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## ABSTRACT

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# Female Leadership and Gender Gap within Firms: Evidence from an Italian Board Reform\*

Over the last decade, several countries have followed the Norwegian example and introduced laws mandating gender quota for corporate board membership. The main aim of these laws is breaking the “glass ceiling” which prevents women from advancing into top corporate positions. In this paper, we evaluate the Italian law of 2011, which installed a step-wise increase in gender quota that remain effective for three consecutive board renewals of listed limited liability firms. We link firm-level information on board membership and board election dates with detailed employment and earnings records from the Social Security registers. Exploiting the staggered introduction of the gender quota regulation and variation in board renewals across firms, we evaluate the effect of the board gender composition on measures of gender diversity in top positions over a period of 4 years. While the reform substantially raised the female membership on corporate boards, we find no evidence of spillover effects on the representation of women in top executive or top earnings positions. Our results confirm the findings by Bertrand et al. (2019) who study the introduction of a gender quota for board members in Norway. Given that Italy is a much less egalitarian society than Norway, with a larger scope of establishing gender equality, our results confirm that board quota policies alone are ineffective in raising female representation in top corporate positions, at least in the short run.

**JEL Classification:** J24, J7, J78

**Keywords:** gender quota, corporate board reform, glass ceiling, female employment

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## Introduction

The low representation of women in top earnings positions has been identified as a major obstacle for closing the remaining gender pay gaps and achieving full gender equality (Fortin et al., 2017). Even though women make up almost half of the labor force they are becoming increasingly scarce the higher one moves in the earnings distribution and they are also severely under-represented in leadership positions. Mandated gender quota have been suggested as a policy measure to promote female career progression towards the top. In 2003 Norway was the first country to pass a law requiring a minimum of representation of 40% for each gender on the board of directors of publicly limited companies. Since then, Austria, Belgium, Denmark, France, Ireland, Iceland, Italy, Germany, the Netherlands and Spain have followed with similar regulations. In the Europe 2020 Strategy the European Commission proposes a law that requires a minimum of 40% female board members in listed companies across the European Union.

Gender quota laws are generally highly successful in raising the number of female members on corporate boards. By 2016 female board membership in large listed companies in the EU has increased to 23% on average, up from only 12% in 2010. The biggest changes have occurred in countries that have introduced a female quota law in recent years (European Union, 2016). However, it is much less clear whether gender quota laws also have an impact on women outside corporate boards. Matsa and Miller (2011) show that US companies with higher shares of female board members are more likely to hire female top executives. But it is not entirely clear whether this is a causal link or whether unobserved factors are driving both outcomes. In their seminal study, Bertrand et al. (2019) exploit quasi-experimental variation from the Norwegian law and find no evidence that the quota regulation benefited other women employed in companies subject to the quota, neither do they find an impact on highly qualified women.

In this paper, we evaluate short run effects of the Italian law of 2011 that introduced a gradual and temporary gender quota for boards of directors and auditors of companies listed at the Italian Stock Exchange. In contrast to Norway, which is considered to be one of the most gender equal countries in the world, Italy is characterized by a highly conservative gender culture. In the Global Gender Gap Report 2017<sup>1</sup> that benchmarks 144 countries, Norway ranks second while Italy is far behind on rank 82. It is thus interesting to see whether gender quota law is potentially more powerful in a conservative, Southern European culture.

As our data cover at most four post-reform years, we expect that the most immediate impact of the change in the board composition manifests itself in decisions concerning the gender of employees in top management position, before it starts trickling down to lower levels in the hierarchy. Therefore, our main focus is on gender diversity in top executive and high earnings positions in companies that are subject to the law. Our empirical analysis is based on detailed data that match company-level information on board composition and board elections to

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<sup>1</sup> <https://www.weforum.org/reports/the-global-gender-gap-report-2017>

administrative social security record records which allow us to compute annual information on gender workforce composition and top executive positions for the universe of Italian private sector firms over the period 2008 – 2016.

To identify the effects of the mandated change in board composition on gender disparities within companies, we pursue three different strategies. First, we exploit variation in the timing of board elections at which gender quota become binding in listed firms. Second, we compare post-election outcomes in listed firms with a matched comparison group of limited non-listed firms that are not subject to the law applying a difference-in-difference design. Third, we consider heterogeneity in the incentive for board adjustments at the company level by exploiting variation in the share of female board members in the pre-reform period.

The annual reports of the regulatory board of the Italian stock exchange which supervises compliance with the law (CONSOB 2016, 2017) as well as a recent paper by Ferrari et al. (2018) document large and significant increases in the share of female board members in listed companies. In addition, we observe that some companies even acted in anticipation of the law and increased gender diversity on their boards in 2012 board elections before the law was binding. We also show, that in the pre-reform years the share of female board members was strongly correlated with the representation of women in the workforce and in highly qualified positions which is in line with the findings by Matsa and Miller (2011).

Our estimation results point towards the following main findings. First, our results provide no evidence that the female board quota mandated by the Italian law led to an increase in female representation at the top executive level or among top earners, at least not in the short run. Second, there is some indication that listed companies promoted one of their female managers as a CEO. But these promotions did not increase the representation of women among top earners in the company. Heterogeneity analysis by the pre-reform share of female board members reveals that new appointments of female CEOs occurred only in companies that already fulfilled the female quota in 2012. Third, when we extend the focus of our analysis to the wider group of all female employees at listed companies or the implementation of family friendly policies, there is again no evidence of changes in the overall gender workforce composition due to the reform.

Our evidence for Italy thus fully confirms the findings for Norway by Bertrand et al. (2019). Even though both countries differ strongly in terms of gender attitudes and female labor market outcomes, the strict enforcement of gender ratios on boards of directors are equally ineffective in improving female career progression towards the top.

The rest of the paper is organized as follows. Section 1 presents a review of the recent literature and highlights the contribution of our paper. Section 2 explains the Italian institutional background and the Golfo-Mosca law. Section 3 describes data and presents descriptive evidence. Section 4 discusses the empirical methodology and

provides justification for our identification assumptions. Section 5 presents estimation results and Section 6 concludes.

## **1. Literature Review**

In most countries, the introduction of gender board quota policies aroused skepticism and was accompanied by vivid debates about the potential effects on firm performance and the economy as a whole. Proponents emphasized the need to increase gender diversity in top positions and the importance of providing female role models. In addition, experience with female board members should correct negative perceptions about women in leadership positions and reduce statistical discrimination. Opponents were worried that the legal restriction of the company's optimal choices of board members and an insufficient supply of qualified female candidates for board positions might harm business outcomes. While the different positions were widely discussed the empirical evidence is surprisingly inconclusive.

The corporate governance literature provides credible evidence that managers' personal traits influence corporate decisions (Malmendier et al. 2011, Bertrand and Schoar (2003)). However, it is less clear whether gender diversity among executives matters directly. At the end of the fierce selection process women reaching top executive positions have vastly different characteristics and preferences than women in the average population and are more similar to men in the same positions (Adams and Funk, 2012). Furthermore, it is unclear whether females in higher ranks of the hierarchy actively promote other women's careers (Staines, Tavis, & Jayarante, 1974). Kunze and Miller (2017) find evidence for positive spillovers of females across ranks in large Norwegian companies. But Bagues et al. (2017) find evidence for the opposite behavior. They document that female evaluators are less favorable toward female candidates than toward males, such that additional female evaluators effectively worsen the chances of female candidates.

Multiple empirical studies document a positive relationship between female leadership and various female labor market outcomes at the firm level, among them female employment, gender wage gaps, retention rates after economic shocks, or the use of flexible employment contracts such as part-time work (Flabbi et al., 2018; Tate and Yang, 2015; Cardoso and Winter-Ebmer, 2010; Gagliarducci and Paserman, 2015; Matsa & Miller, 2014; Lucifora and Vigani, 2016; Devicienti et al., 2018). These results are either based on cross-sectional evidence or on models with time invariant firm fixed effects that do not necessarily have a straight forward causal interpretation.

Another strand of the literature focuses on the impacts of gender diversity on corporate boards on firm outcomes. In a sample of US firms Adams and Ferreira (2009) find that female directors behave differently than males, they have higher attendance at board meetings and gender-diverse boards spend more effort on monitoring.

However, the relationship between board diversity and firm performance is ambiguous and depends on the strength of governance.

Smith (2018) and Ferreira (2015) provide comprehensive surveys of the literature studying the relationship between board diversity and firm performance. As Norway was the first country to enforce a mandatory gender quota policy a decade ago, the majority of studies focus on this reform. But the evidence remains surprisingly inconclusive. Early studies by Ahern and Dittmar (2012) and Matsa and Miller (2013) find rather negative short-term effects on firm value and Tobin's Q, labor costs and short run profits, while more recent studies draw a more nuanced picture. Evidence from other countries shows a similarly vague picture. Comi et al. (2016) examine the effects of mandated gender quotas on firm performance in four EU countries: Belgium, France, Italy and Spain and report mixed results. Flabbi et al. (2017) document that companies with female board members in Latin America and the Caribbean have a higher probability to appoint female executives. Ferrari et al. (2018) study the short run effects of the Italian reform and find positive responses to board renewals in stock market values. Overall, it seems that the success of mandated board quotas depends on the institutional and legal framework in the country as well as the governance structure within companies, which poses serious challenges for the design of efficient policies.

While the question how board quota mandates affect firm performance has received a lot of attention in empirical research, the effects on gender discrimination and female labor market outcomes have not been studied as extensively (see Matsa and Miller, 2011 for the US; and Bertrand et al., 2019 for Norway). Our paper contributes evidence from Italy to the question whether smashing the glass ceiling at the board level can reduce gender discrimination at lower levels in the company.

## **2. The Italian Gender Quota Law and Board Composition**

Following the example of other countries, Italy introduced a gender quota for the members of boards of directors in companies listed with the Italian stock exchange. The so-called Golfo-Mosca<sup>2</sup> law was passed in parliament in June 2011 and went into effect on August 12, 2012. But unlike in other countries, the Italian law imposes a time limited measure that is gradually introduced. It aims at supporting a cultural renovation and removal of barriers that limit the access of women to leading positions.

In Italy, each listed firm appoints the board of directors via elections that are typically held every three years in the period from March to June. The Golfo-Mosca law requests a minimum of 1/5 of board seats for each gender with the first board appointment following August 2012, and a minimum of 1/3 starting with the second

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<sup>2</sup> The law 120/2011 is named after Golfo and Mosca, who were the two first members of parliament, who signed it.

appointment.<sup>3</sup> The quota regulation mandated by the law expires with the third term of board appointments. In contrast to the widely studied Norwegian law, which was passed in 2003 but not strictly enforced before 2008, the timing in the Italian case is sharper, which is an advantage for identification of the reform effects.

The regulatory board of the Italian stock exchange, CONSOB, is in charge of monitoring and supervising compliance with the law.<sup>4</sup> In case of noncompliance, CONSOB first issues warnings with 60 day deadlines. If the initial deadlines expire, administrative penalties between €10.000 and €100.000 can be administered and the company is given another three months to comply with the regulation. Finally, if non-compliance persists, the elected board will lose legitimacy.

In the annual report, CONSOB documents female representation on corporate boards of Italian listed companies (CONSOB 2016, 2017). Figure 1, based on CONSOB data shows the development of the share of females among board members in Italian listed firms over time. In 2008 the average company started out with a very low female board share of 5.9 percent which was rising slowly over the subsequent years. But from 2012 onwards, we see a strong increase in the female shares to levels which are in line with the introduction of the quota regulation that applied to additional cohorts of companies holding board elections over the years. The gender quota of 20 percent stipulated in the first round of board appointments was already surpassed in 2014 and in June 2017 the overall share of female board members was about one third, which implies that some boards appointed more female members than required by the law. Table 1 further confirms the high compliance with the law; while in 2008 only 43% of companies had at least one female board member, male-only boards were virtually eliminated by 2015 with the first round of board appointments (see column (4)). The average board of directors has 10 members and the reform increased the number of positions held by females from 170 in 2008 to 758 in 2017. CONSOB further reports that the Golfo-Mosca law increased board diversity along other dimensions. With the appointments of more female directors, the average age of board members has declined, board members have on average higher educational levels, and they include more non-Italians and fewer family members.

It is not uncommon for directors to hold seats on multiple boards, which might lead to concerns that a select group of few women hold all the female board seats. According to CONSOB (2017) the average number of seats held by a female director is slightly higher than that of a male director. Between 2013 and 2017 number of female board seats has increased by 80% and the number of individual women holding board seats has increased by 51%, which implies that more women are taking a second seat. Conversely male board seats have declined by 23% but the number of individual men who are on boards declined only by 20% as some of them lost a second

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<sup>3</sup> The decimals arising from application of one-fifth and one-third are rounded up the nearest integer.

<sup>4</sup> A company must communicate their board composition within 15 days of renewal and/or substitution of members. The administrative, management and supervisory bodies must communicate possible non-compliance with gender quota.



seat.<sup>5</sup> Overall, the changes in board composition along with the swift compliance with the gender quota suggest that the male dominance on boards of directors prior to the law was not driven by a shortage in the supply of women qualified for director positions (Ferrari et. al., 2018).

### 3. Data and Descriptive Analysis

We construct our dataset by linking information about boards of directors and board renewal dates of companies listed with the Italian stock exchange with longitudinal administrative firm-worker records provided by Italian Social Security Institute (INPS).<sup>6</sup>

We start with the names of 241 companies listed with the Italian stock exchange in 2013, who are subject to the Golfo-Mosca law according to the CONSOB website. From this website we also downloaded the names of each company's board members. We identify the gender of board members from their first names.<sup>7</sup> In addition, we manually collected the election date of the board of directors from each company's website. We further restrict the sample to companies listed in the stock market 2013, who entered in the listed market before the reform and remained listed until December 2016. This sample of firms continuously listed between 2012 and 2016 includes 200 firms. One concern is that with the introduction of the Golfo-Mosca law, some companies might delist from the stock exchange in order to avoid the legal requirement. But according to historical data directly available at the official website of the Borsa Italiana (Italian Stock Market), Italy didn't register a peak in the rate of delistings after the announcement of the Golfo Mosca law<sup>8</sup> (Borsa Italiana, 2018).

In the next step, company names are merged to the administrative records from INPS archives, which cover the entire population of dependent workers' job spells in the private non- agricultural sector of the Italian economy and include detailed information on about 18 million workers and 1.5 million firms per year. The match rate of this merge is 99.6%. From the INPS data, we construct yearly variables with firm-level information on workforce characteristics and executives from 2008 to 2016. In our empirical analysis, we focus on a balanced panel of companies who are continuously observed in INPS (i.e. employing a positive number of workers each year) over the full period 2008-2016. This sample includes 188 listed companies.

From the information on the universe of workers employed in each company, we derive annual workforce characteristics capturing the distribution of workers by gender and occupation and the within firm wage distribution.<sup>9</sup> Furthermore, by following the inflow and outflow of workers into a company over the year, we

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<sup>5</sup> For female interlocking on corporate boards of Italian listed companies see CONSOB (2017), Table 2.21.

<sup>6</sup> Data access is available through VisitINPS program <https://www.inps.it/nuovoportaleinps/default.aspx?itemDir=47212>

<sup>7</sup> In order to identify the few ambiguous cases, we checked on line (i.e. website like linkedin)

<sup>8</sup> [https://www.borsaitaliana.it/borsaitaliana/statistiche/mediaitaliano/statistiche/mercatoprimario/2018/revoche.en\\_pdf.htm](https://www.borsaitaliana.it/borsaitaliana/statistiche/mediaitaliano/statistiche/mercatoprimario/2018/revoche.en_pdf.htm)

<sup>9</sup> For the construction of firm-level variables, we exclude workers younger than 15 and older than 64 and workers who worked less than eight weeks in a given year.

compute the number of hires and layoffs by gender and year. In addition, the INPS data records managers as a separate occupational category, which we exploit to construct information on executives. We use the following variables capturing gender diversity in leadership positions: an indicator variable equal to one if one of the managers is female, the share of workers who are female managers, and an indicator equal to one if the CEO is female. In the definition of the CEO we follow Flabbi et al. (2018) who identify the CEO as the manager with the highest wage in a given firm-year. We also consider the representation of females in the upper part of the firm-specific wage distribution and compute the share of female workers who have wage earnings in the top quartile and the top decile of the distribution, respectively.

Since the law affects only companies which are listed with the stock exchange, we can construct a comparison group of no-listed firms. As INPS data provide information about the legal form of the companies, we select the comparison from the sample of limited companies who employ at least one manager and have continuous INPS records from 2008 to 2016.<sup>10</sup> Descriptive statistics for the samples of listed and limited companies in 2012 are shown in Table 2 columns (1) and (2). The two groups of companies differ markedly in terms of the firm size distribution and by the occupational distribution. Listed firms having a stronger focus on more highly qualified white collar workers and managers than the average limited company. Accordingly, average wage levels are also significantly higher among listed firms. There is also a gap in female employment between listed firms, who employ 40% female workers on average and limited firms with an average female workforce of 32%. Female representation in executive and high earnings positions is low in all firms. But listed firms are significantly more likely to employ at least one female manager.

To reduce differences in observed pre-reform characteristic between the group of listed firms and the comparison group we apply a matching procedure. In particular, we estimate a propensity score for the probability that the firm is subject to the law based on observed workforce characteristics in 2008 – 2012 along with a detailed set of regional (42 provinces) and industry (46 industry codes at two digit level according to ATECO07) indicators. Figure A1 in the Online Appendix shows the distribution of predicted propensity scores for the samples of listed companies and limited non-listed companies in Table 2 columns (1) and (2). We select the matched comparison group of non-listed companies via nearest neighbor matching using a Mahalanobis matching metric based on several key variables.<sup>11</sup> In order to improve the quality of the match, we drop observations from either group of companies if their number of employees is in the top or the bottom 1 percentiles of the annual distribution in any year from 2008 to 2012. This reduces the number of companies in the balanced panel to 167 listed companies and 149 matched control companies. The t-tests for the mean difference between listed and matched control firms of almost all variables included in the matching procedure are not statistically different from zero (see Table A1 in the Online Appendix).

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<sup>10</sup> Over the period of observation there are 23,747 limited firms in the data and 7770 limited firms with at least one manager.

<sup>11</sup> The list of variables included in the matching metric and in the propensity score estimation can be found in the Appendix.

Table 2, columns (3) and (4), reports summary statistics of key variables in the pre-reform year 2012 for the matched samples which confirm that the main differences between listed and matched non-listed firms have disappeared. The average firm employs about 630 workers of which about 40% are female. The average gross earnings of full-time workers are 1000 Euro per month and about 7% of workers are employed part-time, most of them are female. About 20% of the workforce are blue-collar workers and 70% are white collar. About 7% of workers in listed firms are managers. About one quarter of employees in the pool of managers are female. While about 70% of the listed and matched limited companies have at least one female manager, only 5% have a female CEO.<sup>12</sup> Women are also strongly underrepresented in the top of the firm-specific wage distribution. About 20% of workers in the top quartile of the distribution are female and only ten in 100 workers with earnings in the top decile of the firm-specific wage distribution is female.<sup>13</sup> These statistics imply that in 2012 Italian listed companies were far away from gender equality in top executive positions and in top earnings positions.

The panels in Figure 2 compare the evolution of our gender diversity measures in the matched sample of listed and non-listed firms before and after the introduction of the Golfo-Mosca law in 2012. As shown in the graphs, female representation in leadership positions mostly follows rising trends over time in both groups of companies, but it remains very low over the whole period. The share of firms with at least one female manager in Panel A has risen by about 5 percentage points from 70% in 2008 to 75% in 2016 among listed firms and from 57% to 62% in limited non-listed firms. The percentage of listed firms with a female CEO, Panel C, increased from about 6% in 2008 to 8% in 2016, while there was no corresponding increase in the share of firms with a female CEO among non-listed firms. We also see that female representation has increased in the top part of the wage distribution, Panels D and E. But as it started from very low levels, the increase over time did not achieve much in terms of gender equality. Perhaps most importantly, the figures do not show major changes in the gaps between the listed and non-listed firms from 2012 onward, which would be indicative of the effect of the board gender quota on diversity outcomes.

To confirm the visual impression from the figures, we estimate for each outcome measure  $Y_{it}$  a linear regression model with a full set of firm dummies  $\alpha_i$ , year dummies  $\gamma_t$ , and a set of year dummies interacted with an indicator variable  $L_i$  equal to one for listed firms as denoted in the following equation

$$Y_{it} = \sum_{k=-4, k \neq 0}^4 \delta_k L_i I(t = 2012 + k) + \gamma_t + \alpha_i + \epsilon_{it} \quad (1)$$

The model parameters  $\delta_k$  measure the difference between listed and non-listed firms over time. We report parameter estimates in Online Appendix Table A2 and plot  $\hat{\delta}_k / \bar{Y}_{2012}$ , the coefficient estimate relative to the

<sup>12</sup> Flabbi et al. (2018) study a sample of Italian manufacturing companies in the 1990's and report lower shares of female workers (26%), female executives (3%) and female CEO's (2%). In their sample only 20% of firms have at least one female executive in 1997.

<sup>13</sup> Table 2 reports the mean of the share of workers who are female and have earnings in the top quartile or decile. To get the share of female workers in the top quartile or decile we multiply the means by 4 and 10, respectively.

mean value of Y among listed firms in 2012 for selected variables in Figure 3. The results confirm that differences between listed firms and matched control firms are small and statistically insignificant prior to 2012 which implies that our matched control sample is a valid comparison group for the listed firms in the pre-reform period. After 2012, we do not see an increase in the outcome gap between listed and non-listed firms which could be attributed to the rising share of female board members in Figure 1. For most outcomes the change between 2012 and 2016 is less than 10% and none of them is statistically significant, except the share of part-time workers in 2016. In Figure 3, panel B we see that changes in the share of firms with a female CEO are particularly noisy. This is due to the low probability of observing a female CEO and the relatively small sample size. In 2012 only 8 listed firms have a female CEO. This implies that if one additional firm hires a female CEO in the next year this already corresponds to a change by 12%. In the next section, we exploit the exact timing of the quota regulation at the firm level to estimate the magnitude of the reform effects.

#### **4. Empirical Strategy**

The Golfo-Mosca law links the mandated gender quota to board elections which are typically held every three years. Election years vary across companies and they are arguably exogenous with respect to the introduction of the reform. Thus, the law creates variation in the timing when the quota rule becomes binding at the firm level. In 2016, the last year of our data, all firms should have completed the first round of board appointments at which the mandated minimum share of each gender of 20 percent on the board of directors applies.<sup>14</sup> Therefore our estimates can be interpreted as reflecting the short-run effects of the first step of the Golfo-Mosca reform.

Our first empirical strategy combines three different types of variation for identification of the effect of female board representation on gender diversity within the company. First, we exploit the variation in the timing of the board election among the set of listed firms. Second, we include the matched comparison companies who are unaffected by the reform and perform a difference-in-difference analysis. Our third strategy additionally considers heterogeneity in the incentive for board adjustments generated by the reform at the company level by exploiting variation in the share of female board members in the pre-reform period.

Table 3 shows descriptive statistics by the three different cohorts of companies with the first board renewal in 2013, 2014, and 2015, respectively. Roughly on third of our sample of matched listed companies have scheduled board elections in each of the three years. Companies with elections in 2014 tend to be slightly larger, employ more blue-collar workers and less females and are also less likely to have a female manager than those in the other two board election cohorts. But due to the small sample sizes the differences are mostly insignificant, which confirms our assumption that the board election years are as good as randomly assigned. However, if we

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<sup>14</sup> Only the group of firms who had their first board elections after the implementation of the law in 2013 have reached the second step of the gender quota by 2016 and are required to reach a female share of one third of their board members.

look at the shares of female directors, it becomes apparent that anticipation of the Golfo-Mosca law already influenced board elections before it became binding. The share of female board members who are in office in 2012 increases over election cohorts. Companies with the most recently elected boards, i.e. those in election cohort 2015, already have an average share of 13.6% of female directors in 2012, while companies with scheduled renewals in 2013 on average only have 8.6% female directors in 2012.<sup>15</sup> In the pre-reform year less than a fifth of companies in the 2013 and 2014 election cohorts fulfill the 20% female board quota, but about one third of the companies in the 2015 election cohort do. These companies will be defined as “low incentive” in the next section. The anticipation pattern also persists after the first board appointment following the reform. While firms in the 2013 election cohort employ 25% female directors after the first board renewal, firms in the 2015 cohort employ 29% and are thus closer to the final quota threshold than to the threshold set by first reform step.

Our first identification strategy exploiting variation in the timing of board elections estimates of the following model for the set of listed firms:

$$Y_{it} = \beta_1 D_{it} + \beta_2 X_{it} + \gamma_t + \alpha_i + \epsilon_{it} \quad (2)$$

where  $Y_{it}$  is a variable representing one of our gender diversity measures for firm  $i$  in year  $t$ .  $D_{it}$  is a dummy variable that is equal to zero in the years prior to firm  $i$ 's first board appointment and 1 in the appointment year and in all subsequent years.  $\beta_1$  is the main parameter of interest capturing the average change of the outcomes associated with the reform.  $\alpha_i$  is a firm fixed effect that captures any time invariant unobserved firm characteristics and  $\gamma_t$  represent a set of year dummies. The vector  $X_{it}$  represents controls for firm size and firm size squared.

The identification strategy in equation (2) compares outcomes in firms who appoint a new board subject to the gender quota early with firms who are scheduled to appoint their board later. Because boards are reappointed every three years, the time window between renewals in the first and the third cohort of firms is only 2 years. For example, we compare outcomes in year 2013 between firms that renew their boards in 2013 and firms that renew in 2014 and we compare outcomes in 2013 and 2014 between firms that renew their boards in 2013 and firms that renew in 2015. So the estimates of equation (2) only give us the immediate or very short run effects of the reform on firm outcomes.

To get at the longer-run effects, we estimate a model for listed and limited non-listed firms in the matched comparison group:

$$Y_{it} = \beta_1 L_i * D_{it} + \beta_2 X_{it} + \gamma_t + \alpha_i + \epsilon_{it} \quad (3)$$

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<sup>15</sup> Companies that held board elections in January to May 2012 are included in the sample. But we removed three firms that renewed their board the in the last months of 2012. Including these firms in the sample does not change the summary statistics of the final sample nor the econometric results.

In addition to the comparison within listed firms, this specification adds a difference-in-difference design across both groups of companies. If a change in the gender composition of the board of directors affects firm level outcomes with some delay, we should see larger estimates in the model with the full set of companies than in the model only including listed firms.

The estimation sample consists of a balanced panel of firms observed in each year from 2008 to 2016. Observations are weighted by firm size to make the analysis representative of the economy wide impact. To control for potential autocorrelation in the error term, standard errors are clustered at the firm level.

We have discussed that the average share of women on boards of directors of listed firms in Italy was extremely low before the introduction of the Golfo-Mosca law; in 2011 only 7.4% of all board members were female. Nevertheless, there was heterogeneity in board gender diversity across firms with some firms being close to the threshold already before the law was passed and others that faced a wide margin of adjustment, for example if it had appointed male-only boards before 2012. With the implementation of the Golfo-Mosca law, companies thus faced different incentives to adjust their board gender composition. Our third identification strategy exploits this heterogeneity by estimating separate reform effects for different groups of companies.<sup>16</sup> In particular, we consider three groups of companies depending on their board gender composition in 2012.<sup>17</sup> The first group of firms facing a “high incentive” to change the board composition had less than 10% female board members in 2012. This group includes 47% of the listed companies in our matched sample. The second group facing a “medium incentive” for adjustment had more than 10% but less than 20% of female board members in 2012 and it consists of 31% of listed companies. The third, “low incentive”, group consists of firms who already fulfilled the first step of the quota regulation and have 20% or more female board members in 2012. This group includes 22% of our sample.<sup>18</sup>

Table 4 shows descriptive statistics of firm characteristics in year 2012 for each group of companies. The table shows that gender diversity at the firm level is correlated with diversity on the board of directors. Low incentive firms that already fulfill the gender quota in 2012 have on average higher shares of female employees and also higher shares of women at the top of the earnings distribution. In addition, those firms have higher shares of female managers. No firm in the high incentive group has a female CEOs. This is not particularly surprising, because the CEO is typically a member of the board of directors. In addition, as remarked above, gender diversity at the board in 2012 is also correlated with the election cohort due to anticipation of the female quota policy.

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<sup>16</sup> This identification strategy resembles Bertrand et al. (2019) who instrument the contemporaneous pre-reform female board share with the pre-reform female board share interacted with year dummies.

<sup>17</sup> Currently we do not have data on the board composition in 2011, the year before the Golfo-Mosca law was passed. 2011 would be a better baseline year heterogeneity analysis, because there was less anticipation of the reform.

<sup>18</sup> About half of the companies in the low incentive group are also in the 2015 board election cohort. This means that they reappointed their boards in 2012 and these elections were probably influenced by anticipation of the Golfo-Mosca law.

To test for differences in the reform effects across groups, we estimate the empirical models in equations (2) and (3) interacting dummy variables for group membership with the reform indicator variable. In addition, we run a separate matching procedure for each group of companies to select non-listed companies which are most similar to group members in terms of observed characteristics.

#### *4.1 Identification Assumptions and Validity Checks*

Identification of the comparison of outcomes in listed and matched comparison companies relies on the assumption that in the absence of the law mandating a change in the female share of board members, all outcome variables in listed firms subject to the quota regulation would evolve in the same way as in the comparison firms. While we cannot fully test the common trend assumption, we can check whether trends in outcomes in listed and comparison firms developed in a similar way in the period before the law was introduced.

Our first validity check aims at testing for common pre-trends among listed firms who renew their boards early, and those who renew their boards for the first time in later years. In particular, we perform a set of placebo tests, where we substitute the variable  $D_t$  in equation (2) with dummy variables, which turns equal to one in the first and second year before the actual board election dates, respectively. The model specification including only listed firms, in equation (2), effectively compares outcomes in the one or two year time windows between board elections for different cohorts of listed firms. Thus bringing the placebo renewal year forward by one year should reduce the estimated coefficient, because we only compare outcomes in the year of board renewal. Bringing the placebo renewal date forward by two years only compares outcomes before any of the firms have changed their boards and should thus result in estimated coefficients of zero. Online Appendix Tables A3 and A3\_bis show estimation results of this validity check. Indeed we find zero coefficients throughout for the placebo test which shifts the board appointment date by two years.

The second validity check tests for differences in the pre-trends among listed companies and the matched sample of limited non-listed companies. As explained above, our matching strategy takes annual values of all outcome variables from 2008 to 2011 into account when estimating the propensity score. This should guarantee that both groups of firms are fairly close in the pre-reform period, which is also confirmed by tests on the propensity score shown in Online Appendix Table A1. In addition, we estimate the model in equation (1) which includes coefficients for differences in outcomes at the yearly level. Table A2 in Online Appendix shows that none of the coefficients is statistically significant in any of the pre-reform years.

These checks make us confident that the common trend assumption is valid in our application. There are further concerns about identification, which we cannot test directly, however. First, firms with later scheduled dates of board elections might respond to the Golfo-Mosca law in anticipation and already implement changes in gender diversity policies before their boards are elected. If this is the case our first estimation strategy should produce downward biased results. Second, companies might compete for highly qualified female workers who can be

promoted to top positions. If a listed firms have a higher incentive to hire these qualified women than non-listed firms, we would expect an upward bias in our results.

A further identification assumption is that companies start responding to the Golfo-Mosca law in the year of the first reappointment of their boards after 2012. We have seen in Figure 1 that the share of female board members starts rising already in 2012 and in Table 3 we have shown that some companies who reappoint their boards in 2012 are influenced by anticipation of the reform. While the model assumes that companies with board elections in 2015 only respond to the reform in 2015, anticipation might drive some of them already to respond in 2012. If this is the case, our estimates might be downward biased. We therefore re-estimate our main specifications for the sample that excludes companies with board renewals in 2015. This robustness check does not change the main findings.<sup>19</sup>

## 5. Estimation Results

A central role of a company's board of directors is to appoint and review company executives. If female directors are more supportive of female executives, we might expect that gender diversity at the board has a direct impact on the gender composition of the company's top management. We therefore test if the Golfo-Mosca law which mandated more diversity at the board level had an impact on diversity among company executives. Estimation results for different measures of executive level gender diversity are shown in Table 5. Panel A reports results for the model specification in equation (2), which focuses on listed firms only and exploits variation in the timing of the gender quota mandate, and Panel B reports results for the full comparison of listed and matched non-listed companies in equation (3).<sup>20</sup> We have multiplied the coefficient estimates by 100 and can thus interpret the parameters as percentages.

We find that the share of companies that employ at least one female manager does not change due to the reform, see column (1). Point estimates are very small and statistically insignificant. Also the share of female managers in the overall workforce does not increase significantly as shown in column (2). The point estimate indicates at most a positive increase of 0.04 percentage points (Panel A) from a mean of 1.6% in 2012. Estimates for whether the firm has a female CEO in column (3) show a positive increase by one percentage point in Panel A. Given our sample size of 167 listed firms this would imply that two additional firms appointed a female CEO at or immediately after the first post-reform board election. Panel B shows that in the longer run comparison with the matched control firms this effect becomes larger and statistically significant. Given that we see no change in the overall share of female managers, this finding suggests that a more gender diverse boards are more likely to

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<sup>19</sup> Estimation results for the reduced sample are available on request.

<sup>20</sup> Estimation results for specifications without covariates differ very little from the estimates in Table 5 and they are shown in Online Appendix Table A4.



promote one of the female managers to become the CEO. According to the estimate in Panel B, the fraction of firms who have a female CEO increases by 3 percentage points, which means it almost doubles relative to the base of 4.8% in 2012. Columns (4) and (5) in Table 5 show the impact on female representation in the upper part of the firm specific earnings distribution. Our results point to a very small and positive increase in the share of females in the top earnings quartile, which is significant only in the short run specification but not stable if we consider the matched comparison group. There is no change at all in the share of females in the top earnings decile. Thus even if firms become more likely to promote one of the company's female managers as a CEO, this is not accompanied by a substantial change in top female earnings. This result is at odds with Flabbi et al. (2018) who report that female CEO's have a positive impact on female wages in the top quartile of the female distribution in large Italian manufacturing firms.

In Table 6, we investigate whether the reform led to changes in the overall gender composition of the workforce. In particular, we study the share of females employed in the company and the female share in the inflow and outflow of workers in columns (1) – (3). We also investigate whether firms with more gender diverse boards invest more in family friendly workplace conditions proxied by the workforce shares of part-time workers and female part-time workers in columns (4) and (5). However, none of these characteristics is significantly affected by the reform. We find some (marginally) significant coefficients in Panel A in the specification exploiting short term variation in outcomes among listed firms. For example, the average share of female employees increases by 1.3 percentage points from a mean of 41%. But these effects are not robust over the longer term horizon in the comparison with matched control firms. In panel B, all estimated coefficients are very small and statistically insignificant.

We have seen in Table 3 that companies which have a relatively high share of female board members already in 2012 tend to be more diverse in terms of leadership and also in terms of overall gender workforce composition. It is thus interesting to see whether firms that are mandated a large adjustment in the number of female board members, become more similar to companies that started out with higher shares of female directors. In Table 7 we examine heterogeneity in the effects by the incentives for adjustment due to the Golfo-Mosca law. As a robustness check, Online Appendix Table A5 shows the estimates with a modified comparison group, where we match a separate comparison sample to each of the three groups of firms. The estimation results do not confirm our initial hypothesis. If anything, low incentive firms who already have relatively more women on their boards make the biggest changes in female leadership positions after the reform. Column (3) in Table 7 shows additional female CEOs are exclusively appointed in the low incentive firms, while there are no adjustments in medium and high incentive firms. The point estimates imply a 100% increase in female CEOs among low incentive firms. With respect to the increase of females in the top quartile and deciles of the earnings distribution, the effects are also most pronounced and robust in the low incentive group, but they are quantitatively less important. In addition, there is some indication of positive effects on the probability of having

a female manager and the share of female managers among medium incentive firms, but estimates are small and not robust across specifications.

This result is counter intuitive, because it is not clear why low incentive firms would change the gender composition in top positions in lock step with the timing of board elections. It is more plausible that firms who started the gender equalization process earlier moved to a differential trend with respect to the gender diversity measures and thus the common trend assumption is violated in the heterogeneity analysis. Unfortunately, our sample of listed firms is too small to perform rigorous tests for common trends in the matched subsamples. We should thus interpret the estimated effects on female CEOs with caution.

## **6. Conclusion**

Over the last decade, many European countries have followed the Norwegian example and introduced laws mandating gender quota for corporate board membership. In this paper we have evaluated an Italian reform linking firm-level information on board membership and board renewals with detailed employment and earnings information from INPS archives. As in other countries, Italian listed companies complied swiftly with the gender quota once the law was implemented. From 2011 to 2017 the number of board seats taken by women increased four-fold. We find evidence that companies appreciated the gradual introduction of the quota regulation as some of them responded in anticipation of the law and started raising their gender quotas at board elections scheduled in 2012.

Taking advantage of the staggered introduction of the gender quota and variation in board renewals across firms, we evaluate the effect of the sharp increase of female representation on boards of directors on several measures of gender gaps in the workforce. Our results provide no evidence that the female board quota mandated by the reform translated into an increase in female representation at the top executive level or among top earners, at least not in the short run. There is some indication that listed companies promoted one of their female managers as a CEO. But these promotions did not lead to a higher representation of women among top earners in the company. In addition, heterogeneity analysis by the pre-reform share of female board members reveals that new appointments of female CEOs occurred only in companies that already fulfilled the female quota in 2012. Furthermore we find no evidence of changes in the overall gender workforce composition due to the reform.

Our findings are in line with evidence for Norway by Bertrand et al. (2019). Even though Italy is a much less gender egalitarian country than Norway with lower female labor force participation, higher gender wage gaps, and lower representation of women in the top of the earnings distribution, the strict enforcement of gender ratios on boards of directors do not have a trickle-down effect that leads to changes in the overall labor market situation of women.

There are several potential explanation for the absence of effects from the Italian board quota. First, the number of high profile positions created by the reform is relatively limited. In 2017, when the law was almost fully

implemented, 758 director positions in Italy were filled by women. Compared to the overall market of highly qualified women in the country this seems to be a symbolic number which suggests that the coverage of the law should be extended to a much wider range of companies. Second, if the law affects perceptions and social norms about women in top positions, economic outcomes might respond with some delay and our analysis of short-term effects might not capture the full extent of its impact. If norms respond very slowly, it puts into question the temporary nature of the Golfo-Mosca law which is scheduled to expire after the third board election. Third, newly appointed female board members might not be in powerful positions that allow them to influence changes at the firm level. In a recent study Rebérioux and Roudaut (2016) show that newly appointed females on boards of French companies are less likely to hold key positions than their male counterparts, which weakens any potential positive effects of gender quota.

In conclusion, while a higher female representation on corporate boards is certainly desirable on the ground of equity concern, our findings do not support the idea that gender quota alone represents an effective tool to reduce gender disparities within firms, especially in a country like Italy characterized by a traditional gender culture.

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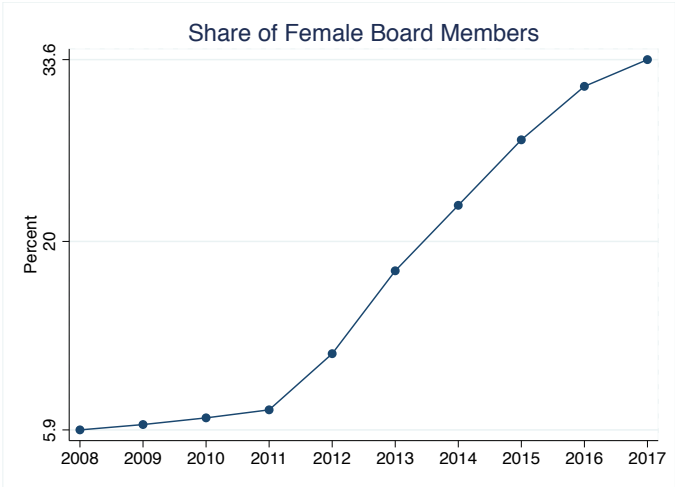
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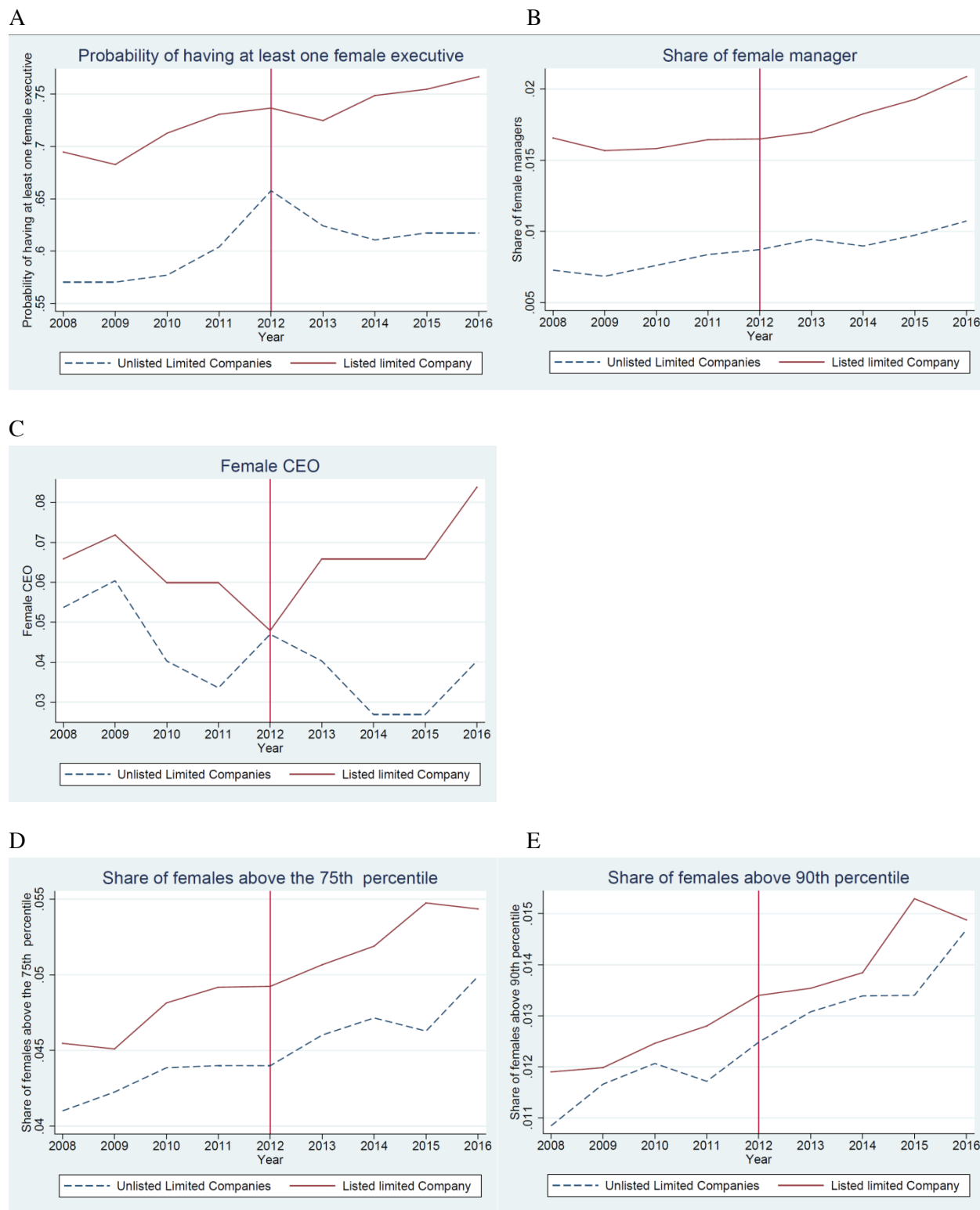
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Figure 1: Share of Female Board Members based on CONSOB data

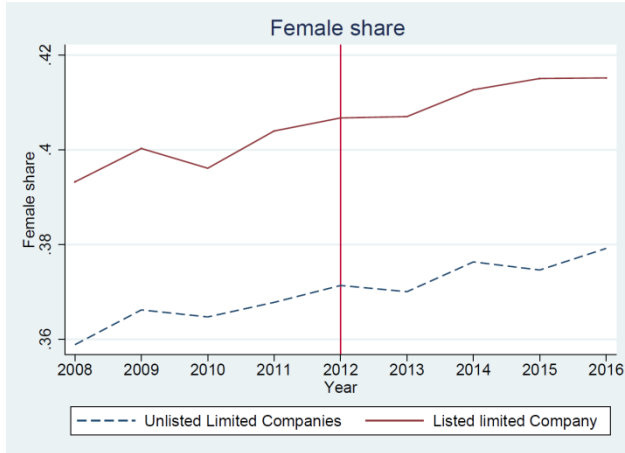


Note: Source CONSOB (2016, 2017)

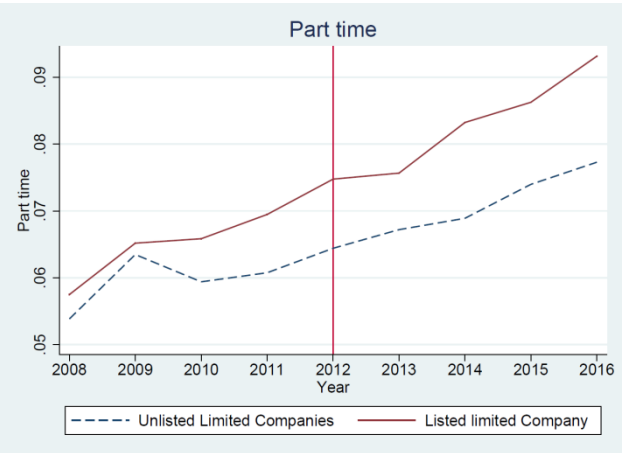
Figure 2: Listed Companies and Matched Comparison Companies over Time



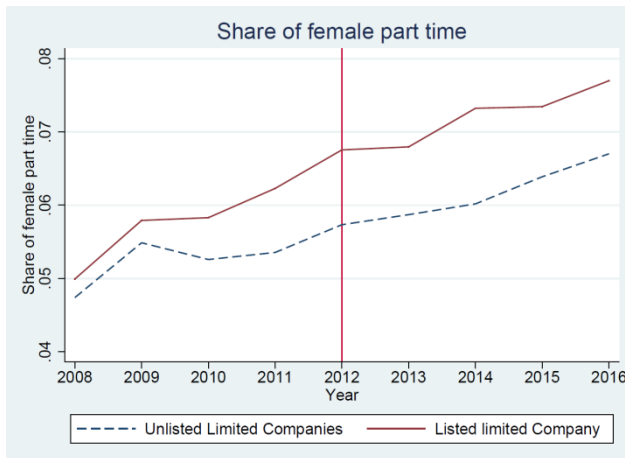
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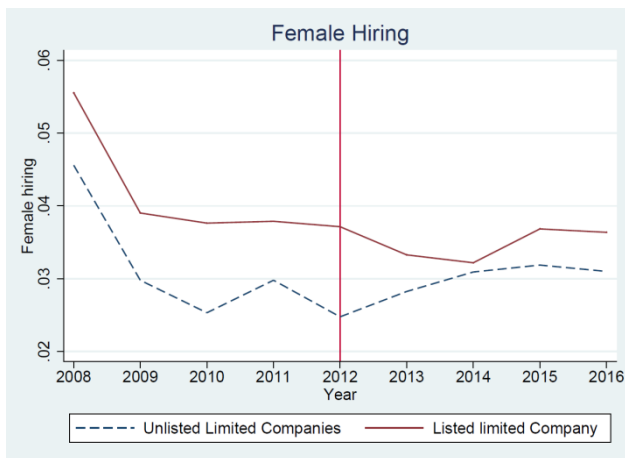
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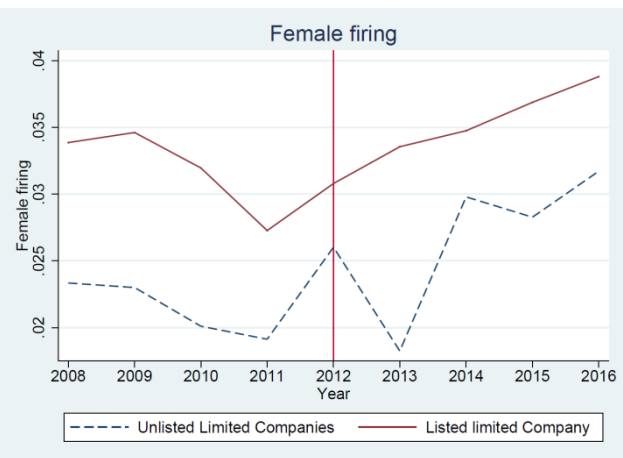
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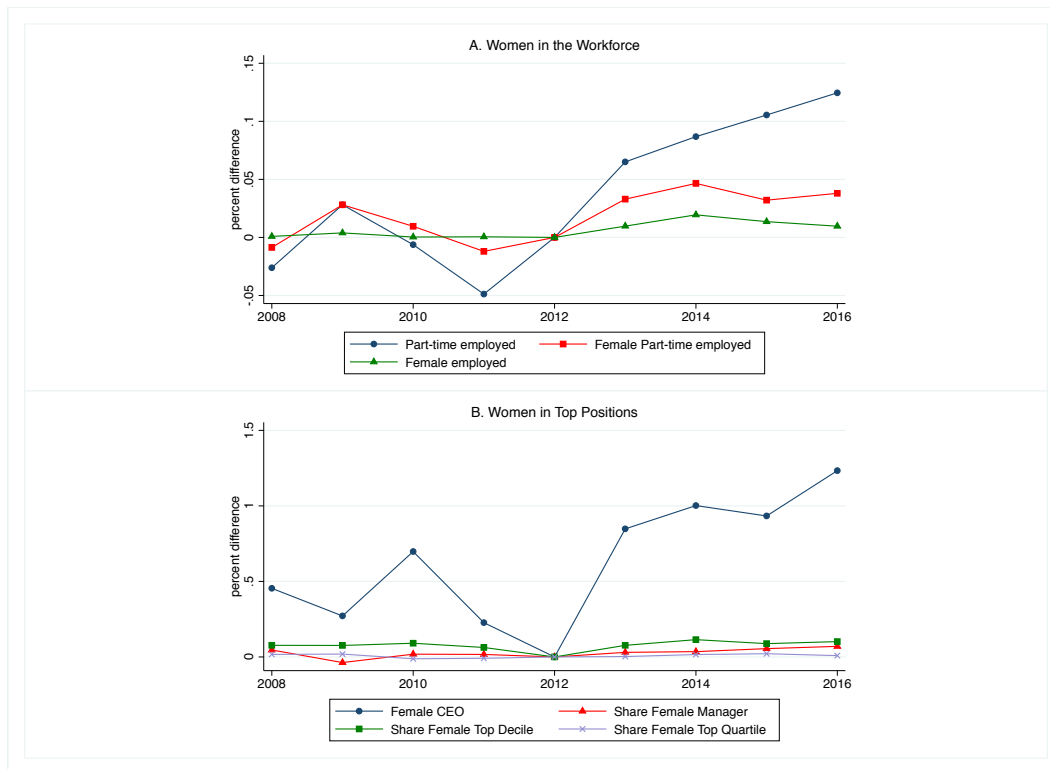
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Notes: Figures show annual mean outcome variables for Listed Companies and Matched Limited Comparison Companies before and after the implementation of the Golfo-Mosca Law in 2012.



Figure 3: Workforce characteristics in listed companies relative to reform year 2012



Note: Coefficient estimates of equation (1) relative to mean of dependent variable in the group of listed companies in 2012

Table 1: Female Representation on Corporate Boards

Year	Female Directorships		Diverse Board Companies	
	Number of female directors	Share	Number of companies with at least one female director	Share
2008	170	5,9	126	43,8
2009	173	6,3	129	46,4
2010	182	6,8	133	49,6
2011	193	7,4	135	51,7
2012	288	11,6	169	66,8
2013	421	17,8	202	83,5
2014	521	22,7	217	91,9
2015	622	27,6	230	98,3
2016	701	31,6	226	99,1
2017	758	33,6	227	99,1

Source: CONSOB data on corporate boards of Italian companies with ordinary shares listed in Borsa Italiana SPA–MTA Stock exchange, CONSOB reports 2017, 2018.

Table 2: Descriptive Statistics

	Unmatched Sample		Matched Sample	
	Listed Firms	Comparison Group	Listed Firms	Comparison Group
	(1)	(2)	(3)	(4)
Employment: Mean	1459	180	631	626
Median	240	664	294	241
Std. Dev.	(5652)	(623)	(1241)	(1375)
Share of Workers Employed as Apprentice	0,01 (0,05)	0,02 (0,05)	0,01 (0,04)	0,01 (0,02)
Blue Collar	0,17 (0,24)	0,39 (0,31)	0,18 (0,24)	0,22 (0,27)
White Collar	0,73 (0,25)	0,54 (0,28)	0,74 (0,24)	0,72 (0,26)
Manager	0,09 (0,16)	0,06 (0,13)	0,07 (0,12)	0,06 (0,08)
Average weekly wage	1076,474 (672,99)	763,05 (500,88)	1026,20 (559,11)	904,81 (375,26)
Wage gap male female	0,68 (0,20)	0,80 (0,26)	0,68 (0,18)	0,72 (0,18)
Region:				
North	73,40	75,02	74,25	79,86
Center	19,68	15,56	17,96	14,09
South	6,92	9,42	7,79	6,05
Industry:				
Services	54,26	38,10	51,50	51,68
Manufacturing	45,74	61,90	48,50	48,32
<b>Gender diversity</b>				
Share Female	0,40 (0,18)	0,32 (0,21)	0,41 (0,18)	0,37 (0,19)
Share Part Time	0,07 (0,08)	0,07 (0,10)	0,08 (0,09)	0,06 (0,08)
Share Female and Part Time	0,06 (0,08)	0,06 (0,08)	0,07 (0,08)	0,06 (0,07)
Share Female and Hired	0,04 (0,06)	0,03 (0,09)	0,04 (0,06)	0,03 (0,06)
Share Female and Fired	0,03 (0,07)	0,03 (0,08)	0,03 (0,06)	0,03 (0,05)
Female ceo	0,04 (0,20)	0,08 (0,26)	0,05 (0,21)	0,05 (0,21)
Share Female and Manager	0,02 (0,03)	0,01 (0,05)	0,02 (0,03)	0,01 (0,02)
Share Female among Managers	0,18 (0,28)	0,17 (0,37)	0,23 (0,13)	0,16 (0,16)
At least one Female Manager	0,71 (0,46)	0,28 (0,45)	0,74 (0,44)	0,66 (0,48)
Share Female and Top Quartile Earnings	0,05 (0,04)	0,04 (0,04)	0,05 (0,04)	0,04 (0,04)
Share Female and Top Decile Earnings	0,01 (0,01)	0,01 (0,02)	0,01 (0,01)	0,01 (0,01)
Number of Companies	188	6338	167	149

Notes: The sample in column (1) includes all companies continuously listed between 2012 and 2016 with matched INPS records in the years 2008 - 2016. Column (2) includes limited companies with at least one manager and continuous INPS records from 2008 - 2016. The matching procedure to select the matched samples in columns (3) and (4) is explained in Section 4. Wage gap is defined as the difference between the average weekly female and male full time equivalent wage.

Table 3: Characteristics by Year of Board Renewal

Year of Board renewal	2013	2014	2015
Share Female Directors 2012	8,6 (8,5)	11,2 (8,6)	13,6 (10,1)
Share Female Directors at Renewal	25,4	26,6	28,9
Low Incentive Company	0,17 (6,7)	0,19 (5,9)	0,32 (7,5)
Employment	557 (953)	888 (1837)	507 (852)
Share of Blue Collar	0,136 (0,230)	0,252 (0,256)	0,169 (0,237)
Share of White collar	0,762 (0,232)	0,679 (0,231)	0,755 (0,240)
Share of managers	0,088 (0,147)	0,054 (0,081)	0,067 (0,115)
Share Part Time	0,062 (0,056)	0,080 (0,107)	0,083 (0,091)
Share of female	0,426 (0,177)	0,374 (0,189)	0,414 (0,180)
Share of female part time	0,057 (0,055)	0,073 (0,091)	0,074 (0,084)
Share of female manager	0,020 (0,031)	0,006 (0,008)	0,022 (0,043)
Female CEO	0,052 (0,223)	0,043 (0,204)	0,048 (0,216)
Share Female and Top Decile	0,014 (0,015)	0,013 (0,015)	0,014 (0,013)
Number of companies	58	47	62

Notes: Low incentive companies are defined as having at least 20% female board members in 2012.

Table 4: Descriptives by Type of Reform Incentive

	Full Sample		Low Incentive		Medium Incentive		High Incentive	
	Listed (1)	Comparison (2)	Listed (3)	Comparison (4)	Listed (5)	Comparison (6)	Listed (7)	Comparison (8)
Employment: Mean	644	671	490	601	540	561	784	774
Std. Dev.	1291	1510	810	1183	897	1113	1645	1795
Median	291	218	242	268	197	208	291	226
Share of Workers Employed as								
Apprentice	0,013 (0,045)	0,007 (0,025)	0,008 (0,018)	0,008 (0,020)	0,003 (0,010)	0,002 (0,008)	0,022 (0,063)	0,010 (0,033)
Blue Collar	0,192 (0,249)	0,209 (0,261)	0,161 (0,254)	0,211 (0,269)	0,182 (0,248)	0,173 (0,244)	0,212 (0,250)	0,227 (0,263)
White Collar	0,732 (0,236)	0,723 (0,244)	0,770 (0,241)	0,731 (0,245)	0,729 (0,235)	0,753 (0,243)	0,715 (0,235)	0,708 (0,241)
Manager	0,064 (0,099)	0,061 (0,085)	0,061 (0,085)	0,050 (0,056)	0,086 (0,136)	0,073 (0,111)	0,050 (0,070)	0,055 (0,071)
Average weekly wage	988,9 (517,2)	927,4 (357,5)	923,5 (376,9)	861,3 (242,6)	1121,8 (721,6)	977,6 (407,7)	931,0 (385,0)	918,9 (348,3)
Wage gap male female	69,15 (17,590)	71,55 (17,600)	0,68 (0,165)	0,742 (0,177)	0,68 (0,182)	0,71 (0,166)	0,70 (0,178)	0,72 (0,179)
Region:								
North	75,5	79,4	66,7	83,3	83,0	75,0	74,7	81,2
Center	14,2	14,2	21,2	6,7	10,6	18,8	16,9	14,5
South	8,6	6,4	12,1	10,0	6,4	6,3	8,5	4,4
Industry:								
Services	49,7	49,7	46,9	48,4	55,3	54,0	46,5	46,4
Manufacturing	50,3	50,4	53,1	51,6	44,7	45,8	53,5	53,6
<b>Gender diversity</b>								
Share Female	0,400 (0,184)	0,363 (0,183)	0,454 (0,174)	0,378 (0,178)	0,406 (0,179)	0,376 (0,170)	0,370 (0,189)	0,340 (0,192)
Share Part Time	0,075 (0,087)	0,060 (0,071)	0,103 (0,112)	0,060 (0,048)	0,071 (0,075)	0,053 (0,050)	0,065 (0,080)	0,063 (0,088)
Share Female and Part T.	0,068 (0,078)	0,053 (0,059)	0,090 (0,107)	0,053 (0,046)	0,066 (0,067)	0,048 (0,044)	0,058 (0,068)	0,055 (0,071)
Share Female and Hired	0,037 (0,065)	0,020 (0,036)	0,033 (0,040)	0,025 (0,031)	0,041 (0,078)	0,019 (0,040)	0,036 (0,066)	0,017 (0,034)
Share Female and Fired	0,030 (0,057)	0,021 (0,045)	0,024 (0,039)	0,017 (0,023)	0,037 (0,074)	0,021 (0,041)	0,028 (0,051)	0,021 (0,053)
Female CEO	0,053 (0,225)	0,035 (0,186)	0,091 (0,292)	0,067 (0,254)	0,106 (0,312)	0,063 (0,245)	0,000 (0,000)	0,000 (0,000)
At least one Female Manager	0,748 (0,435)	0,674 (0,471)	0,788 (0,415)	0,700 (0,466)	0,745 (0,441)	0,688 (0,468)	0,732 (0,446)	0,681 (0,469)
Share Female and Manager	0,017 (0,034)	0,010 (0,021)	0,020 (0,032)	0,011 (0,017)	0,023 (0,049)	0,012 (0,025)	0,011 (0,018)	0,008 (0,018)
Share Female among Managers	0,263 (0,182)	0,168 (0,144)	0,333 (0,132)	0,216 (0,166)	0,272 (0,199)	0,164 (0,134)	0,213 (0,112)	0,149 (0,156)
Share Female and Top Quartile	0,050 (0,042)	0,041 (0,038)	0,057 (0,045)	0,049 (0,037)	0,049 (0,043)	0,044 (0,033)	0,047 (0,040)	0,035 (0,039)
Share Female and Top Decile	0,014 (0,032)	0,012 (0,028)	0,014 (0,036)	0,013 (0,027)	0,015 (0,032)	0,012 (0,022)	0,012 (0,031)	0,010 (0,030)
Number of Companies	151	141	33	30	47	48	71	69

Notes: Low Incentive means company has at least 20% female directors in 2012; medium Incentive company has between 10 and 20% female directors, high incentive company has less than 10% female directors in 2012. Wage gap is defined as the difference between the average weekly female and male full time equivalent wage. Comparison sample selected by a separate match for each treatment group.

Table 5: Estimated Reform Effects on Females in Top Positions

	At least one Female Manager (1)	Share Female and Manager (2)	CEO is Female (3)	Share Female and Top Quartile (4)	Share Female and Top Decile (5)
<b><u>A: Listed Firms</u></b>					
Reform	0,56 (2,92)	0,04 (0,04)	1,19 (2,81)	0,31 (0,13)	0,06 (0,05)
Constant	67,00 (26,40)	14,00 (2,47)	-5,01 (11,30)	-0,92 (2,86)	-0,37 (0,56)
Pre-Reform Mean Dependent Variable	73,70	1,60	4,80	4,90	1,30
R-squared	0.027	0.427	0.008	0.187	0.170
<b><u>B: Listed Firms and Matched Comparison Firms</u></b>					
Reform	3,29 (2,24)	0,00 (0,03)	2,90 (1,23)	0,15 (0,13)	0,06 (0,04)
Constant	53,70 (23,00)	9,50 (3,26)	-2,55 (10,20)	-0,23 (2,49)	-0,10 (0,56)
R-squared	0.012	0.277	0.005	0.191	0.136

Notes: Coefficient estimates multiplied by 100; standard errors (clustered by company) in parentheses; regressions include controls for firm size, firm size squared, firm fixed effects and year fixed effects. Numbers of observation: Panel A 1,503 annual observation of 167 listed firms, Panel B: 2844 annual observations of 316 listed and matched comparison firms. Share Female and Manager refers to the company level share of workers who are female and manager. Share Female and Top Quartile (Decile) refers to the share of workers who are female with earnings in the top quartile (decile) of the company specific earnings distribution.

Table 6: Estimated Reform Effects on Workforce Characteristics

	Share Female (1)	Share Female and Hired (2)	Share Female and Fired (3)	Share Part Time (4)	Share Female and Part Time (5)
<u>A: Listed Firms</u>					
Reform	1,30 (0,63)	0,28 (0,40)	0,64 (0,38)	-0,67 (0,40)	-0,58 (0,31)
Constant	24,80 (35,60)	12,30 (6,65)	4,85 (3,46)	1,50 (3,94)	0,42 (3,69)
Pre-Reform Mean Dependent Variable	40,70	3,70	3,10	7,50	6,80
R-squared	0.197	0.192	0.071	0.139	0.118
<u>B: Listed Firms and Matched Comparison Firms</u>					
Reform	0,86 (0,64)	-0,49 (0,43)	-0,11 (0,17)	0,43 (0,38)	-0,02 (0,24)
Constant	41,60 (31,00)	15,20 (6,27)	5,39 (3,00)	5,96 (4,46)	3,11 (3,65)
R-squared	0.154	0.179	0.030	0.099	0.110

Notes: Coefficient estimates multiplied by 100; standard errors (clustered by company) in parentheses; regressions include controls for firm size and firm size squared, firm fixed effects and year fixed effects. Numbers of observation: Panel A 1,503 annual observation of 167 listed firms, Panel B: 2844 annual observations on 316 listed and matched comparison firms.

Table 7: Estimated Effects by Reform Incentive

	At least one Female Manager (1)	Share Female and Manager (2)	CEO is Female (3)	Share Female and Top Quartile (4)	Share Female and Top Decile (5)
<b><u>A: Listed Firms</u></b>					
Reform Low Incentive	-2,29 (3,37)	0,00 (0,08)	7,66 (4,53)	0,59 (0,19)	0,13 (0,07)
Reform Med. Incentive	8,60 (5,60)	0,09 (0,06)	-1,37 (3,57)	0,03 (0,18)	0,05 (0,06)
Reform High Incentive	-1,55 (3,21)	0,04 (0,05)	-0,34 (3,40)	0,32 (0,14)	0,05 (0,06)
Constant	67,00 (25,70)	14,00 (2,46)	-8,90 (11,00)	-1,04 (2,80)	-0,41 (0,55)
R-squared	1,503	0.427	0.021	0.198	0.172
<b><u>B: Listed Firms and Matched Comparison Firms</u></b>					
Reform Low Incentive	0,50 (2,18)	0,05 (0,08)	9,55 (5,05)	0,44 (0,18)	0,13 (0,06)
Reform Med. Incentive	11,30 (5,80)	0,12 (0,07)	0,49 (1,84)	-0,13 (0,17)	0,05 (0,06)
Reform High Incentive	1,05 (2,00)	0,07 (0,06)	1,46 (1,11)	0,16 (0,17)	0,04 (0,06)
Constant	51,20 (22,40)	11,60 (2,66)	-3,57 (9,81)	-1,07 (2,47)	-0,41 (0,55)
R-squared	0.021	0.307	0.013	0.158	0.136

Notes: Coefficient estimates multiplied by 100; standard errors (clustered by company) in parentheses; regressions include controls for firm size and firm size squared, firm fixed effects and year fixed effects. Numbers of observation: Panel A 1,503 annual observation of 167 listed firms, Panel B: 2844 annual observations on 316 listed and matched comparison firms. Share Female and Manager refers to the company level share of workers who are female and manager. Share Female and Top Quartile (Decile) refers to the share of workers who are female with earnings in the top quantile (decile) of the company specific earnings distribution.



## Appendix

### **Estimation of the propensity score:**

We estimate a propensity score for the probability that the firm is subject to the law based on the following observed workforce characteristics in 2012 and their relative trend over the period 2008-2012: share of female manager, female CEO probability, probability to observe at least one female among managers, share of part time, share of female part time, share of females, share of female above the 90<sup>th</sup>, log of firm size, log of firmsize squared, share of permanent workers, share of apprenticeship, white collar, blue collar, and manager, log of the firm specific total wage cost, log of the firm specific total wage cost squared, share of female above the 75<sup>th</sup> and below the 90<sup>th</sup> percentile of the specific firm wage distribution, share of female above the 90<sup>th</sup> of the specific firm wage distribution, female hiring and firing rate, female hiring and firing gross rate, detailed set of regional (42 provinces available in our sample) and industry (46 industry codes at two digit available in our sample according to ATECO07) indicators.

We select the matched comparison group of non-listed companies via nearest neighbor matching using a Mahalanobis matching metric based on the following key variables: share of female managers, female CEO probability, probability to observe at least one female among managers, share of part time and relative trend, share of female part time and relative trend, share of females, share of female above the 90<sup>th</sup> percentile of the specific firm wage distribution and relative trend, share of female above the 75<sup>th</sup> and below the 90<sup>th</sup> percentile of the specific firm wage distribution and relative trend, log of firm size, log of firmsize squared, share of permanent workers, share of apprenticeship, white collar, blue collar, and manager, log of the firm specific total wage cost, female hiring rate.

Figure A1 shows the distribution of predicted propensity scores among listed companies and control companies. Table A1 shows the t-tests for the mean difference between listed and matched control group of all variables and relative trend we use as dependent variables in our regression model and all variables included in the matching procedure. The t tests for the mean difference between listed and matched control group of almost all variables included in the matching procedure are not statistically different from zero.

Figure A1. Distribution of predicted propensity scores

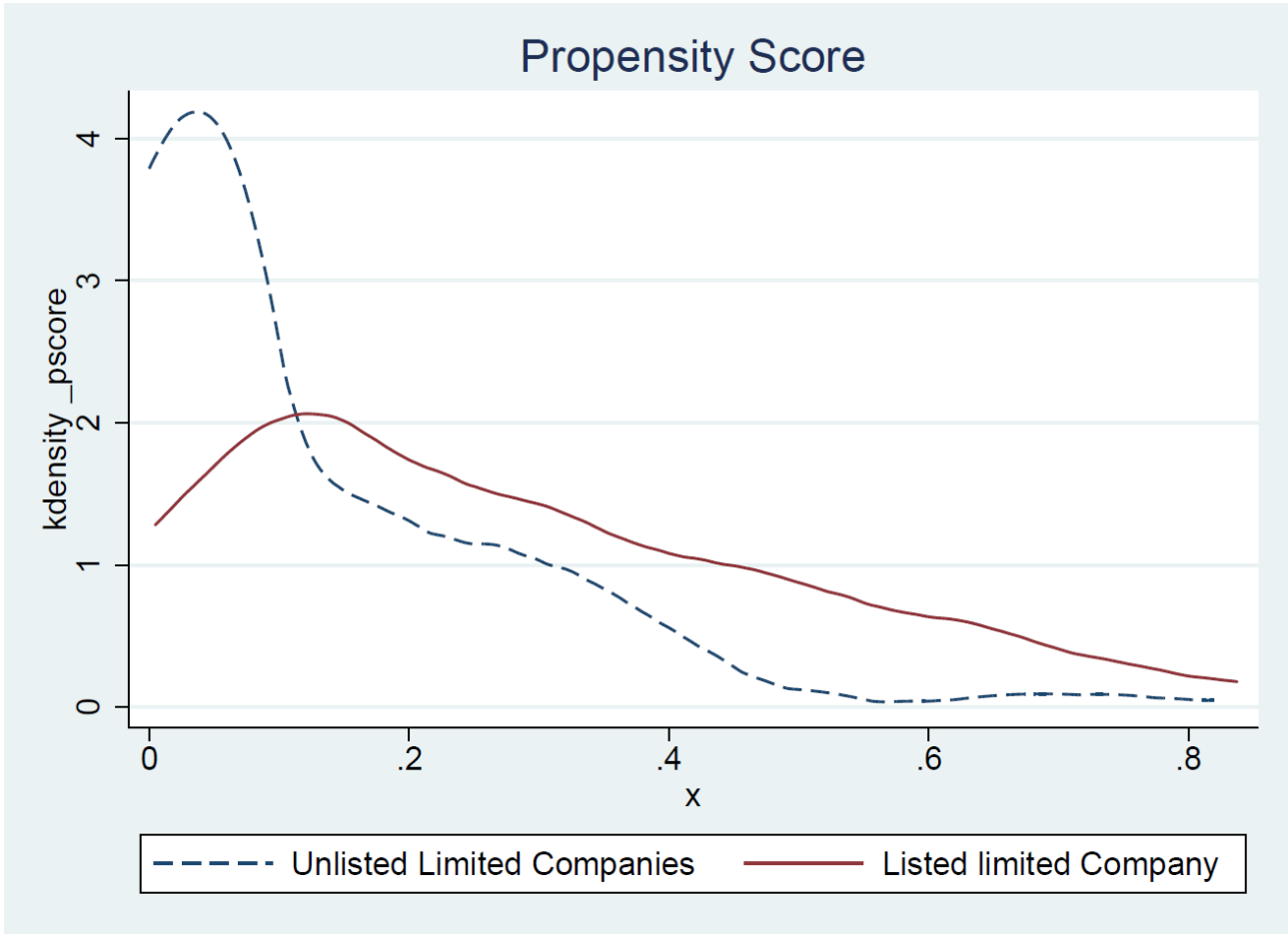


TABLE A1: t test for the mean differences between treated (listed) and control(limited) group

Variables	Treated	Control	t	p> T
<b>one female manager</b>	<b>0,7365</b>	<b>0,6577</b>	<b>1,53</b>	<b>0,128</b>
d1 one female manager	0,0060	0,0537	-1,74	0,083
d2 one female manager	-0,0120	0,0269	-0,99	0,322
d3 one female manager	0,0000	0,0067	-0,11	0,915
d4 one female manager	0,0539	-0,0067	0,55	0,58
<b>female_ceo</b>	<b>0,0479</b>	<b>0,0470</b>	<b>0,04</b>	<b>0,969</b>
d1 female_ceo	-0,0120	0,0134	-1,16	0,249
d2 female_ceo	-0,0120	0,0201	-0,97	0,331
d3 female_ceo	-0,0240	0,0067	-0,52	0,605
d4 female_ceo	-0,0539	-0,0336	-0,18	0,861
<b>share of female manager</b>	<b>0,0165</b>	<b>0,0087</b>	<b>2,49</b>	<b>0,013</b>
d1 share of female manager	0,0001	0,0004	-0,31	0,76
d2 share of female manager	-0,0006	-0,0004	-0,08	0,938
d3 share of female manager	-0,0011	-0,0004	-0,17	0,866
d4 share of female manager	-0,0005	0,0008	-0,22	0,822
<b>75 pct&lt; fem &lt; 90pct</b>	<b>0,0358</b>	<b>0,0315</b>	<b>1,26</b>	<b>0,209</b>
d1 75 pct< fem < 90pct	-0,0006	-0,0008	0,16	0,876
d2 75 pct< fem < 90pct	-0,0013	-0,0013	0,01	0,994
d3 fem>75 pct< fem < 90pct	0,0006	-0,0006	0,26	0,792
d4 75 pct< fem < 90pct	0,0055	0,0009	0,5	0,615
<b>fem&gt; 75 pct</b>	<b>0,0492</b>	<b>0,0440</b>	<b>1,13</b>	<b>0,261</b>
d1 fem> 75 pct	0,0001	0,0000	0,04	0,968
d2 fem> 75 pct	-0,0010	-0,0002	-0,37	0,715
d3 fem> 75 pct	0,0010	0,0013	-0,07	0,947
d4 fem> 75 pct	0,0064	0,0031	0,35	0,725
<b>fem&gt; 90 pct</b>	<b>0,0134</b>	<b>0,0125</b>	<b>0,59</b>	<b>0,558</b>
d1 fem> 90 pct	0,0006	0,0008	-0,25	0,801
d2 fem> 90 pct	0,0003	0,0011	-0,84	0,401
d3 fem> 90 pct	0,0004	0,0019	-0,79	0,431
d4 fem> 90 pct	0,0009	0,0022	-0,41	0,679
<b>mean female</b>	<b>0,4067</b>	<b>0,3713</b>	<b>1,7</b>	<b>0,091</b>
d1 mean female	0,0028	0,0036	-0,15	0,88
d2 mean female	-0,0051	0,0005	-0,83	0,404
d3 mean female	-0,0172	-0,0041	-1,23	0,218
d4 mean female	-0,0404	-0,0175	-1,18	0,241
<b>part time</b>	<b>0,0748</b>	<b>0,0644</b>	<b>1,13</b>	<b>0,26</b>
d1 part time	0,0053	0,0037	0,53	0,599
d2 part time	0,0017	0,0023	-0,19	0,852
d3 part time	-0,0013	-0,0031	0,25	0,802
d4 part time	-0,0113	-0,0223	0,49	0,622
<b>female part time</b>	<b>0,0676</b>	<b>0,0573</b>	<b>1,25</b>	<b>0,212</b>
d1 female part time	0,0053	0,0038	0,56	0,575
d2 female part time	0,0013	0,0028	-0,46	0,644
d3 female part time	-0,0024	-0,0004	-0,31	0,755
d4 female part time	-0,0136	-0,0134	-0,01	0,993

<b>female hiring rate</b>	<b>0,0372</b>	<b>0,0248</b>	<b>1,76</b>	<b>0,08</b>
d1 female hiring rate	-0,0007	-0,0050	0,91	0,363
d2 female hiring rate	-0,0010	-0,0095	1,07	0,286
d3 female hiring rate	-0,0026	-0,0184	1,08	0,281
d4 female hiring rate	0,0109	-0,0160	0,92	0,36
<b>female firing rate</b>	<b>0,0308</b>	<b>0,0260</b>	<b>0,75</b>	<b>0,454</b>
d1 female firing rate	0,0035	0,0069	-0,63	0,531
d2 female firing rate	0,0082	0,0079	0,04	0,971
d3 female firing rate	0,0102	0,0060	0,25	0,802
d4 female firing rate	0,0089	0,0015	0,25	0,805
<b>In employment</b>	<b>5,2796</b>	<b>5,3070</b>	<b>-0,15</b>	<b>0,882</b>
ln employment squared	30,7210	30,5900	0,07	0,946
Ln total wage cost	16,09	16,032	0,34	0,734
apprenticeship	0,0120	0,0065	1,4	0,164
white collar	0,1811	0,2201	-1,35	0,179
blue collar	0,7364	0,7176	0,68	0,497
managers	0,0705	0,0559	1,26	0,208
<b>share of permanent workers</b>	<b>0,9365</b>	<b>0,9476</b>	<b>-1,13</b>	<b>0,258</b>
d1 share of permanent workers	-0,0004	0,0034	-0,91	0,364
d2 share of permanent workers	-0,0030	0,0056	-1,25	0,212
d3 share of permanent workers	-0,0044	0,0091	-1,08	0,282
d4 share of permanent workers	-0,0115	0,0077	-0,86	0,39
North	0,7425	0,7987	-1,18	0,239
Center	0,1796	0,1409	0,93	0,352
South	0,0778	0,0604	0,61	0,545
Manufacturing	0,4850	0,4832	0,03	0,974



Table A3: Placebo test , listed sample

VARIABLES	(1) Part time	(2) Part time	(3) Mean Female	(4) Female 75=<pct<90	(5) Female pct> =75	(6) Female firing rate
Reform lag1	-0,0004 (0,0292)	-0,0012 (0,00254)	0,0187*** (0,007)	0,00316*** (0,000948)	0,00381*** (0,00114)	0,0018 (0,0024)
Constant	0,0094 (0,0391)	-0,0001 (0,0371)	0,2470 (0,353)	-0,0055 (0,0257)	-0,0090 (0,0285)	0,0268*** (0,00365)
Observations	1,503	1,503	1,503	1,503	1,503	1,503
R-squared	0.135	0.114	0.202	0.133	0.190	0.062
Number of group	167	167	167	167	167	167
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Reform lag2	0,01 (0,00524)	0,00387 (0,00358)	0,00123 (0,00387)	-0,00025 (0,00070)	-0,00078 (0,00089)	-0,00014 (0,00243)
Constant	0,117*** (0,00556)	0,0950*** (0,00357)	0,385*** (0,00592)	0,0421*** (0,000899)	0,0603*** (0,0011)	0,0288*** (0,00224)
Observations	1,503	1,503	1,503	1,503	1,503	1,503
R-squared	0.119	0.094	0.040	0.073	0.133	0.061
Number of group	167	167	167	167	167	167
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes

Note : Placebo regression for listed firm sample

Table A3\_bis : Placebo test , matched sample

CEO is Female		CEO is Female	
Reform lag1	0,0305** (0,015)	Reform lag2	0,0284 (0,0191)
Constant	0,000646 (0,0986)	Constant	-0,00534 (0,105)
Observations	2,844	Observations	2,844
R-squared	0,005	R-squared	0,005
Number of group	316	Number of group	316
Year fixed effect		Year fixed effect	Yes

Table A4: Estimates Reform Effects on Female Top Positions

	At least one Female Manager (1)	Share Female and Manager (2)	CEO is Female (3)	Share Female and Top Quartile (4)	Share Female and Top Decile (5)
<u>A: Listed Firms</u>					
Reform	0,00576 (0,0292)	0,000489 (0,0007)	0,0114 (0,0285)	0,00336*** (0,00116)	0,000637 (0,0005)
Constant	0,931*** (0,0275)	0,00586*** (0,0009)	0,0404 (0,0353)	0,0566*** (0,0014)	0,0173*** (0,0006)
R-squared	0,025	0,008	0,006	0,14	0,14
<u>B: Listed Firms and Matched Comparison Firms</u>					
Reform	0,033 (0,0223)	0,000709 (0,0006)	0,0290** (0,0123)	0,00154 (0,0014)	0,000589 (0,0005)
Constant	0,904*** (0,0082)	0,00624*** (0,0002)	0,0265*** (0,0071)	0,0556*** (0,0004)	0,0165*** (0,0002)
R-squared	0,01	0,007	0,004	0,152	0,121

Notes: Coefficient estimates multiplied by 100; standard errors (clustered by company) in parentheses; regressions include firm fixed effects and year fixed effects. Numbers of observation: Panel A 1,503 annual observation of 167 listed firms, Panel B: 2844 annual observations of 316 listed and matched comparison firms. Share Female and Manager refers to the company level share of workers who are female and manager. Share Female and Top Quartile (Decile) refers to the share of workers who are female with earnings in the top quartile (decile) of the company specific earnings distribution.

Table A5: Estimates by the Reform Incentives –Robustness check.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Share Female and Manager	CEO is Female	At least one Female Manager	Share Female and Top Quartile	Share Female and Top Decile
<u>A: Listed Firms</u>					
Reform Low Incentive	-0,001 (0,0007)	0,083 (0,052)	-0,022 (0,0385)	0,006*** (0,002)	0,001 (0,0008)
Reform Med. Incentive	0,000 (0,0004)	-0,016 (0,0392)	0,083 (0, 568)	0,000 (0,0018)	0,000 (0,0007)
Reform High Incentive	0,000 (0,0004)	-0,012 (0,0373)	-0,018 (0,0363)	0,002 (0,00137)	0,000 (0,0006)
Constant	0,108*** (0.0218)	0,014 (0.159)	0,553 (0.482)	0,039 (0.0255)	-0,006 (0.00994)
Observations	1,359	1,359	1,359	1,359	1,359
R-squared	0.253	0.023	0.046	0.200	0.158
Number of group	151	151	151	151	151
Controls	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
<u>B: Listed Firms and Matched Comparison Firms</u>					
Reform Low Incentive	-0,0004 (0,0009)	0,0965* (0,0582)	-0,0034 (0,0203)	0,00413** (0,0019)	0,0011 (0,0007)
Reform Med. Incentive	0,000758 (0,0006)	-0,00264 (0,0178)	0,1000* (0,0569)	-0,00156 (0,0017)	0,000285 (0,0006)
Reform High Incentive	0,000472 (0,0005)	0,00122 (0,0086)	-0,0028 (0,0160)	0,000624 (0,0016)	5,07E-05 (0,0006)
Constant	0,101*** (0,0178)	0,0723 (0,145)	0,4800 (0,390)	0,0152 (0,0252)	-0,0072 (0,00872)
Observations	2628	2628	2628	2628	2628
R-squared	0,2210	0,0150	0,0230	0,2130	0,1480
Number of group	292	292	292	292	292
Controls	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes

Note: Estimates with a modified comparison group, where a separate comparison sample is matched to each of the three groups of firms.