Board Members' Education, Turnover, and Risk Taking: Evidence from Cooperative and Joint-Stock Banks

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Abstract

We investigate the effect of board characteristics on the relationship between bank's institutional setting and risk-taking. We show that board members' education mediates this relationship in a large sample of Italian cooperative and joint-stock banks over the 2006-2012 period. No evidence is found for board turnover. Our results indicate that cooperatives are more risk-averse than joint-stock banks based on their directors' lower educational level, but only for proxy of total risk. Overall, we contribute to the debate on the higher resilience of the cooperative model and the requests by cooperative banks for more flexible and "ad hoc" corporate governance standards.

Keywords: Corporate Governance, Cooperative Banks, Bank Ownership, Board Turnover, Board Education, Bank Risk.

JEL classification: G21, G32, G34

EFM classification: 150

I. Introduction

In recent years, bank risk has come under greater scrutiny by regulators reinvigorating the on-going debate among policymakers and academics regarding best practices in bank risk management and governance. Since the Basel Committee introduced the prudential capital framework in 1988, the literature on this topic has grown rapidly and in different directions. This literature embodies a variety of approaches and examines numerous factors, including ownership, regulation and market discipline, and monetary policy (Anderson & Fraser, 2000; J. H. Boyd & De Nicoló, 2005; Jiménez, Ongena, Peydró, & Saurina, 2014; Saunders, Strock, & Travlos, 1990), in seeking to explain (and monitor) bank decisions regarding exposure to different types of risks, as risk management constitutes a bank's core business. However, there has been less emphasis thus far on understanding the interplay between corporate governance – and particularly board characteristics – and bank risk-taking (Berger, Kick, & Schaeck, 2014). This is surprising given that the board of directors is one of the key factors in bank dynamics and that the board's impact on bank risk and performance is widely recognized (Andres & Vallelado, 2008; Pathan, 2009). The recent global financial crisis has renewed the debate regarding the importance of bank governance, and banking authorities throughout the world have explicitly assigned a central role to the board of directors in managing credit institutions soundly and prudently.

To fill this gap in the literature, we aim to analyze how and to what extent the characteristics of board members impact bank risk taking, focusing on the crucial ownership distinction between cooperative and joint-stock banks. The importance of this distinction is confirmed by the theoretical and empirical studies that have provided arguments and evidence regarding the different risk propensities that the two ownership models entail. The literature offers consistent evidence that cooperative banks have, on average, less incentive to take on more risk and thus choose more risk-averse strategies, resulting in greater stability over time, less volatility in profits and lower credit risk (Chaddad & Cook, 2004; Fonteyne, 2007; Groeneveld & de Vries, 2009; Hansmann, 2000). Hansmann (2000) emphasizes that during the US saving and loans crisis, investor-owned banks took on more speculative investment than mutual savings and loan associations. Based on a sample of 16,577 banks from 29 OECD countries over the 1994–2004 period, Hesse & Čihák (2007) find that cooperative banks are more stable, given that they have, on average, a higher Z-index than commercial banks and much lower volatility in their returns. Studies of a number of EU countries reveal the same results. García-Marco & Robles-Fernández (2008) analyze a sample of Spanish banks over the 1993-2000 period and find that cooperative banks take on less risk than commercial banks. Beck, Hesse, Kick, & von Westernhagen (2009) show that cooperative and savings banks in Germany are more stable than private banks. Finally, Köhler (2015) analyzes the impact of business models on bank stability in 15 EU countries between 2002–2011 and finds that savings and cooperative banks are more stable than investment banks, which typically take the form of joint-stock companies. Overall, these findings are consistent with the pivotal role of cooperative banks, which is to provide loans to its members, such that profit maximization objectives are tempered by the broader goal of maximizing the general interests of their members and the community over the long run (Fonteyne, 2007). This mix of short- and long-term horizons and objectives discourage cooperative banks from taking on excessive risk (Rajan, 1994).

To the best of our knowledge, although various studies have highlighted the difference in risk-taking between cooperative and joint-stock banks, no studies have yet directly related this difference to bank governance and specifically to board characteristics. By the same token, studies on bank governance and risk-taking have thus far neglected the implications of different institutional settings. Investigating this topic has the potential to add new evidence

to this ongoing debate, still active in Europe, regarding how differences in terms of business concepts and company models should be reflected in "ad hoc" banking regulation and corporate governance standards that are currently under revision (see European Association of Co-operative Banks, 2015). This debate began soon after the most recent financial crisis when cooperative banks stressed their superior ability to master the crisis much better than other banking groups. For instance, write-offs by European cooperative banks (cooperative banks represent 20% of the European banking services market) after the outbreak of the financial crisis amounted only to 7% of the write-offs of the whole banking system. The industry claimed that this was "due to their prudence in dealing with risks and the cooperative ownership and governance model that keep them close to their members and customers" (European Association of Co-operative Banks, 2012). However, this view contrasts with agency theory, which predicts that the weaknesses associated with cooperative banks' ownership structure and the ambiguity of their objectives will lead to poor governance (Borgen, 2004; Hart & Moore, 1998). In this light, it might be more difficult for cooperatives to adhere to higher standards, thus challenging the notion that their strong governance prevents them from assuming excessive risk.

Among several board dimensions, we test whether board education and board turnover help explain risk-taking, as we expect these two key characteristics to be more problematic for cooperative banks. Corporate governance standards stress the importance of hiring directors with strong knowledge and competences, as more (and better) educated directors are expected to deal better (at lower cost) with the complexities and risks of the banking industry and thus to make better decisions (Harris and Raviv, 2008). Moreover, governance standards highlight the risks associated with director entrenchment (low turnover). Therefore, the extent to which board education and turnover are associated with (play a mediating role in) more or less bank risk taking and whether this relationship changes with the institutional setting are our empirical questions.

We use hand-collected data regarding the boards of directors in a comprehensive sample of 638 Italian banks covering the 2006-2012 period. Our evidence first reveals the relatively large number of bank directors with low levels of education in the Italian banking industry – among cooperative banks, in particular, but also among joint-stock banks. Second, we find that cooperatives are more risk-averse than joint-stock banks and that cooperatives' boards have lower turnover and lower education levels. In particular, we show that board education mediates the relationship between cooperative status and bank risk, which indicates that cooperative banks carry less risk than joint-stock banks because directors of cooperatives are less educated than directors of joint-stock banks. This finding supports the view that less-educated directors tend to assume less risk, which leads cooperative banks to be more stable. Notably, our results are only valid for measures of total risk but not for one of cooperatives' core risks, i.e., credit risk. Specifically, we find that small cooperative banks assume less credit risk than large ones and this is unrelated to the directors' education. Our interpretation is that credit risk depends more on the closeness of the relationship between bank and its customers so that directors' level of education is probably less relevant than the "in house" know-how developed within the cooperative organization (i.e., credit policies). By contrast, our estimations do not support the hypothesis regarding the mediating role of board turnover on the relationship between cooperative status and bank risk.

We test the robustness of our results in the following ways: i) by using a Generalized Method of Moments (GMM) estimator, which helps to solve simultaneity problems, unobserved heterogeneity and dynamic endogeneity; ii) by estimating our models on the sub-sample of cooperative banks to control for the possibility that cooperatives are less risky because of their business characteristics and in spite of their board members' education levels; iii) by re-estimating the models after removing listed banks because listed banks tend

to be under stricter regulation and market discipline – which may "externally" require such banks' directors to have a higher education – and because these banks are typically bigger and have higher quality reputations, thus providing them with access to more talented directors and risk-return opportunities that are unavailable to most cooperative banks; and iv) by adopting another measure of bank risk (RWA), which is a regulatory proxy for risk-taking mainly based on Basel Pillar I risks, i.e., the most traditional risks. In all the above cases, our results are confirmed. Consistent with the evidence for our proxy of credit risk-taking, we find that the mediating role of board education on RWA exposure is weaker.

Overall, our evidence supports the previous literature on board education and risk-taking and also extends the research examining bank institutional settings and the role of specific aspects of board governance on bank risk-taking. An interpretation consistent with our results is that less-educated directors not only involuntary "prevent" the boards of cooperative banks from undertaking risky and more systemic projects whose risk cannot be understood (or even accessed) by management but also that they are probably not acting as shareholder value-maximizers, given their low education level. By contrast, joint-stock banks, which are characterized by stronger incentives to maximize shareholder value and more educated boards, tend to undertake more of these sophisticated risks (Minton, Taillard, & Williamson, 2014).

With regard to the current policy debate in the industry, our evidence does not suggest having less-educated boards is desirable for cooperative banks but does suggest that the weakness of the cooperative bank governance model remains an issue even in light of their stronger resilience to the crisis. Moreover, our results also suggest that it is the "know-how" of the bank as an organization more than the education of the board that matters for core risk-taking, which supports the notion that it is the education (whether externally or internally acquired) of different hierarchical levels of banks that is important.

The remainder of the paper is organized as follows. The next section specifies our testable hypotheses and discusses the related literature. Section III describes our empirical design and the related methodological issues, and then Sections IV and V discuss our results and our robustness checks. The last section discusses policy implications and concludes.

II. Related literature and hypotheses development

A. Risk propensity and bank ownership

Several arguments have been developed in the literature to support the notion that managers of cooperative banks should be characterized by more risk-averse behavior. The first argument is based on the cooperative bank business model. Cooperative banks operate in small and localized communities with the aim of providing loans and basic financial services to their members. This aim is then complemented by the more traditional objective of profit maximization, together with the aim of enhancing and preserving their capital endowment for future members/generations. This long-run orientation distinguishes cooperative banks from joint-stock banks, which simply aim at maximizing shareholder value, particularly over the short run. Thus, joint-stock banks tend to undertake higher levels of risk, whereas cooperative banks tend to make safer and more prudent investment decisions that involve less risk-taking and longer term objectives (Fonteyne, 2007; Hansmann, 2000).

Second, some authors have argued that the ownership structure of cooperative banks itself leads to more risk-averse behavior, suggesting that banks dominated by large and powerful owners are more prone to risk taking than widely held banks with smaller and more dispersed shareholdings (Laeven & Levine, 2009; Saunders et al., 1990). In the former case, large owners tend to prefer riskier projects because they can yield the most in terms of cash flow

when risky projects are successful, while losses will be shared among all the other owners (including minority owners). In cooperative banks, which are characterized by dispersed ownership (Borgen, 2004; Chaddad & Cook, 2004; Hart & Moore, 1998), decision-making power will be held by managers who are not controlled by any shareholder and who typically are incentivized to protect their positions and extract private benefits, which leads them to engage in less risky and less innovative projects (Beck et al., 2009).

Finally, cooperative banks are expected to have superior abilities in handling customers' information and a great deal of soft information regarding borrowers creditworthiness, which should allow them to reduce misallocated capital and to limit lending mistakes (Fiordelisi & Mare, 2013; Groeneveld & de Vries, 2009; Hesse & Čihák, 2007). Moreover, as cooperative banks are local in nature and operate in restricted geographical areas, the literature suggests that they are better at addressing asymmetric information and agency problems. In particular, peer monitoring and social sanction mechanisms are key drivers limiting adverse selection and borrowers' moral hazard because of the greater incentive to control one another and to punish misbehaviors (Hansmann, 2000). Therefore, we posit the following hypothesis:

Hp 1: *Cooperative banks are more risk-averse than joint-stock banks*

B. Board characteristics and bank risk taking

It is generally acknowledged that the turnover of board members or top managers is a disciplining mechanism that exerts pressure on these actors to act in the interests of shareholders. In fact, shareholders can threaten dismissal if board members and/or top management do not act in their interests (Hermalin & Weisbach, 2003; Kaplan, 1994). However, the mechanisms available in cooperative banks to discipline board members (such as replacing directors), are significantly weakened for the following reasons: i) because of their dispersed ownership, individual members have less interest and less incentive to expend resources to monitor and control managers, preferring to free-ride instead; ii) because shareholders are members and customers at the same time, they may be more interested in obtaining loans on good terms than in controlling managers; and iii) because cooperative banks' shares are not listed and because they typically face low levels of competition in the local area in which they operate, they are less likely to face the scrutiny of sophisticated shareholders (Cook and Iliopoulos, 1999; Hart & Moore, 1998). Thus, the managers of cooperative banks are subject to lower external controls.

Consequently, the underlying characteristics of the cooperative model increase the risk that board members will become powerful and entrenched, as they are insulated and protected from many internal and external pressures (Spear, 2004). In this respect, the literature suggests that management in cooperative banks can become a 'self-perpetuating autocracy' (Nicols, 1967) – particularly when compared to joint-stock banks – and that cooperatives have less board turnover (Battistin, Graziano, & Parigi, 2012; Stefancic, 2014). The result is that cooperative directors remain in their positions for long periods. Therefore we test the following hypothesis:

Hp 2: *Cooperative banks have lower board turnover than joint-stock banks*

Cooperatives are generally defined as self-administered because cooperative members typically elect the board of directors from among their membership (Shaw, 2006). However cooperative members are usually ordinary citizens, professionals, craftsmen, traders, farmers or retirees. As a consequence, compared to the directors of joint-stock banks, cooperative directors do not always have high educational qualifications or professional experience in the

field (Allemand, Brullebaut, & Raimbault, 2013; Cornforth, 2004; Hardesty, 2005; Keeling, 2004; Servin, Lensink, & van den Berg, 2012; Shaw, 2006; Vitaliano, 1983). Analyzing a sample of Italian cooperative banks, Schwizer & Stefanelli (2011) showed that, on average, 46% of the directors are entrepreneurs, farmers and artisans, 23% are professionals (accountants, lawyers, etc.), 17% are retirees and 15% represent other categories (civil servants, doctors and unemployed). Furthermore, 18% of the directors have only a graduation certificate from middle school, 52% have a high school diploma, and only 30% have a university degree. In their survey, Alexopoulos, Catturani, & Goglio (2013) obtained similar results. Therefore, we test the following hypothesis:

Hp 3: *Cooperative banks have less-educated boards than joint-stock banks*

C. The mediating role of board turnover

In cooperative banks, low board turnover increases the risk of entrenching directors who are insulated from the threat of dismissal and who have often spent many years in office. This implies that cooperative directors might remain in their posts for long periods, even when they are ineffective. In this situation, board members can exploit cooperative resources to pursue their own advantage, including to protect their position. As a result, they are incentivized to prefer a "quiet life" and to avoid risky projects that may affect their current positions and future benefits (Bertrand & Mullainathan, 2003). These incentives are even stronger when directors are also investors in (customers of) the bank (Konishi & Yasuda, 2004).

Therefore, we test the hypothesis that director turnover mediates the relationship between the cooperative model and bank risk taking. Our hypothesis is formulated as follows:

Hp 4: *Board turnover mediates the relationship between cooperative banks and bank risk. In particular, cooperative model characteristics lead to low board turnover, which, in turn leads to low bank risk.*

D. The mediating role of board education

Scholars recognize that educational background is a demographic characterizing top management that affects managerial behavior and firm performance (Hambrick & Mason, 1984). In particular, educational degrees are considered proxies for human capital, knowledge base or intelligence, and it is expected that managers with higher educational degrees should be better equipped to process complex information, to respond to change and to innovate. In particular, Bantel & Jackson (1989) analyze the relationship between top management characteristics and innovation in banking and find that top managers' educational degrees are positively related to a greater propensity to engage in innovative projects. Other studies show that a well-educated top management is associated with higher probability of changes in firm strategy, such as in the direction of a more internationally diversified portfolio (Herrmann & Datta, 2005; Wiersema & Bantel, 1992). Finally, scholars suggest that high educational levels lead to more open-mindedness, a higher likelihood of undertaking change and greater ability to process information (Hambrick & Mason, 1984). With regard to the relationship between education and risk-taking, the empirical literature has found conflicting evidence (Berger et al., 2014) but is in favor of the notion that higher education is positively associated with more aggressive strategic choices and thus with risk-taking propensities (Beber & Fabbri, 2012; Bertrand & Schoar, 2003; Frank & Goyal, 2007). Among others, Bertrand & Schoar (2003)

show that firms whose managers have an MBA appear to follow more aggressive strategies and run more leveraged companies.

Based on this literature, we expect that the lower level of director education in cooperative banks can explain their higher risk aversion. Our last hypothesis is thus as follows:

Hp 5: *Board education mediates the relationship between cooperative banks and bank risk. In particular, the characteristics of the cooperative model lead to low levels of director education, which in turn leads to low levels of bank risk.*

III. Research design: sample, variable and estimation framework

To test our hypotheses, we focus on the Italian banking industry. Italy is an interesting case as it has a large and well-developed system of cooperative banks (Becchetti, Garcia, & Trovato, 2011; Bofondi & Gobbi, 2006; Fiordelisi & Mare, 2013; Giagnocavo, Gerez, & Sforzi, 2012). Excluding the branches of foreign banks, the Italian banking sector consists of approximately 600 banks with over 30,000 branches across the country. The cooperative form is the most widespread legal status among Italian banks, and cooperative banks are particularly strong in localized areas. More than 70 percent of Italian banks are cooperative banks, and joint-stock banks constitute the remainder (Statistical Database of the Bank of Italy, 2015). In terms of the generalization of our analysis to other contexts, it is notable that Italian cooperative banks are similar in their objectives and main features to most cooperative banks in Europe, as they are also part of the European Association of Co-operative Banks.

In Italy, cooperative status is adopted by the Italian Banche di Credito Cooperativo (BCCs) (Art. 28 Legislative Decree no. 385/1993) and by the Italian Banche Popolari Cooperative (BPs). Even if BCCs and BPs are similar with regard to the voting rights of their members who are entitled to the "one person, one vote" principle, these banks actually differ in several respects. BCCs function in a well-defined geographical area and mainly serve their members who typically must reside or permanently work in the area in which the bank operates. BCCs must retain almost 70 percent of their annual profit as a reserve. In addition, BCC directors are elected from among cooperative members. Unlike BCCs, BPs can operate with non-members and do not have geographical limitations. The net profits of BPs can be distributed to members except for a quota at least of 10 percent that is allocated to the legal reserve. Finally, unlike BCCs, the shares of BPs can be publicly traded. Although BPs are a hybrid of joint-stock banks and BCCs, they are closer to the former than to the latter in terms of operational characteristics. In fact, BPs are large banks operating on a broad (national/international) scale that offer a wide range, even sophisticated, of financial services (Tarantola, 2009).

A. Sample and data collection

Our hypotheses were tested on the population of Italian banks over the 2006-2012 period. We retrieved the population of banks operating in Italy in the sampled period from the statistical information system of the Bank of Italy. In particular, we focus on joint-stock and on cooperative banks (the Italian BCCs). We excluded the branches of foreign banks and BPs. As noted above, BPs are hybrid banks. Therefore, to avoid gray areas and to reduce the likelihood of confounding effects, we exclude them from the analysis. Moreover, given that Italian banks prepared their financial statement using Italian accounting principles prior to 2006 but used IAS/IFRS principles beginning in 2006, we choose 2006 as the starting year of our analysis to avoid non-comparability problems in financial data.

Overall, we identified 727 banks that were operative over the 2006-2012 period. Banks that began their business after 2006 and banks that closed down before 2012 were included in this group. However, we included only those banks with information available for at least two consecutive years (Pathan, 2009). We excluded 89 banks due to missing information. Moreover, we excluded all annual observations related to banks that were affected by special measures taken by the Supervisory Authority (special administration, interim management, etc.). The final sample comprises 638 banks, consisting of 198 joint-stock banks and 440 cooperative banks.

Data collection was performed from different databases. We used the database of the Bank of Italy to collect demographic information (bank name, location, age, etc.) for the sampled banks and information about banks that acquired other banks during the period. As for information on bank board characteristics, we hand collected these data from bank websites, governance reports and financial statements. We further checked this information with reference to Associazione Bancaria Italiana (ABI) Yearbooks. The ABI Yearbook is published annually and reports information on the governing bodies (size, gender, etc.) of each Italian bank. Finally, we collected bank balance sheet data from the Bankscope database. Our data-gathering resulted in an unbalanced panel of 4176 observations.

B. The dependent variable – Bank risk.

We proxy bank risk using a number of measures that are used extensively in the banking literature. First, we use the Z-index (De Nicoló, Jalal, & Boyd, 2006; Laeven & Levine, 2009; Pathan, 2009), which is calculated as the sum of the equity-asset ratio (or capital-asset ratio; CAR) and return on assets (ROA) divided by an estimation of the ROA's standard deviation. A higher Z-index indicates that a bank is less risky and thus more stable. In particular, this measure provides the number of standard deviations that the ROA must diminish before equity capital is depleted and the bank is insolvent as a consequence. Thus, the Z-index is able to capture the overall exposure to bank risks, such as credit risk, liquidity risk, market risk, etc., depending on the bank's business model. We follow the approach used by Delis & Staikouras (2011) and calculate the Z-index as follows:

$$Z_{i,t} = \frac{ROA_{i,t} + CAR_{i,t}}{\sigma(ROA)_{i,t}}$$

where $ROA_{i,t}$ and $CAR_{i,t}$ are the return on asset and the equity-asset ratio, respectively, of bank i during the period t, calculated at the end of the fiscal year. ROA is calculated as the ratio of pre-tax profit to total assets. To compute $\sigma(ROA)_{i,t}$ of bank i in the period t, we used data from two periods (t, $t-1$) to capture the short-term fluctuations of bank risk (Delis, Hasan, & Tsionas, 2014). Using a different time specification (t, $t-1$ and $t-2$) has no impact on our results. Following the literature, we use the log of the ratio to handle the distribution's asymmetry.

Next to this ratio, we use a proxy for bank credit risk-taking, the non-performing loan (NPL) score, which is defined as the ratio between non-performing loans and gross loans measured at the end of the fiscal year. This score provides information on the quality of a bank's loan portfolio. This score is only partial in comparison to the Z-score, as it focuses only on lending, banks' traditional core activity. Lending remains the predominant activity in smaller and more traditional banks (such as cooperative banks) but is less fundamental in well-diversified banks, such as joint-stock banks. As expected, the Z-index and NPL score are negatively correlated: higher credit risk increases ROA volatility and bank instability.

Finally, in line with the recent literature, we also test our hypotheses using the standard deviation of profit, i.e., $\sigma(ROA)_{i,t}$, as the dependent variable (Delis & Staikouras, 2009; Schaeck & Cihák, 2014).

C. Key Independent and control variables

To test our hypotheses that relate to the relationship between bank risk taking and bank institutional setting, the independent variable is a dummy variable equal to 1 for cooperative banks. Joint-stock banks are the baseline category. To avoid spurious relations between dependent and independent variables, we control for bank and board characteristics that may affect bank risk taking. With regard to bank-level variables, it is generally acknowledged that bank risk is influenced by firm characteristics. Therefore, we control for bank size, bank age and the ratio of loans to total assets as a proxy for the bank business model (Andres & Vallelado, 2008). We measure bank size as the natural log of bank total assets at the end of the fiscal year. Bank age is the natural log of the age of a bank.
Furthermore, we consider a dummy variable for listed banks that equals 1 if bank *i* is listed on a stock market during the period *t*, and 0 otherwise. Listed companies are subject to more scrutiny from authorities, stock markets, etc. (Dyck, Morse, & Zingales, 2010) and are thus expected to manage their risk more closely. Moreover, we include the following control variables in the model with the Z-index and $\sigma(ROA)$ as the dependent: i) a variable to control for the abnormal level of NPL, measured as a dummy variable equal to 1 if the NPL score of bank *i* in year *t* is higher than the 90th percentile, and 0 otherwise; ii) a variable to control for bank growth, which is measured as the growth rate of bank assets; and iii) a dummy variable equal to 1 if bank *i* completed an acquisition in time *t*, and 0 otherwise.
On the board level, we consider the following control variables that might affect bank risk taking.

Board size. This variable is expressed by its natural log. The literature highlights the relationship between board size and firm risk taking. In particular, scholars suggest that small board size is positively related to firm risk taking, as a smaller board leads to a closer alignment with shareholder interests, which in turn increases company risk taking (Chaganti, Mahajan, & Sharma, 1985; Nakano & Nguyen, 2012; Pathan, 2009).

Gender diversity. This variable is expressed as the proportion of female directors on the board. Gender diversity is a demographic characteristic that influences risk taking. In the banking literature, scholars highlight that women are more risk adverse than their male counterparts (Beck, Behr, & Guettler, 2013; Bellucci, Borisov, & Zazzaro, 2010; Berger et al., 2014; Palvia, Vähämaa, & Vähämaa, 2014).

Board turnover. Board turnover was calculated following Eldenburg, Hermalin, Weisbach, & Wosinska (2004) as follows:

$$\frac{(\text{N.of new directors at } t) + (\text{N. of directors that left the board between } t \text{ and } t\text{-}1)}{2 \times (\text{Board size at } t-1)}$$

Scholars note that replacing directors is a means of persuading them to do their job better (Franks, Mayer, & Renneboog, 2001; Kang & Shivdasani, 1995; Kaplan, 1994). In addition, board turnover is a proxy of entrenchment risk (Schulze, Lubatkin, Dino, & Buchholtz, 2001).

Board education. Ideally, the proxy for board education would include detailed information about the level of education (undergraduate degree, MBA, Ph.D., etc.), the main subject studied and the academic institutions that awarded the degree for each director (King, Srivastav, & Williams, 2016; Lester, Certo, Dalton, Dalton, & Cannella, 2006). Unfortunately, this

information is not always available, particularly for cooperative banks, as they are smaller and much more opaque (San-Jose, Retolaza, & Gutierrez-Goiria, 2011). However, we were able to build a unique hand-collected dataset with information regarding the educational degree achieved by directors; for each board, we have information regarding directors with at least a university degree when they were appointed (Audretsch & Lehmann, 2005; Colombelli, 2015). We proxy the board education of bank *i* in the period *t* by calculating the proportion of directors who hold a university degree. We have little or no information on post-graduate education (e.g., PhD, MBA or equivalent degrees). However, we believe that our proxy should be able to capture the biggest difference in board education level between the two types of banks, given the substantially weaker mechanism of director selection adopted in cooperative banks (Alexopoulos et al., 2013; Schwizer & Stefanelli, 2011; Shaw, 2006).

CEO duality and independent directors. There are no conclusive results in the literature on the impact of CEO duality on the effectiveness of corporate governance mechanisms and on risk propensity (Baliga, Moyer, & Rao, 1996; Bhagat & Bolton, 2008; Lewellyn & Muller-Kahle, 2012; Pathan, 2009; Rechner & Dalton, 1991). We considered this factor as a potential control variable, but we observe that CEO duality is rare in Italian banks. Indeed, CEOs are common in large joint-stock banks but the role itself is not common in cooperative banks. Moreover, even in those joint-stock banks with a CEO position, the coincidence with the board chairman is limited to only a few cases. Therefore we excluded those joint-stock banks where CEO duality exists. With regard to independent directors, there is a large body of literature on the beneficial effect of independent directors on effective corporate governance (B. K. Boyd, 1994; Fama, 1980; Rechner & Dalton, 1991). In our estimations, we omitted this variable because it is not clearly identifiable in cooperative banks, since board members are elected among the owners, who are also customers (depositors or debtors) of the bank. Consequently, it is questionable whether these directors are ever independent (Basel Committee on Banking Supervision, 2015; European Association of Co-operative Banks, 2015). Therefore, we did not control for this variable because, in the alternative, we would have had to assume that all the directors are either independent or not independent, which might lead to multicollinearity issues with the cooperative dummy. In any event, we believe that board turnover might serve as a proxy of independence, since we would expect that high board turnover implies low likelihood of entrenchment problems and that directors should therefore be able to control managers (Boubakri, Dionne, & Triki, 2008).

Bank location and GDP. We controlled for this variable (Beck, De Jonghe, & Schepens, 2013; Boytsun, Deloof, & Matthyssens, 2011; Guiso, Sapienza, & Zingales, 2009) to limit those spurious effects related to different contextual conditions (economic, social, etc.) that might affect bank governance. To control for bank location, we created three dummy variables for Northwest Italy, Central Italy, and South Italy and the Islands. Northeast Italy is used as the baseline.

All models are estimated with time fixed effects to control for changes in macroeconomic conditions.

D. Summary statistics

Table 1 presents descriptive statistics for our main variables. Table 2 shows the mean comparison between joint-stock and cooperative banks. Finally, Table 3 presents the correlation matrix.

Table 1
Summary statistics

Table 1 presents summary statistics for bank and board characteristics for our sample of Italian banks over the 2006-2012 period. The Z-index measures bank stability. σ(ROA) is the ROA standard deviation. NPL/Gross Loans is the ratio of NPL

to Gross Loans. Bank size denotes total bank assets. Bank age denotes the age of a bank. Business model is the ratio of loans to total assets as a proxy for the bank business model. Growth rate is asset growth rate. ROE is bank profitability. Board size is the number of board members. Gender diversity is the proportion of female members on the board. Board turnover is board member turnover. Board education is the proportion of directors with a university degree.

Variable	Obs.	Mean	Median	Std. Dev.	Min	Max
Z-index	3489	431.9	68.12	3941.977	-1.394	171458
σ(ROA)	3489	0.003	0.002	0.007	0	0.170
NPL/Gross Loans	3821	0.093	0.079	0.065	0.01	2.168
Bank size (€/billion)	4161	3,92	0.386	18,7	0.003214	431
Bank age (year)	4161	58.135	50	43.602	0.5	183
Business model (Loans/TA)	4161	0.659	0.7	0.184	0.006	0.990
Growth rate	3494	0.199	0.066	5.542	-0.835	326.872
ROE	4160	0.048	0.048	0.093	-0.741	0.912
Board size	4161	9.740	9	2.831	5	24
Gender diversity	4161	0.047	0	0.073	0	0.444
Board turnover	4157	0.125	0	0.198	0	1.417
Board education	4131	0.394	0.33	0.326	0	1

As shown in Table 1, most Italian banks have a strong focus on traditional and core activities, as 66% of their assets consist of customer loans, and their asset growth is approximately 20% with an average profitability of 4.8%. Bank boards typically consist of 10 members, of which only 4.7% are female directors. As for our key variables at the banking system level, board turnover is 12.5% and board education is 39.4%. Table 2 indicates that low board education in the Italian banking industry derives from cooperative banks, with an average board education of approximately 23%, which contrasts with 77% for joint-stock banks.

Table 2

Univariate tests of difference between joint-stock and cooperative banks

Table 2 presents the univariate tests of difference between joint-stock and cooperative banks for different bank and board characteristics. Z-index is the natural logarithm of the Z-index. σ(ROA) is the natural logarithm of the ROA standard deviation. NPL/Gross Loans is the natural logarithm of the ratio of NPL to Gross Loans. Bank size denotes the natural logarithm of total assets. Bank age denotes the natural logarithm of the age of a bank. Business model is the ratio of loans to total assets as a proxy for the bank business model. Growth rate is the growth rate of assets. GDP is gross domestic product. ROE is the natural logarithm of bank profitability. Board size is the natural logarithm of the number of board members. Gender diversity denotes the percentage of female members on the board. Board turnover is the natural logarithm of board member turnover. Board education is the percentage of directors holding a university degree. †, *, **, *** denote significance at the 10%, 5%, 1% and 0.1% levels, respectively.

Variable	Joint-stock Banks	Cooperative Banks	t-value
Z-index (*ln*)	4.042	4.539	-9.759***
σ(ROA) (*ln*)	-6.413	-6.675	5.026***
NPL/Gross loans (*ln*)	-2.821	-2.469	-15.915***
Bank size (*ln*)	21.458	19.324	48.754***
Bank age(*ln*)	2.967	3.898	-27.176***
Business model (Loans/TA)	0.640	0.668	-4.535***
Growth rate	0.441	0.092	1.716*
ROE (*ln*)	0.041	0.043	-0.305
Board size (*ln*)	2.333	2.192	14.932***
Gender diversity	0.035	0.052	-6.854***
Board turnover (*ln*)	0.152	0.085	12.950***
Board education	0.766	0.228	75.717***
No of obs.	1294	2867	

Table 2 shows that there are significant differences between joint-stock and cooperative banks with regard to bank structure and board characteristics. In particular, compared to joint-stock banks, cooperative banks are smaller ($t = 48.754$, $p < 0.1\%$) and older ($t = -27.176$, $p < 0.1\%$), and their business model is primarily based on loan activities ($t = -4.535$, $p < 0.1\%$). Compared to the boards of joint-stock banks, the boards of directors of cooperative banks are smaller ($t = 14.932$, $p < 0.1\%$) and have more women ($t = -6.854$, $p < 0.1\%$). In addition, in cooperative banks, both board turnover ($t = 12.95$, $p < 0.1\%$) and board education ($t = 75.717$, $p < 0.1\%$) are significantly lower than in joint-stock banks.

Finally, joint-stock and cooperative banks differ significantly regarding their risk levels. We highlight that while cooperative banks have higher Z-index ($t = -9.759$, $p < 0.1\%$) and lower standard deviation of ROA ($t = 5.026$, $p < 0.1\%$) than joint-stock banks, they take higher credit risk ($t = -15.915$, $p < 0.1\%$).

Table 3 shows that the correlation coefficients between our main variables are quite low, and we can thus assume that the multicollinearity problems in our models are modest. In particular, we note that both board turnover and board education are significantly associated with bank risk level. Board turnover is negatively associated with bank risk, and thus an increase in director turnover leads to low bank stability as measured by the Z-index ($\rho = -0.113$, $p < 0.1\%$), high profit volatility as measured by σ(ROA) ($\rho = 0.135$, $p < 0.1\%$), and high credit risk as measured by NPL/Gross Loans ($\rho = 0.055$, $p < 0.1\%$). Meanwhile, board education is negatively associated with bank risk as measured by the Z-index ($\rho = -0.216$, $p < 0.1\%$) and profit volatility ($\rho = 0.185$, $p < 0.1\%$). Therefore, an increase in directors' education leads to low bank solidity and high profit volatility. However, board education is positively associated with credit risk. Thus an increase in board education leads to low credit risk ($\rho = -0.112$, $p < 0.1\%$).

Table 3

Correlation matrix – Pearson coefficients

Table 3 presents the correlation coefficients between different bank and board characteristics. Z-index is the natural logarithm of the Z-index. σ(ROA) is the natural logarithm of the ROA standard deviation. NPL/Gross Loans is the natural logarithm of the ratio of NPL to Gross Loans. Bank size denotes the natural logarithm of total assets. Bank age denotes the natural logarithm of the age of a bank. Business model is the ratio of loans to total assets as a proxy for the bank business model. Growth rate is the growth rate of assets. GDP is gross domestic product. ROE is the natural logarithm of bank profitability. Board size is the natural logarithm of the number of board members. Gender diversity denotes the percentage of female members on the board. Board turnover is the natural logarithm of board member turnover. Board education is the percentage of directors holding a university degree. †, *, **, *** denote significance at the 10%, 5%, 1% and 0.1% levels, respectively.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Z-index (*ln*)	1												
2. σ(ROA) (*ln*)	-0.501***	1											
3. NPL/Gross Loans (*ln*)	-0.095***	-0.007	1										
4. Bank size (*ln*)	-0.055**	-0.053**	0.002	1									
5. Bank age (*ln*)	0.195***	-0.147***	0.060***	-0.075***	1								
6. Business model	0.122***	-0.177***	0.417***	0.149***	0.165***	1							
7. Growth rate	-0.041*	0.058***	-0.108***	0.013	-0.057***	0.001	1						
8. GDP	0.166***	-0.047**	-0.107***	-0.014	0.013	0.056**	-0.018	1					
9. ROE (*ln*)	0.292***	-0.325***	-0.355***	0.106***	0.059***	-0.089***	-0.060**	0.118***	1				
10. Board size (*ln*)	-0.028†	-0.027	0.036*	0.489***	-0.157***	0.088***	-0.018	-0.019	0.038*	1			
11. Gender diversity	-0.003	-0.022	0.089***	-0.041**	0.084***	0.036*	-0.013	-0.058***	-0.045**	0.013	1		
12. Board turnover (*ln*)	-0.113***	0.135***	0.055***	0.103***	-0.175***	-0.063***	0.066***	-0.018	-0.096***	0.070***	0.085***	1	
13. Board education	-0.216***	0.185***	-0.112***	0.499***	-0.379***	-0.197***	0.057***	-0.041**	-0.025	0.191***	-0.049**	0.205***	1

E. Methodology

To investigate the relationship between bank risk and bank institutional setting, we estimate the following panel model:

$$Bank\ risk_{i,t} = \beta_0 + \beta_1 Cooperative_{i,t} + \beta_j Control\ variables_{i,t} + \beta_k Time\ dummies + \varepsilon_{i,t} \quad [1]$$

Bank risk is measured as NPL ratio, the Z-index and ROA's standard deviation, alternatively. We use a dynamic panel approach to estimate the model [1], including a lagged dependent variable as a regressor to account for the dynamic nature of risk (Delis & Kouretas, 2011; Köhler, 2014). In particular, we use a 2SLS-IV approach because of our model's endogeneity issue. While our key independent variable – a proxy for the institutional setting – is treated as exogenous (Gorton & Schmid, 1999), we add the following endogenous control variables: i) the lagged dependent variable and ii) corporate governance variables (Board size, Gender diversity, Board turnover, Board education and Executive committee). To control for endogeneity, we instrument these variables with their own first and second lags.

To test the validity of our approach, we use the Hansen *J*-statistic of over-identifying restrictions to test the instruments' validity, namely the lack of correlation between the instrumental variables and the error term. In addition, we test the presence of first and second order serial correlation. The absence of second-order serial correlation indicates that the model is correctly specified and therefore that there is no bias due to omitted variables.

To test whether board turnover and board education mediate the relationship between institutional setting and bank risk taking (hypotheses 4 and 5), we follow the approach of Baron & Kenny (1986) (Tab. 7). Therefore, in the first step, we determine whether there is a significant relationship between the independent variable and the mediators by estimating the following panel models:

$$Board\ \ turnover_{i,t} = \beta_0 + \beta_1 Cooperative_{i,t} + \beta_j Control\ variables_{i,t} + \beta_k Time\ dummies + \varepsilon_{i,t} \quad [2]$$

$$Board\ education_{i,t} = \beta_0 + \beta_1 Cooperative_{i,t} + \beta_j Control\ variables_{i,t} + \beta_k Time\ dummies + \varepsilon_{i,t} \quad [3]$$

As control variables, we consider the natural log of total assets, the natural log of bank age, the ratio of loans to total assets, bank risk (measured as the NPL/Equity ratio) and the natural log of bank performance (measured as ROE). Moreover, we consider a dummy variable to account for the geographical location and a dummy variable for listed banks (Liu, Wang, Zhao, & Ahlstrom, 2013). Finally, we account for time fixed effects. We estimate models [2] and [3] using an instrumental variable (IV) approach to control for simultaneity bias between the dependent variable and an independent variable, such as bank performance or bank risk.

We then estimate the relationship between the independent variable (cooperative bank dummy) and bank risk. To test this relation, we use model [1] less board turnover and board education as control variables. We also test the relationship between the mediators and the dependent variable (model [1] less the independent variable). Finally, we combine the two previous models and test whether the dummy for cooperative bank affects the dependent variable through board turnover and board education as model [1]. The hypothesis regarding the existence of a mediation effect cannot be rejected if the mediators reduce or cancel the effects of the relationship between the independent and dependent variables.

IV. Results

In Table 4, we present the results of our analyses. We measure bank risk with the Z-index, σ(ROA) and the NPL/Gross Loans ratio. All models are significant, and the Hansen's *J* test statistic of overidentifying restrictions and the serial-correlation tests do not reject the null hypothesis of correct specification. Therefore, the instruments are exogenous and the models do not suffer from serial correlation problems. Although the models indicate the presence of first-order autocorrelation ($\Pi 1$), since $\Pi 1$ is statistically significant, our results are not inconsistent because this issue arises if a significant second order autocorrelation ($\Pi 2$) emerges (Blundell & Bond, 1998). Finally, we note that in all the estimated models, the control variables have the expected signs and the lagged dependent variables are also significant, indicating that bank risk is persistent. In particular, when the lagged dependent coefficient is significant and between 0 and 1, it suggests that risk persists but will eventually return to its average level.

With regard to our first hypothesis, we find a significant association between the independent variable and bank risk. In particular, in column (3), we note a positive association between the cooperative dummy and the Z-index ($\beta = 0.257$, $p < 1\%$). In column (7), we note a negative association between the cooperative dummy and profit volatility, σ(ROA) ($\beta = -0.323$, $p < 0.1\%$). Therefore, we conclude that cooperative banks are more stable and have less volatile profitability than joint-stock banks. Surprisingly, column (11) reports no association between the cooperative dummy and the NPL/Gross Loans ratio, our proxy for credit risk taking, but further investigation (see later in this section) shows that the relationship between cooperative status and bank credit risk is moderated by bank size (see results in column 15). More specifically, exposure to credit risk increases in larger cooperative banks, as confirmed by the interaction variable Cooperative×Bank size, showing a positive and significant sign ($\beta = 0.0524$, $p < 0.1\%$). Overall, the first hypothesis is not rejected.

To test hypotheses 2 and 3, we estimate models [2] and [3], respectively. Accordingly, Table 4 presents i) in column (1) the results of model [2] (using robust standard errors) testing the relationship between our main independent variable (cooperative dummy) and board turnover and ii) in column (2) the results of model [3] (using robust standard errors) that test the relationship between cooperative dummy and board education. Table 4 indicates that the dummy for cooperative bank status has a highly significant and negative effect on board turnover ($\beta = -0.046$, $p < 0.1\%$) and on board education ($\beta = -0.458$, $p < 0.1\%$). Thus, we do not reject the hypothesis that board turnover and education are significantly lower in cooperative banks than in joint-stock banks.

Table 4

Regression results of bank risk measured using the Z-index, σ(ROA) and NPL/Gross Loans ratio - 2SLS-IV approach

This table reports the regression (2SLS-IV) results of the mediation effect of board turnover and board education on the relationship between cooperative banks and bank risk taking. Bank size denotes the natural logarithm of total assets. Bank age denotes the natural logarithm of the age of a bank. Business model is the ratio of loans to total assets as a proxy for the bank business model. Growth rate is the growth rate of assets. Listed bank is a dummy variable equal to 1 if a bank is listed in a stock exchange market. M&A is a dummy variable equal to 1 if a bank acquires another bank in a given year. Performance is expressed as the natural logarithm of bank profitability (ROE). Abnormal NPL is a dummy variable equal to 1 if the NPL/Gross Loans ratio of a bank is higher or lower than the 90th or 10th percentile, respectively. GDP is gross domestic product. Board size is the natural logarithm of the number of board members. Gender diversity denotes the percentage of female members on the board. Executive Committee is a dummy variable equal to 1 if an executive committee exists in a given bank. Cooperative dummy is equal to 1 if a bank is a cooperative and 0 otherwise. Board turnover is the natural logarithm of board member turnover. Board education is the percentage of directors holding a university degree. Year and location dummies control for year and location fixed effects. Z values are reported in parentheses. Standard errors are robust to heteroskedasticity and autocorrelation. †, *, **, *** denote significance at the 10%, 5%, 1% and 0.1% levels, respectively.

Dependent	Board turnover	Board education	Z-index	Z-index	Z-index	Z-index	σ(ROA)	σ(ROA)	σ(ROA)	σ(ROA)	NPL	NPL	NPL	NPL	NPL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Lagged dependent			0.520***	0.477***	0.554***	0.484***	0.522***	0.474***	0.546***	0.478***	0.882***	0.876***	0.873***	0.875***	0.882***
			(4.43)	(3.94)	(4.85)	(3.97)	(4.60)	(3.91)	(4.85)	(3.95)	(44.90)	(41.67)	(40.31)	(40.88)	(41.05)
Bank size	0.0018	0.0221**	0.0178	0.00867	0.00957	0.0266	-0.0836*	-0.0723†	-0.0707†	-0.0977*	0.00250	-0.0000845	0.00305	0.00263	-0.0231*
	(0.54)	(3.16)	(0.62)	(0.28)	(0.30)	(0.84)	(-2.54)	(-1.86)	(-1.92)	(-2.57)	(0.37)	(-0.01)	(0.44)	(0.37)	(-2.12)
Bank age	-0.0013	-0.0270**	0.115**	0.148***	0.135**	0.136**	-0.0856*	-0.118**	-0.106**	-0.100*	-0.01000	-0.00701	-0.00942	-0.00852	-0.00806
	(-0.38)	(-3.12)	(3.01)	(3.55)	(3.19)	(3.25)	(-2.45)	(-2.88)	(-2.62)	(-2.53)	(-1.56)	(-0.95)	(-1.34)	(-1.23)	(-1.19)
Business model	-0.044†	-0.000838	-0.0473	-0.176	-0.131	-0.161	0.0603	0.177	0.130	0.149	0.243**	0.246**	0.255***	0.253**	0.226**
	(-1.74)	(-0.03)	(-0.26)	(-0.86)	(-0.65)	(-0.80)	(0.32)	(0.82)	(0.62)	(0.71)	(3.07)	(3.26)	(3.31)	(3.27)	(2.90)
Growth rate			-0.0685	0.0187	0.0224	0.0151	-0.275	-0.341	-0.367	-0.332					
			(-0.40)	(0.10)	(0.12)	(0.08)	(-1.18)	(-1.35)	(-1.48)	(-1.36)					
Listed bank	-0.003	0.0898*	-0.0512	-0.124	-0.137	-0.109	0.111	0.197	0.185	0.172	0.0117	0.000656	0.00701	0.00420	0.0361
	(-0.16)	(2.50)	(-0.32)	(-0.66)	(-0.72)	(-0.58)	(0.67)	(1.04)	(0.97)	(0.90)	(0.23)	(0.01)	(0.13)	(0.08)	(0.72)
M&A			-0.226	-0.363†	-0.370†	-0.375†	0.349*	0.467*	0.483*	0.476*					
			(-1.41)	(-1.90)	(-1.90)	(-1.94)	(2.11)	(2.29)	(2.34)	(2.32)					
Performance	-0.377***	0.280**													
	(-3.87)	(2.67)													
Abnormal NPL			-0.585***	-0.674***	-0.652***	-0.672***	0.515***	0.589***	0.584***	0.586***					
			(-5.14)	(-5.36)	(-5.16)	(-5.31)	(4.64)	(4.66)	(4.59)	(4.63)					
GDP			8.162**	8.164**	8.333**	8.105**	-6.719*	-6.682*	-7.021*	-6.578*	-0.625	-0.603	-0.622	-0.623	-0.544
			(3.11)	(3.05)	(3.04)	(3.02)	(-2.49)	(-2.45)	(-2.52)	(-2.41)	(-1.26)	(-1.18)	(-1.23)	(-1.22)	(-1.07)
Board size	0.004	-0.0763***	0.0392	0.0890	0.170	0.0899	-0.0313	-0.0746	-0.163	-0.0687	0.0604*	0.0565*	0.0544†	0.0538†	0.0497†
	(0.30)	(-4.08)	(0.28)	(0.49)	(0.93)	(0.50)	(-0.22)	(-0.38)	(-0.81)	(-0.35)	(2.07)	(1.96)	(1.87)	(1.83)	(1.74)
Gender diversity	-0.021	0.0401	0.138	0.194	0.0230	0.125	-0.250	-0.331	-0.118	-0.242	0.00603	0.0168	0.00837	0.0109	-0.00242
	(-0.47)	(0.46)	(0.33)	(0.45)	(0.05)	(0.28)	(-0.59)	(-0.74)	(-0.26)	(-0.53)	(0.08)	(0.21)	(0.11)	(0.14)	(-0.03)
Exec. commit.			0.120†	0.133†	0.0947	0.118†	-0.0937	-0.112	-0.0749	-0.0922	0.00726	0.00653	0.00682	0.00562	-0.00607
			(1.88)	(1.94)	(1.36)	(1.69)	(-1.46)	(-1.64)	(-1.08)	(-1.32)	(0.61)	(0.53)	(0.56)	(0.46)	(-0.49)

Independent															
Cooperative	-0.046***	-0.458***	0.257**		0.367**	0.191	-0.323***		-0.422***	-0.264*	-0.000270		0.0195	0.0260	-1.061***
	(-3.85)	(-18.21)	(2.84)		(3.10)	(1.46)	(-3.45)		(-3.32)	(-1.98)	(-0.01)		(0.64)	(0.92)	(-3.70)
Cooperative×Bank size															0.0524***
															(3.89)
Mediator															
Board turnover		-0.0215		2.052	2.304	2.145		-1.701	-2.124	-1.720		0.399	0.334	0.391	0.351
		(-0.80)		(1.51)	(1.60)	(1.57)		(-1.01)	(-1.20)	(-1.02)		(1.10)	(0.93)	(1.13)	(1.02)
Board education	0.002			-0.536***		-0.397*		0.536**		0.343*		-0.00213		0.0168	0.0177
	(0.11)			(-3.31)		(-2.17)		(3.21)		(1.99)		(-0.06)		(0.53)	(0.57)
Constant	0.096	0.418**	1.471*	1.845**	0.834	1.292	-0.860	-1.531*	-0.418	-0.799	-0.425*	0.135	0.0748	0.0651	0.108
	(1.58)	(2.97)	(2.04)	(2.62)	(1.02)	(1.51)	(-1.23)	(-2.22)	(-0.53)	(-0.96)	(-2.57)	(1.00)	(0.44)	(0.39)	(0.38)
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Location dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
N	2453	2450	2096	2091	2095	2091	2096	2091	2095	2091	2456	2449	2455	2449	2449
F	144.48***	1116.1***	23.52***	20.41***	20.21***	19.61***	22.11***	19.14***	19.61***	18.90***	335.5***	307.6***	308.9***	292.4***	290.4***
Hansen *J*	3.293	2.298	1.803	4.477	0.246	4.016	1.218	6.123	0.676	5.517	3.221	4.293	3.550	4.215	4.142
*II*1			-2.62**	-2.22*	-2.78**	-2.24*	-2.72**	-2.24*	-2.82**	-2.27*	-1.02	-1.15	-1.09	-1.13	-1.35
*II*2			-0.82	-1.09	-1.33	-1.14	-0.66	-0.89	-1.14	-0.92	0.56	0.05	0.25	0.05	-0.14

To test the mediating effects of board turnover and education (hypotheses 4 and 5) on the relationship between cooperative status and bank risk, we follow the approach developed by Baron and Kenny (1986). Specifically, Table 4 shows a positive relationship between the Z-index and the cooperative dummy (column 3). In column (4), we note that the first mediator variable (board turnover) does not affect bank risk (β = 2.052, p >10%), while the second mediator, board education, has a highly significant and negative effect on bank risk (β = – 0.536, p < 0.1%). Moreover, in column (5), we observe that when board turnover is added to the model with the independent variable, the latter remains significant (β = 0.367, p < 0.1%) and the coefficient of the cooperative dummy increases from 0.257 (in column 3) to 0.367 (column 5). Overall, we thus find that board turnover does not mediate the relationship between the cooperative status of a bank and bank risk but that it does acts as a suppressor variable. Finally, in column (6), we show that the coefficient of the cooperative dummy variable is reduced in its effect and significance (β = 0.191, p > 10%) when board education is added to the model, while board education remains significant (β = –0.411, p < 5%). Thus, our evidence confirms that board education mediates the relationship between the cooperative status of a bank and bank risk, as measured by the Z-index.

We obtain similar results when bank risk is measured as profit volatility, i.e., σ(ROA). In column (7), we show that our independent variable has a highly significant and negative impact on bank risk, suggesting that cooperative banks are significantly less risky than joint-stock banks. In column (8), we show that although board turnover does not affect the σ(ROA) (β = – 1.701, p > 10%), board education has a highly significant and positive effect on bank risk (β = 0.536, p < 1%). Therefore, we can conclude that board turnover does not mediate the relationship between cooperative status and bank risk taking. In fact, in column (9) we observe that when board turnover is added to the model with the independent variable, the latter remains significant (β = – 0.422, p < 0.1%) and the coefficient of the cooperative dummy increases from – 0.323 (in column 7) to – 0.422 (column 9). Again, we conclude that board turnover does not mediate the relationship between the cooperative status of a bank and bank risk but does act as a suppressor variable. Finally, in column (10), we show that when board education is added to the model, the coefficient of the cooperative-status dummy variable remains significant (β = – 0.264, p < 5%), as does the mediator variable (β = 0.343, p < 5%). However, the coefficient of the cooperative-status dummy variable is reduced from – 0.422 (in column 9) to – 0.264 (column 10), and the significance level of the coefficient is reduced from 0.1% to 5%. Thus, we can conclude that board education partially mediates the relationship between bank cooperative status and bank risk, as measured by profit volatility.

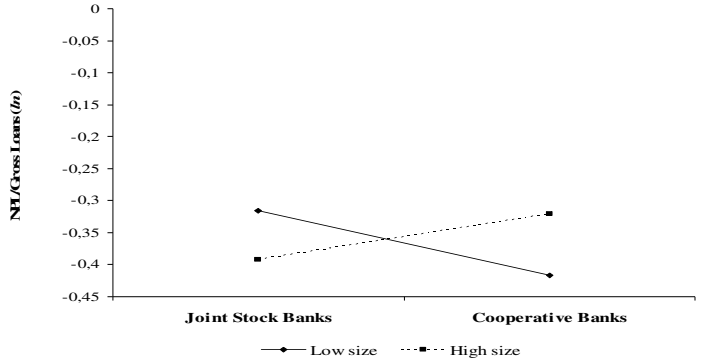
Surprisingly, when credit risk is used as the dependent variable, the results do not support any mediation effect of board turnover and board education on the relationship between cooperative bank status and bank risk taking. In particular, we note in columns 11 to 14 that the coefficients of our independent variable (Cooperative) and of the two mediators are all not significant, which suggests that the cooperative status of a bank has no impact on credit risk taking, which is also the case when we consider the mediating role of board characteristics in terms of turnover and education. However, we further extend our investigation on credit risk in two directions. First, we try a different model specification by testing a moderating hypothesis regarding board education and turnover. Second, we exploit bank characteristics that play a major role in explaining the credit risk. With regard to the first test, the moderation hypothesis was not supported (not tabulated). With regard to the second alternative, we focus on bank size as a proxy for relationship-oriented banking activity and on bank age as a proxy for bank experience in credit management. We expect that small cooperative banks operating in localized areas have a closer relationship with their customers, such that the peer monitoring mechanisms are more effective. By contrast, the larger cooperatives operating in larger areas will have more distant relationships with

customers and are relatively more transaction-oriented such that they resemble joint-stock banks. In addition, in larger geographical areas, peer monitoring mechanisms are less effective because of the less stable relationships between the bank and its customers and among customers. As a result, it can be assumed that small cooperative banks may have lower credit risk than larger cooperatives. With reference to bank age, we suggest that older banks have greater opportunity to build their experience in credit management than younger banks, which should lead such older banks to have a better understanding of credit management policies at different levels of the credit process (from loan officers to CFOs and across credit cycles). Therefore, it can be expected that older cooperatives will have lower credit risk than younger cooperatives because they can better leverage their experience and their internal well of established procedures to conduct better evaluations of borrowers. On the basis of these considerations, we explore whether there is a moderating effect of bank size and age on the relationship between the cooperative status of a bank and credit risk. Specifically, we test both the two-way and the three-way interactions. In the first case, we added the interaction terms between the cooperative dummy variable and bank size and age (Cooperative×Bank size and Cooperative×Bank age) to the model in column 14 of Table 4. Subsequently, to test whether there is a three-way interaction, we include the last lower order term, i.e., the interaction between bank size and age and the three-way term, i.e., the interaction between cooperative dummy, bank size and bank age. The results of such estimations support the existence of neither a three-way interaction between cooperative dummy, bank age and bank size nor a two-way interaction between cooperative dummy and bank age (not tabulated), but they do point to the existence of a significant interaction between cooperative status and bank size. In Table 4, column (15), we tabulate only this last result. In particular, we find that the dummy Cooperative (β = -1.061, p < 0.1%) is negatively associated with bank risk and the interaction term (Cooperative×Bank size) is positively associated with bank risk (β = 0.0524, p < 0.1%). In Figure 1, for small and large bank size, we plotted the bank risk for joint-stock banks and for cooperative banks. Small size and large size are calculated as average bank size minus/plus a standard deviation, respectively.

Figure 1

Interaction effects of bank size on the relationship between bank institutional setting and credit risk

Figure 1 provides the expected marginal means of bank credit risk for joint-stock and cooperative banks and for small and large bank.



We highlight that the difference in simple slope for small banks and large banks is significantly different from zero (β = -0.1004, p < 5%; β = 0.0712, p < 5%, respectively). Consequently, credit risk is significantly moderated by bank size. As small cooperative banks are less risky than their joint-stock bank counterparts, large cooperatives are riskier than large

joint-stock banks. Moreover, we note that the difference in credit risk between cooperative and joint-stock banks is much higher for small banks than for large banks.

Overall, we conclude that our argument is partially supported by empirical evidence. In other words, we reject hypothesis 4 on the mediating effects of board turnover. By contrast, we do not reject hypothesis 5 on the mediating effects of board education only when bank risk is measured as Z-index and σ(ROA). Finally, when bank risk is measured as credit risk (NPL), we reject hypothesis 5.

V. Robustness Checks

In the previous estimates, we used a 2SLS-IV approach and instrumented the endogenous variables with their first and second lags. However, this approach poses certain problems. First, using the lags of the explanatory variables as instruments can be a weak method of controlling endogeneity, and a 2SLS approach would thus report bias estimation, as with OLS (Mileva, 2007). In addition, the use of lagged variables as instruments in a 2SLS procedure yields a trade-off between the lag distance used to generate internal instruments and the depth of the sample for estimation. Thus, by increasing the lag distance to instrument a variable, an increasing number of observations would be dropped from the estimation sample. Therefore, we check our previous results using a GMM estimator (Blundell & Bond, 1998). The GMM estimator solves simultaneity, unobserved heterogeneity and dynamic endogeneity problems by instrumenting the endogenous variables with their own lags as with data from the original level specification. In particular, given that our independent variable is time-invariant, we use the system GMM estimator, which lets us use time-invariant variables as regressors, unlike the more well-known difference-in-difference estimator. Moreover, we choose to use the two-step system GMM instead of the one-step system GMM because the former provides more efficient estimators than the latter (Bond, Hoeffler, & Temple, 2001). Although the two-step GMM provides a covariance matrix that is robust to heteroskedasticity and autocorrelation, standard errors are biased downward. Therefore, we use robust standard errors that lead to consistent results in the presence of heteroskedasticity and autocorrelation problems. Moreover, unlike the one-step system GMM, the two-step GMM results in a robust Hansen J-test for over-identification. Thus, we choose the two-step system GMM procedure with robust standard errors to re-estimate our model. Table 5 shows the estimation of model [1] with different measures of bank risk. The diagnostics tests suggest that the models are well-fitted and that the instruments are valid, as second-order autocorrelation (*II*2) and the Hansens *J*-test of over-identifying restrictions are not significant, respectively. Finally, as suggested by Roodman (2009), we report the number of instruments used in the estimation, which is lower than the number of the panel group (610). Therefore, the Hansen *J*-statistic is more reliable.

Table 5 show some differences in the effect size and significance of each regressors, but the results are consistent with those in Table 4 and lead to the same conclusions that we reached earlier.

Table 5

Regression results of bank risk measured using the Z-index, σ(ROA) and NPL/GROSS Loans – GMM estimation

This table reports the regression (GMM estimator) results of the mediation effect of board turnover and board education on the relationship between cooperative banks and bank risk taking. Bank size denotes the natural logarithm of total assets. Bank age denotes the natural logarithm of the age of a bank. Business model is the ratio of loans to total assets as a proxy for the bank business model. Growth rate is the growth rate of assets. Listed bank is a dummy variable equal to 1 if a bank is listed in a stock exchange market. M&A is a dummy variable equal to 1 if a bank acquires another bank in a given year. Abnormal NPL is a dummy variable equal to 1 if the NPL/Gross Loans ratio of a bank is higher or lower than the 90th or 10th percentile, respectively. GDP is gross domestic product. Board size is the natural logarithm of the number of board members. Gender diversity denotes the percentage of female members on the board. Executive Committee is a dummy variable equal to 1 if an executive committee exists in a given bank. Cooperative dummy is equal to 1 if a bank is a cooperative and 0 otherwise. Board turnover is the natural logarithm of board member turnover. Board education is the percentage of directors holding a university degree. Year and location dummies control for year and location fixed effects. Z values are reported in parentheses. Standard errors are robust. †, *, **, *** denote significance at the 10%, 5%, 1% and 0.1% levels, respectively.

Dependent	Z-index	Z-index	Z-index	Z-index	σ(ROA)	σ(ROA)	σ(ROA)	σ(ROA)	NPL	NPL	NPL	NPL	NPL
	1	2	3	4	5	6	7	8	9	10	11	12	13
Lagged dependent	0.118***	0.122***	0.130***	0.123***	0.108**	0.107**	0.106**	0.106**	0.938***	0.941***	0.941***	0.939***	0.937***
	(3.34)	(3.48)	(3.56)	(3.46)	(3.09)	(3.07)	(2.94)	(3.01)	(17.45)	(17.93)	(18.15)	(17.96)	(18.16)
Bank size	0.695**	0.432*	0.454†	0.409	-0.704*	-0.498*	-0.512*	-0.542*	0.000651	-0.00709	0.000594	0.00202	-0.0120
	(2.63)	(2.10)	(1.89)	(1.49)	(-2.49)	(-2.51)	(-2.41)	(-2.19)	(0.10)	(-0.32)	(0.09)	(0.24)	(-1.16)
Bank age	0.0213	0.1000	0.0793	0.0615	0.00274	-0.0314	-0.0476	-0.00930	-0.0110	-0.00946	-0.0123†	-0.0144†	-0.0138†
	(0.25)	(1.05)	(1.25)	(0.92)	(0.03)	(-0.32)	(-0.81)	(-0.14)	(-1.64)	(-0.68)	(-1.80)	(-1.86)	(-1.80)
Business model	4.503**	0.710	1.976	0.385	-3.621*	-0.308	-1.805	-0.504	0.216***	0.220***	0.223***	0.205***	0.191***
	(2.60)	(0.46)	(1.30)	(0.22)	(-2.02)	(-0.19)	(-1.27)	(-0.29)	(3.82)	(3.60)	(4.16)	(3.67)	(3.37)
Growth rate	0.651†	0.139	0.280	0.0568	-0.804*	-0.375	-0.544†	-0.385					
	(1.73)	(0.44)	(0.99)	(0.19)	(-2.02)	(-1.06)	(-1.78)	(-1.14)					
Listed bank	-0.0144	-0.384	-0.107	-0.241	0.310	0.550	0.385	0.492†	0.00250	-0.00958	0.00513	0.0123	0,0288
	(-0.04)	(-0.91)	(-0.39)	(-0.84)	(0.83)	(1.33)	(1.29)	(1.69)	(0.06)	(-0.18)	(0.11)	(0.26)	(0.63)
M&A	-0.424	-0.438†	-0.279	-0.376†	0.516†	0.496*	0.385	0.497*					
	(-1.39)	(-1.79)	(-1.14)	(-1.65)	(1.79)	(2.02)	(1.59)	(2.22)					
Abnormal NPL	-0.657***	-0.687***	-0.736***	-0.684***	0.562***	0.563***	0.602***	0.560***					
	(-4.20)	(-5.11)	(-5.02)	(-5.15)	(3.91)	(4.39)	(4.40)	(4.37)					
GDP	10.22***	11.46***	8.706**	11.10***	-8.496**	-9.099***	-7.565**	-9.049***	-1.039*	-1.078*	-1.019*	-1.032*	-0.941†
	(3.34)	(4.46)	(3.21)	(4.40)	(-3.02)	(-3.48)	(-2.91)	(-3.64)	(-2.14)	(-2.20)	(-2.09)	(-2.10)	(-1.94)
Board size	-1.908	-0.820	-1.834†	-0.882	1.480	0.694	1.253	0.824	0.0550*	0.0644†	0.0534†	0.0516†	0,0485
	(-1.43)	(-0.84)	(-1.69)	(-0.83)	(1.21)	(0.72)	(1.33)	(0.82)	(1.98)	(1.74)	(1.90)	(1.73)	(1.64)
Gender diversity	1.423	-0.703	-1.006	-0.831	-0.241	0.881	1.637	1.038	-0.413	-0.315	-0.404	-0.318	-0.346
	(0.59)	(-0.37)	(-0.45)	(-0.43)	(-0.10)	(0.46)	(0.80)	(0.54)	(-1.37)	(-1.19)	(-1.35)	(-1.21)	(-1.32)
Executive committee	-0.156	0.0307	0.144	0.0806	0.174	-0.0117	-0.0212	-0.00488	0.00533	0.00381	0.00613	0.00549	-0.000558
	(-0.56)	(0.14)	(0.60)	(0.35)	(0.69)	(-0.05)	(-0.10)	(-0.02)	(0.45)	(0.32)	(0.52)	(0.45)	(-0.05)
Independent													

Cooperative	1.462**		1.078*	0.0826	-1.387**		-1.058**	-0.223	-0.0000723		-0.00400	-0.0360	-0.658*
	(2.98)		(2.45)	(0.13)	(-2.69)		(-2.63)	(-0.36)	(-0.00)		(-0.17)	(-0.45)	(-2.35)
Cooperative×Bank size													0.0302*
													(2.39)
Mediator													
Board turnover		0.996	1.522	1.101		-0.299	-0.628	-0.347		-0.0907	-0.0939	-0.103	-0.0943
		(0.69)	(1.04)	(0.75)		(-0.20)	(-0.42)	(-0.24)		(-0.52)	(-0.55)	(-0.59)	(-0.54)
Board education		-1.773*		-1.947**		1.928*		1.851*		0.0714		-0.0672	-0.0678
		(-2.47)		(-2.72)		(2.39)		(2.22)		(0.40)		(-0.38)	(-0.39)
Constant	-9.987†	-3.162	-3.666	-2.249	8.384	2.196	3.717	3.020	-0.407*	-0.288	-0.385†	-0.354†	-0.0347
	(-1.85)	(-0.78)	(-0.74)	(-0.41)	(1.47)	(0.56)	(0.82)	(0.60)	(-1.98)	(-0.97)	(-1.91)	(-1.73)	(-0.12)
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Location dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
N	2684	2679	2684	2679	2684	2679	2684	2679	3112	3104	3111	3104	3104
Wald χ^2	256.5***	361.8***	315.5***	374.2***	292.7***	347.6***	337.2***	352.3***	4387.9***	4076.0***	4400.6***	4291.4***	4333.9***
Hansen *J*	14.81	30.29	29.12	30.50	16.88	29.10	28.82	29.16	28.77	33.75	28.98	32.91	32.65
*II*1	-11.29***	-11.08***	-10.68***	-10.98***	-11.52***	-11.60***	-11.40***	-11.57***	-6.478***	-6.376***	-6.485***	-6.393***	-6.404***
*II*2	0.587	0.305	0.274	0.281	0.550	0.318	0.306	0.327	-0.685	-0.687	-0.678	-0.681	-0.685
No of instruments	50	59	55	60	50	59	55	60	41	48	45	49	50

Given the cooperative bank characteristics, a further robustness test is necessary to control for the possibility that the bank risk taking we analyze is not directly related to board education but to the cooperative business model itself. In other words, we must control for the possibility that cooperatives are simply structurally more risk-averse than joint-stock banks because of their inherent business characteristics and in spite of their board members' education. To control for this possibility, we estimate our models using only the cooperative sample. We should expect that board education is not significant when the cooperative banks' risk-taking is mainly driven by their business model. Table 6 shows the results of this analysis. The models in Table 6 are significant and correctly specified.

Table 6

Regression results of bank risk for a sample of cooperative banks – GMM estimation

This table reports the regression (GMM estimator) results for the cooperative sample only. Bank size denotes the natural logarithm of total assets. Bank age denotes the natural logarithm of the age of a bank. Business model is the ratio of loans to total assets as a proxy for the bank business model. Growth rate is the growth rate of assets. Listed bank is a dummy variable equal to 1 if a bank is listed in a stock exchange market. M&A is a dummy variable equal to 1 if a bank acquires another bank in a given year. Abnormal NPL is a dummy variable equal to 1 if the NPL/Gross Loans ratio of a bank is higher or lower than the 90th or 10th percentile, respectively. GDP is gross domestic product. Board size is the natural logarithm of the number of board members. Gender diversity denotes the percentage of female members on the board. Executive Committee is a dummy variable equal to 1 if an executive committee exists in a given bank. Board turnover is the natural logarithm of board member turnover. Board education is the percentage of directors holding a university degree. Year and location dummies control for year and location fixed effects. Z values are reported in parentheses. Standard errors are robust. †, *, **, *** denote significance at the 10%, 5%, 1% and 0.1% levels, respectively.

Dependent	Z-index	σ(ROA)	NPL	NPL
	1	2	3	4
Lagged dependent	0.0906*	0.0728†	0.938***	0.933***
	(2.20)	(1.77)	(11.84)	(11.53)
Bank size	0.202	-0.179	0.0354†	-0.0582
	(0.77)	(-0.72)	(1.65)	(-1.44)
Bank age	0.0453	-0.0496	-0.0147	-0.513*
	(0.60)	(-0.67)	(-0.88)	(-2.39)
Bank size × Bank age				0.0255*
				(2.39)
Business model	1.199	-2.354†	0.259*	0.242*
	(0.91)	(-1.91)	(2.57)	(2.43)
Growth rate	0.0122	-0.482		
	(0.03)	(-1.13)		
Listed bank	-0.0144	0.310	0.0123	0,0288
	(-0.04)	(0.83)	(0.26)	(0.63)
M&A	-0.0556	0.151		
	(-0.21)	(0.58)		
Abnormal NPL	-0.566***	0.500***		
	(-3.69)	(3.56)		
GDP	11.82***	-8.534**	-0.361	-0.273
	(4.07)	(-3.08)	(-0.48)	(-0.36)
Board size	-1.114	0.692	0.0488	0.0396
	(-1.32)	(0.85)	(0.68)	(0.55)
Female on board	-0.144	0.879	-0.798	-0.702
	(-0.08)	(0.51)	(-0.98)	(-0.86)
Executive committee	0.252	-0.176	0.0115	0.00891
	(1.50)	(-1.13)	(0.52)	(0.41)
Board turnover	0.593	-0.478	0.568	0.526

	(0.40)	(-0.36)	(0.87)	(0.85)
Board education	-2.931***	2.101**	-0.698	-0.759
	(-3.58)	(2.60)	(-1.28)	(-1.37)
Constant	2.003	-2.488	-1.013**	0.848
	(0.58)	(-0.77)	(-2.58)	(1.01)
Year dummies	yes	yes	yes	yes
Location dummies	yes	yes	yes	yes
N	1943	1943	2286	2286
Wald χ^2	206.3***	259.4***	2097.6***	2134.7***
Hansen *J*	27.67	27.90	27.35	28.09
*II*1	-9.477***	-9.528***	-6.583***	-6.739***
*II*2	0.833	0.675	0.482	0.486
No of instruments	60	60	41	42

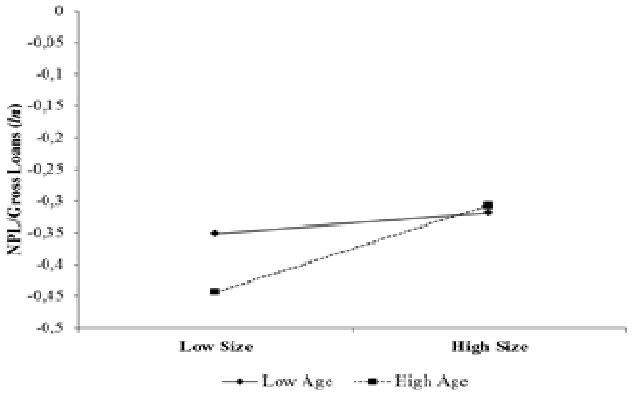
The results in Table 6, which are coherent with our previous results, show that the Board Education variable is significant only when bank risk is measured using the Z-index and σ(ROA), but it is not significant when the dependent variable is credit risk. In column 1, we note that the coefficient of Board Education is significant and negatively associated with bank stability (β = -2.931, p < 0.1%). In column 2, the coefficient of Board Education is significant and positively associated with profit volatility (β = 2.101, p < 1%). Therefore, we conclude that in cooperative banks, stability and profit volatility are significantly associated with board education. Specifically, an increase in Board Education leads to greater cooperative bank risk-taking, in terms of both lower bank stability and higher profit volatility. Overall, this result suggests that an increase in Board education will likely lead cooperative banks to more closely resemble joint-stock banks in terms of risk appetite.

In column 3, we show that Board Education is not associated with cooperative credit risk (β = -0.698, p > 10%). However, we have again further extended the analysis by exploring the moderating role of cooperative size and age. The results in column 4 do not reject the notion of an interaction effect of bank size and age on cooperative credit risk. Although the coefficient of bank size is not significant (β = -0.0582, p > 10%), the coefficient of Bank age is significant and negatively associated with cooperative credit risk (β = -0.513, p < 5%), and the interaction term is significant and positively associated with credit risk (β = 0.0255, p < 5%). In Figure 2, for Young and Old banks (low and high ages), we plotted bank risk for small and large cooperative banks. The low and high levels of size and age are calculated as the average of the variables minus/plus a standard deviation, respectively.

Figure 2

Interaction effect of bank size and age on cooperative credit risk.

Figure 2 provides the expected marginal means of bank credit risk for young and old and small and large cooperative banks.



Although for young cooperatives, the simple slope of the relationship between cooperative credit risk and cooperative size is not significant, it is significant and positive for old cooperatives ($\beta = 0.066$; $p < 5\%$). For young cooperative banks, the credit risk level does not differ for small and large cooperatives. On the contrary, Figure 2 shows that in terms of old cooperative banks, small cooperatives are less risky than large cooperatives.

Therefore, although young age is a weakness for both small and large cooperative banks because it means a lack of experience or weak procedures that are unable to adequately select deserving borrowers, a greater age does not on its own limit the negative effects of large bank size because it negatively affects the strength of cooperatives, namely the proximity to customers.

Finally, we re-estimated the previous models by excluding listed banks. First, in Italy, listed banks are larger banks. Second, given that i) the stock market is a mechanism to discipline managers and ii) cooperative banks are not listed because their fundamental characteristics do not allow their shares to be traded, we decided to exclude listed banks to compare cooperative banks only with unlisted joint-stock banks, as neither are exposed to the disciplining power of the stock market. Therefore, by excluding listed banks we have a more homogeneous sample. Unreported model estimations on the sample of unlisted banks confirm the previous results.

VI. Conclusions

Based on a comprehensive sample of cooperative and joint-stock banks, this study makes several contributions to the literature and to the current policy debate on bank governance.

Although bank governance is a subject of wide debate in the literature, to the authors' knowledge, no empirical study has thus far focused on the relationship between board characteristics and bank risk-taking by distinguishing between cooperative and joint-stock banks. This distinction is important to adequately assess the effect of board dynamics on risk-taking, given the different business models and objectives that these two types of banks entail, but also to clarify whether such differences are substantial enough to justify claims for different corporate governance standards between them.

Our first result shows that cooperative banks are more risk-averse than joint-stock banks, as suggested in the theoretical literature. Second, we show that these two types of banks are quite different in terms of their boards' characteristics, as cooperative banks have lower board turnover and educational levels than joint-stock banks, both traits that are commonly considered to indicate weak governance. Our third result shows that cooperative banks' lower risk-taking is driven by the lower educational level of directors on the board, which is also confirmed when using a sample consisting solely of cooperative banks and when excluding listed banks. Notably, the result is not confirmed for credit risk-taking, but only for measures of total risk. A comprehensive interpretation of these results leads to the conclusion that in cooperative banks a lower level of board members' education leads to a lower exposure to total risk and in turn to more stable performance when risks materialize systemically as in a crisis. However, for "core" risk the competences and experience accumulated within the organization may be more relevant than those of the board. Indeed, for credit risk while we expect that the risk appetite is defined at board-level, the actual exposure depends on the abilities in handling the relationship with customers/borrowers and/or to assess their creditworthiness (in small cooperative banks we expect that these abilities are more effective given the closeness of the relationship with customers and the great deal of soft information).

Finally, the analysis has revealed how the focus on institutional settings (cooperative as opposed to joint-stock status) can be misleading. The proposal of different standards for cooperative banks based on their "better" governance should consider that the cooperative banking system is diverse, such that large cooperative banks may eventually lose their focus on relationships with customers and enter into new activities and businesses that make them resemble – and even make them riskier than – joint-stock banks from a risk-taking perspective.

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