

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

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*The authors evaluate a 2011 Italian law that installed a step-wise increase in gender quota that remains effective for three consecutive board renewals of listed limited liability firms. They 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 renewal years across firms, the authors evaluate the effect of the board gender composition on measures of gender diversity in top positions over a period of four years. While the reform substantially raised the female membership on corporate boards, results show only moderate and imprecisely estimated spillover effects on the representation of women in top executive or top earnings positions.*

\* We benefitted from discussions with Tito Boeri, David Card, Pietro Garibaldi, Astrid Kunze and Josef Zweimüller. We thank seminar and conference participants at Italian Social Security Institute (INPS), Research Institute for the Evaluation of Public Policies (IRVAPP, Trento) Department of Econometrics, Statistics and Applied Economy of University of Barcelona, ESPE-Antwerpen, EEA-Cologne, EALE-Lyon, Brucchi Luchino workshop –Rome. For providing invaluable support with the data access, we thank the research division of the Social Security Institute of Italy (INPS), especially Massimo Antichi, Mariella Cozzolino, Edoardo Di Porto, and Paolo Naticchioni. We gratefully acknowledge funding and data access through the VisitINPS Scholars A programme. The usual disclaimers apply.

## 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). In the light of the strong increases in gender diversity in board membership, we ask the question: Does a higher share of women on corporate boards have an impact on career prospects of other women in the company? The literature does not provide a conclusive answer. Matsa and Miller (2011) show that US companies with higher shares of female board members are more likely to hire female top executives. For Italy, Flabbi et al. (2019) show that a higher share of female executives is related to smaller gender wage gaps at the top but larger wage gaps at the bottom of the distribution. But it is not entirely clear whether these results are due to 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. 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 positions, 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. But we also investigate whether the quota effects trickle down the firm hierarchy and affect the situation of females at lower ranks in the company.

Our empirical analysis is based on detailed data that match company-level information on board composition and board elections to 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 compare outcomes in companies that were subject to the law with other companies that were not affected by the law or were not yet subject to the board quota. In particular, we pursue three different identification strategies. First, we exploit variation in the timing of board elections at which the gender quota become binding in listed firms and compare listed companies that had to change the gender composition of their boards in the first year after the law was passed with other companies that had to make changes one or two years later. 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 and apply 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. In this strategy we compare outcomes of companies that had no female board members prior to the reform and had to make a large change to fulfill the mandated quota with companies that already had some females on their boards before the reform and thus had to make smaller changes to comply with the quota.

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 the gender quota law has different impacts in a conservative, Southern European culture. On the one hand, there is certainly more room to achieve gender equality in Italy than in Norway, which might imply that the gender quota is a more powerful tool in Italy. On the other hand, social norms and attitudes towards women in leading positions might be less flexible in a conservative society, which would mean that the gender quota finds higher resistance in Italy and is thus less effective.

## **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

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

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., 2019; Tate and Yang, 2015; Cardoso and Winter-Ebmer, 2010; Gagliarducci and Paserman, 2015; Matsa & Miller, 2014; Lucifora and Vigani, 2016; Devicienti et al., 2019). 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. (forthcoming) examine the effects of mandated gender quotas on firm performance in three EU countries: 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. 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.

Evidence for Italy is provided by Flabbi et al. (2019) who study the effects of female executives on the gender-specific wage distribution within Italian manufacturing firms during the 1980's and 90's. They report that under a female CEO, females in high wage positions gain relative to their male colleagues, while females in low wage positions tend lose relative to males. Females in leadership positions have a positive impact on firm performance especially in firms with high share of female employees. The impacts of the Golfo-Mosca law during the first years after the passage of the law have been analyzed by two studies. Using a diff-in-diff setup, Comi et al. (forthcoming) report increased firm productivity in listed companies from 2012 to 2014 relative to a matched control group of limited non-listed companies. Ferrari et al (2018) also analyze the period up to 2014 and do not find significant impacts from increased female board membership on firm performance. But they document a positive effects on stock market returns at the date of board election in companies that are mandated to adjust the female board share.

While the question how board quota mandates affect firm performance has received a lot of attention in empirical research in several countries, the effects on gender discrimination and female labor market outcomes have not been studied as extensively (see Matsa and Miller, 2011 for the US; Flabbi et al. 2019 for Italy, 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. In contrast to prior studies on the Italian reform our observation period up to 2016 covers the full first reform step where the quota mandate includes the first board renewals of all listed companies.

## **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 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 2018). Appendix Figure A1, 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. The black

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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.

<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.

line in Figure 1 shows the corresponding development based on our estimation sample, reassuringly it very closely follows the overall picture. Appendix 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 (2018) the average number of seats held by a female director is higher than that of a male director. In 2016 the average number of seats held by a female director was 1.45 and the average number of seats held by a male director was 1.32. In this year, the share of female director positions held by a woman with multiple seats was 29% and the share of male position held by a man with multiple seats was 19%. Between 2013 and 2018 the number of board seats held by a female director has increased by 92% and the number of individual women holding board seats has increased by 53%, because more women are taking a second seat. Conversely, male board seats have declined by 26% but the number of individual men on boards declined only by 17%, as some of them lost a second seat.<sup>5</sup> Overall, these numbers show that the number of women involved in boards of directors has increased significantly with the gender quota, and while females on multiple board seats play a role they can only explain a small part of the gender dynamic.

CONSOB (2018) further reports that with the increasing share of women the average educational attainment of directors has improved; by 2017 91% of female directors hold a first degree and 30% of female directors hold a postgraduate degree. While male directors are predominantly recruited from management positions, female directors more frequently have a consulting or academic background. Comi et al. (forthcoming) and Ferrari et al. (2018) also report detailed changes in characteristics of board members based on information gathered from the CVs of all board members who were active in 2004 – 2013 and in 2007 – 2014, respectively. The developments of board characteristics suggest a swift and efficient compliance with the gender quota and put in question the concern that the male dominance on boards of directors prior to the law was due to a shortage in the supply of women qualified for director positions.

### **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 from on CERVED data with longitudinal administrative firm-worker records provided by Italian Social Security Institute (INPS).<sup>6</sup>

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<sup>5</sup> For female interlocking on corporate boards of Italian listed companies see CONSOB (2018), Table 2.23. For

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

To define our estimation sample, 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. 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>7</sup> (Borsa Italiana, 2018).

In the next step, we manually collected the first board election date after 2012 from each company's website and link the company name with CERVED registers, which provides us longitudinal information on the board of directors from 2008 to 2016. In particular, we have information on the board size, the number of female and male directors, and the average age of board members.

In the third 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.

#### *Boards of Directors:*

Figure 1 shows the development of the share of female board members over time for the full estimation sample and for each renewal year cohort separately. The figure makes clear that the board elections years matter for the implementation of the gender quota. For each renewal cohort we see a sudden jump in the share of female directors in the corresponding renewal year, from average levels that are clearly below the quota to a share above 25%. In 2016 there is a second jump for the companies in renewal cohort 2013, who have to comply with the second step of the quota law and thus increase their female board share above 33%. The figure also shows some anticipatory behavior among companies in the last renewal cohort who slightly increase their share of female directors with the board election in 2012.

How do companies adjust their boards to fulfill the gender quota? If there is a shortage in the supply of suitable female directors, companies might reduce the size of their boards to comply with the law. The left panel in Figure 2 shows that this is not the case. The average number of board members is close to 10 throughout our observation period and there is a clear indication that outgoing male board members are replaced by incoming female members as the lines plotting average numbers of directors by gender show. Unfortunately, we do not have access to the complete set names of individual directors in CERVED and thus we cannot observe multiple board memberships. We also observe a declining

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<sup>7</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)

trend in the average age of board members with a reduction of more than 8 years between 2008 and 2016 as shown in the right panel in Figure 2. While this trend might have slightly accelerated after 2012, it was already ongoing before the implementation of the gender quota reform.

#### *Workforce Characteristics:*

From the information on the universe of workers employed in each company in the INPS records, we derive annual workforce characteristics capturing the distribution of workers by gender and occupation and the within firm wage distribution.<sup>8</sup> Furthermore, by following the inflow and outflow of workers into a company over the year, we 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 managers who are female, and an indicator equal to one if the CEO is female. In the definition of the CEO we follow Flabbi et al. (2019) 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 among wage earners in the top quartile and the top decile of the distribution, respectively.

#### *Comparison Group:*

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 group from the sample of limited companies who employ at least one manager and have continuous INPS records from 2008 to 2016.<sup>9</sup> Descriptive statistics for the samples of listed and limited companies in 2012 are shown in Table 1 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 in 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. Appendix Figure A2 shows the distribution of predicted propensity scores for the samples of listed companies and limited non-listed companies in Table 1 columns (1) and (2). We select the matched treatment and comparison group in a set of listed and potential control firms within the common support region defined by the estimated propensity score. Then we use a

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<sup>8</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.

<sup>9</sup> Over the period of observation there are 23,747 limited firms in the data and 7770 limited firms with at least one manager.



nearest neighbor matching algorithm based on a Mahalanobis distance metric on several key variables to select one comparison unit for each treated company from the pool of potential controls with replacement.<sup>10</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. The matching procedure reduces the number of companies in the balanced panel to 153 listed companies and 145 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 Appendix Table A2).

Table 1, 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 700 workers of which about 40% are female. The average gross earnings of full-time workers are 900 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 and 9% of workers in listed firms are managers. About 14% of managers are female. While 76% of listed and 70% matched limited companies have at least one female manager, only 5% have a female CEO.<sup>11</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 15 in 100 workers with earnings in the top decile of the firm-specific wage distribution is female. 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 3 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 the levels remain low over the whole period. As the main purpose of the figures is to compare time paths in both groups of firms, we have normalized the values for 2009 to the mean among non-listed firms. The mean difference in 2012 is shown in Table 1, columns (3) and (4). The share of firms with at least one female manager in Panel A has risen by almost 10 percentage points from 2008 to 2016. The percentage of listed firms with a female CEO, Panel C, remained relatively stable in listed firms and while it declined among non-listed firms. But the levels are extremely low in both groups of firms. We also see that female representation has increased in the top part of the wage distribution, Panels D and E. If we look at the development of the variables from 2012 onward, the figures do not show any major changes in the gaps between the listed and non-listed firms, which might be indicative of the effect of the board gender quota on diversity outcomes.

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<sup>10</sup> Detailed information on the matching procedure as well as the list of variables included in the matching metric and in the propensity score estimation can be found in the Appendix. As the matching algorithm replaces each control company to the pool of potential nearest neighbors, the same control can be a nearest neighbor for multiple listed companies.

<sup>11</sup> Flabbi et al. (2019) 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.

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 Appendix Table A3. The coefficient estimates of parameters  $\delta_k$  are small relative to the mean values in 2012 and mostly insignificant, which confirms the graphical impression. The estimates also show 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. Figure 1 shows the variation in the share of female board members by renewal cohort. Up to 2011 the average female share remains low in all groups of companies and it only starts rising in 2012. In particular, there are sharp increases in the board election years when the mandate applies for each renewal cohort.

While the share of female members on the board is low on average until 2011, there was still substantial heterogeneity across companies, which creates variation in the reform incentives faced by each firm. In 2011, almost 50% of listed companies in our sample had zero female directors. These companies arguably faced a high incentive to change their board composition at the first board election after 2012. We split the remaining companies at the median share of female board members in 2011, which was 14%, and create three groups with low, median and high reform incentives. The variation in reform incentives among the average member of each group is shown in Figure 4. The three groups start out with stable and distinctly different female board shares in the period from 2008 – 2011, but with the reform average female board shares converge to around 30% by 2016.

Our empirical strategy combines the three different types of variation for identification of the effect of female board representation on gender diversity within the company: (i) variation in the timing of the board election among the set of listed firms, (ii) the matched comparison companies who are unaffected by the reform, and (iii) variation in the incentive for board adjustments generated due to heterogeneity in the share of female board members in the pre-reform period.

Table 2 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.

Our first identification strategy exploits variation in the timing of board elections and 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) exploits variation in  $D_{it}$  within year across renewal cohorts and thus 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 short run effects of the reform on firm outcomes in the renewal year and the first year after renewal.

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

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

In addition to the comparison within listed firms, this specification adds a difference-in-difference design across listed and non-listed groups of companies with comparisons of up to 4 post-renewal years. For example, we can compare outcomes in firms that increase their female board share in 2013 with non-listed comparison firms over the four-year period 2013 – 2016. If a change in the gender composition of the board of directors affects firm level outcomes with some delay, we should therefore 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.

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>12</sup> Therefore our estimates can be interpreted as reflecting the effects of the first step of the Golfo-Mosca reform.

Our third identification strategy adds variation in the reform incentive, which we proxy by the definition of three incentive types, high, middle, and low.<sup>13</sup> To test for differences in the reform effects across types, we estimate the empirical models in equations (2) and (3) interacting dummy variables for types with the reform indicator variable. In the Appendix, we show results based on a samples with 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.

Under the assumption that the effects of the female board share on firm outcomes are linear and homogeneous across firms, we would expect to see increasing coefficients from low to medium to high incentive groups. If, however, the effects are heterogeneous across firms, this ranking does not necessarily hold. For example, adjustment processes in companies with a more female-friendly environment might be more responsive to an additional female board member.

Table 3 shows descriptive statistics of board characteristics in 2011 and workforce characteristics in 2012 for each incentive type. The table shows that gender diversity at the firm level is correlated with diversity on the board of directors. The average low incentive firm already fulfills the gender quota in 2011. Low incentive firms also tend to have higher shares of female employees, and female managers and higher shares of women at the top of the earnings distribution. In addition, those firms are also more likely to have a female CEO, while 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. High, medium, and low incentive companies are equally distributed across board renewal years, which indicates that anticipation of the quota mandated did not affect the board gender composition in 2011.

#### *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 to tests, where we substitute the variable  $D_{it}$  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

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<sup>12</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.

<sup>13</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.

(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. Appendix Tables A4 and A4\_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 A2. In addition, we estimate the model in equation (1) which includes coefficients for differences in outcomes at the yearly level. Appendix Table A3 shows that none of the coefficients is statistically significant in any of the pre-reform years.

As a third test, we check for differential trends in the outcomes of reform cohorts in the years prior to the first board renewal subject to the quota law by estimating models in equations (2) and (3) with additional dummy pre-reform variables that vary by renewal cohort. As we do not observe board renewal dates in non-listed firms, the matched control specifications for this approach randomly pick a renewal year for each company in the control group assuming that they all follow a common trend. The results are shown in Appendix Table A5; coefficients in these specifications are noisy and none of them is statistically significant.

The validity checks make us confident that the common trend assumption holds 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. This is especially relevant for companies with first board renewal in 2015, who also reelected their boards in the spring 2012, when the Golfo-Mosca law is processed in parliament. 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 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 listed firms have a higher incentive to hire these qualified women than non-listed firms, we would expect an upward bias in our results. Third, the gender quota mandated by the Golfo-Mosca law might be perceived as an informal guideline by non-listed firms. Even though those firms are not subject to the law, some of the non-listed companies might still raise the number of female board members as a consequence. If this were the case, our diff-in-diff strategy would underestimate the quota effects.

## 5. Estimation Results

Before looking at company level outcomes, we apply the model in equation (2) to estimate the effects of the gender quota on board characteristics. Estimation results in Table 4 show that companies increase the female share of board members in with the first renewal after the passage of the quota law by 11 percentage points on average. This is in line with size of the jumps observed in Figure 1. In addition, we estimate that the board renewal reduced the average age of board members by 2.8 years, while the number of directors is unchanged on average.

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). We have multiplied the coefficient estimates by 100 and can thus interpret the parameters as percentages.

The point estimates in Table 5 indicate positive effects from the increase in the female board quota on female executives and women in high-income positions. We find that the share of companies that employ at least one female manager increases by 1 to 3 percentage points, comparing across specifications in column (1). The average share of females among managers, in column (2), increases by about 0.6 pp, which is a small change relative to the pre-reform mean of 14%. The share of companies with a female CEO in column (3) increases more substantially by 1 pp in Panel A and by 3 pp in Panel B, which implies almost a doubling from the mean of 4%. We also see increases in the shares of females in the top of the earnings distribution in columns (4) and (5). The share of female workers in the top quartile increases by roughly 1 pp from a mean of 20% and the share of females in the top decile increases by 0.6 pp on average.

Even though point estimates of the effects of increasing the share of female directors indicate increases in the shares of women in executive and high earnings positions, the standard errors are large and most estimates are not significantly different from zero; exceptions are significant coefficients for the quota effects on the share of females in the top earnings quartile in Panel A and on the probability of having a female CEO in Panel B. While the specifications in Panel A estimate the effects of increasing the share of female directors by 11 pp in the year of board renewal and in the year after the renewal, specifications in Panel B estimate average effects until 2016, up to 4 years after the quota mandate kicks in. The point estimates are slightly higher in Panel B than in Panel A, except for the effect on female share in the top earnings quartile. This can be interpreted as an increase of the reform effects over time, which might be due to delays in the adjustment of firm outcomes to the new board composition. It also confirms, that spill-overs of the quota mandated to non-listed firms are of minor importance, as they would have led to a downward of the estimates in Panel B. However, none of the differences between Panel A and Panel B is statistically significant.<sup>14</sup>

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<sup>14</sup> We have also estimated models that distinguish between the reform effect in the renewal year and in the years after renewal. But estimated differences between the renewal year and subsequent years are all relatively small and insignificant, which suggests that the reform effects do not vary much over the first years after board renewal.

In Table 6, we investigate whether the reform led to changes in the overall gender composition of the workforce or in the type of jobs where many women are employed. We find that the share of female employees increases by less than one percentage point, see column (1), and the share of females in the bottom half of the firm specific wage distribution also increases by about the same amount. These are small effects and not precisely estimated. Overall turnover of women within the firm, measured by the female share among hires and layoffs in columns (2) and (3) seems to increase quite substantially with the reform. We do not find any systematic changes in the share of part-time workers which are predominantly female or the share of females among part-time workers in columns (4) and (5). Given that none of the coefficients is statistically significant at the 5% level, we conclude that the reform did not have any measurable impacts in the overall gender composition of the workforce.

We have seen in Table 3 that companies which have a relatively high share of female board members already in 2011 tend to be more diverse in terms of leadership and also in terms of the 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 by the law, become more similar to companies that started out with higher shares of female directors. In Table 7 we examine heterogeneity in the quota effects by the incentives for adjustment due to the Golfo-Mosca law.<sup>15</sup> The results are not in line with the hypothesis of linear and homogeneous treatment effects of the female board share on firm outcomes. First, we unfortunately lack statistical power to make clear statements about heterogeneity across incentive groups and second, even point estimates do not increase from low to medium to high incentive groups. Only for the outcome in column (4) share of females in the top quartile of the earnings distribution, the point estimate of the quota effect is strongest in the high incentive group. But the differences across different incentive types in column (4) are very small. With respect to the other outcomes there is no clear pattern across incentive types. The probability of appointing a female CEO after the quota law is introduced, column (3), is clearly the largest in the low incentive group and small or even negative in the high incentive group. The results in Table 7 suggest that the effects of changes in the gender board composition are heterogeneous across firms.

To investigate this further, we show heterogeneity in the quota effects by the share of female workers in the company in 2011 and the share of females among managers in 2011 in Tables 8 and 9. The idea is that a more gender diverse workforce or management structure might be more responsive to female board directors or more flexible to adopt diversity policies originating from the board. The findings corroborate our hypothesis. In all outcome measures the gender quota law has a larger impact among firms with a pre-reform female workers share above the median or a share of female managers above the median. The only exception is the probability that the company has at least one female manager, which is already very close to 1 before the reform in companies with high shares of female workers or female managers. The results make clear that the quota effect on the probability of appointing a female CEO is exclusively driven by companies with high female shares and is absent for companies with a share of female workers or females among managers below the median. If top executives are recruited from within the company, it is more likely that a

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<sup>15</sup> As a robustness check, Online Appendix Table A6 shows the estimates with a modified comparison group, where we match a separate comparison sample to each of the three groups of firms.

female CEO is selected from the company-pool with many high profile female workers and female managers. This result confirms Flabbi et al. (2019) who show that female leadership is more efficient in manufacturing companies with a high share of female employees.

## **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 by 11 pp on average on several measures of gender gaps in the workforce. Our results provide evidence that the female board quota mandated by the reform translated into a moderate increase in female representation at the top executive level or among top earners in the short run. We find small increases in the share of female managers and in the share of females in the top of the firm specific earnings distribution and larger increases in the share of companies with a female CEO in response to the reform. However, the results are imprecisely estimated and not always statistically significant. Heterogeneity analysis by the pre-reform share of female board members reveals that new appointments of female CEOs occurred predominately in the group companies with the highest shares of female board members in 2011 and in companies with above median shares of female workers or female managers. This result indicates that a higher female share at the board level might be more effective in companies that are more open to diversity. While our results suggest that the quota law affected females in executive ranks, we find no consistent evidence of a trickle-down of these effects to lower ranks within the company.

Our findings are broadly 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 strong spillover effects on the overall labor market situation of women. While there is more room for adjustment towards gender diversity in Italy than in Norway, the adjustment processes might also work slower in a more gender conservative society.

There are several potential explanations for the moderate 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 position 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 the analysis of short-term effects might not capture the full extent of its impact. If norms respond slowly and if adjustment processes are more effective in more gender diverse companies, our findings put 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 close gender disparities within Italian firms in the near future. Additional policy measures might be necessary ensure faster progress toward a gender equal society.

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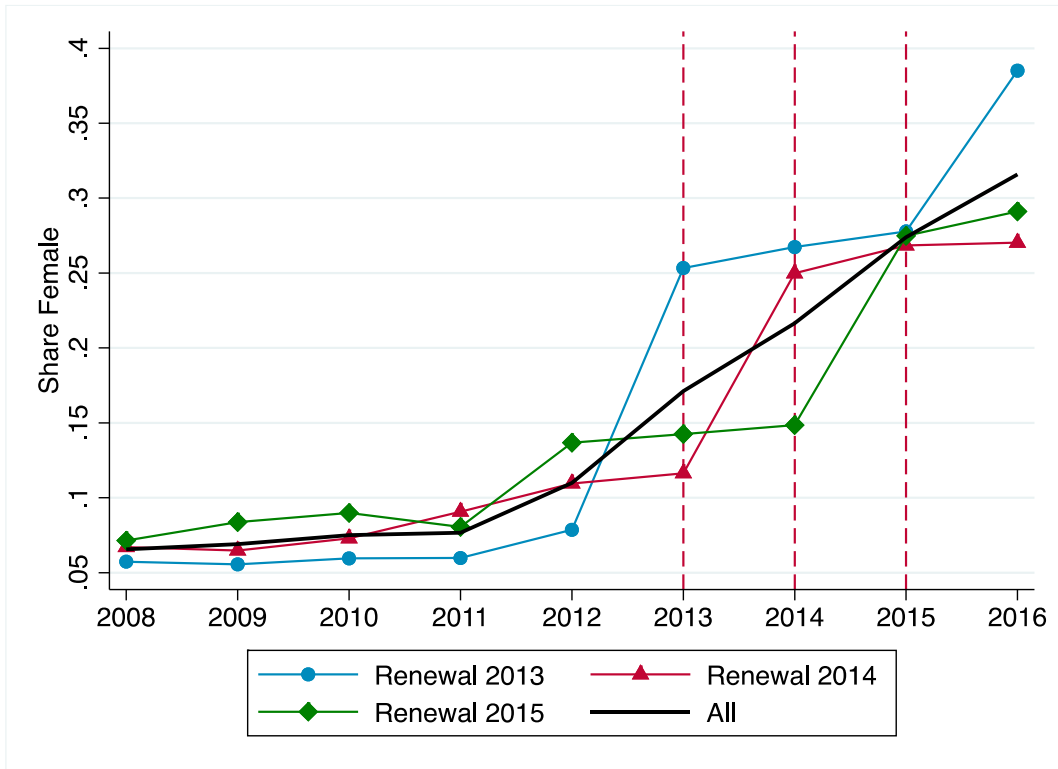
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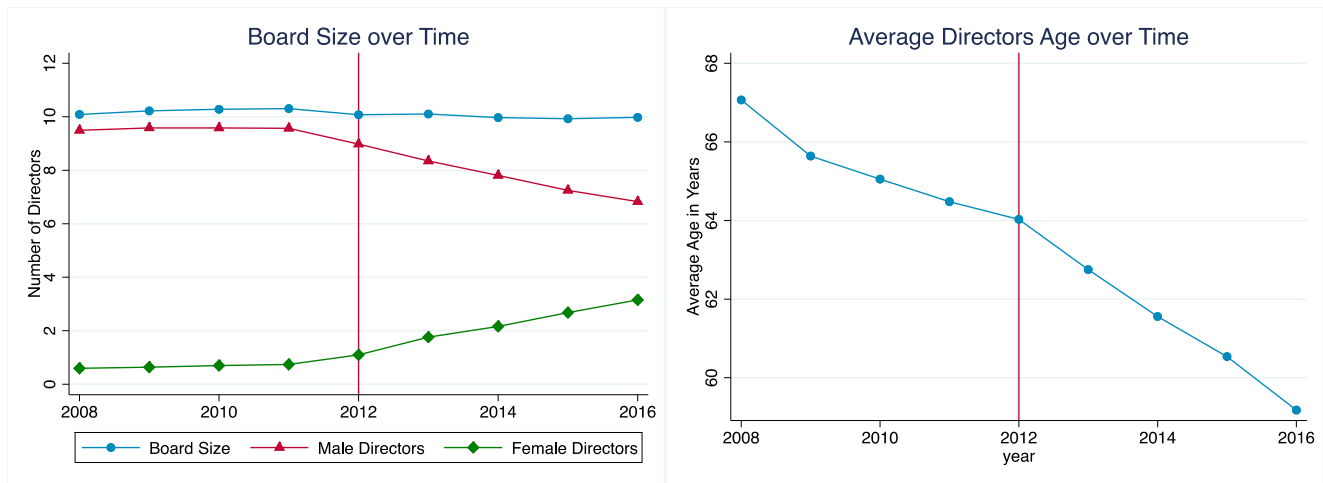
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Figure 1: Share of Female Board Members by year of first scheduled board election after 2012.



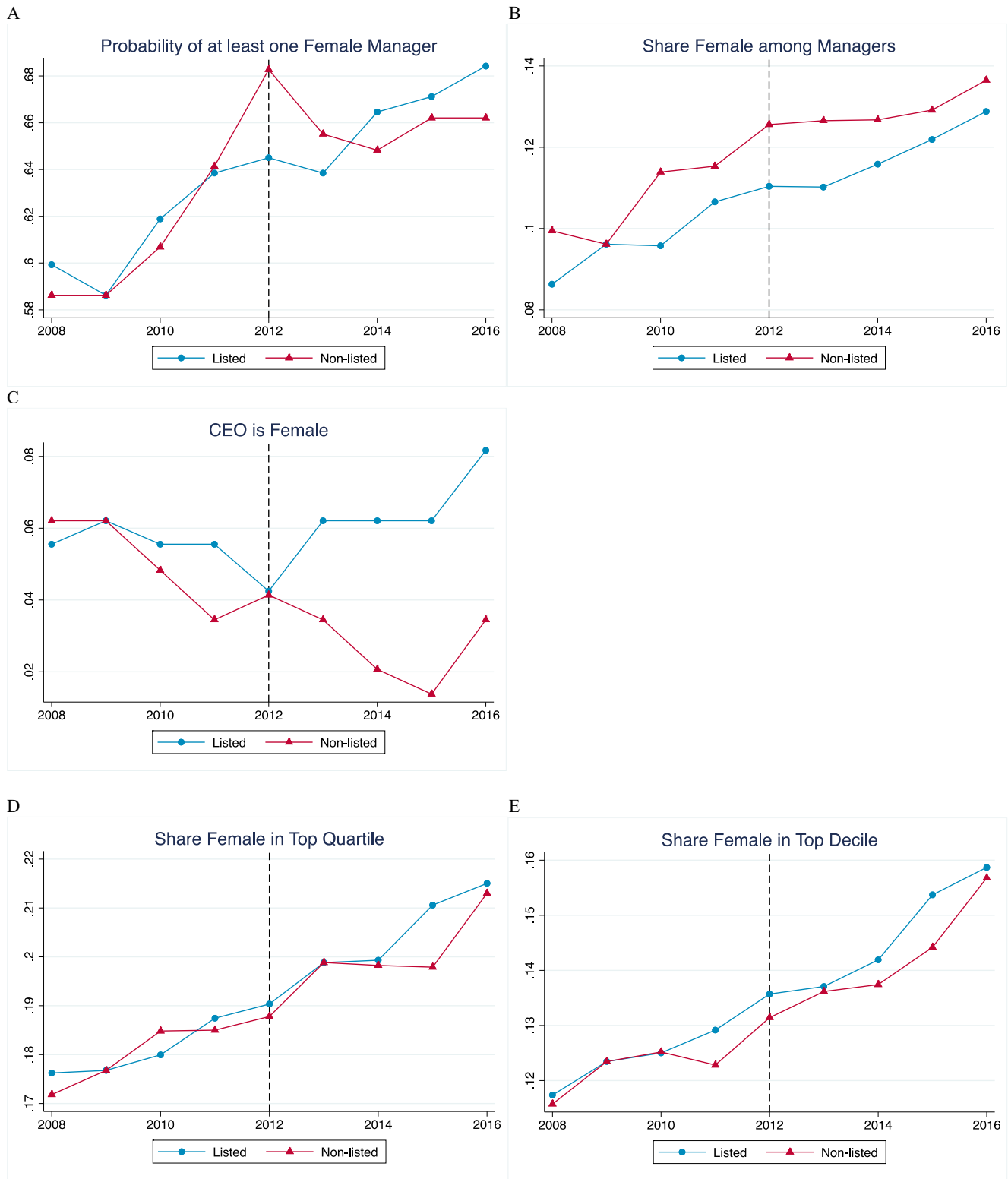
Note: Sample 153 matched listed companies.

Figure 2: Board characteristics in listed companies over time



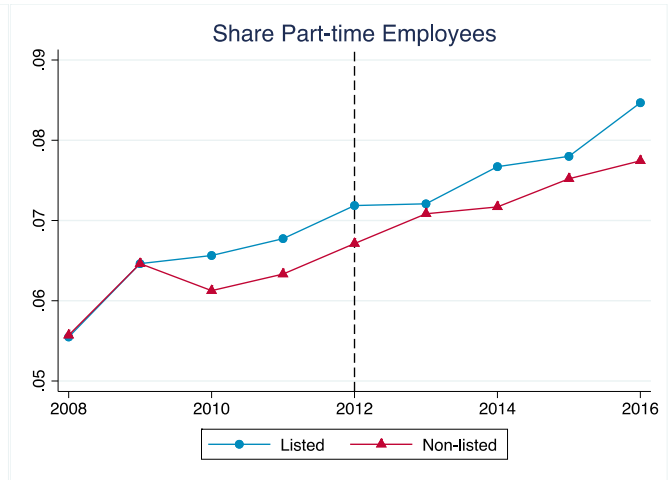
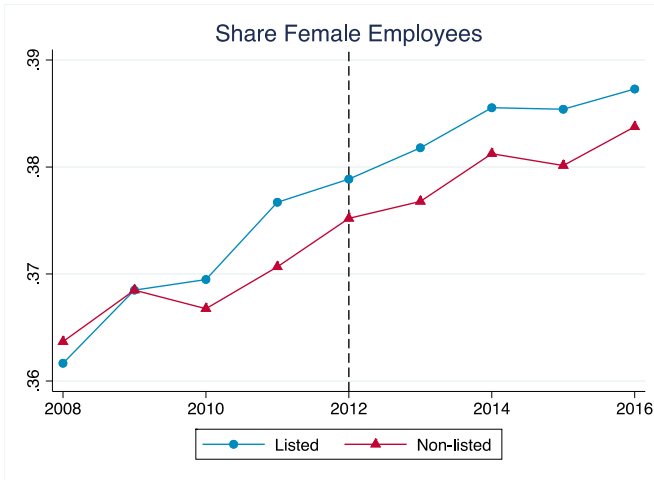
Note: Sample 136 matched listed companies.

Figure 3: Listed Companies and Matched Comparison Companies over Time

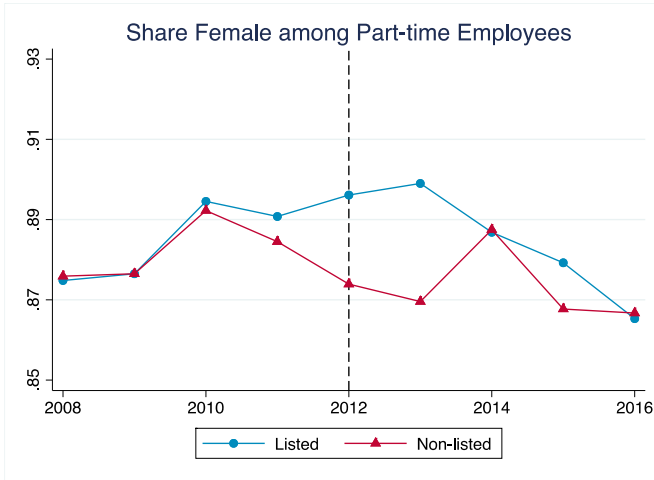


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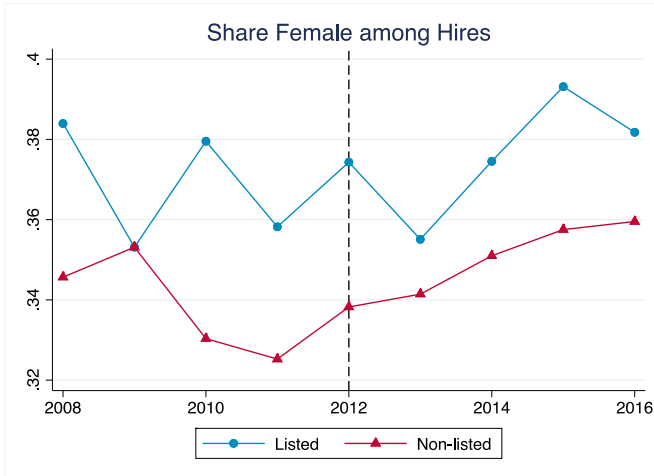
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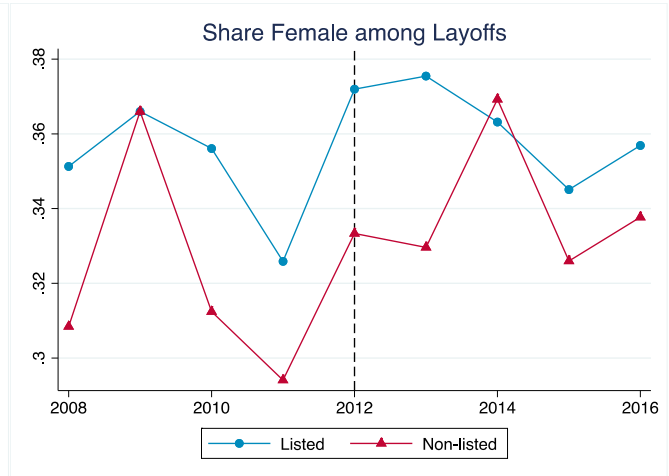
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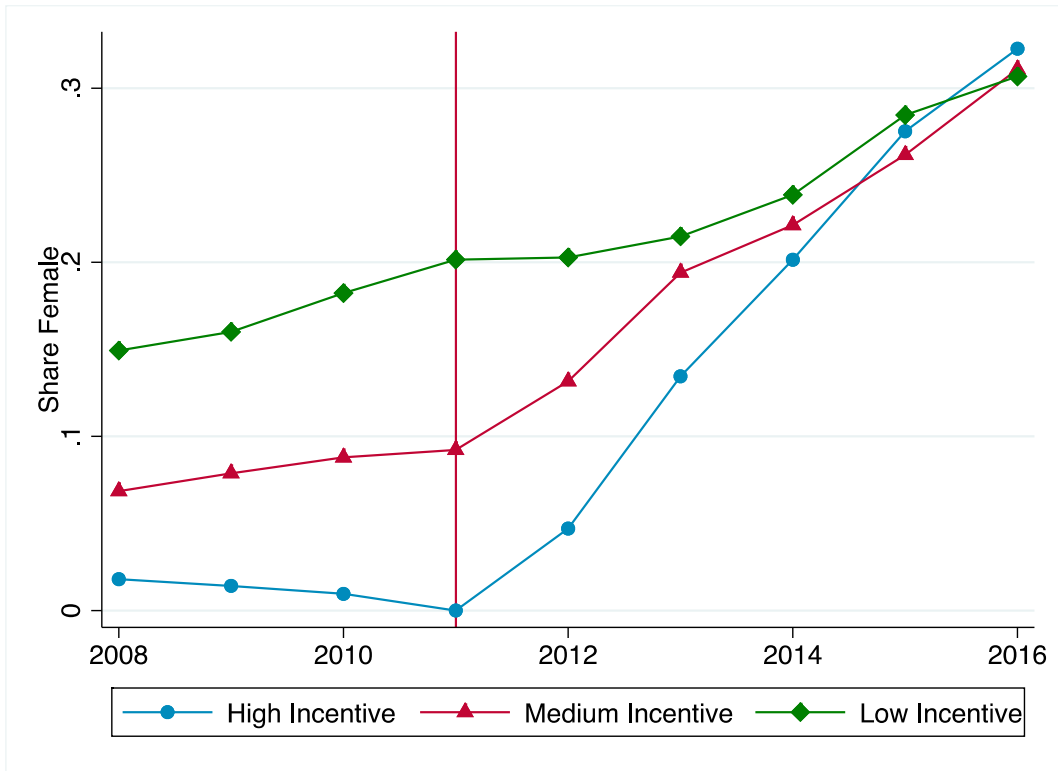


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Notes: Figures show annual mean outcome variables for 153 listed companies and 145 matched limited comparison companies before and after the implementation of the Golfo-Mosca Law in 2012. Means for 2009 have been normalized to the value of the average matched limited company.

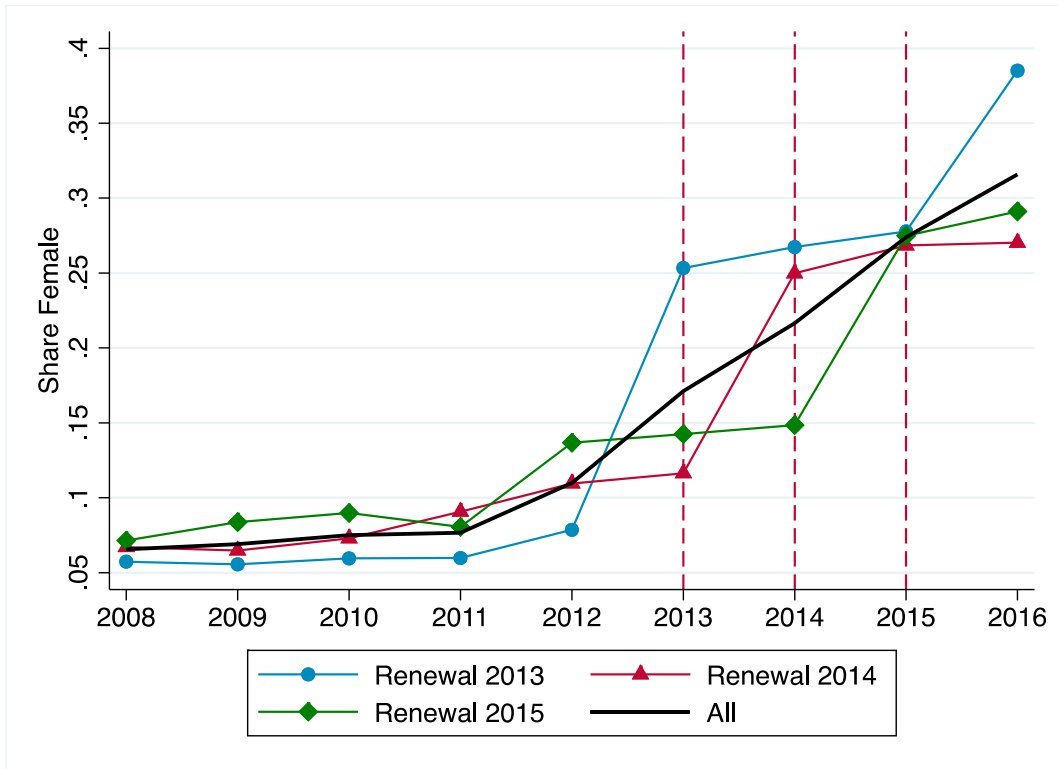
Figure 4: Share of female directors on boards of listed companies by reform incentive



Note: High incentive firms have zero female directors in the base year 2011, medium incentive firms have a female share between 0 and 14% in 2011, low incentive companies have at least 14% female board members. The sample consists of 136 matched listed companies.

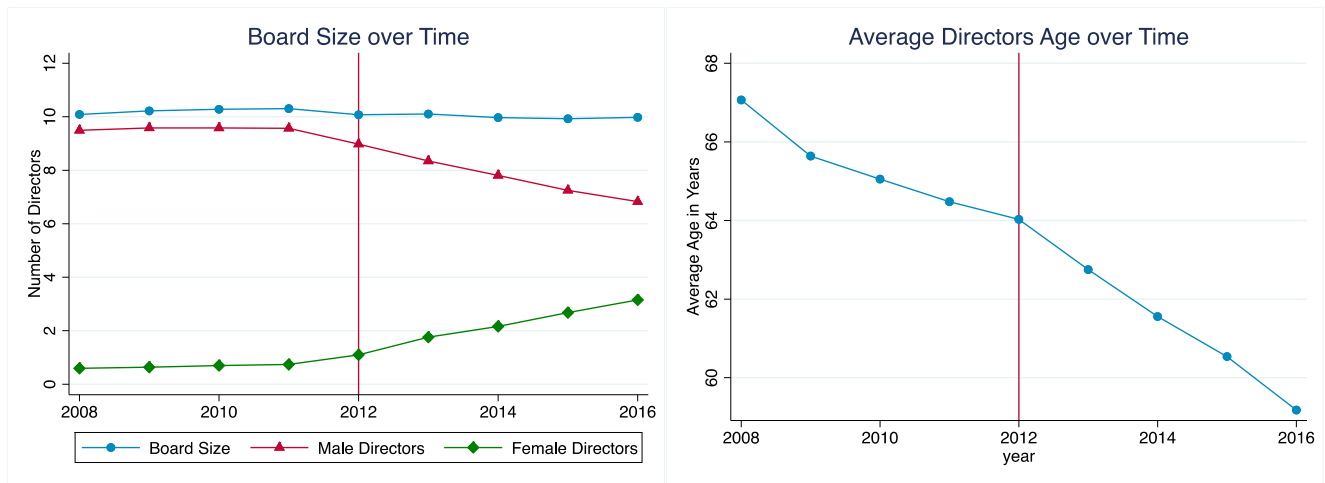


Figure 1: Share of Female Board Members by year of first scheduled board election after 2012.



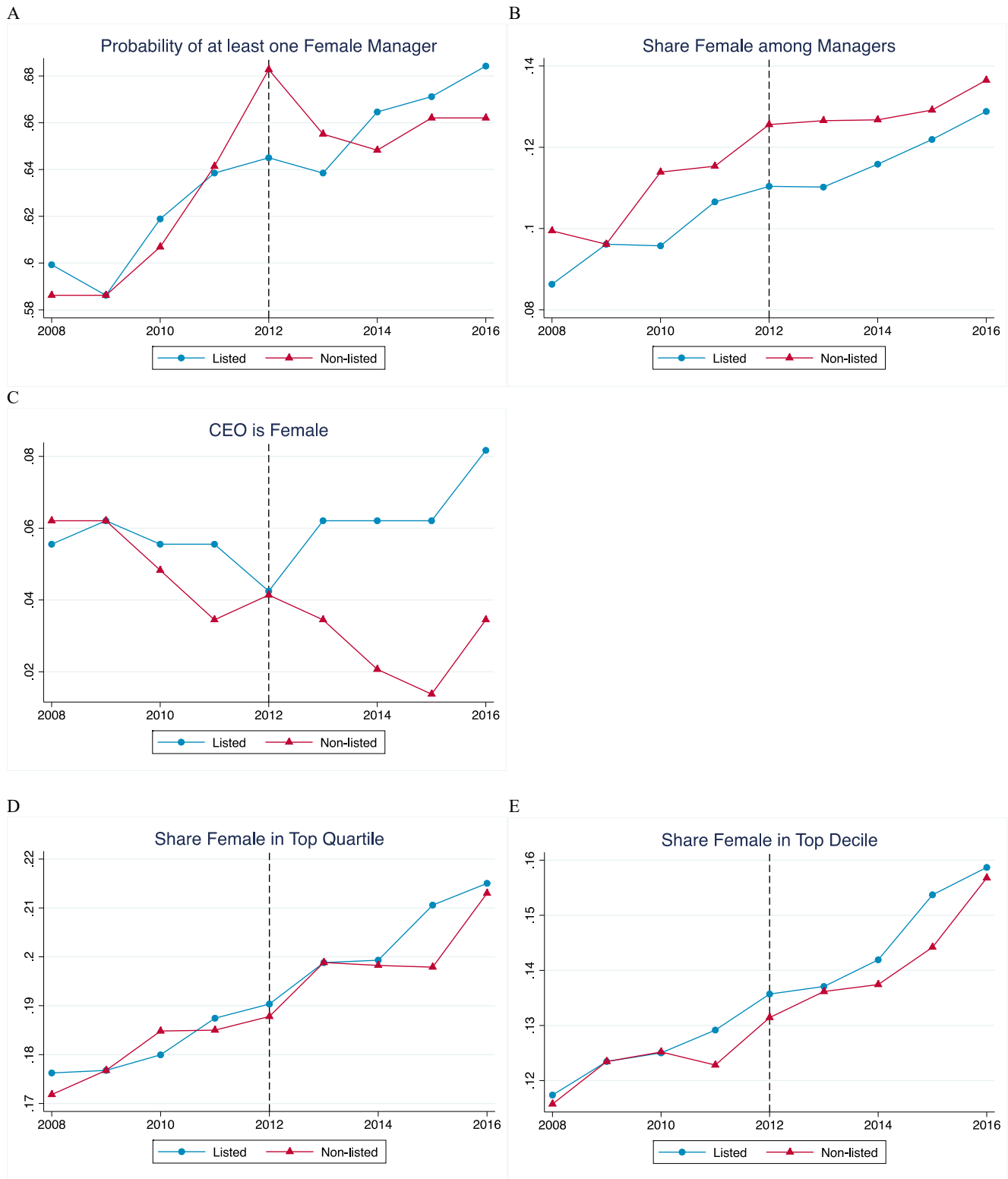
Note: Sample 153 matched listed companies.

Figure 2: Board characteristics in listed companies over time



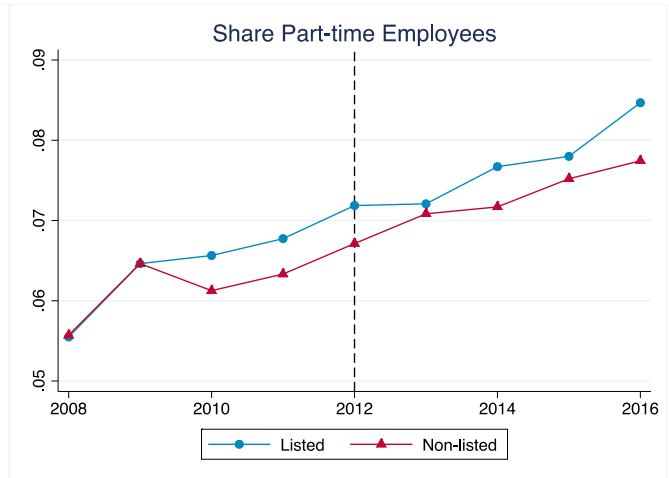
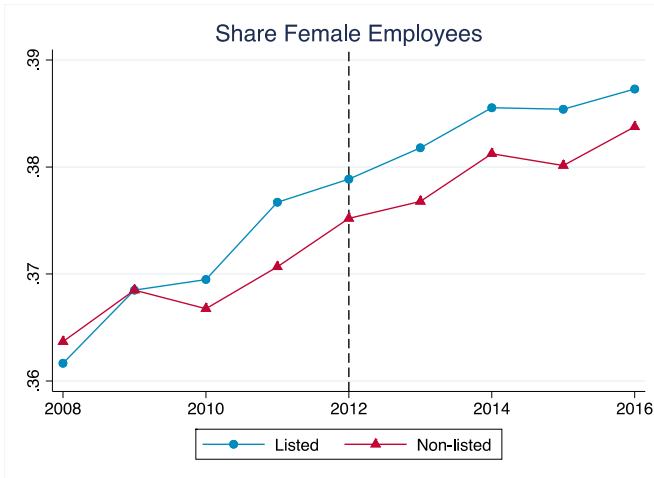
Note: Sample 136 matched listed companies.

Figure 3: Listed Companies and Matched Comparison Companies over Time

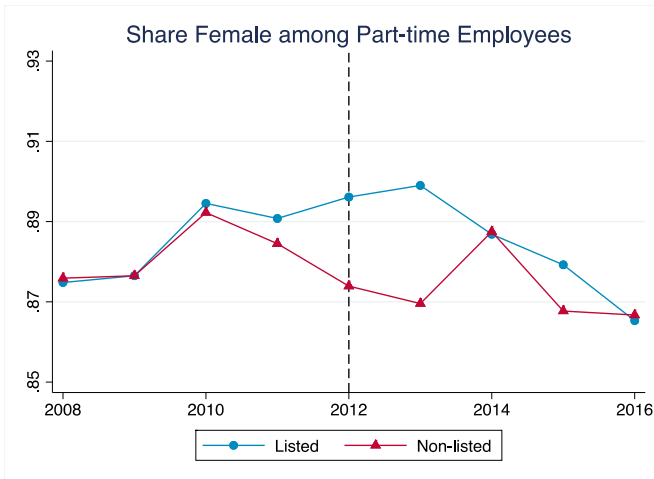


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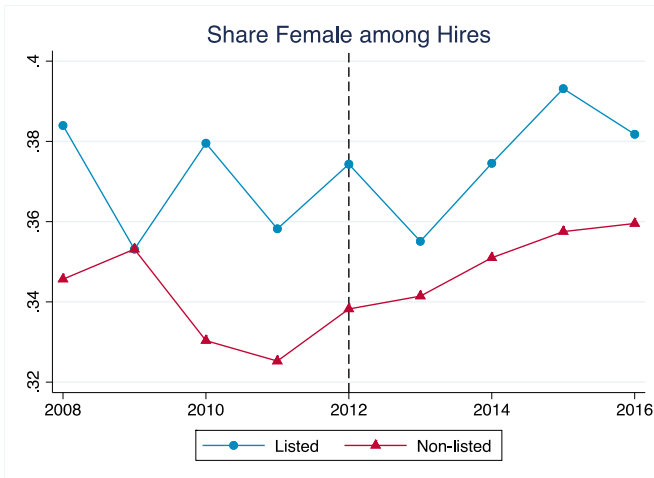
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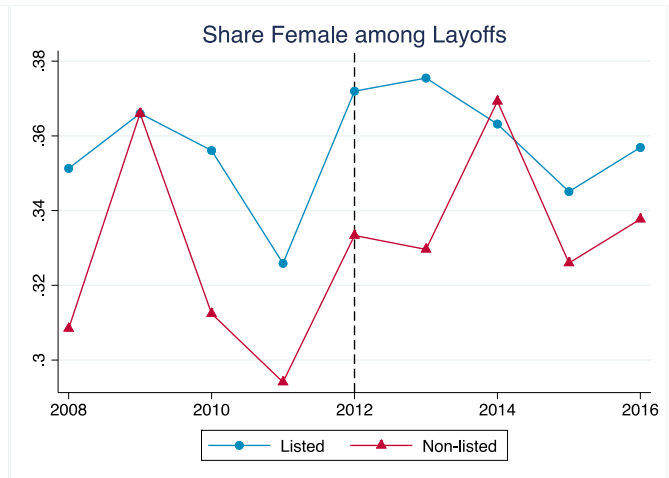
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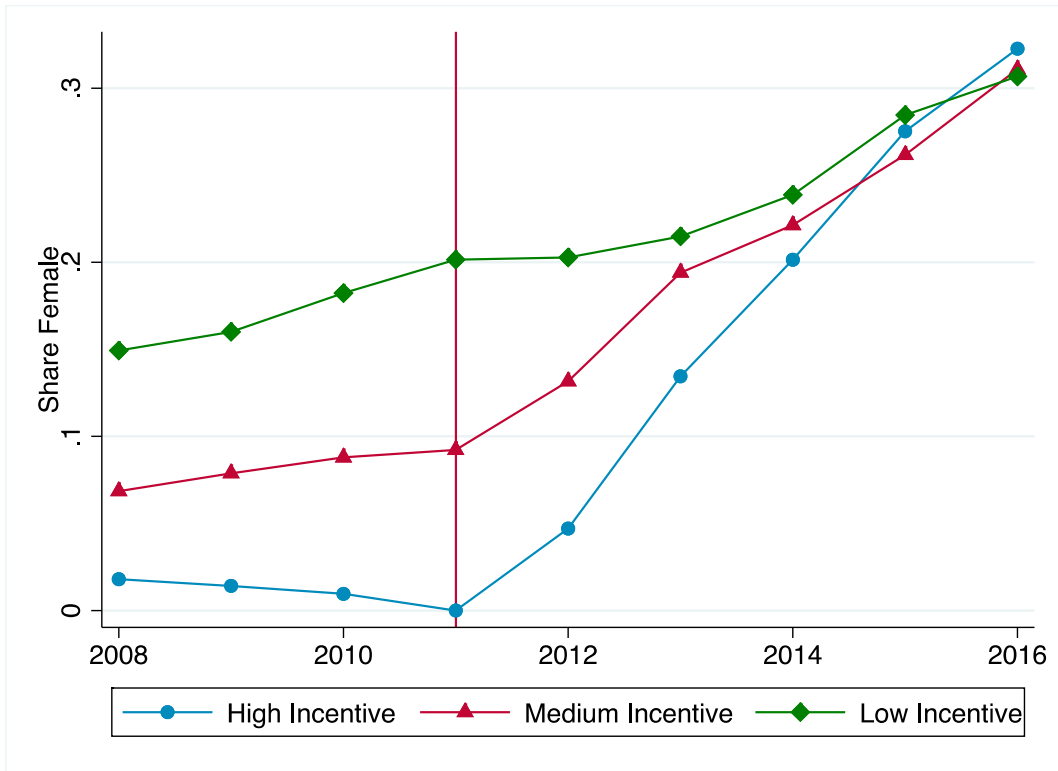


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Figure 4: Share of female directors on boards of listed companies by reform incentive



Note: High incentive firms have zero female directors in the base year 2011, medium incentive firms have a female share between 0 and 14% in 2011, low incentive companies have at least 14% female board members. The sample consists of 136 matched listed companies.