	-.004***	-.002***	-.002***	-.006***
Diversification	.001***	.002***	-.002	-.0002	.002***	.002***	.004
Crisis Phase 1	-.001	-.006	-.015	-.034	-.003	.010	-.032
Crisis Phase 2	-.038***	-.027*	-.090*	-.131***	-.026*	-.013	-.173**
Share of CCBs branches	-.111	-.351	-1.141	2.517*	-.549	-.403	2.287
Share of commercial banks' branches	.137**	.161***	.077	-.131	.173***	.195***	-.530
Share of cooperative firms	-.039	-.076**	.206	.167	-.080**	-.060	.452*
Share of real estate firms	-.009*	-.003	-.004	-.021	-.004	-.011*	-.042**
Pro-capite added value	.182**	.254***	-.253	-.051	.203***	.232***	.129
Observations	2789	2160	207	422	2367	2510	139

Significance level: .01 \*\*\*, .05\*\*, .1\*  
Error terms robust for heteroskedasticity