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WOMEN AS 'GOLD DUST': GENDER DIVERSITY IN TOP BOARDS AND THE PERFORMANCE OF ITALIAN BANKS

by Silvia Del Prete* and Maria Lucia Stefani**

Abstract

European comparisons for the 2000s show that Italy was among the EU countries where women were least represented in bank boardrooms. Using a unique dataset on Italian banks over the period 1995-2010, this paper investigates the effects of gender diversity in boards on bank riskiness and economic performance. Taking account of omitted variables and reverse causality problems, as a source of endogeneity, our main econometric findings suggest that gender diversity may have a positive impact on the quality of credit and, to a lesser extent, on profitability. Both results may be driven by women's higher risk aversion and their attitude to monitoring activities. Our study therefore suggests that women are 'gold dust' for Italian banks and that increasing their presence may be beneficial to economic performance.

JEL Classification: G21, G34, J16.
Keywords: banking, corporate governance, gender diversity, board of directors.

Contents

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1. Introduction and motivation[1]

The financial crisis has increased interest in bank governance concerns, as confirmed by the new Principles issued in 2010 by the Basel Committee on Banking Supervision. It is widely recognized that good governance practices are essential to maintain confidence in the banking system: in this respect, diversity on boards can be particularly valuable in critical situations, since it implies openness to different backgrounds, knowledge and points of view. Among the kinds of diversity possible in bank boards, gender is one of the most discussed.

The role of women in economic activity has become a topic of great interest and relevance following growing awareness that promoting gender equality is not only a matter of equal opportunities but also an economic issue, since more women in the labour market translates into more economic growth. In particular, to promote the presence of women in firms' top boards, many European countries have introduced quota systems over the last decade, starting with Norway in 2003.

The issue of gender diversity in bank boards has become even more pressing since the global financial crisis, as many economists and researchers have questioned whether a greater participation of women on the top boards of financial institutions would have been able to contain the excessive riskiness and leverage of the financial sector and to prevent major collapses. Indeed, there is widespread awareness that financial turmoil can frequently be attributed to failures and weaknesses in corporate governance arrangements (Kirkpatrick, 2009).

[1] We would like to thank for their insightful comments Antonio Accetturo, Magda Bianco, Emanuele Ciani, Francesca Lotti, Francesca Modena, Roberta Zizza and two anonymous referees, as well as the participants at a seminar held at the University of Udine (November 2012), and at the 55th Conference of the 'Società Italiana degli Economisti' in Trento (October 2014). The views expressed in this paper are those of the authors and do not necessarily reflect those of the Bank of Italy.

To date, the literature on the impact of gender diversity on bank performance has been scarce and not conclusive. This is partly due to the fact that women are still rare in bank boards, and that disentangling the effects of their presence is often difficult. By contrast, this topic has been explored much more thoroughly for non-financial firms: most studies have highlighted the benefits of greater involvement of women in boardrooms, but the evidence for its effects on performance is ambiguous overall. Despite the large number of studies conducted for other sectors, interest in focusing on the banking system remains high, given that its special *status* as a regulated activity means that the conclusions drawn for other firms do not necessarily apply to banks (Adams and Mehran, 2003).

The main aim of this paper is to contribute to the literature on how the presence of women in bank boards affects performance by studying the Italian case for the years 1995-2010. Italy deserves special attention since that period was characterized by very few women on bank boards (Tarantola and Magliocco, 2007, and ABI, 2011), and the gender gap for Italian banks was wide both by European standards (Mateos de Cabo et al., 2012) and in comparison with other economic sectors nationwide (Bellavigna and Zavanella, 2010). To boost female participation in company boards, in 2011 gender quotas were introduced in Italy for listed companies, including banks.[2]

Using a unique dataset built on the Bank of Italy's data on bank board membership and combined with data on performance, riskiness and other balance sheet data, this paper investigates how the presence of women on bank boards may affect *ex-post* riskiness and other economic outcomes. To this end, we estimate some performance equations where possible sources of endogeneity – omitted variables and reverse causality – are considered.

[2] This law has led to a significant improvement in the number of women on boards of Italian listed companies (Conde-Ruiz and Profeta, 2015). From a research point of view, it also represents a legal discontinuity that could be used in the future, when the law will be completely implemented, to evaluate its impact on the number and the effects of the presence of women on boards (see also footnote 4).

We find that a female presence in bank top boards is associated with lower ex-post riskiness, which is in line with the evidence on women being more risk averse than men and more inclined to monitor and control activities. To the best of our knowledge, this paper is the first to provide empirical evidence of the effective impact of gender diversity on performance for Italian banks.

The rest of the paper is organized as follows: Section 2 summarizes the theoretical framework and the previous findings on gender diversity and firm or bank performance; Sections 3 describes the data and variables; Section 4 presents some stylized facts; Section 5 shows the econometric model and discusses the identification strategy; Section 6 presents the results on the effects of gender diversity on riskiness and other performance indicators. Section 7 concludes and highlights some possible lines of further research.

2. Main empirical evidence from the related literature

Although the economic crisis has increased interest in the relationship between banks' governance and performance, the literature on this topic is still scarce. In particular, not much work has been done on the role of gender diversity in top boards, and whether having women on boards of financial firms is beneficial for risk control and profitability is still an open question.

Starting from the seminal papers by Adams and Ferreira (2007, 2009), there is significant evidence of better governance practices in non-financial firms where more women are on boards; however, the literature has yet to reach a conclusive answer on the impact of gender diversity on firms' performance (see Table 1 for an overview). Some authors have found a positive correlation between the greater presence of women on boards and shareholder value (Carter et al., 2003) and profitability. Others have found either no impact or a negative correlation between gender and performance (Shrader,

Blackburn and Iles, 1997; Adams and Ferreira, 2009). Adams and Ferreira (2009), in particular, state that women are more frequently on audit committees, highlighting a positive correlation between the presence of women and board attendance, and arguing that more diverse boards devote more attention to monitoring activities. According to the authors, this attitude can explain the negative impact of diversity on the performance of non-financial firms when it leads to over-monitoring. Ahern and Dittmar (2012) studied the impact on firm valuation of the mandatory requirement to increase the number of women on boards following the introduction of a quota requirement in Norway in 2003. The authors found that the overall effect of the quota was negative due to the small pool of female candidates, leading to the selection of new female directors who were younger and less experienced than their male counterparts. For the same country, Nielsen and Huse (2010) had previously found that women on boards led to better corporate governance practices because of their different leadership style, often translating into less conflict among the board members and a higher quality of board development activities. Haslam et al. (2010) discuss the difference between the objective performance of a firm (as measured by ROA and ROE) and 'subjective' stock-based measures of performance (as assessed by Tobin's Q), which may be affected by the perception that female directors are in charge in firms that are performing poorly.

Focusing on the evidence from Italy, some studies investigate the relationship between the presence of women on top boards and governance practices for listed companies. Bianco et al. (2013) do not find any effect on attendance but confirm a positive impact on the number of meetings. For a slightly different period and a different sample of listed firms, Schwizer, Soana and Cucinelli (2012) show a positive correlation between a female presence in boards of directors and monitoring activities and, considering auditing boards, a positive correlation between a female presence and the frequency of meetings.

As mentioned earlier, the literature on the effect of gender on bank performance is more recent and still limited, particularly with respect to European countries. Mateos de Cabo et al. (2012) find evidence for European banks of a positive correlation between a higher proportion of women on boards and bank capitalization and a negative correlation with performance volatility (measured by the standard deviation of ROA). Again, better performance when women are present can be linked to their attitude to monitoring activities. This is consistent with the findings provided by de Andres and Vallelado (2008), who investigate the role of the size of the board of directors on bank performance, even though they do not explicitly consider gender diversity. The authors detect a positive effect of larger boards and, in particular, of increasing the proportion of 'outsider' members since this enhances monitoring and advisory activities, thus improving governance and, through this, shareholder value. However, they also find an upper limit to this positive effect, identifying a maximum number of members beyond which coordination and control problems outweigh the benefits of larger (and implicitly more diverse) boards.

A negative correlation between women's participation in boardrooms and bank riskiness is found in Gulamhussen and Fonte Santa (2009), who consider a cross-section of data for large banks from OECD countries. Riskiness is approximated by loss reserves, loan loss provisions and the impaired loan ratio, and the results are confirmed when they control for reverse causality. However, using difference-in-difference techniques to tackle endogeneity problems, Berger et al. (2012) show that younger executive teams in German banks increase risk-taking as do board changes leading to a higher proportion of female executives.

A negative association between the number of women on boards and risk is consistent with the empirical literature suggesting that women are more risk averse than men. Most of this literature is based on experimental data (see Croson and Gneezy, 2009, for a survey,

and Biancotti et al., 2013, for an econometric case study of Italy); such data also detect some exceptions: differences in risk preferences by gender tend to disappear for corporate managers, due to either selection or adaptive behaviour. Considering non-financial firms, Guiso and Rustichini (2011), with reference to a sample of Italian small and medium entrepreneurs, and Adams and Funk (2011), in a survey of Swedish directors of listed firms, find that female directors may be even more risk prone than their male counterparts. More recently, Adams et al. (2012), using data on mandatory announcements of new directors' appointments for listed firms in Australia, argue that the appointment of a new female director has a more positive impact on shareholder value than that of a new male director.

Different attitudes to risk by gender also emerge in the strand of literature that investigates its relevance in bank-firm relationships. Beck et al. (2013) find that loans granted by female officers tend to present a lower probability of default than those allowed by their male colleagues. Since this result does not depend on different abilities or experience, the difference may arise because of women's greater monitoring efforts and/or capability. Bellucci et al. (2010) state that, consistent with their higher risk aversion, female loan officers tend to grant less credit to new and unestablished borrowers compared with their male colleagues.

European comparisons for the 2000s show that Italy was among the EU countries where women were least represented in bank boardrooms. In a previous study Del Prete and Stefani (2013) investigated some preliminary correlations between female presence in banks' top boards and past bank performance. Focusing on bank governance and credit risk-taking, Benvenuti, Gallo and Kim (2013) found that, among other factors, gender diversity helped reduce *ex-post* risk for Italian banks in the financial crisis. The following analysis aims to shed further light on this issue.

Table 1

Author(s)	Countries	Period	Type of firm	Main findings
Adams and Ferreira (2009)	US	1996-2003	Non-financial firms	Positive correlation between women's presence on boards and attendance; women are more likely to join monitoring committees; the effect of gender on performance is on average negative.
Adams and Funk (2011)	Sweden	2005	Listed firms	Female directors are more risk averse than their male counterparts.
Adams and Mehran (2003)	US	1986-1996	Banks and other firms	Bank holding companies present corporate governance characteristics that are different from those of other industries.
Adams, Grey and Nowland (2012)	Australia	----	Listed firms	The addition of a new female board member increases shareholder value more than the addition of a male director.
Ahern and Dittmar (2012)	Norway	2001-09	Listed firms	The quota led to younger and less experienced boards, increased leverage and acquisitions, and a deterioration of outcomes.
Beck, Behr and Güttler (2013)	Albania	1996-2006	Banks	Loans monitored by female bank officers display lower probability of turning problematic, due to higher female monitoring capabilities.
Bellucci, Borisov and Zazzaro (2010)	Italy	2004-06	Sole proprietor-ships	Female loan officers tend to grant less credit to new and unestablished firms.
Benvenuti, Gallo and Kim (2013)	Italy	2001-10	Banks	Gender diversity on boards helped reduce *ex-post* risk for banks.
Berger, Kick and Schaeck (2012)	Germany	1994-2010	Banks	Board changes leading to higher female participation increase bank risk.
Bianco, Ciavarella and Signoretti (2013)	Italy	2008-10	Listed various sectors	Positive correlation between women's presence on boards and the number of meetings, but not with meetings' attendance.
Carter, Simkins and Simpson (2003)	Various	1997	*Fortune* 1000 firms	Positive correlation between female participation on boards and shareholder value.
Croson and Gneezy (2009)	Literature survey	- - -	- - -	There are gender differences in risk, social and competitive attitudes.
De Andrés and Vallelado (2008)	OECD countries	1996-2006	Banks	Inverted U-shaped relationship between bank performance and board size.
Del Prete and Stefani (2013)	Italy	1995-2010	Banks	Negative correlation between women on boards and *ex-post* risk.
Foti (2011)	14 European countries	2007-09	Banks	Women are more present on larger and younger boards, with more independent members and in family-owned banks.
Guiso and Rustichini (2011)	Italy	2008-09	SMEs	Female entrepreneurs exhibit more masculine traits.
Gulamhussen and Fonte Santa (2010)	OECD countries	2006	Large banks	Negative relationship between female presence on boards and riskiness; positive relationship with profitability (ROA, ROE).
Haslam, Ryan, Kulich, Trojanowski and Atkins (2010)	UK	2001-05	FTSE 100 companies	Women are found on the boards of companies that are perceived to be performing poorly; so, their presence on boards can lead to the devaluation of companies by investors.
Italian Banking Association (2011)	Italy	1997-2009	Banks	Women in Italian banks are on average more present than in other economic sectors, are younger than men and more educated. However, although it is increasing, their presence on boards remains very limited.
Mateos de Cabo, Gimeno and Nieto (2012)	Europe	2006	Banks	There are more women on boards in banks that are low-risk, have larger boards and display higher rates of growth of assets.
Nielsen and Huse (2010)	Norway	2003	Firms	The positive effects of female directors on board effectiveness are found in increased board development activities and decreased levels of conflict.
Schwizer, Soana and Cucinelli (2012)	Italy	2007-09	Listed various sectors	Positive correlation between the presence of women on boards and the monitoring activity of the board of directors and the number of meetings of the audit committees.
Shrader, Blackburn and Iles (1997)	US	1992-93	200 large firms	Firms' performance cannot be predicted by a high percentage of women as top managers or board members.
Tarantola and Magliocco (2000)	Italy	2000-05	Various sectors	Women in banks' senior management are less present than in other Italian sectors, and compared with other EU banking systems.

3. Sources and data

This paper uses a panel dataset that combines information on bank board members with data on the characteristics and performance of the banks where they sit. The panel includes three sets of data: 1) individual features of board members that are collected by the Bank of Italy's database (OR.SO. – *Organi Sociali*), which is a historical archive and contains information on the boards of all banks and financial intermediaries supervised by the Bank of Italy;[3] 2) bank characteristics (i.e. legal form, size, geographical area of the administrative headquarters, etc.), which are collected by the Bank of Italy's Census; 3) data on bank performance and riskiness that are taken from the Bank of Italy's Supervisory Reports and balance sheet data. The dataset starts in 1995 and ends in 2010, owing to data and legal discontinuity in the subsequent years.[4]

The following boards are considered in this study: Boards of Directors, Supervisory Boards or Boards of Statutory Auditors, General Management and the boards nominated in default procedures.[5] Details on these boards according to Italian law are provided in Appendix A.

As for individual board member characteristics, age, tenure and education are directly calculated from the OR.SO. archive. Education is a dummy variable (*B.A. degree*) taking the value of one if the member has at least a B.A. degree (*laurea*).[6] The role of family affiliation

[3] Data include census information on members (name, date and place of birth, residence, educational degree, etc.), information on their role in the board and its duration (appointment date, cessation date, causes of cessation, etc.).

[4] The OR.SO. archive was partially reorganized in 2011 and thus an accurate comparison of bank mandates before and after this reorganization is not possible. Moreover, in 2011 a quota law for listed firms (including banks) was introduced, thus creating a discontinuity in regulations before and after 2011 and between listed and non-listed firms. However, this legal discontinuity is a very rich source of exogeneity across banks and over time which can be exploited in further research to evaluate the effectiveness of the quota law.

[5] Such as: *Amministrazione controllata*, *Amministrazione straordinaria*, *Liquidazione coatta amministrativa*, *Fallimento.*

[6] Unfortunately the level of education in the dataset is not clearly identified, thus this variable could be underestimated.

with the controlling agent is caught by a dummy variable (*family bank*), which is equal to one if the board member belongs to the family that controls the bank. The role of the knowledge that a board member has of the local environment in which the bank operates, as well as the fact that the member is known in the same environment is caught by the dummy *membership in the same birth municipality*: the variable takes the value of one if the board member lives (and presumably works) in the same municipality where he or she was born.

Turning to bank characteristics, the natural logarithm of total assets (*sizebank*) is used as a measure of the bank's size.[7] The legal form of the bank is taken into account with four dummy variables (limited bank - *società per azioni*, cooperative bank - *banca popolare*, mutual bank - *banca di credito cooperativo*, or a branch of a foreign bank). Dummy variables are also introduced to control for: membership of a banking group (dummy *group*), and especially of the top five banking groups (dummy *top5*), the presence of foreign branches and subsidiaries (dummy *foreign presence*), being listed on the Italian Stock Market (dummy *listed bank*), and for having adopted a dual governance regime (dummy *dual governance*). These characteristics exhibit very limited variance over time; so, in our baseline estimations using bank fixed effects they are often absorbed by bank dummies.

Finally, data on banks' performance include the ratio between operating costs and the income margin (*ceffbank*), which is a measure of cost efficiency. The profitability of a bank is measured by the ratio of profits before taxes to total assets (*roabank)*. The ratio of non-performing loans to total loans (*riskbank*) provides information on the riskiness of the bank portfolio. Alternatively, we use two other risk indicators: a) the *credit default rate*, calculated

[7] In some (unreported) estimates a dummy variable (*small bank*) is also inserted, based on the Bank of Italy's categorical classification, which takes account of bank total assets. Dummy variables are also introduced to control for the geographical location of the headquarters, grouping Italian regions in four areas (North-West, North-East, Centre and South). The results remain unchanged.

as a percentage share between new bad loans and lagged performing loans; b) the *impairment index*, as a ratio of net credit impairments (or losses) to total loans, in percentage terms.

Table a1 summarizes the descriptive statistics on the whole dataset used in the following econometric analysis together with variable definitions.

The panel dataset at individual level contains around 253,000 observations and is used to present some descriptive statistics on gender diversity in bank boardrooms. On average in the whole period, Italian bank board members were 54 years old and held the position for 5 years and 3 months (Table a1). One in two members had at least a B.A. degree and a slightly higher share was born in the same municipality where he or she lived and worked. Both results seem to be driven by the presence of a large number of small (and mostly mutual) banks in the sample, whose members are on average less educated and more likely to be born in the same municipality where they operate. Finally, less than 2 per thousand of total board members are in charge of banks belonging to their own family, considering the very small number of family banks in Italy.

The analysis of possible correlations and links between the number of women in boardrooms and bank performance has been run at bank level, thus collapsing the previous dataset. The resulting dataset includes more than 15,000 (bank-year) observations.[8]

Over the entire period, the median bank exhibited a return on assets (ROA) close to 1 per cent, a cost-income ratio around 70 per cent, a capital ratio of almost 10 per cent, and a share of non-performing loans to total loans that was around 3.3 per cent (6 per cent on average).

[8] In order to clean up the balance sheet data, we have set outliers of performance indicators at the 1st and 99th percentile of their annual distribution and those of the riskiness indicators at the 5th and 95th percentile. The main econometric findings also hold dropping outliers from the datasets.

4. Women in Italian bank boardrooms: some stylized facts

At the end of 2010 the share of women in all kinds of bank boards amounted to just 7 per cent,[9] even though the data show a marked increase from 1995, when the share was around 2 per cent (Figure a1). Women are more represented on 'Supervisory Boards', that is on boards with monitoring tasks, in line with the results of Adams and Ferreira (2009) for non-financial firms. Moreover, the share of women decreases at the highest levels of board membership (Figure a2).

As it has been found for Italian listed firms (Bianco et al., 2013), in most cases when a woman sits on a bank board, she is the only one: in the whole panel of banks over the period 1995-2010, in almost 60 per cent of the (bank-year) observations there was no female presence on boards, and in around 30 per cent of the cases there was just one woman (Figure a3).

In 2010 the average (and median) number of board members was 16.9 (Table a2) and the mean number of women members was 1.2, that is around one woman in every 15 members.

Women are in general younger than their male counterparts, even though the age gap has decreased over time and their tenure is shorter.[10] The gender gap on education (which is slightly higher for men) is not statistically significant (Table a3). In case of family affiliation, women are more represented on boards, with an average number of 1.5 in 2010 (0.7 in 1995).

[9] The analysis also considers boards in the event of default procedures. However, since in the period covered by this study these were very rare, the main results presented in this paper do not change if these observations are excluded from the sample.

[10] The tenure gap appears to have increased in recent years. It is worth noting that the length of memberships has been underestimated by the OR.SO. database, mainly in the early years after its creation in the mid-1990s, since the fact that some members were already in office in previous years was not always correctly recorded.

5. The econometric strategy

In order to measure whether women's presence on boards could affect economic outcomes, we directly investigate the impact of gender diversity on bank performance and riskiness – and, indirectly, the role of diverse gender risk aversion – through the estimation of some performance equations, as follows:

$$PerformanceIndex_{it} = \alpha + \beta (DummyFemale)_{it-2} + \varphi X_{it-2} + \gamma Z_{it-2} + \nu_i + d_t + e_{it} \quad (1)$$

In model (1) the dependent variable is alternatively a bank performance indicator (risk, profitability, cost measure, etc.); *X* and *Z,* respectively, stand for vectors of explicative variables concerning bank balance sheet characteristics and board or other governance features; v_i represents the vector of bank specific effects (time invariant and unobservable under fixed effect estimations); d_t are time dummies for cyclical common effects; and *DummyFemale,* the focus of our analysis, is a dummy variable which is equal to 1 if there was at least one woman on bank boards two years before the time referring to the dependent performance indicator. We prefer to use a dummy variable instead of the share of women, because – as suggested by descriptive evidence – the presence of women on all kinds of top boards is very close to zero over the period under investigation: in the context of a 'rare event' a dummy variable is more suitable (than a continuous one) to capture the female presence in bank governance models.

We use a 2-year lag for two reasons: first, it is plausible to assume that gender diversity on boards (as it is a rare and generally recent event) takes some time to generate its effects on bank performance and riskiness; secondly, on the basis of our dataset, the median

period a woman lasts on a bank board ranges from 2 years till the end of the 1990s up to 5 years in the last decade (see Figure a4). A 2-year lag therefore appears to be the minimum lag to consider for the female variable in order to capture some effects on performance and riskiness without dropping too many observations in the econometric estimations. So, we inserted the dummy *female* with a 2-year lag in the model and we adopted the same lag for all the other controls for homogeneity.

For dependent variables we used three different measures of credit portfolio quality and three different performance indicators. The former are: *a)* the share of bad loans over total loans (our main risk indicator); *b)* the probability of default of the bank loan portfolio (as the ratio of new bad loans to lagged performing loans); *c)* the impairment ratio, as net credit impairments or losses to total loans. The latter are: *a)* a profitability index (ROA), calculated as earnings before taxes on total assets (our main performance indicator); *b)* a cost-efficiency index, as the ratio of operating costs to income margin; and *c)* a capital ratio, as the ratio of capital and reserves to total assets.

6. The effect of gender diversity on bank riskiness and economic performance

Estimating performance equations may therefore be seen as a first attempt to shed light on the link between bank economic outcomes and women or men's different attitudes to monitoring activities. OLS estimates may, however, be affected by endogeneity problems stemming both from omitting relevant variables in the model and from potential reverse causality issues. In particular, for omitted variables we cannot be sure we have controlled for all relevant bank and board characteristics in each estimation: omitted non-observable variables (like individual skills of board members, the corporate culture, and similar intangible characteristics) may influence board composition and performance; in particular,

we expect more skilled boards to be generally more open to women and potentially obtain better economic outcomes. Moreover, a reverse causality concern arises since female presence is likely to affect future bank performance, but it is also plausible that this performance further enhances a gender diversity approach relative to underperforming intermediaries. In both cases, endogeneity could produce a bias that can be either upward or downward, according to the performance indicator investigated, blurring the real effect of a female presence on riskiness and other economic outcomes.

Actually, these issues are so relevant and difficult to tackle that most of the empirical results on the effect of gender diversity on economic performance have proved inconclusive to date. In the following empirical exercise, we adopt a two-step approach. First, we implement the identification strategy suggested by Altonji et al. (2005) in order to detect the bias stemming from omitted variables in panel estimation with bank and year fixed effects. Next, we run IV estimations in order to tackle reverse causality and to identify the causal link between a female presence on boards and riskiness or other performance indicators.

6.1 The identification strategy: controlling for omitted variables

As mentioned earlier, the OLS panel estimations of performance equations as in model (1) provide results that are intrinsically endogenous. This problem remains even if we insert lagged bank and board individual variables into the model: estimates may present a bias for the reasons discussed before. Therefore, OLS estimates can simply highlight conditional correlations between a female presence on boards and bank outcomes. Focusing on riskiness indicators, we expect a negative correlation between women's presence on bank boards (in the past two years) and the current level of our indicators of bank portfolio riskiness, consistent with different gender risk aversion (see Section 2 for more details). By

contrast, for the other performance indicators (profitability, cost efficiency and capitalization), we do not have a strong *a priori* expectation as to the direction of gender diversity, since the empirical literature is mixed on this point.

The first issue to tackle in order to deal with endogeneity is omitted variables. In our case, we cannot be sure that the vectors X and Z in model (1), measuring respectively balance sheet and governance characteristics, include all the relevant variables. To this end we implement the Altonji et al. (2005)'s identification strategy on the regression estimating the correlation between a female presence on boards and riskiness, measured by our main risk indicator (the share of non-performing loans to total loans).

The main idea in Altonji et al. (2005) is to compare the significance and magnitude of the estimated coefficient of the variable of interest (in this study, the dummy *female*) in different and increasingly complex models, obtained by adding more and more control variables.[11] The authors propose a test based on the ratio of the coefficient of the variable of interest in the model with controls to the difference between the estimated coefficients in the models without and with controls, and they state that an index higher than 3.55 excludes a relevant distortion due to omitted variables.[12]

To implement Altonji et al.'s strategy in our estimation on riskiness we can divide our control variables into two categories: *1)* a first group related to the characteristics of the banks and to their balance sheet structure (size, profitability, costs and capitalization, as well as credit risk); *2)* a second group linked to the demographic characteristics of boards (gender composition, the size of the board, the average age and tenure of people in charge,

[11] In other words, the idea is that starting from the more parsimonious estimation, and adding observable variables belonging to all the groups of controls (balance sheet and board characteristics), we should observe that the estimated coefficient of the variable of interest (the dummy *female)* remains quite stable after the insertion of these further observables; this may indirectly indicate that the effect stemming from other unobservable features affecting the dependent variable is negligible, assuming that observable controls are representative of all possible controls.

[12] For a similar strategy, see also Accetturo (2014).

their level of education, membership of a family bank, etc). As for the first group of controls (X), we assume that we have no omitted variables for different reasons: first, the richness of our dataset allows us to construct all the relevant size and balance sheet variables; second, using bank fixed effects, we are confident that we can capture all the relevant bank idiosyncratic time-invariant features related to banking organization and culture; third, by inserting year dummies we are able to take into account the common trend in financial statements due to the business cycles. By contrast, in the second group of explicative variables (*Z)* an omitted variables' issue could be more severe, because not all the relevant characteristics of board members are observable (management skills, for instance) and in this hypothesis Altonji et al.'s strategy could prove crucial for the correct identification of our model.

Table a4 shows the results of a stepwise approach where subsequent estimations are made with additional controls. Considering the very basic estimation, with only bank and year fixed effects, we obtain a coefficient equal to -0.323 percentage points for the dummy *female*, which is significant at 5 per cent. The second model includes bank size and past profitability, cost efficiency and capital ratio, i.e. all the balance sheet variables which can affect a bank's credit policy and, consequently, its portfolio risk. From now on we consider this model as our benchmark, since we believe that controlling for balance sheet past indicators is essential in a performance equation. With this model we obtain a gender coefficient that is a bit lower in absolute terms (-0.267) but still statistically significant. In the third model, where we further insert board member individual features, the coefficient on the dummy *female* remains substantially unchanged and statistically significant (at 10 per cent). Finally, in the last two models we add other bank level variables, not related to board composition, but again accounting for bank governance: we insert three dummy variables for the institutional category of each bank (*cooperative, mutual, foreign bank*, using *limited*

company as a benchmark), a dummy for *listed* intermediaries, a dummy for banks with a *dual governance regime*, and alternatively a dummy for banks belonging to a *banking group* or to the Italian *top5 banking groups*. In the last full model, the estimated coefficient for a board female presence on riskiness is -0.282 percentage points and it is significant at 5 per cent.

Using the first basic model (only bank and year fixed effects) and comparing the coefficient with the model with all the relevant controls (last column), we obtain an Altonji et al.'s index of 6.8. Comparing the last full model with the second model, using bank and year fixed effects and the balance sheet indicators (our baseline estimation), we end up with an Altonji et al.'s indicator greater than 18. In both cases, the index is much greater than 3.55, which suggests that our model is well specified. If the set of observed controls is representative of all possible controls, then a high ratio suggests that it is implausible that omitted variable bias can explain away the entire effect.

Thus, the presence of women on boards appears to be negatively correlated (with a delay of about 2 years) to the riskiness of the loan portfolio, measured as a percentage of non-performing loans. The coefficient, which is statistically significant though economically small (-0.3 percentage points), is in line with the higher risk-aversion of women and their greater attitude to monitor and control outcomes.[13]

In Table a5 we present OLS panel estimations where dependent variables are all the riskiness and performance indicators presented before and we use as independent variables both balance sheet and board controls (as in Model III in Table a4).[14]

[13] Adams and Ragunathan (2012) obtain a similar result using IV estimation in an equation where the (log) fraction of bad loans is regressed on the fraction of women on boards. Women's propensity to monitor outcomes is detected by Del Prete and Stefani (2013), who argue that the greater the share of women on boards the higher the likelihood of turnover of board members in case of past bad performance.

[14] For the sake of brevity we omit the most parsimonious models with only the dummy *female*. Among the board characteristics, for which we can control, the connection with the local environment (dummy *membership in the same birth municipality*) is never significant and we exclude it from the observables.

This first set of estimations suggests that gender diversity could significantly reduce bank riskiness, while it does not affect the other economic outcomes.[15] In addition, among the other individual characteristics, the most significant are the size of the board and family affiliations.

However, the real significance and the magnitude (in absolute terms) of the effect on performance stemming from gender diversity could be hidden by reverse causality problems, due to board composition or other board features. Indeed, this kind of endogeneity can induce a bias in the estimated coefficients of the dummy *female*, due to the fact that women are more present in efficient and dynamic contexts (Becker, 1957; Mateos de Cabo et al., 2012). We address this issue in the next section.

6.2 The causal link between gender diversity and performance: reverse causality and exclusion restriction

As mentioned, our OLS estimates are potentially affected by two sources of endogeneity problems. Besides omitted variables, which we have dealt with in the previous paragraph, we may not be able to accurately identify the causal link between a female presence on boards and performance indicators, due to reverse causality.

Potential reverse causality implies that OLS coefficients, obtained for the dummy *female* in model (1), can simply be interpreted as *negative (significant) conditional correlations* between gender diversity and bank riskiness, with no implications in terms of causal effect.

In order to disentangle the *causal link* between gender diversity and economic outcomes more effectively, performance equations should be re-estimated by using 2SLS

[15] Indeed, while a negative correlation emerges between women's presence on boards and the current level of the share of bad loans over total loans, a significant effect of female presence on boards does not emerge if we consider the default rate of bank customers or the net impairment ratio as alternative measures of portfolio risk. As regards profitability, cost-efficiency and bank capitalization, gender diversity on boards does not exert a significant effect on these kinds of outcome.

econometric techniques, which can isolate the endogeneity that may arise from reverse causality. The question is obviously a very complex one, as shown in the (limited) empirical literature on this topic, because not only the female presence that we want to study, but also all the other variables related to the characteristics of the board and to bank governance may have feedback effects from performance and risk. It is also very difficult to find a 'good' instrument for the IV estimation, i.e. a variable that is correlated with the presence of women on a board but that also fully meets the requirements of orthogonality with respect to economic outcomes, in order to be compliant with the *exclusion restriction*.

In this respect, we follow an idea similar to the one adopted by Adams and Ferreira (2009), and we use as an instrument the percentage of 'outsider' members, that is young bank board members in terms of their tenure.

Adams and Ferreira (2009) build an instrumental variable for the share of women on boards of non-financial firms by exploiting male and female board connections: they use the proportion of male directors who sit on other boards on which there are female directors. Even if this kind of connection may approximate male directors' openness to female presence, we believe that this is not sufficient to ensure the instrument is not correlated with the dependent variables. It is possible that these male directors influence bank performance if they have a long tenure in the same bank. Moreover, we believe that with this instrument the exclusion restriction is not fully satisfied because sitting on several boards is a measure of inter-firm linkages and these linkages may have a direct (likely positive) effect on a firm's performance.

A useful instrument for 'the presence of women' that may overcome this problem could be the share of 'independent' top members with respect to bank ownership, but this variable is not available in our dataset. Therefore, we have used the share of 'outsider' board members, identified as those with a maximum tenure of one year in the same bank,

since this variable should be correlated with a female presence, but it is likely to be uncorrelated with the outcomes. On the one hand, considering the tenure in the same bank as a proxy of the level of entrenchment, it is unlikely that these people will be heavily involved in managing the bank; we can accordingly assume that they are not involved in 'collusive' behaviour with other male senior members to preserve gender board homogeneity. On the other hand, we can expect them to be too 'junior' in managing the bank to really affect performance.

One might worry that our instrument will not fully satisfy the exclusion restriction if the openness of boards to 'outsiders' could signal a change of strategy with the intention of improving performance. Descriptive statistics suggest that these new entries are mostly connected with the expiration term of other mandates or similar causes (more than 60 per cent), which determined the need for natural replacement of members rather than a change of strategy. In addition, the real removal hypothesis (e.g. revocation or forfeiture), which may hide a change of bank strategy, is very limited (see Figure a5). Descriptive statistics also show that the median values of the average distribution (at bank-year level) of the age of the 'outsider' members are over time not so different to the pattern of the average age distribution of the 'non-outsider' board members. In Figure a6 the two distributions present very similar trends of their median values, excluding – in our opinion – a real intention to engage skilled directors to implement new strategies or new credit policies. For these reasons, we are confident that our instrument satisfies the *exclusion restriction* and we employ it in a 2SLS estimation analysis to instrument female presence on bank boards.

Since all the board and governance characteristics are potentially correlated among them and should have feedback effects by outcomes (as suggested by Table a6),[16] to implement IV estimates of our performance equations with 2SLS techniques more effectively, we use very parsimonious models in which we have inserted only the dummy *female* (2-year-lagged and instrumented by the lagged share of outsider members), bank and year fixed effects, and 2-year lagged balance sheet indicators, as in Model II of Table a4 in the previous step of the analysis (our preferred specification). After demonstrating that omitted variables are not so crucial, using more parsimonious models may have econometric advantages in 2SLS techniques, where the problems of higher correlations among explicative variables could be exacerbated. We prefer to use the model with at least balance sheet controls (and not the very parsimonious one with the only dummy *female*), given that in performance equations the use of these controls appears necessary to take into account correlations between the main balance sheet characteristics and gain efficiency in the IV estimations, where the standard errors are more inflated.

The results of the first stage support the relevance of our instrumental variable (see Tables a7-a8).[17] Table a7 reports the main findings on gender diversity on boards and economic indicators obtained using the IV estimations of the following more simplified performance equations, as in model (2):

$$PerformanceIndex_{it} = \alpha + \beta (DummyFemale = ShareOutsider)_{it-2} + \varphi X_{it-2} + \nu_i + d_t + e_{it} \quad (2)$$

with bank and year fixed effects, only 2-year lagged balance sheet indicators, and the dummy *female,* instrumented using the share of outsider members as a tool to account for

[16] However, the reverse causality problems on gender composition and its impact on bank performance can therefore similarly apply to all other board characteristics (tenure, family affiliation, education, etc.) used as explicative variables in our performance equations. For this reason, we have estimated some other parsimonious models in terms of board controls.

[17] The estimated coefficient of the share of outsider members is positive and highly significant; moreover, the F-statistic of the first stage is always greater than 10 in all models, usually considered a good benchmark for the right identification strategy in IV techniques.

the 'presence of at least one woman on boards' two years before (taken with the same 2-year lag).

The evidence suggests that, after taking into account reverse causality, the presence of women on bank boards for at least two years reduces bank riskiness significantly, both in terms of default rate and incidence of impairments on total credits (more than one percentage point and around a half percentage point, respectively), while it does not significantly affect the stock of bad loans on total loans, as found previously (Table a5).[18]

Gender diversity on boards also seems to positively affect profitability, as supported by the estimated coefficient on the dummy *female* in the equation using ROA as the dependent variable. It is plausible that the positive effect on profitability stems from more rigorous policies following female presence on boards, *via* a reduction of loan losses and other operational costs.

Moreover, estimated coefficients in the IV strategy (if significant) are higher (in absolute terms) than in the OLS estimates, signaling the existence of a bias of the OLS estimations, due to the fact that women are more frequently present in dynamic contexts with younger boards (Del Prete and Stefani, 2012).

Summing up, these IV estimates highlight the causal link of gender diversity on bank outcomes; specifically, these findings suggest that the effect of women on boards goes in the direction of reducing credit portfolio risk (particularly the default rate and net credit losses), and this positive effect on riskiness may have a significant impact on bank profitability. However, since the latter result emerges only from IV estimates, which are less efficient than OLS ones, we believe that the relationship between the presence of women on boards and profitability merits further investigation.

[18] This result is in line with Benvenuti, Gallo and Kim (2013). Even if these authors do not focus on gender issues, they find – among other results on bank governance – that a higher share of female directors lowers the *ex-post* credit risk, using a Tobit model.

6.3 IV over-identification and robustness

To check the robustness of our results, we have used alternative instruments exploiting other individual characteristics of the board members, by means of an *over-identification* strategy in the IV estimations. In particular, we have instrumented the dummy *female* simultaneously with the share of outsiders and with the mean age of the board members. Of all the demographic features of the board members, age can be considered the best choice because, on the one hand, women are more present on younger boards (see Del Prete and Stefani, 2013), and, on the other hand, the age of members should be less correlated with bank outcomes than other characteristics such as education or family affiliation.[19]

Therefore, we use the average age of the board and the share of outsiders as tools for the presence of women on boards (both with a 2-year lag), as in model (3):

$$PerformanceIndex_{it} = \alpha + \beta(DummyFemale = ShareOutsider, MeanBoardAge)_{it-2} + \varphi X_{it-2} + \nu_i + d_t + e_{it} \quad (3)$$

The results in Table a8 mostly confirm the previous IV findings and are even more significantly robust. Indeed, with this approach, we obtain a negative and significant effect of the presence of women on boards on all the different risk indicators, and once again a positive effect on bank profitability. So, all other things being equal, the positive effect of greater gender diversity on riskiness emerges *via* a reduction of impairments on credits, a decline in the stock of bad loans, and a decrease in the credit default rate. Moreover, the more rigorous and effective monitoring strategy, implied by a greater female presence,

[19] More specifically, the literature on this topic tells us that the size of the board, the tenure and the level of education, as well as membership of a family bank are all variables that potentially have an impact on performance, because they are linked to the size of the bank, the experience of the management or to the structure of the ownership (see, among others, Liang, Xu, Jiraporn, 2013). Among the demographic characteristics that we observe for the board members, age could be considered the most exogenous variable with respect to performance, given that the bank strategy or its credit policy should depend on the degree of financial education of the board and on the experience gained by the management in the past.

appears capable of generating beneficial spillovers over time on bank profitability, as shown by the positive effect on the ROA indicator.

In unreported IV estimations we have also used as instrumental variables further lags of the dummy *female* and, alternatively or jointly, the lagged values of bank size (measured in terms of log of total assets). The findings on the effect of a female presence on riskiness are generally robust, but these instruments are less powerful, since the presence of women on boards is a relatively recent event in Italian banks. Moreover, in some (unreported) robustness exercises, we have added other bank level controls to the performance equations, particularly to take into account governance characteristics such as listed banks, banks with branches and subsidiaries abroad, banks belonging to a top5 banking group or with a dual governance regime, and the results are mostly confirmed.

Therefore, in a cautious reading of the results, given that the IV estimates are less efficient than the OLS ones, we can conclude that the presence of women significantly reduces credit risk over time, measured with different approaches and indicators, while the effect of gender diversity on profitability in top boards is more mixed.

7. Concluding remarks

Despite a growing interest on the effects of gender diversity on corporate boards, the evidence on Italian banks is still scarce. Using a unique dataset on board composition and bank features for the period 1995-2010, which was characterized by very few women on Italian bank boards, we analyze the impact of gender diversity on portfolio riskiness and bank performance. In doing so, the empirical exercise devotes much effort to tackle endogeneity issues stemming from omitted variables and reverse causality.

Using performance equations and controlling for these sources of endogeneity, our main results show that gender diversity on boards tends to have a positive effect on the quality of credit and, though less robust, on bank profitability. The positive impact on riskiness is likely to stem from higher risk awareness on the part of women (identified by a wide strand of experimental literature) and their much greater propensity to control outcomes, as suggested by their prevalent role in supervisory boards. This paper therefore provides evidence on the beneficial effects of female participation in top boards, even though women are still rare in Italian banks – which is why they can be considered as 'gold dust'.

This result on riskiness is robust to several specifications and to the application of different econometric techniques. On the contrary, the result on profitability requires further investigation. Finally, we do not find statistically significant effects of gender diversity on cost efficiency and on the degree of capitalization, since the latter is also influenced by the regulation of the sector.

Our findings may also provide some insight into the debate on how to improve corporate governance in banks, an issue that has become more crucial after the recent crisis, when it was recognized that the inability to manage credit risk, over and above the management of general bank strategy, played a key role in originating the financial turmoil. The risk averse attitude of women, who are also more inclined than men to monitor risky activities, could be considered an asset in the implementation of credit policies in order to control and contain risk exposure more effectively.

When the recent Italian quota law for listed firms, which includes the main Italian banks, has been fully implemented and their boards are at least 30 per cent female, it will be interesting to evaluate the robustness of our results on the effects of gender diversity on performance by comparing different groups of banks (listed and non-listed) over time.

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APPENDIX:

A. Top Boards in Italian Banks

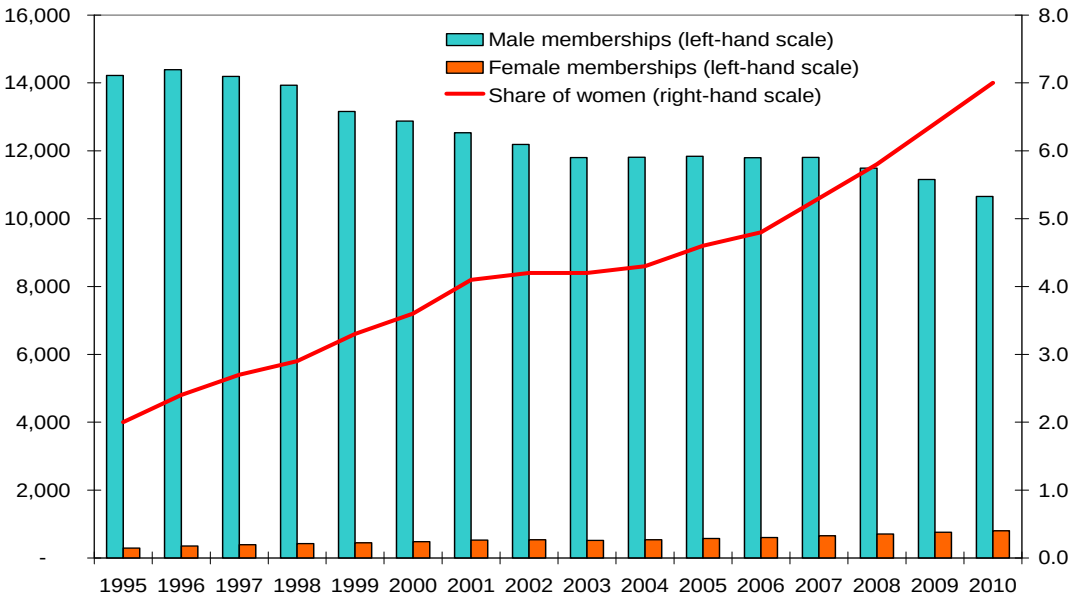
Following the 2003 company law reform (Legislative Decree No. 6 of 17 December 2003, which came into force on 1 January 2004), Italian banks can choose either a traditional or a two-tier (dual) board regime. The law also envisages the possibility of adopting a one-tier system, which no Italian bank has done to date. Only a handful of banks have adopted the dual regime since 2007. The traditional regime has a Board of Directors (*Consiglio di amministrazione*), with a number of committees (executive committee, internal control committee, nomination committee, etc.), and a Board of Statutory Auditors (*Collegio sindacale*). The two-tier model has a Supervisory Board (*Consiglio di sorveglianza*), and a Management Board (*Consiglio di gestione*). For the purposes of this paper, all the members of the *Consiglio di amministrazione* in the traditional regime and of the *Consiglio di gestione* in the dual governance regime are considered as 'members of Board of Directors'. The members of both the *Collegio sindacale* (traditional regime) and *Consiglio di sorveglianza* (dual regime) are instead considered as 'members of Supervisory Boards'.[20] This study also takes into account information on General Management (*Direzione generale*).

[20] In some regressions and robustness checks (Section 6) the effects of the dual governance regime adopted by banks are taken into account through a dummy variable (Dummy *dual governance*).

Figures and Tables

Figure a1 – Share of women on bank boards

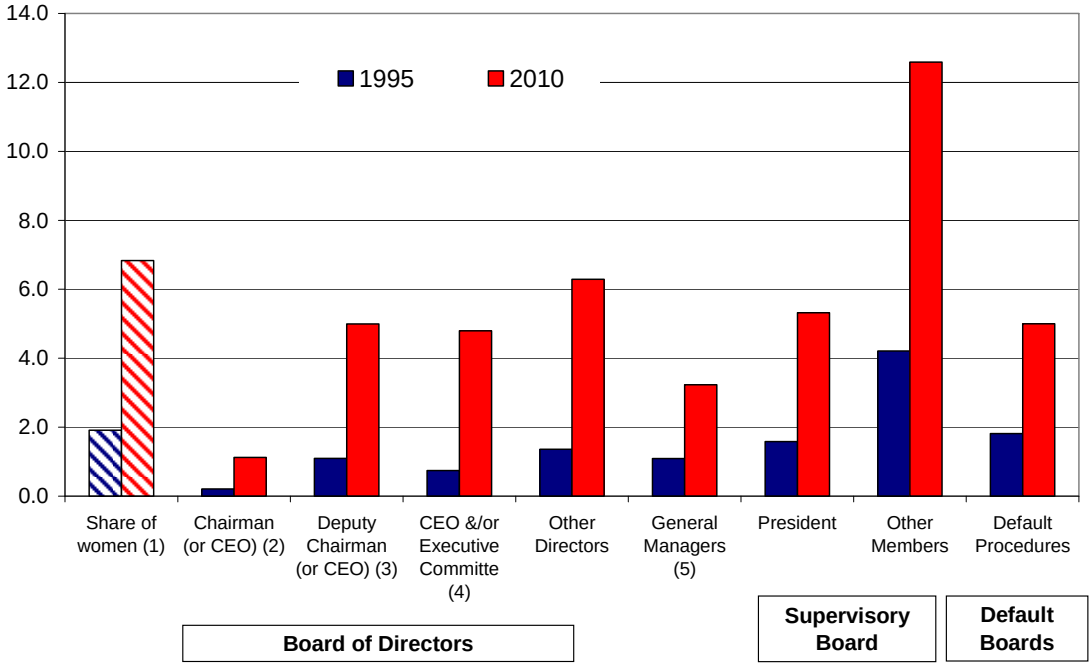
(units and percentages)



Source: authors' elaborations on the Bank of Italy's OR.SO. database.

Figure a2 – Share of women's membership on boards by board type

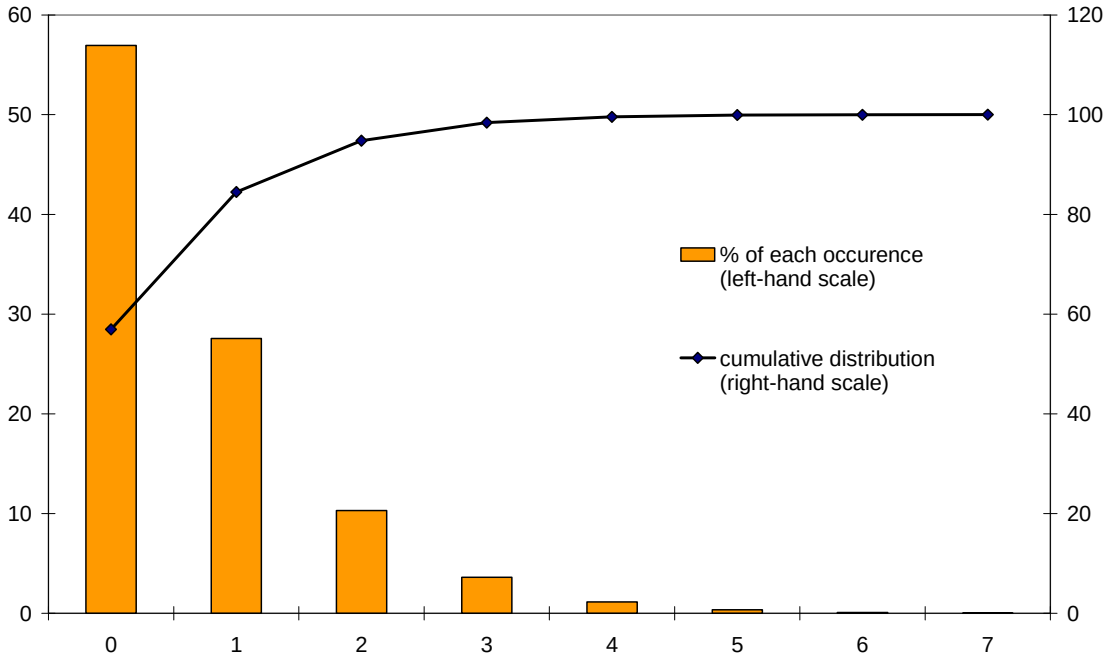
(percentages)



Sources: authors' elaborations on the Bank of Italy's OR.SO. database. – (1) Data include, also for fractions of a year, memberships in each kind of bank board (administrative, executive, supervisory boards and boards set up in the event of default procedures). The sum of different kinds of board memberships exceeds the total because a person can be a member of several boards in a given bank in a given year. – (2) Including the Chairman of the Board of Directors also when s/he holds other positions at the same time, including the one of CEO. – (3) Including the Vice President of the Board of Directors also when s/he holds other positions at the same time, including the one of CEO. – (4) Excluding the case in which the CEO is also either the Chairman or the Deputy Chairman of the Board of Directors. – (5) Including the General Manager, the Deputy General Manager and equivalent positions.

Figure a3 – Frequency and cumulative distribution function of number of women in Italian bank boards

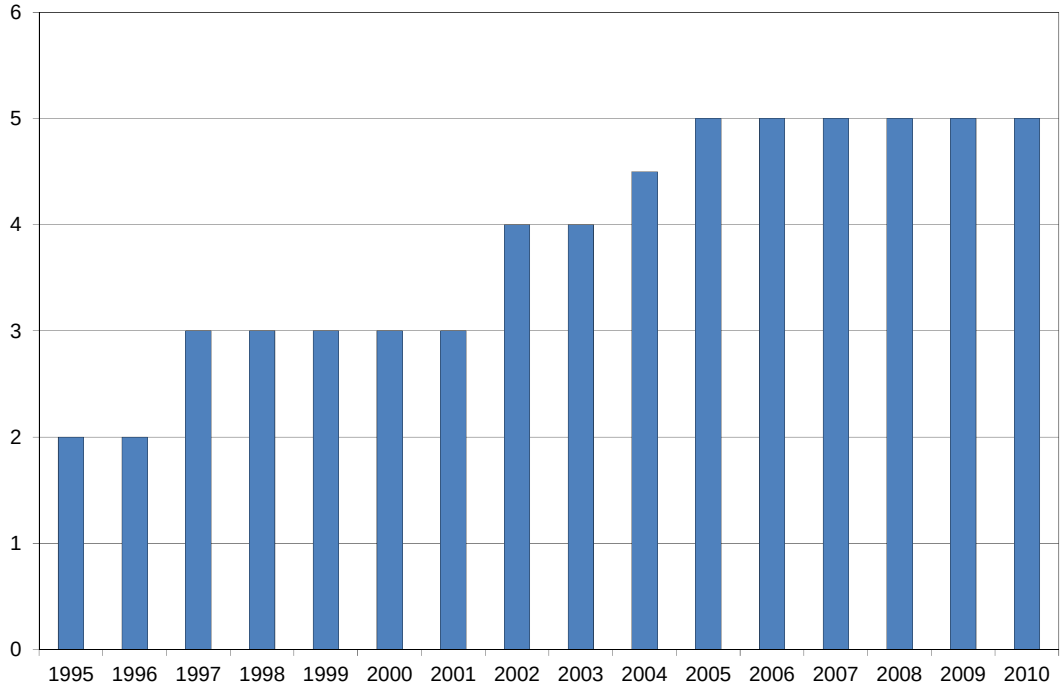
(units and percentages)



Source: authors' elaborations on the Bank of Italy's OR.SO. database.

Figure a4 – Women's tenure on bank boards

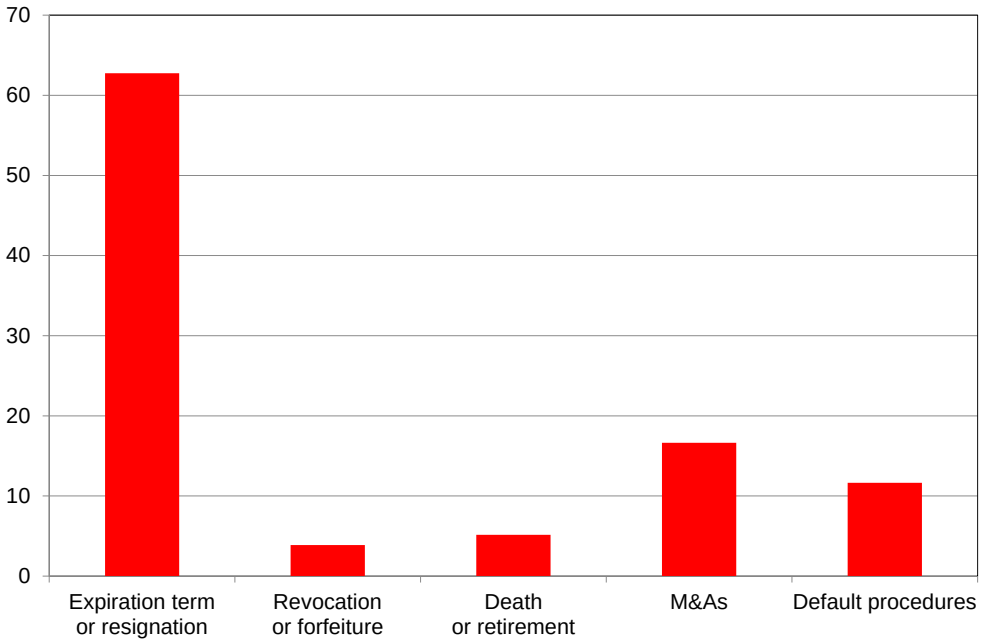
(years; median values)



Source: authors' elaborations on the Bank of Italy's OR.SO. database.

Figure a5 – Frequency of different causes of turnover of board mandates (1)

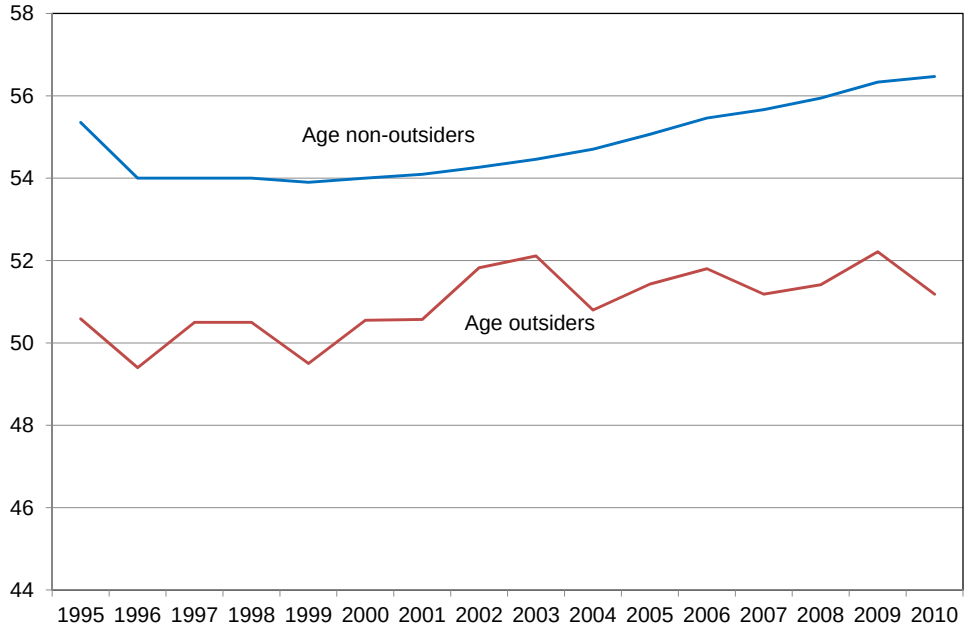
(percentages)



Source: authors' elaborations on the Bank of Italy's OR.SO. database.
(1) The frequencies are calculated considering only the cases in which each board member changes mandate and not for renewals of a mandate in the same bank.

Figure a6 – Age of bank board member: 'outsiders' *versus* 'non-outsiders' (1)

(years; median values)



Source: authors' elaborations on the Bank of Italy's OR.SO. database.
(1) Outsider members are those with tenure of not more than one year in the same bank; non-outsiders are the other 'senior' members. The figure reports the median values of the distributions of the average ages for outsider and non-outsider members, calculated on the individual values by bank-year.

Table a1 – Description of the explicative variables and main descriptive statistics

Variable Name	Variable Definition	n. obs.	mean	median	std. dev.
Variables at board member level					
Age	Age of board member (years)	253,033	54.35	54	11.16
Tenure	Length of *tenure* per board member in the same bank (years)	253,033	5.38	4	4.37
Dummy family bank	Dummy variable assuming value equal to one if the board member is affiliated to the family that controls the bank	253,033	0.002	0	0.04
Dummy B.A. degree	Dummy variable assuming value equal to one if the board member holds at least a B.A. degree	253,033	0.50	1	0.50
Dummy membership in the same birth municipality	Dummy variables assuming value equal to one if the birth municipality coincides with the one in which s/he lives (that is the person has a board membership in the same municipality in which s/he was born)	253,033	0.54	1	0.50
Nr. memberships in the same bank	Number of different memberships that a given person had in the same bank during the sample period (e.g. General Manager and Chairman of the Board of Directors or CEO or others)	253,033	1.54	1	0.81
Variables at bank level					
Sizeboard	Number of board members	15,167	16.68	16	7.31
Number of women per bank	Number of women, considering each kind of bank top board	15,167	0.66	0	0.94
Share of women	Share of women (in percentage points) in each kind of bank board (administrative and supervisory boards) at the vertex of each bank	15,167	4.14	0	7.25
Share of outsider members	Share of members (in percentage points) in each kind of bank board (administrative and supervisory boards) with a tenure less than one year in a given bank	15,167	14.08	6.25	22.64
Dummy limited company bank	Dummy variable assuming value equal to one if the bank is a limited company bank (*società per azioni*)	15,167	0.31	0	0.46
Dummy cooperative bank	Dummy variable assuming value equal to one if the bank is a cooperative (*banca popolare*)	15,167	0.06	0	0.24
Dummy mutual bank	Dummy variable assuming value equal to one if the bank is a mutual bank (*banca di credito cooperativo*)	15,167	0.56	1	0.50

Dummy foreign bank	Dummy variable assuming value equal to one if the bank is a branch of a foreign bank (*filiale di banca estera*)	15,167	0.07	0	0.26
Dummy North West bank	Dummy variable assuming value equal to one if the administrative headquarters of the bank is in a North-Western Italian region	15,167	0.26	0	0.44
Dummy North East bank	Dummy variable assuming value equal to one if the administrative headquarters of the bank is in a North-Eastern Italian region	15,167	0.32	0	0.47
Dummy Centre bank	Dummy variable assuming value equal to one if the administrative headquarters of the bank is in a Central Italian region	15,167	0.20	0	0.40
Dummy South bank	Dummy variable assuming value equal to one if the administrative headquarters of the bank is in a Southern Italian region	15,167	0.22	0	0.41
Dummy listed bank	Dummy variable assuming value equal to one if the bank is listed	15,167	0.03	0	0.18
Dummy for foreign presence	Dummy variable assuming value equal to one if the bank has branches or subsidiaries abroad	15,167	0.03	0	0.16
Dummy for banks belonging to a top5 bank group	Dummy variable assuming value equal to one if the bank belongs to one of the top 5 Italian banking groups (Unicredit, Intesa Sanpaolo, Banca Monte dei Paschi di Siena, Unione di Banche Italiane, Banco Popolare)	15,167	0.04	0	0.21
Dummy dual governance	Dummy variable assuming value equal to one if the bank has a dual governance regime, for years after 2007	15,167	0.00	0	0.04
Sizebank	Total assets (log of euros)	13,465	19.49	19.23	1.89
Ceffbank	Ratio between operating costs and the income margin of the bank (percentage), that is the cost/income ratio	13,288	71.48	67.28	33.95
Roabank	Ratio between profit before taxes and total assets (percentage)	13,231	0.80	0.90	1.57
Indcap	Ratio between bank capital and reserves, and total assets (percentage)	13,170	11.19	9.66	8.11
Riskbank	Ratio between non-performing (bad) loans and total loans (percentage)	12,214	6.19	3.35	7.67
Credit default rate	Ratio between new bad loans and lagged performing loans (percentage)	11,527	1.61	1.02	1.71
Impairment index	Ratio between net credit impairments and total loans (percentage)	12,380	0.77	0.55	0.82

Sources: authors' elaborations on the dataset employed in the estimations and matching individual level-characteristics (OR.SO. database) with bank-level features (Supervisory Reports).

Table a2 – Descriptive statistics on Italian banks' boards

(units)

Year	Statistics on all banks			Statistics on board memberships (2)			
	Banks (1)	*of which:* mutual banks	*of which:* large and medium-sized banks	Mean	Median	Max	Max for women's memberships
1995	989	*593*	*62*	16.1	15	58	4
1996	991	*609*	*60*	17.0	16	49	5
1997	995	*587*	*59*	17.1	17	46	5
1998	986	*585*	*60*	17.2	16	55	6
1999	969	*573*	*57*	17.4	17	49	6
2000	936	*543*	*57*	16.9	17	50	5
2001	902	*511*	*53*	17.1	17	48	5
2002	873	*481*	*56*	17.1	17	77	5
2003	848	*456*	*59*	16.9	17	53	5
2004	819	*444*	*57*	16.9	17	46	5
2005	822	*441*	*58*	16.8	17	53	6
2006	827	*438*	*57*	16.8	17	62	5
2007	828	*440*	*61*	17.0	17	58	5
2008	828	*432*	*55*	16.6	16	52	6
2009	814	*429*	*55*	16.9	17	57	6
2010	791	*421*	*54*	16.9	17	70	7

Sources: authors' elaborations on the Bank of Italy's OR.SO database. – (1) The number of banks in the sample is generally slightly higher than the one of the Bank of Italy's Annual Reports referred to the end of the year. Computations consider instead banks operating during the year and also if they operate for only a fraction of it. – (2) Data include, also for fractions of a year, memberships in each kind of bank boards (administrative, executive, supervisory boards and boards set up in the event of default procedures).

Table a3 – Individual characteristics of board members (1)

(years, percentages)

Year	Age (years)		B.A. degree (%)			Tenure (years)	
	Female	Male	Share of women over memberships with a BA degree	Female	Male	Female	Male
1995	42.6	53.9	1.8	43.3	45.1	2.5	2.9
1996	42.1	53.8	2.5	46.3	43.4	2.7	3.4
1997	42.0	53.9	2.8	46.3	44.7	3.0	3.9
1998	42.3	53.9	2.9	46.1	46.3	3.3	4.3
1999	42.5	53.8	3.5	48.7	48.0	3.3	4.6
2000	43.1	54.0	3.6	50.1	49.5	3.5	4.9
2001	43.8	54.2	3.9	50.3	50.7	3.7	5.2
2002	44.4	54.4	4.0	49.8	51.9	4.1	5.5
2003	44.9	54.6	4.0	49.9	52.6	4.5	5.9
2004	45.3	54.9	4.2	50.6	52.5	4.9	6.2
2005	45.6	55.2	4.4	51.0	52.6	5.2	6.6
2006	46.3	55.6	4.6	51.9	53.3	5.5	7.0
2007	46.5	55.8	4.9	52.2	53.8	5.7	7.2
2008	47.0	56.1	5.6	52.0	54.0	5.6	7.5
2009	47.4	56.4	5.9	52.4	54.3	5.7	7.8
2010	47.9	56.7	6.6	52.5	54.3	5.8	8.0

Sources: authors' elaborations on the Bank of Italy's OR.SO database. – (1) Data include, also for fractions of a year, memberships in each kind of bank board (administrative, executive, supervisory boards and boards set up in the event of default procedures).

Table a4 – Gender diversity on bank riskiness: Altonji et al.'s strategy for omitting variables (1)

	Riskiness indicator: Bank loans on total loans				
Dependent variables	*Basic estimation*	*Balance sheet indicators*	*Board observable characteristics*	*Other bank institutional and governance controls*	*Other bank governance controls*
Dummy for "at least one woman in bank boards" $_{i,t-2}$	-0.323** [0.138]	-0.267** [0.131]	-0.244* [0.131]	-0.280** [0.129]	-0.282** [0.129]
Sizebank (log. total assets) $_{i,t-2}$		2.078*** [0.275]	1.874*** [0.281]	1.967*** [0.278]	1.982*** [0.279]
Ceffbank (operating costs/income margin) $_{i,t-2}$		-0.010** [0.005]	-0.010** [0.005]	-0.009* [0.005]	-0.009* [0.005]
Roabank (gross profit/total assets) $_{i,t-2}$		-0.533*** [0.106]	-0.519*** [0.105]	-0.508*** [0.104]	-0.509*** [0.104]
Indcap (capital & reserves/total assets) $_{i,t-2}$		0.060** [0.030]	0.053* [0.030]	0.049* [0.030]	0.049* [0.030]
Sizeboard $_{i,t-2}$			0.031* [0.016]	0.030* [0.016]	0.030* [0.016]
Age (mean) $_{i,t-2}$			0.083*** [0.018]	0.078*** [0.018]	0.078*** [0.018]
Tenure (mean) $_{i,t-2}$			0.029 [0.030]	0.022 [0.028]	0.022 [0.028]
Share of membership in family banks $_{i,t-2}$			2.315 [5.258]	2.617 [5.289]	2.231 [5.342]
Share of membership with a BA degree $_{i,t-2}$			-0.918* [0.477]	-0.834* [0.473]	-0.835* [0.474]
Cooperative bank (Banca popolare) $_{i,t-2}$				3.142*** [0.600]	3.079*** [0.590]
Mutual bank (Banca cooperativa) $_{i,t-2}$				0.000 [0.000]	0.000 [0.000]
Foreign bank (Filiale banca estera) $_{i,t-2}$				0.052 [0.427]	-0.034 [0.480]
Bank belonging to top5 banking groups $_{i,t-2}$				-0.175 [0.540]	-
Listed bank $_{i,t-2}$				-2.554*** [0.558]	-2.510*** [0.546]
Bank with dual governance regime $_{i,t-2}$					0.965 [0.870]
Bank belonging to a banking group $_{i,t-2}$					-0.134 [0.280]
Bank fixed effects	YES	YES	YES	YES	YES
Dummy year	YES	YES	YES	YES	YES
Constant	7.721*** [0.167]	-31.116*** [5.343]	-31.759*** [5.521]	-33.525*** [5.453]	-33.792*** [5.479]
Observations	10,535	10,149	10,104	10,104	10,104
R-squared	0.77	0.78	0.78	0.78	0.78

(1) Panel of banks in the period 1995-2010. Estimations with bank fixed effects. Robust standard errors (corrected for heteroskedasticity) are in brackets.* significant at 10%; ** significant at 5%; *** significant at 1%.

Table a5 – Gender diversity, bank riskiness and performance: panel OLS estimations with relevant bank and board lagged variables (1)

	Riskiness indicators			***Performance indicators***		
Dependent variables	*Riskbank index: Bad loans on total loans*	*Default rate: New bad loans on lagged performing loans*	*Impairment index: Net credit impairments on total loans*	*Profitability index (ROA): Gross profit on total assets*	*Cost-efficiency index: Operating costs on income margin*	*Capital ratio: Capital and reserves on total assets*
The presence of women on boards						
Dummy for 'at least one woman in bank boards' $_{i,t-2}$	-0.244*	0.031	-0.014	0.008	-0.278	-0.101
	[0.131]	[0.036]	[0.019]	[0.026]	[0.370]	[0.110]
Some board member characteristics						
Sizeboard $_{i,t-2}$	0.031*	0.007*	0.003	-0.009***	0.130**	0.031**
	[0.016]	[0.004]	[0.002]	[0.003]	[0.054]	[0.014]
Age (mean) $_{i,t-2}$	0.083***	0.013**	0.006**	0.001	-0.090	-0.012
	[0.018]	[0.006]	[0.003]	[0.005]	[0.095]	[0.017]
Tenure (mean) $_{i,t-2}$	0.029	0.022**	-0.002	-0.002	-0.021	-0.022
	[0.030]	[0.011]	[0.005]	[0.006]	[0.118]	[0.024]
Share of membership in family banks $_{i,t-2}$	2.315	5.051*	2.739***	-2.671***	11.804	-9.725***
	[5.258]	[3.004]	[1.017]	[0.774]	[13.290]	[2.884]
Share of membership with a BA degree $_{i,t-2}$	-0.918*	-0.454***	0.000	-0.055	-1.881	0.323
	[0.477]	[0.149]	[0.079]	[0.113]	[2.937]	[0.418]
Balance sheet variables						
Sizebank (log. total assets) $_{i,t-2}$	1.874***	0.221***	0.154***	-0.339***	-3.970***	-2.263***
	[0.281]	[0.063]	[0.027]	[0.078]	[1.304]	[0.346]
Ceffbank (operating costs/income margin) $_{i,t-2}$	-0.010**	-0.001	-0.000	-0.005***		-0.002
	[0.005]	[0.001]	[0.000]	[0.002]		[0.006]
Roabank (gross profit/total assets) $_{i,t-2}$	-0.519***	-0.026	-0.008		-2.334***	0.127
	[0.105]	[0.024]	[0.010]		[0.423]	[0.131]
Indcap (capital & reserves/total assets) $_{i,t-2}$	0.053*	0.008	0.005**	-0.014*	-0.241*	
	[0.030]	[0.006]	[0.002]	[0.008]	[0.144]	
Riskbank (bad loans/total loans) $_{i,t-2}$				-0.009**	0.190***	0.062***
				[0.004]	[0.068]	[0.021]
Bank and year FE						
Bank fixed effects	YES	YES	YES	YES	YES	YES
Dummy year	YES	YES	YES	YES	YES	YES
Constant	-31.759***	-2.787**	-2.171***	8.416***	147.947***	52.700***
	[5.521]	[1.251]	[0.547]	[1.578]	[26.556]	[6.499]
Observations	10,104	9,557	10,113	9,822	9,822	9,903
R-squared	0.78	0.52	0.53	0.47	0.55	0.74

(1) Panel of banks in the period 1995-2010. Estimations with bank fixed effects. Robust standard errors (corrected for heteroskedasticity) are in brackets.* significant at 10%; ** significant at 5%; *** significant at 1%.

Table a6 – Correlation of board characteristics and 'outsider' members (1)

	Share of outsider top members	Dummy for female presence on boards	Age	Tenure	Family affiliation	BA degree	Sizeboard
Share of outsider top members (*with less than 1 year tenure in the same bank*)	1						
Dummy for female presence on boards	-0.0234	1					
Age	-0.1615	-0.0670	1				
Tenure	-0.4357	0.0860	0.2623	1			
Family affiliation	-0.0180	0.0188	0.0704	0.0196	1		
BA degree	0.0192	-0.0063	0.3568	-0.1076	0.0917	1	
Sizeboard	0.0304	0.1934	0.4071	-0.0230	-0.0166	0.2771	1

(1) Correlation among variables in the panel of Italian banks during the period 1995-2010.

Table a7 – Effects of gender diversity on bank riskiness and performance: IV panel estimation controlling for bank balance sheet characteristics (1)

	Riskiness indicators			***Performance indicators***		
Dependent variables	*Riskbank index: Bad loans on total loans*	*Default rate: New bad loans on lagged performing loans*	*Impairment index: Net credit impairments on total loans*	*Profitability index (ROA): Gross profit on total assets*	*Cost-efficiency index: Operating costs on income margin*	*Capital ratio: Capital and reserves on total assets*
Dummy for 'at least one woman in bank boards' $_{i,t-2}$	-1.299	-1.630***	-0.474*	1.505***	-4.766	-0.338
	[1.628]	[0.531]	[0.255]	[0.397]	[5.878]	[1.318]
Sizebank (log. total assets) $_{i,t-2}$	2.069***	0.272***	0.169***	-0.387***	-3.678***	-2.216***
	[0.160]	[0.053]	[0.022]	[0.042]	[0.616]	[0.122]
Ceffbank (operating costs/income margin) $_{i,t-2}$	-0.010***	-0.001	-0.000	-0.005***		-0.001
	[0.003]	[0.001]	[0.000]	[0.001]		[0.003]
Roabank (gross profit/total assets) $_{i,t-2}$	-0.546***	-0.057***	-0.015*		-2.417***	0.114**
	[0.063]	[0.022]	[0.008]		[0.206]	[0.053]
Indcap (capital & reserves/total assets) $_{i,t-2}$	0.058***	0.013***	0.006***	-0.015***	-0.228***	
	[0.014]	[0.005]	[0.002]	[0.004]	[0.059]	
Riskbank (bad loans/total loans) $_{i,t-2}$				-0.009***	0.187***	0.062***
				[0.003]	[0.040]	[0.009]
Bank fixed effects	YES	YES	YES	YES	YES	YES
Dummy year	YES	YES	YES	YES	YES	YES
Observations	10,036	9,467	10,032	9,758	9,759	9,841
Number of banks	1,009	985	1,009	965	966	979
			First stage			
Share outsider members $_{i,t-2}$	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Angrist-Pischke F test - 1st stage	48.71***	45.90***	42.96***	49.38***	49.07***	51.63***

(1) Panel of banks in the period 1995-2010. 2SLS estimations with bank fixed effects. Standard errors are in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table a8 – Effects of gender diversity on bank riskiness and performance: IV panel estimation controlling for bank balance sheet characteristics and over identification strategy (1)

	Riskiness indicators			***Performance indicators***		
Dependent variables	*Riskbank index: Bad loans on total loans*	*Default rate: New bad loans on lagged performing loans*	*Impairment index: Net credit impairments on total loans*	*Profitability index (ROA): Gross profit on total assets*	*Cost-efficiency index: Operating costs on income margin*	*Capital ratio: Capital and reserves on total assets*
Dummy for 'at least one woman in bank boards' $_{i,t-2}$	-4.729***	-1.358***	-0.419***	0.381**	1.967	0.593
	[0.960]	[0.299]	[0.134]	[0.191]	[3.293]	[0.762]
Sizebank (log. total assets) $_{i,t-2}$	2.071***	0.270***	0.169***	-0.369***	-3.755***	-2.221***
	[0.171]	[0.051]	[0.022]	[0.035]	[0.610]	[0.122]
Ceffbank (operating costs/income margin) $_{i,t-2}$	-0.010***	-0.001	-0.000	-0.005***		-0.001
	[0.003]	[0.001]	[0.000]	[0.001]		[0.003]
Roabank (gross profit/total assets) $_{i,t-2}$	-0.605***	-0.053***	-0.014*		-2.339***	0.126**
	[0.063]	[0.020]	[0.008]		[0.197]	[0.051]
Indcap (capital & reserves/total assets) $_{i,t-2}$	0.057***	0.012***	0.006***	-0.015***	-0.227***	
	[0.015]	[0.005]	[0.002]	[0.003]	[0.059]	
Riskbank (bad loans/total loans) $_{i,t-2}$				-0.009***	0.190***	0.062***
				[0.002]	[0.040]	[0.009]
Bank fixed effects	YES	YES	YES	YES	YES	YES
Dummy year	YES	YES	YES	YES	YES	YES
Observations	10,036	9,467	10,032	9,758	9,759	9,841
Number of banks	1,009	985	1,009	965	966	979
			First stage			
Share outsider members $_{i,t-2}$	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Age (mean) $_{i,t-2}$	-0.016***	-0.015***	-0.015***	-0.015***	-0.015***	-0.015***
	[0.001]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]
Angrist-Pischke F test - 1st stage	81.40***	68.39***	77.23***	78.52***	78.24***	78.34***

(1) Panel of banks in the period 1995-2010. 2SLS estimations with bank fixed effects. Standard errors are in brackets.* significant at 10%; ** significant at 5%; *** significant at 1%.

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