Gender Quotas: Challenging the Boards, Performance and the Stock Market*

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Abstract

In 2011, Italy introduced board gender quotas in listed companies. Comparing within firms before-after reform changes, we document that quotas are associated with a higher share of female board directors, with higher levels of education of board members and a lower share of elderly members. We then use the reform period as an instrument for the share of female directors and find no significant impact on firms' performance. Interestingly, we find that the share of female directors is associated to a lower variability of stock market prices. We also run event studies on the stock price reaction to the introduction of gender quotas. A positive effect of the quota law on stock market returns emerges at the date of board's election. Our results are consistent with gender quotas inducing

a beneficial renovation of the board, which is positively received by the market.

1   Introduction

Women are underrepresented in top positions. The *glass ceiling* – the obstacles encountered by women in reaching top positions - is still a dominant phenomenon. Even in countries in which women participate more to the labour market, only a minority makes it to eminent positions. According to the World Economic Forum (2015), only 59% of the gender gap in economic opportunities has been closed across the world. As the economic gender gap has been reduced by only 3% in the past 10 years, the World Economic Forum claims that it will take another 118 years to vanish completely.

There is an urgent need to accelerate the process towards gender equality. In fact, not only is equality between men and women in itself an important development goal, but women's economic participation is also "a part of the growth and stability equation" (IMF, 2014). As women represent half of the population, with talent, human capital and productivity not lower than that of men, the global economy would benefit from boosting women's participation in the labor force. The absence of women from leadership positions is at odds with the strategy of exploiting talents to promote business and performance (IMF, 2014). This is particularly relevant in times of modest economic growth. A greater involvement of women in the economy may also have beneficial effects on cultural developments. Dominant gender stereotypes and social norms have played a crucial role in generating gender gaps. Learning from other women's experience in the labor market may generate a virtuous and persistent circle of gender equality through changes in the cultural process (Fernàndez, 2013; Fernàndez et al., 2004).

Gender quotas have been proposed to accelerate the process towards economic gender equality and to promote women's empowerment.[1] Norway pio-

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[1]In parallel, gender quotas have been introduced to reduce political gender gaps, the other crucial dimension of gender inequalities (see section 2 for more references).

neered the introduction of gender quotas in boards of directors in 2005. Italy, France and Germany, among others, followed. Three European Directives on gender quotas have been proposed and are currently under discussion, while the debate is open in many other countries. However, gender quotas are controversial. They have strongly been advocated to achieve a gender-balanced representation at the top of economic positions, a fundamental part of economic gender equality across the world (see OECD, 2012). Yet, opponents of quotas argue that they violate meritocracy, with costly consequences: by equalizing outcomes rather than opportunities, quotas risk to promote less qualified individuals, who are likely to perform poorly (Holzer an Neumark, 2000). For instance, if high qualified women cannot be found, board gender quotas may produce negative effects on the performance of companies and negative stock market reactions (Ahern and Dittmar, 2012). Are these negative consequences the necessary cost to be paid for achieving a more gender-balanced representation?

What we know so far about the effects of board gender quotas on the economy is based on the Norwegian experience. In late 2003, a law was approved in Norway, mandating 40% representation of each gender on the board of publicly limited liability companies. The Norwegian law imposed a dramatic and rapid transformation in the composition of boards of directors. Research has shown that the Norwegian law has been effective at increasing the number of women on boards up to the 40% threshold, while it has not been able to reduce gender gaps overall (Bertrand et al., 2014). Moreover, an influential study by Ahern and Dittmar (2012) shows that the increase of women on boards in Norway imposed a significant cost on the firms and the stock market.[2]

This paper provides new evidence based on the introduction in July 2011 of board gender quotas in Italian listed companies. The so-called "Golfo-Mosca" law (by the names of the two promoters) mandates a gender-balanced representation of either gender in the board of directors and statutory auditors of publicly listed companies. Unlike in Norway, the Italian quotas are temporary and gradual. In fact, the measure will be in place only for three consecutive board elections. The required target of representation of either gender is set at

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[2]See however results in Nygaard (2011) and the references detailed in section 2.

1/5 for the first election after August 2012, to be increased to 1/3 for the next two board elections. Differently from Norway, Italy features a very conservative gender culture, and ranks poorly in Europe in almost all gender statistics (see Profeta et al., 2014): in the last ten years, women's participation to the labour force has remained stable around only 47%, the lowest value in Europe, if we exclude Malta. In this context, a shocking policy such as quotas was perceived as the only possible way to start the process towards gender equality. But what about its costs? A country with no economic growth certainly can not afford substantial economic costs. In this paper, we find no evidence of significant costs, neither on companies nor on the stock market, associated to the introduction of board gender quotas in Italy.

To perform our analysis we manually collected individual data on all members of the boards of Italian listed companies in the period 2007-2014 (4,627 different individuals), as well as firm-level data on relevant outcomes of these companies (243 companies) and stock-market prices. With these data, we are able to address four questions, which are fundamental to evaluate the efficacy of quotas in the process of promoting women's empowerment *vis-à-vis* the costs they may generate: Do the composition of the boards and the characteristics of the members change after the introduction of quotas? Do firms' outcomes, such as economic performance and variability of stock market prices, change after the introduction of gender quotas? How does the stock market react to the announcement of board gender quotas? How does the stock market react to the introduction of board gender quotas at the boards' elections?

Our results can be summarized as follows. First, to understand the effects of board gender quotas on the selection process, we compare before-after reform changes of board member characteristics, such as gender, age and education, for each firm, while controlling for time trends. We find that, when gender quotas are enforced, firms show a higher share of women directors (well above the required threshold), higher average education levels of all members of the board and lower age than before the quotas. Gender quotas trigger a process of better selection of the entire board. We do not find an increase of board members belonging to the same family, nor a clear increase of members holding multiple board positions.

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Second, to assess the causal effect of women's empowerment on firms' performance, we use the reform period, which is exogenous to firms' decisions, as an instrument for the share of female directors. Although the short time period (two years) after the introduction of gender quotas does not allow us to assess the long-term effects, our analysis shows that so far quotas in Italy have not been associated with different (for instance worse, as in Norway) firms' performance. However, consistently with the existing evidence that women are more risk averse than men (see a review in Bertrand, 2011), we show that women's empowerment reduces the variability of companies' stock prices - a dimension not addressed in the Norwegian context.

Third, since we are considering listed companies, we measure the consequences of the introduction of gender quotas on the stock market. Our event study at the date of the announcement of the law compares Italian companies with Spanish companies listed on the Madrid Stock Exchange. While we do not identify significant effects at the day of the approval of the law by the Senate, we do find a negative effect for Italian companies at the day of the approval of the law. However, since this effect had no differential impact on stock price performance of Italian companies that would be first affected by the reform relative to other companies, it is difficult to link it to the quota law.

Fourth, to provide a final assessment on the impact of gender quotas on the stock market, we perform an event study at the day of board elections. We find that the introduction of gender quotas in Italy is associated to better firms' returns: companies with a smaller share of women in the pre-reform board composition (i.e., farther from the quota target) experience better stock market results at the date of the first board election after the approval of the law, with respect to companies that were already closer to the target. In other words, the renewal of the board associated to gender quotas, which is clear at the day of the election, and may still be uncertain at the day of the announcement of the law, has positive effects on the stock market. This result is different from what found by Ahern and Dittmar (2012) for the Norwegian case,

Overall our results support the idea of a potential double dividend from

gender quotas. Not only gender quotas may contribute to women's empowerment, quotas may also induce a better selection mechanism, mainly by increasing the level of education of the entire board. As long as promoting education goes hand in hand with exploiting talents, a fact which is particularly relevant in our economies, and which represents a crucial engine for business (see OECD, 2012), our results point out the beneficial effects of quotas. More competition emerges with the entry of qualified women. In countries such as Italy, dominated by a male gerontocracy, where boards of directors were not necessarily populated by the most competent and most qualified people for the job, as documented by Bianco et al. (2015), the introduction of gender quotas induces a beneficial renovation of the boards, which is positively received by the market.

The paper is organized as follows: the next section reviews the related literature and section three describes the Italian law. Section four presents the data that we will use throughout the different analysis performed in the paper. The next four sections present analysis and results related to our four fundamental questions: the impact of the law on the characteristics of the boards, the impact of the law on firms' performance and the variability of stock prices, the impact of the announcement of the law on stock market prices and the effect of the election of the board under the new rule on stock market prices. Each of these sections presents first the empirical methodology adopted and then the results. Conclusions are in section nine. Additional evidence is provided in the appendix.

2 Related literature

The literature on the effects of gender quotas in the context of business and/or politics, is vaste (see Profeta et al., 2014, Pande and Ford, 2011 for reviews). Gender quotas represent a controversial policy. The main argument in favor of the adoption of gender quotas is their effectiveness as a mean to equalize opportunity in specific areas where women face systematic barriers due to discrimination or persistent stereotypes (Holzer and Neumark, 2000). These policies may lead to a redistribution of jobs, positions, contracts, or parliament

seats in favour of women, and thus allow for a fair distribution of rewards of good jobs. Moreover, if women who benefit from affirmative action are largely qualified to successfully perform the tasks they are appointed to, the benefits do not remain within the group of women but spread to the entire economy. If women accumulate more human capital that raises their productivity, these policies may even increase efficiency (Conde Ruiz et al., 2015).[3] Quotas represent an instrument (often considered the only one) to break down the masculine monopoly power, which obviously does not lead to an equal outcome, but probably neither to an efficient one. Critics of affirmative action instead share the view that the underrepresentation of women is not due to discrimination, but it is merely the result of women's choices, especially related to fertility and motherhood. Thus, by equalizing outcomes rather than opportunities, affirmative action policies risk promoting less-qualified individuals, who very likely will perform poorly. Not only there is a risk of decreasing the average quality if there are not enough women with the appropriate qualifications to be appointed, but a "mismatch" may occur if women are allocated to positions in which they are unable to successfully perform. Recent studies have also doubted the effectiveness of quotas in reducing gender inequalities: Bertrand et al. (2014) have found that gender quotas in listed companies in Norway have improved the representation of female employees at the very top of the earnings distribution within affected firms, while it had no trickled-down effects and no other significant effects on reducing gender gaps.[4]

In the context of business, the study of the effects of board gender quotas is particularly meaningful to identify the causal effects from women's representation to economic outcomes and overcome the typical endogeneity concerns which are involved in addressing this relationship. A well studied example is Norway. Several studies assess whether the increased female representation in top positions due to the quota had any impact on firms' economic perfor-

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[3]In the context of politics, the Indian reservation system has been exploited as a very useful case of analysis, which provides evidence on the impact of quotas on the number of female representatives (Beaman et al., 2009; Pande and Ford, 2011) and on the policies implemented (Chattopadhyay and Duflo, 2004).

[4]However Wang and Kelan (2013) find that the Norwegian gender quota law and the subsequent higher presence of female directors increase the likelihood of women being appointed to top leadership roles.

mance. The evidence is not conclusive. Matsa and Miller (2013) find that firms affected by the quota law have fired fewer workers, increasing relative labor costs and employment levels and reducing short-term profits. Ahern and Dittmar (2012) show that gender quotas had negative reactions by the market, since young and less-expert members are serving on boards. However, Nygaard (2011) shows that this effect depends on asymmetric information between independent members of the boards and the companies' managers (see also Ferreira, 2015). Board gender quotas in Italy provide new evidence on the causal effects of women's empowerment in the corporate sector on economic outcomes. Our study will contributes to understand whether negative economic outcomes are a necessary cost to be paid for achieving a more gender balanced representation.

In the context of politics, recent studies have shown that gender quotas are not at odds with meritocracy: gender quotas help increase the quality of representatives. In the Italian political context, gender quotas have been associated to better quality of politicians (Baltrunaite et al., 2014), as measured by their level of education. In the Swedish case, the 'zipper' quota requiring the alternance between a male and a female candidate in the party's list of candidates has increased both female representation and, interestingly, the competence of male politicians (Besley et al., 2013). This paper will contribute to understand to what extent this result applies also to the business context.

A large literature has analyzed the relation between female leadership and firms' outcomes outside the context of gender quotas. Research has developed in the field of economics, finance and management. Results are not fully conclusive. Having both men and women in top positions of a company may have positive consequences on the performance. In a heterogeneous context, the perspectives are enlarged, the pool of talents and competences are diversified, and the shareholders are better represented (see, among the others, Van der Walt and Ingley, 2003; Rose, 2007, Hoogendoorn et al., 2013). The female style of leadership, including more risk aversion (see Bertrand, 2011 for a survey), may also produce performance benefits. These results are however challenged by recent studies. Adams and Ferreira (2009) find a negative impact of gender diversity on performance measures such as return on assets (ROA) and To-

bin's Q, while Gagliarducci and Paserman (2014) find no evidence that female leadership is related to performance outcomes. The view itself that women are more risk averse than men is challenged by Adams and Ragunathan (2013) and Adams and Funk (2012). Other studies qualify the conditions under which a positive relationship between women's empowerment and firms' performance may emerge: the existence of a critical mass of women (Schwartz-Ziv, 2015), a positive interaction between women CEO and women on boards (Amore et al, 2014) or between women CEO and female workers employed at the firm (Flabbi et al., 2014).

Non-conclusive results also emerge when looking at the relationship between women's empowerment and stock market returns. Wolfers (2010) find no differences in stock price performance between female-headed firms and other firms. Dobbin and Jung (2011) argue that women on corporate boards are more likely to adversely affect stock prices, and less likely to affect profitability. Ryan and Haslam (2005) find a significant increase in the share price following the appointment of a female director. However, women are more likely to be appointed in times of general financial downturn in the stock market, and thus have a more precarious position (the so-called "glass cliff"). How the stock market reacts at the appointment of a female director is not unambiguous: Chapple and Humphrey (2011) for Australia find no reaction, Adams et al. (2012) find a positive reaction, Lee and James (2007) find a negative reaction.[5] Adams and Ferreira (2003) find that firms facing more variability in their stock returns have fewer women on board.

Finally, our paper speaks also to the corporate governance literature, which has underlined the importance of diversity for boards' quality and their functioning (see Dhir, 2015). Our results suggest that quotas may be effective at increasing diversity and inducing a better selection of board members. This is particularly important for the Italian case (see Consob, 2015), where the pre-quota situation was characterized by the presence of women only in family firms (Bianco et al., 2015).

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[5]For Italy see also Rossi and Cebula (2015), who, for a small sample of 100 Italian listed companies during the period 2012–2014, find a positive reaction within 20 days around the date of the announcement of the composition of the board.

3 The Italian law

Women are largely underrepresented in the Italian labor market: in the last ten years the labor force participation rate of Italian women has been stable around only 47%, against an European average of 60%. In 2009 the average share of women on the board of directors of publicly listed companies was 7%, one of the lowest value in Europe. Despite this context, not very favourable to women's representation, Italy introduced board gender quotas in July 2011 (Law 120/2011). The first proposal of the law was submitted in May 2009 by the Member of the Chamber of Deputies Lella Golfo, belonging to the centre-right coalition; in November 2009, the draft was re-submitted by the Member of the Chamber of Deputies Alessia Mosca, belonging to the centre-left coalition. However, it was only two years later that the draft started being discussed thoroughly by the Italian Parliament. In February 2011 two important amendments to the original draft were introduced: the gradual implementation of the law and the sanction system in case of non-observance. On March 9, 2011 the draft was approved by the Parliamentary Commission in charge of the quota law, and on March 15, 2011 the draft was approved by the Senate. The final draft of the law was approved by the Italian Parliament on June 28, 2011 with an overwhelming majority of votes.

Law 120/2011, also known as the "Golfo-Mosca" law, mandates that publicly listed companies should have at least 1/3 of either gender in their board of directors and statutory auditors.[6] Boards of companies listed on the Ital-

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[6]Italian companies may choose among the following governance models: a one-tier governance system (*Monistico*); a dual-tier system with distinct supervisory (*Consiglio di sorveglianza*) and management (*Consiglio di gestione*) functions; or the traditional model with a decision-making board (*Consiglio di amministrazione or amministratore unico*) and a separate board of statutory auditors (*Collegio sindacale*) with monitoring and control functions. In this last model, which is the one used by the majority of companies (96.2% of the companies listed in the main market in 2013 and 94.8% in 2012), members of both boards are elected by the shareholders. The board of directors includes executive directors, non-executive directors and independent directors, while the board of statutory auditors is composed of three to five experts who must be independent. The size of the board varies according to company size and sector, with financial companies having larger boards than non-financial ones. On average, the board of directors is made up of 10 directors. For more details on how companies are regulated and what are the activities of the boards, see Profeta et al. (2014).

ian stock exchange are elected every three years. The quota is implemented gradually: at the first board election, the required target is 1/5 and becomes 1/3 in the next two elections. The measure is temporary and remains in place for three consecutive board elections only. If a firm does not comply, Consob (the regulatory body of the Italian stock exchange) warns the company, which has four months to comply. The warning system continues with a fine ranging from a minimum of EUR 100,000 to a maximum EUR 1,000,000. Should the company persist in failing to comply without reacting to the second warning within the following three months, the law states that the appointment of every elected member will be invalidated. The law was approved on July 12, 2011, with application to listed companies, but its effects become binding for firms one year after the approval, namely on August 12, 2012. We refer to the interval period between July 12, 2011 and July 12, 2012 as the "phase-in" period. On February 2012, the law was extended to state-owned companies, i.e. public companies under the control of the government, with immediate effect.[7] The crucial features of the law are thus the following: time-limited nature, gradualism, sanctions and the interaction between private and public. These features make the Italian law different from the one in Norway. In particular, the time-limited nature is a specific feature of the Italian design of the reform. It is consistent with the idea that gender quotas are promoted as a shocking measure to break the male dominant power, and to lead the market to a new, more gender-balanced, equilibrium. The idea behind this feature is that when the new equilibrium will be reached, the quotas will no longer be needed. Gradualism is also a different feature from the Norwegian policy. It is consistent with the idea that, especially in conservative countries such as Italy, firms need time to adapt to changes. Gradualism may help to turn changes, which can be costly, into opportunities.

As the law on gender quotas was approved in August 2011 and implemented the year after (August 2012), and as the boards are elected every three years,

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[7]While publicly listed companies are, according to CONSOB, around 240, we estimate around 4,000 state-owned companies that have to comply with the gender quota law. For them, the Department of Equal Opportunities at the Presidency of Council of Ministries is in charge for the monitoring and sanctioning system. Information on these companies, however, is not available. Thus, our analysis concentrates on listed companies.

we can classify boards in three, almost equally distributed, groups: 1) those changing their composition in 2011 before August, which we call "pre-reform"; 2) those appointing new members in the transition period (i.e., between August 2011 and July 2012), called "phase-in"; and 3) those renewing in the new regime that is after August 2012, called "post-reform" .[8] Companies are exogenously assigned to the three groups: the date of renewal of the board depends on the past, instances occurred well before the initial discussion on the gender quotas law, which cannot be manipulated according to the timing of the law. In any case, we check that no firm anticipated the board election to postpone the introduction of the quota. We will use this division into groups in several parts of the following analysis.

Figure 1 clarifies the timeline of the implementation of the law.

4   The Data

We focus on listed companies and collect several categories of data: (i) individual data, containing the main socio-demographic information on the members, men and women, of boards of directors and boards of statutory auditors of the companies listed on the Italian stock exchange in the period 2007-2014; (ii) firm-level data, including a set of financial and economic information on each company listed on the Italian stock exchange, such as number of employees, production, profits, value firm, returns on assets, returns on equity, debts and assets; (iii) stock market data, such as the daily stock price and the daily closing price of the FTSE MIB.

The list of companies under the application of the law is found at the Consob website. We compare this list with the one in Aida, the Italian branch of Amadeus (Bureau van Dijk), the database of comparable financial and business information on Europe's biggest 500,000 public and private companies by assets. In the period 2011-2014, the list of Italian publicly listed firms comprises around 245 firms each year.

For each firm, we collect the election date of the board of directors by

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[8]Since elections typically happen in the period April- June, post reform firms have board elections in 2013 and 2014.

accessing the Corporate Governance relation (*Relazione di Corporate Governance* or *Relazione sul governo societario e gli assetti proprietari*) on the company's website. When this is not available, we search on the website of the Milan Stock Exchange (*Borsa Italiana*), in the section collecting official corporate documents. In case the Corporate Governance relation is in the stock exchange records, the election date is collected from the convocation notice of the shareholder meeting for the board election in the official journal of record. Elections are held in the period from April to June. For each firm we collect the full names of the board members as of June 30 for every year from 2007 to 2014. The information on board members is collected from Consob — the regulatory body of the Italian stock exchange, where the names and role of board members are available for each company starting from the 1990s. Most of the times, the gender of each member is unambiguously identified through the person's first name; when the first name is ambiguous, we search for a photo of the person.

4.1   Individual data

Information on the individual characteristics of board members is not available in an organized manner, and it is sparse among the documents which each company has to provide to Consob when a board member is elected. We therefore had to manually collect the CV of all members of the boards of directors and boards of statutory auditors of listed companies elected between 2007 and 2014.

From our inspection of the 4,627 CVs of different individuals, we collect individual data for each member of the board on the following characteristics:[9] name and surname, age, gender, state of birth and residence, type of board (board of directors, board of statutory auditors, management board, supervisory board), position within the board (president, vice-president, CEO, administrator/advisor, auditor), qualification (diploma or lower degree, bach-

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[9]Despite the effort exerted to have a complete dataset, for a limited number of boards we are not able to have information on all members. We however check that our results do not substantially change when excluding companies with more than 10% of missing values on the education variable, which is the most critical to obtain.

elor's degree, graduate degree), university where the degree was obtained (distinguishing in particular whether the university is in Italy or abroad), field of education (if graduated); any kinship with other members of the board. From this information we construct the following variables:

1) Women's empowerment, which is captured by the share of women on boards and whether this share exceeds the first target of the law, i.e. 20%. We also look at the role of members of the board by gender, distinguishing between presidents and CEOs.

2) Education, which is measured by the level of education of each board member (university degree or graduate education)[10] and a variable which indicates whether the individual has studied abroad or not. We also consider fields of study (economics, law, engineering, political science, and others). To capture the level of field heterogeneity in each board, we build a Herfindahl index.[11]

3) Age, which is captured by the percentage of board members older than 60 or 70 years.

4) Family relationships, which is captured by the percentage of board members who belong to the company's owner family.

5) Multiple positions, i.e. the average number of board positions hold by each member.[12]

Following Ahern and Dittmar (2012) we aggregate individuals' characteristics at the board level and consider average values for the board.[13] Table 1 presents summary statistics of the measures that we use for the above outcomes. We show average board characteristics. We consider together all type

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[10]We consider the percentage of members with at least a university degree and the share of board members holding a graduate degree. The first variable represents the proportion of board members who hold a university degree of any kind, namely bachelor's degree, master of arts and master of science, MBA or PhD. The second variable is the proportion of members with a PhD, a master program or MBA.

[11]This index is widely used as a measure of diversity, under the expectation that higher heterogeneity is related to better performance, see Adams et al. (2012).

[12]A similar indicator is used in the literature on Norway. Seierstad and Opsahl, 2011 show that the introduction of gender quotas in Norway is associated with an increase of multiple positions, the so called golden skirt phenomenon.

[13]The alternative would be to consider observations at the individual level. Our main results would not change.

of boards: boards of directors, boards of statutory auditors and the alternative forms of governance for the existing very few cases (see footnote 4). The table also shows the percentage of retained members, i.e. members of the board who are confirmed from the previous election.[14]

4.2 Firm-level data

We then collect firm-level data on the characteristics and outcomes of each company (Ahern and Dittmar, 2012). This information is again not immediately available. We rely, when available, on data from Orbis-AIDA (Bureau van Dijk), which we integrate with data from Bankscope on banks. In case of missing data, which are numerous, we hand collect the corporate documents available on the website of the Italian stock exchange or in the official budget balance sheets published on each company's website. We also collect the firm value measured by Tobin's Q from Datastream. The final dataset contains the following information for each company for the period 2010-2014: name, province of registered office, number of employees, production (thousands of euro), profits (thousands of euro), short-term debts and long-term debts, ROA, Tobin's Q, assets, (thousands of euro) for the period 2010-2014 (data refer to end of December, when the budget is closed).

Sector data are also downloaded from Aida and harmonized to comply with the GICS classification of industrial sectors.

Firm-level data will be used to assess the causal relationship between women's empowerment (through gender quotas) and the firm's economic and financial performance.

Table 2 presents summary statistics for the firms' outcomes.

4.3 Stock market data

Finally, we download from Bloomberg the daily closing price of the FTSE MIB for the years 2011-2014. These data will be used to answer three questions: first, what is the impact of women's empowerment (through gender

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[14]In the appendix A1 we also provide summary statistics for the same variables at the individual level, separately by gender and by type of board.

quotas) on riskiness of the company (part II)? Second, what is the impact of the announcement of the introduction of the gender quota law on stock market prices (part III)? Third, what is the impact of gender quotas on the stock market at board's elections, taking into account the changes the board directors' characteristics associated with quotas (part IV)?

To sum up, our final dataset consists of a panel dataset over the years 2011-2014 including all Italian firms listed on the Milan Stock Exchange, for which we have data on the composition of the board of directors, individual characteristics of board members, board election dates, financial indicators and the daily closing price. We will also use data on 135 Spanish companies listed on the Madrid Stock Exchange as a control group in part III. From Comisión Nacional del Mercado de Valores, we collect information on the gender composition of the board of directors as of June 2011, from Orbis we collect financial and sector data and from Bloomberg we download daily stock price data of these Spanish companies.

5 Part I. How boards of directors change

We start analyzing the effects of the gender quota law on the individual characteristics of board of directors. Following Ahern and Dittmar (2012), we aggregate individual characteristics at the board level. We then evaluate the change of board characteristics before and after the reform, taking into account the pre-reform trend. Understanding how boards change after the quota is important to reply to the "folk wisdom" that gender quotas are associated to the entry of less-qualified individuals. Our analysis focuses on the level of education as the main characteristic that proxies members' competence.[15] This is in line with Bianco et al. (2015) for the Italian context, Adams and Ragunathan (2015) for the U.S. and with the literature on the selection of

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[15]We do not consider CEO experience, not only because of the extremely low number of women directors and CEO in listed companies before the law, but also because having more women in top positions, and thus giving them the opportunity to acquire experience, is exactly the goal of the law.

politicians (Galasso and Nannicini, 2011).[16] Nevertheless, the final "judge" of which characteristics signal a positive attribute will be given by the financial market (see Part IV).

5.1 Methodology

In an ideal evaluation setting of a natural experiment, only one random group of firms is subject to the reform in a given year (treated group), and the other firms are not subject to the reform in this year (control group). We would observe the outcomes in the treated group before and after the reform and compare them with those of the control group. Unfortunately, all Italian listed companies are subject to the law, and it is difficult to imagine a control group of firms similar to the listed ones and not subject to the law. However, we can exploit before-after reform changes for the same firm and we can observe outcomes/indicators in years before the reform to adjust for the time trend. Despite not being the perfect identification strategy, this still represents a very informative analysis. We also use a graphical analysis to support our identification.

Figure 2 shows the timeline of the implementation of the law and the board elections for the two cohorts of firms that we consider: as boards are renewed every three years, the first cohort changes the board in years 2007, 2010 and 2013 and the second cohort in years 2008, 2011 and 2014. Thus, for each cohort, the first two elections (2007 and 2010 for the first cohort, 2008 and 2011 for the second one) are not affected by the quota law, while the third election happens to be in the post-quota period. Thus we can evaluate the impact of the reform on board characteristics by comparing the changes in the period 2007-2010 and the period 2010-2013 for the first cohort. Similarly, we compare the changes in the period 2008-2011 and in 2011-2014 for the second cohort. [17]

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[16]Note also that attracting better educated people is considered an essential part of firms' business strategy and one of the main reasons behind the promotion of gender equality (see OECD, 2012).

[17]In the appendix (A1) we provide an alternative identification strategy which exploits the existence of three random groups of firms with staggered board elections. results are in line with what obtained in this section.

More precisely, starting from the first cohort, we perform an "adjusted before-after reform" evaluation design. We define β as the impact of the reform on the characteristic I of the board, according to the following formula:

$$\beta = \left(\overline{I}_{t+3} - \overline{I}_t\right) - \left(\overline{I}_t - \overline{I}_{t-3}\right) \tag{1}$$

where $\overline{I}$ is the average over the sample of boards of the characteristic under evaluation, and t indicates the calendar year, with $t = 2010$.

The assumption underlying our identification strategy is that, if the reform had not happened, $\left(\overline{I}_{t+3} - \overline{I}_t\right)$ woud have been equal to $\left(\overline{I}_t - \overline{I}_{t-3}\right)$. The coefficient β is estimated through the following equation:

$$I_{ijt} = \alpha_1 + \alpha_2 \, second_{jt} + \beta \, second_{jt} * reform_j + \varepsilon_{ijt} \tag{2}$$

where I_{ijt} refers to the characteristic of board i (board of director and board of auditors) of each firm in period j ($j = 0, 1$, where $j = 1$ refers to the period 2010-2013 and $j = 0$ refers to the period 2007-2010) and year t ($t = 1$ refers to year 2013 if $j = 1$ and to year 2010 if $j = 0$; $t = 0$ refers to year 2010 if $j = 1$ and to year 2007 if $j = 0$). *Second* is a dummy variable equal to 1 if the year is 2013 for the time period 2010-2013 ($j = 1$), or if the year is 2010 for the time period 2007-2010 ($j = 0$); and 0 otherwise. *Reform* is a dummy variable equal to 1 if the time period is 2010-2013 and 0 otherwise; ε_{ijt} is a composite residual consisting of a board-specific fixed effect and a standard error term.

We replicate regression 2 for the second cohort 2008-2011-2014, and together for the two cohorts of boards (2007-2010-2013 and 2008-2011-2014). Having two repeated cohorts of boards staggered over one year gives the opportunity to compare what happened to the cohort 2007-2010-2013 and to the cohort 2008-2011-2014. If the before-after estimated change (i.e. β) is similar across the two cohorts, we are reassured against the concern that time-varying unobservable variables may drive our results. Moreover, we check that the time-trend before the reform is the same for the two cohorts: for each characteristic under evaluation we estimate a regression coefficient for the time-trend before the reform, separately for the two cohorts, and test that they are not significantly different (95% confidence interval).

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The characteristics I of each board under evaluation are: the share of women, whether the share of women exceeds the 20% initial threshold required by the law (yes or no), the presence of a female president (yes or no), the presence of a female CEO (yes or no), the share of board members with a university degree (all, and female and male separately), the share of board members with a graduate degree or MBA (all, and female and male separately), the share of board members with a foreign university degree (all, and female and male separately), the share of board members with a university degree in economics and business, in law, in engineering, in political science (all, female and male separately), the heterogeneity of the fields of study within the board, the share of board members older than 60 and 70 respectively (all, and female and male separately), the share of board members belonging to the family owners (all, and female and male separately), the average number of board positions (all, and female and male separately).

5.2   Results

Table 3 presents our results: the first column shows the results of estimating equation 2 for the cohort 2007-2010-2013; the second column for the cohort 2008-2011-2014 and the third column for both cohorts together. Not surprisingly, the reform is significantly associated with an increase of the share of women directors in all the columns. Interestingly, the reform is also associated with an increase of the share of women on boards over the initial target of 20%.[18] Thus, the reform has reached the goal of increasing female representation on boards. When we look at the roles of members of the board, and distinguish between presidents and CEO, we see an increase of the share of female presidents. For the cohort 2008-2011-2014 and for the full sample of boards, we also observe an increase of female CEOs. These results suggest that the reform increases women's empowerment beyond the simple numerical outcome.

Moving to our second group of outcomes, education, the reform increases the share of members with a university degree and graduate studies. The

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[18]As the law imposes to reach the closer higher rounded number, we have added a unit to the non entire numbers.

result is significant for the cohort 2008-2011-2014, and for the full sample. This suggests that firms that have more time to adapt react more strongly to the change. Interestingly, the higher average level of education of board members after the reform is not only due to women, but, when concentrating on graduate studies, also to men: with gender quotas law, we find men with higher education than before the law. Similarly, the second cohort shows an increase of board members, both men and women, who studied abroad. When we consider the fields of study, a robust result is that after the reform there are more women with a degree in economics and business and with a degree in law, while for the other fields results are not robust across all our cohorts. We do not find significant change of the Herfindahl index, which captures the heterogeneity of the board in terms of fields of study.

Our next indicator is age. Gender quotas are associated with lower age, by introducing younger women on the boards: this effect is clear when we consider individuals above the age of 60 in the cohort 2007-2010-2013 and in the comprehensive group. For the same subgroups we find a significant decrease of board members older than 70. This reduction is driven by women. Note that in Italy board members aged more than 70 are not an exception: in the pre-quota period they were roughly 15% of board members. The reduction of age as a spillover effect of gender quotas is probably particularly meaningful in this context (see also Baltrunaite et al., 2015, in the context of politics): as the average age of directors is high (around 55 years in the period 2009-2011), a reduction of the age of directors (especially if we note that the effect is robust after the threshold of 70 years old) can be interpreted as an outcome of a more balanced composition. To capture heterogeneity of the board by age, we also calculate the standard deviation of the age of all members of the boards and find that it is not significant.

Table 3 also shows that the gender quota reform is not associated with a significant change in the number of board members with family relationship with the ownership. A major concern for the introduction of a gender quota law relates to the risk of appointing non-competent women (low-educated) linked to the family of the owners. The evidence in table 3 seems to reassure against this concern.

Finally, we check whether gender quotas increase multiple positions. This is another common concern when we consider the introduction of gender quotas: if quotas end up in appointing the same few women in all boards, they are not able to reach their goal of giving opportunities to all qualified individuals, men and women, and they risk to produce a reduction of the quality of corporate governance. Table 3 shows that the average number of positions hold by individuals does not seem to show a clear increasing pattern with the reform: it increases for the first cohort, while it does not significantly change for the second cohort and the comprehensive group. If we consider men and women separately, we observe an increase in the number of board positions hold by men in the first cohort, and an increase in the number of positions hold by women in the second and the comprehensive groups.

5.3 Into the mechanism

What is the mechanism driving the observed changes in board characteristics after the implementation of the gender quota law? This fundamental question does not have an easy answer. We do not claim to have the final answer, but we provide some evidence that a possible mechanism relies on the selection process, which dramatically changes after the introduction of quotas.

We focus on education and age, the two main variables where we have observed significant changes after quotas. We split our board members in three groups: retained, exiting and new members.[19] Table 4 reports data for the average characteristic for each group, comparing in panel A for the first cohort of companies the election 2010 (before quotas) and 2013 (after quotas) and, in panel B for the second cohort, the election 2011 (before quotas) and 2014 (after quotas). In the pre-reform situation, new members were not necessarily more educated than exiting ones, rather the opposite. Exiting members were more educated than retained ones, if we consider those with a university degree, and than both new members and retained if we consider those with a graduate level of education (panel A). The situation is completely

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[19]We are aware that re-appointments may be constrained by factors which we do not consider (such as the number of previous appointments). These factors are however time-invariant.

different in 2013, when the new members are significantly more educated than both the exiting ones and the retained for both levels of education (panel A and B). It is not clear whether retained members are more educated than exiting ones: retention is probably based on different criteria. Certainly, the pre-quota evidence, in which retained members were significantly less educated than exiting ones (for both level of education in panel A and for the graduate level in panel B), disappears. If we compare directly the three groups in the different years, retained members after the reform are more educated than those before the reform (considering those with a university degree in panel A and those with a graduate degree in panel B). New members after the reform are more educated than new members before. When we consider male and female members separately, we note that new female members after the reform are always more educated than retained ones (who are however very few). Interestingly, also new male members appointed after the reform are always significantly more educated than both retained and exiting male members, thus suggesting that the selection process of male changes after the reform and it leads to the appointment of more educated men. These results provide evidence of a slightly negative selection process in place before the reform (with more educated members exiting the board), which is reversed after the reform. The reform induces a different, better selection of both female and male members.

Age follows a slightly different process: there is evidence that new members were significantly younger than retained and exiting members even before the reform, a fact which is confirmed after the reform. However, the reform seems to have accelerated the process. In fact, the percentage of new members older than 60 or 70, males and females, is significantly lower after the reform for both cohorts. After the reform, new members have a lower share of older people than the retained ones (males and females) and, especially if we consider males, than the exiting ones.

These results are particularly meaningful in the Italian context, where female appointments before the introduction of the quota were mainly driven by family representation on the board (often of women with lower education and less engaged than men in running the business), rather than by selection

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based on merit (Bianco et al., 2015). Our findings suggest that the gender quota law has improved the overall selection process. This is due both to the enlargement of the competition to women, who turn out to be highly educated, and to the better selection of male members (i.e. the less educated men exit the board).

5.4   Robustness analysis

In this section we perform several robustness checks to our main analysis.

First, one might be concerned that the results of the "before-after" analysis we presented are driven by an omitted time-trend of the variables we considered. This concern is exacerbated by the fact that we do not have a control group, since the quota applies to all Italian listed companies, although in different periods. In Figure 3 and 4 we present four graphs that show the evolution of women's age and education over the period 2009-2014. The triangle shows the first cohort of firms (which renews the board in years 2007, 2010 and 2013), and the square indicates the second cohort (which changes the board in years 2008, 2011 and 2014). We also consider a third cohort of firms with board elections in 2009 and 2012, which is represented by the diamond marker. Note that this third cohort is never affected by the reform (see figure 1). The graphs show a clear time-trend before the reform, and a spike in the value of the variables in 2013 and 2014, namely after the introduction of the quota law. Figure 3 shows that, although the percentage of educated women is increasing over time, it increased dramatically after the introduction of the reform for firms that changed their board in 2013 and 2014. Similarly, in figure 4, the percentage of women directors older than 60 and 70 is decreasing over time for all firms, while in 2013 and 2014 it decreased dramatically only for firms that changed their board under the new rule (square and triangle markers). Therefore, based on this graphical analysis, we are able to limit the concern that the presence of an omitted time-trend substantially drives our main results.

Second, we focus on different industrial sectors: consumer discretionary,

financial sector, industrials and other minor sectors.[20] One may be concerned by the fact that the introduction of the gender quota law overlaps with a period of economic crisis. Firms may decide to better select their board members by appointing more qualified individuals not as a result of the quota law, but as a reaction to stronger competition. However, if this is the case, we should observe differential effects by sectors, with sectors more affected by the economic crisis (for instance, the financial sector) showing, for example, a significant increase in the education level, while the other sectors do not. However, when we split our sample by sectors, we do not find any differential effect across sectors, thus showing that firms belonging to different sectors selected board members in a rather similar way.[21]

Third, we check that quotas are binding in most of our boards and that all effects remain if we exclude the few boards that already satisfied the required threshold in the pre-reform period (around 15-20% of the sample, mainly boards of auditors). All our significant effects related to women's empowerment, education, age are even stronger if we only consider boards that had no women on board in the pre-reform period (50% of the sample).[22]

Fourth, we also consider the dimension of the company and check whether our results are driven by either larger or smaller firms. We consider firms above and below the median value of assets in 2012, and run separate regressions for the two subgroups. Once again, we do not find that our results are different between the two subgroups.[23]

Fifth, since the law applies to all board members, our analysis put all type of boards together, mainly boards of directors and boards of statutory auditors. Our main results are robust to focusing only on boards of directors, or boards of statutory auditors: the gender quota law reform induces higher education

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[20]We follow the GICS classification of industrial sectors. According to the GICS classification of sectors, companies in the consumer discretionary sector include automobiles and components, consumer durables and apparel, consumer services, media and retailing; firms in the industrials include firms producing capital goods and offering professional and commercial services; the financial sector includes banks and companies providing diversified financial services, insurance and real estate. In our analysis, minor sectors include energy, health care, IT, materials, telecommunication services and utilities.

[21]Results are available upon request.

[22]Results are available upon request.

[23]Results are available upon request.

for members of the board, lower age and has no impact on family and multiple positions. However, when we focus on the board of directors only, we notice a very large and highly significant increase in the percentage of directors with a university degree or a graduate degree (both men and women) and a large and significant increase in the percentage of members who studied abroad (both men and women) for the 2008-2011-2014 subgroup, thus suggesting that the increase in the level of education of board members for the 2008-2011-2014 subgroup is mainly driven by the members of the board of directors.[24]

Finally, it could be the case that the quota law is associated with a different number of members of the board: companies may try to elude the law by reducing the number of directors to include in each board. Alternatively, they may enlarge the size of the board in order to keep all male members. We check that this does not happen in Italy.

6 Part II. The effects on performance

In this section we turn to the economic and financial outcomes and analyze the effects of women's empowerment on companies' performance.[25] Following a standard literature (Ahern and Dittmar, 2012), we consider the following measures of firms' performance: number of employees, assets, production, profits, ROA, Tobin's Q, short-term debts. We are aware that the time span after the quota law is still limited, and we can only consider short run effects. A large literature has identified low risk aversion as a female trait (see Bertrand, 2011 for a review). To provide evidence in this direction, we also consider the impact of gender quotas on the riskiness of the company, a dimension that has not been addressed in the Norwegian context.

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[24]Results are available upon request.

[25]For this analysis we drop the companies with a one-tier governance system (*Monistico*) to have a group of companies with a comparable corporate governance system, and we concentrate on the members of the board of directors (*Consiglio di Amministrazione; see footnote 4).*

6.1 Methodology

In order to estimate the causal effect of women's presence on the boards on firms' outcomes, we employ an instrumental variable approach with fixed effects for firms and years.

We use data from 2010 to 2014 and regress the firm's outcome on the percentage of female directors on the board, which is instrumented with the dummy *reform period*. This variable takes on value 1 in 2013 for firms that changed their board in 2013, thus being subject to the quota. In 2014 the variable takes on value 1 also for firms that changed their board in 2014, thus leaving in the control group firms that will change their board in 2015, namely what we called the "phase-in" group. As a second stage, we estimate the following equation:

$$y_{i,t} = \alpha + \beta \, percentage \, women \, directors_{i,t} + \theta_i + \tau_t + \epsilon_{i,t} \qquad (3)$$

where $y_{i,t}$ is the firm's outcome, represented by the number of employees, assets, production, profits, ROA, Tobin's Q and short-term debts, for each firm i and year t, where t goes from 2010 to 2014; $percentage \, women \, directors_{i,t}$ is the proportion of women on the board; θ_i and τ_t represent firm and year fixed effects respectively; $\epsilon_{i,t}$ is a random error with normal distribution, and β is the parameter of interest.

To assess the relationship between women's empowerment and riskiness of the company, we regress the monthly volatility of stock prices on the percentage of female directors. We compute the monthly volatility as the monthly standard deviation in the stock price for each firm, using daily data from 2011 to 2014. We run the same regression as in equation 3, where the outcome is represented by monthly volatility for firm i in month t.

6.2 Results

The first stage regression in table 5 shows that *reform period* is positively related to the share of female directors, and the coefficient is significant at the 1% level, thus showing that the reform dummy is a strong predictor for the percentage of women on the board. The results of the instrumental variable

regression in table 6 show that all the considered performance outcomes are not significantly (and hence, differently from Norway, not negatively) affected by the proportion of women on the board.

Finally, in table 7 we analyze whether women's empowerment is related to the riskiness of the company. The coefficient on the proportion of women directors is equal to -0.0092 and significant at the 1% level. Therefore, our evidence suggests that the proportion of women on the board is associated with a significant reduction in the volatility of stock prices, i.e. less riskiness of the company.

6.3   Robustness analysis

We perform several robustness checks to our analysis. First, it might be the case that the effect of the share of female directors on performance outcomes is non-linear, namely that there is a differential effect at different thresholds of the share of female directors. To account for this possibility, we instrument several thresholds with the instrument *reform period*, setting these percentages at 5%, 10%, 15% and 20% (the latter is the threshold imposed by the quota law). We do not find any effect of these thresholds on performance measures, and thus we can exclude differential effects of the percentage of women directors at different thresholds on performance measures.

Second, we check whether the negative effect of the share of female directors on the volatility of stock prices, which is the only significant effect obtained by the reform on outcomes, is driven by firms of particular industrial sectors. We perform separate regressions to find that the reduction in the monthly volatility is not driven by firms in the financial and consumer discretionary sectors, but rather by companies in the industrials and other minor sectors. We also check whether the percentage of female directors has differential effects on stock price volatility in large firms relative to smaller firms. We run separate regressions distinguishing between firms with assets above and below the median value of assets in every year, and find that the reduction in stock price volatility is negative and significant in both groups. Therefore, we can conclude that there are no heterogeneous effects of the percentage of women directors in firms of

different size.

7 Part III. Stock market reactions at the announcement of the law

As we consider listed companies, a natural way of evaluating the effects of the reform is to analyze the reaction of the stock market. In this section, we investigate the reaction of the Italian financial market at the announcement of the introduction of the quota law, while in the next section we concentrate on the date of board elections.

7.1 Methodology

Our analysis follows the same identification strategy of Ahern and Dittmar (2012) and Nygaard (2011). Ahern and Dittmar (2012) use the "event study" technique to assess whether the Norwegian board quota law affects stock price data of Norwegian listed companies relative to U.S. and other Scandinavian companies (not Norwegian). These countries are chosen as a comparison group, as the debate on gender quotas had not yet hit the political agenda.

We run the event study over the date of approval of the quota law on June 28, 2011; for robustness, we also repeat the analysis over the date of the approval of the draft of the law by the Italian Senate on March 15, 2011. These two dates are chosen after checking the news coverage of the quota law on Lexis-Nexis. In fact, for the first time on March 15, 2011 the Italian public opinion was confronted with the concrete possibility of the enforcement of the board gender quota, and much emphasis was put on the debate, especially after International Women's Day on March 8. Similarly, on June 28, 2011 the final approval of the law hit the news and generated a harsh debate in the political arena.

Closely following Ahern and Dittmar (2012), we consider as comparison group the 135 Spanish companies listed on the Madrid Stock Exchange.[26] We

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[26]In the appendix A2 and A3, we provide a different specification for the comparison group, exploiting the staggered board renewals within Italian companies. Results are similar

select Spain as a comparison group, since it is a Southern-European country similar to Italy with respect to cultural features and not very far in terms of gender statistics. However, gender quotas in Spain were not under fervent discussion in 2011, as the country chose to rely on voluntary recommendations back in 2007, and planned a first assessment of this policy for 2015 (Conde-Ruiz and Hoya, 2015).

We estimate abnormal returns around the event dates by using the standard Capital Asset Pricing Model (CAPM). In the field of law and economics, event studies using the CAPM are commonly used to assess the effects of regulation. The key focus of an event study is measuring the sample securities' mean and mean cumulative abnormal return around the time of an event (Kothari and Warner, 2004). We estimate the following equation:

$$R_{i,t} = \alpha_i + \beta_{i,T} R_{m,t} + \epsilon_{i,t}, \tag{4}$$

where $R_{i,t}$ and $R_{m,t}$ represent respectively the daily stock return of firm i at time t and the market return. The market indexes are represented by the FTSE MIB for Italian firms and by the IBEX-30 for Spanish firms $R_{i,t}$ and $R_{m,t}$ were computed as

$$R_{x,t} = \log(P_{x,t}) - \log(P_{x,t-1}) \tag{5}$$

where $P_{x,t}$ represents the daily closing price of stock x at time t, and $P_{x,t-1}$ represents the daily closing price of stock x at time $t-1$. The parameter $\beta_{i,T}$ in equation 4 is estimated by regressing the stock return on the market return — FTSE MIB for Italy and IBEX-35 for Spain — over the corresponding estimation period (T). Consistently with the previous literature (Rossi and Cebula, 2015, Adams, 2011), we use the (-250, -11) days estimation window for the estimation of equation 4. The abnormal return (AR) for firm i at time t is computed as:

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_{i,T} R_{m,t}) \tag{6}$$

while the cumulative abnormal returns $CAR_{i,T}$ for firm i are the sum of

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to what we obtain in this section.

the abnormal returns over the corresponding event window, from day $-T$ to day T, where $T \geq 1$ and $T \leq 5$:

$$CAR_{i,T} = \sum_{t=-T}^{T} AR_{i,t} \qquad (7)$$

Consistently with previous studies, we consider several event windows for robustness.

In our first specification, we follow Ahern and Dittmar (2012) and run a cross-section OLS regression that compares the sum of abnormal returns between Italy (treated) and Spain (control) at the day of the announcement of the law, interacting the dummy for treatment (*Italian*) with the gender composition of the board, and controlling for board size, the logarithm of assets and industrial sectors:

$$
\begin{aligned}
CAR_i = \alpha &+ \beta\, Italian_i + \gamma\, percentage\, women\, directors_i + \\
&\delta\, Italian_i * percentage\, women\, directors_i + \phi\chi_i + \epsilon_i
\end{aligned}
\qquad (8)
$$

where $Italian_i$ is a dummy variable indicating the firm i is Italian and $percentage\, women\, directors_i$ records its share of female directors at the announcement date. χ_i is a vector of control variables including the board size, the logarithm of assets and industrial sectors dummies. ϵ_i represents the error term. Standard errors are clustered at the firm level. The specification aims at assessing whether the announcement of the quota law has any significant impact on less-gender diverse Italian firms relative to less gender-diverse Spanish firms.

7.2   Results

Table 8 shows in Panel A the results of the event study at the approval of the quota law on June 28, 2011. Italian firms experienced a significant drop in stock prices at the announcement of the approval of the law, with an average cumulative abnormal return of -1.28%, which is significantly different from

zero.[27] In order to check whether the drop is driven by less gender-diverse firms, we compare the mean CAR's of firms whose share of women directors was above the full sample average to CAR's of firms that were below the average share of female directors at the approval of the quota law. The underlying idea is that of comparing two groups that face a different degree of strictness of the constraint imposed by the board gender quota. We find that the mean CAR's are negative and significant for both groups, while the difference in the group means is close to zero and insignificant. These results appear to contradict the findings of Ahern and Dittmar (2012), who argued that gender quotas negatively affect stock prices, and the drop is larger for less-gender diverse firms due to the constraint imposed by the quota law. Our results are robust when looking at subgroups based on the median share of women on board and the median number of women to be appointed by effect of the quota. As discussed in section 7.1, if the financial market had anticipated the approval of the law at an earlier stage of the legislative procedure, we would be underestimating the market reaction to the introduction of the law. Therefore, in Panel B we performed the same event study at an earlier date, namely at the approval of the draft of the law by the Italian Senate on March 15, 2011. However, the results show that on March 15, 2011 the Italian stock market did not experience any significant movement in the average stock price, and thus the results on June 28, 2011 seem to adequately describe the response of the financial market to the introduction of the quota law.

As in Ahern and Dittmar (2012), we present additional evidence of the market reaction to the approval of the quota law and perform a difference-in-difference regression of the cumulative abnormal returns of Italian and Spanish firms on board characteristics and firm financial measures. The results in Table 9 show that on average Italian firms experienced significantly lower returns at the approval of the quota law on June 28, 2011 relative to Spanish firms. In fact, the coefficient on the Italian dummy is negative and significant, and ranges from -2% to -1.6%. However, there was no significant difference in

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[27]Note that a cumulative abnormal return equal to zero is aligned with the stock market performance, and thus what matters is the extent to which the cumulative abnormal return is different from zero.

the stock price performance between more gender-diverse Italian and Spanish firms. Therefore, we are unable to cogently link the drop in the average stock price on June 28 to the introduction of the quota law. For robustness, we repeat the same analysis by looking at stock price performance on March 15, 2011, and as expected we found that there is no significant difference in the average stock price returns of Italian companies relative to Spanish companies.

Overall, we find that the Italian stock market had a negative reaction at the day of the announcement of the law. However since this reaction does not depend on how binding is the quota for the company, we do not have compelling evidence that this negative effect is due the announcement of the quota law. Is this negative effect at the day of the announcement confirmed at the day of board elections? This should be the case, if quotas are a negative, costly shock for the stock market. Next section will provide a different answer.

8 Part IV. Stock market reactions at the board elections

Results in part II show that boards change after the quota law: they mainly become more gender balanced, younger and more educated. If these changes are positively perceived by the market, it could be the case that, although the announcement of the law is not positively received by the market, as documented in part III, the actual changes of the boards at the elections translate into a positive effect on the stock market. In this section we analyze the stock market reactions at the board elections, controlling for the characteristics of the members of the board, i.e. age, gender and education, which we know have changed after the quota law (see Part 2).

Throughout the paper we have been agnostic about a possible interpretation of these characteristics as a signal of quality.[28] As we are considering

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[28]The relationship between age and the quality of decision-makers is indeed not obvious: on one side younger directors have a more active style of leadership, they are more likely to promote structural changes and bring more creativity (Wiersema and Bantel, 1992; Wegge and Schmidt, 2009), on the other side they have less experience. As for education, see Part I and footnote 13.

listed companies, what really matters is the reaction of the financial market. If the stock market reacts positively to a given characteristic, we may argue that this characteristic is associated with quality.

8.1 Methodology

For all board elections of companies in the period 2011-2014 we run an event study over each board election and compute the AR's and CAR's for different event windows.

We consider the board election date and use the three groups of companies identified by the existence of staggered elections: pre-reform, phase-in, post-reform. We consider the characteristics identified before, i,e. age, education level, diversity of field and the relation with the controlling family (see also Adams, 2012). For education, we focus on the proportion of board members with a university degree and we include field diversity captured by the Herfindal index for the diversity of field of study. Age instead is summarized by a dummy variable indicating whether the proportion of board members aged below the median age is above 50%.[29]

We regress the resulting CAR's on the board characteristic variables, controlling for financial variables and industrial sectors, to check whether the quota law and the characteristics of elected members have any significant impact on companies' abnormal returns over the election days:

$$CAR_i = \alpha + \beta\, quota\, election_i + \gamma\, percentage\, women\, directors_i + \phi\psi_i + \epsilon_i \quad (9)$$

where *quota election* is a dummy variable equal to 1 for elections with gender quotas and 0 otherwise, ψ_i is a set of control variables including the board characteristics built from individual characteristics (percentage of members belonging to the family, Herfindahl index of fields of education, percentage of members with post-tertiary education, percentage of members with age be-

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[29]We here prefer a dummy variable to capture age (rather than the usual share of board members above a certain age), because we want to directly identify the different stock market performance of "young" and "old" boards. Our previous variables are however strongly correlated with this dummy variable.

low the median), the board size, the logarithm of assets, ROA and industrial sectors dummies and ϵ_i represents the error term.

8.2   Results

Table 10 shows the result of regression 9 separately for the full sample of board elections (column 1) and the three subgroups of post-reform, phase-in and pre-reform elections. For each subgroup, we regress the computed CAR's on board and firm characteristics, as described in section 8.1. When looking at the full sample of board elections in column 1 we find that the dummy *Quota election* is not significant, suggesting that the constraint imposed by the law does not have any effect on stock price returns *per se*. However, the quota law seems to matter through the number of women to be appointed in order to comply with the law. In fact, the percentage of women on board before the election is negative and highly significant in column 1: a lower share of women before the election — and thus a higher number of women to be appointed in order to comply with the quota — results in higher returns over the election period. This result is consistent with the fact that the introduction of gender quotas imposes a re-organization of the entire composition of the board (see Part I). This effect is stronger in companies farther from the quotas, which have to make more substantial changes. Quotas may thus induce a beneficial renovation of the board, which is positively received by the market. When looking at the full sample specification, the age and level of education of board members also matter. In particular, a higher proportion of members with a degree and relatively young boards are positively related with stock price returns over the days surrounding the election of the board of directors. Again, the renovation of the board is positively received by the market. Financial variables — namely ROA and the logarithm of assets — do not seem to significantly affect abnormal returns over the board election date.

We then split the sample and repeat the analysis to check whether these results are driven by any of the three relevant subsamples: pre-reform, phase-in and post-reform. When looking at the post-reform and phase-in subsamples, we find that the percentage of women on board before the election is negative

and significant at the 5% level (-0.1435 and -0.3093): after the approval of
the law, having less women on board is associated with lower returns. This
is because after the approval of the law it becomes clear that firms with less
women will have to make more substantial changes to their board composition,
in order to comply with the quota target. Interestingly, this effect happens not
only for board elections when the law is enforced (post-reform period) but also
for those during the phase-in period. In fact, we know that the process of board
renovation starts already during the phase-in period, when the percentage of
women directors in Italy increases substantially (see table 1). Similarly, the
positive effect of a young board remains significant only in the phase-in period.

9   Discussion and Conclusions

We have analyzed the effects of the introduction of a gender quota law on
boards of listed Italian companies according to several dimensions: the change
of boards' characteristics, the effects on firms' performance, the stock market
reaction at the announcement of the law and at the board elections. We
show that quotas are associated with a higher share of women directors, well
above the required threshold, with higher education levels of all members of
the board and with lower age. These results suggest that the gender quota
law introduces a new selection process for board members, which changes the
composition of the board. Changes may be costly, at least in the short run.
However, we are able to reject the existence of a negative impact of gender
quotas on economic performance, a crucial concern when talking about the
introduction of quotas. We also find that women's empowerment is linked to
a lower variability of stock market risks. As the law went in place in 2012,
it is probably still too early to provide a final answer to the effects on the
changes in board composition on firms' results. However, we find that there
is a positive reaction of the stock market at board elections.[30]

Our results for the Italian case challenge what we have learnt from the

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[30]Another unintended consequence of the Norwegian law is the delist of companies (Bo-
hern and Staubo, 2014). We do not find evidence of this effect for the Italian case: 215
companies were listed in 2010 and remain listed in 2013, 57 were listed in 2010 and are not
listed in 2013 and 28 are listed in 2013 but were not in 2010.

previous Norwegian case, mainly that the stock market had a negative reaction to the law and performance (measured by Tobin's Q) decreased. How to reconcile our results with the ones in Norway? Table 11 summarizes the status quo of board of directors' characteristics before the reform in Italy and Norway. Norway presents a clearly higher level of education of board members in the period preceding the reform compared to Italy. Moreover, it presents a lower average age of board members. In both cases, the level of education increases after the introduction of the quota (Ahern and Dittmar, 2012),[31] while the change in age appears to be stronger in the Italian case, where we have shown an overall decrease of the share of older members. We propose two arguments to understand the different mechanisms which may have characterized Norway and Italy: the status quo and the selection. In Norway, the status quo before the reform was less critical than in Italy. Moreover, the reform imposed an immediate jump up to 40% of female representation. In the Italian context, instead, the status quo was less favourable to qualified people. The gradualism of the Italian reform may have helped firms to select the appropriate candidates. The starting assumption of Ahern and Dittmar (2012) is that firms know who are the best members for their performance and what characteristics they should have. In their argument, these characteristics correspond to those of the retained members, which are freely chosen by the firm. Thus, the farther the new members are from the characteristics of the retained ones (a fact which is very clear for women), the more likely it is that the firm will incur in losses. We question the initial assumption, and let the market decide which characteristics are associated with better performance (section 8). It turns out that these are higher education and lower age. In section 5 we find that in the pre-reform period, the selection process in Italian boards was not oriented towards merit (see also Bianco et al., 2015): exiting members were often more educated than new and retained ones. After the quota law, instead, the selection process becomes more merit-oriented: both female and male new members were more educated and had lower age than exiting

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[31]Ahern and Dittmar (2012) highlight the role of previous experience as CEO, while we concentrate on the role of education, because the share of Italian women with a CEO experience is close to zero, and thus the effect would be quite mechanical. We thus consider education a more interesting characteristic, as explained in Part I.

and retained ones. If we follow Ahern and Dittmar (2012) argument and we compare directly the characteristics of new female members and exiting male members to understand the effects of the changes on the overall composition of the board, we find that new female members have a higher level of education (both university and graduate) and lower age than exiting men. Thus, this substitution between males and females increases the qualifications of board members (see table 8). This is probably why drops in share prices are not found in the Italian case.

We suggest that our results are consistent with gender quotas inducing a beneficial renovation of the board, which is positively received by the market. This is in line with what has been found in the context of politics by Baltrunaite et al. (2014) and Besley et al. (2013). Our argument is supported by some interesting additional evidence. During the discussion around the introduction of the law, two facts became rapidly clear: first, the law has the potential to threaten the so-called "old-boy club", which dominated the boards of directors prior to the introduction of the quota law, not necessarily because of their competence. Second, competent women are abundant: several lists with thousands of CV of board ready women were collected by women's associations, institutions, business schools (see Profeta et al., 2014). Our results suggest that gender quotas may allow to best exploit the abundant unused female talent. The reaction of the market follows: quotas are not necessarily increasing the number of less qualified directors, who are likely to perform worse, they may rather stimulate a beneficial renovation of the ruling class.

As other countries have recently introduced board gender quotas, such as France and Germany, future studies will assess whether the results obtained for the Italian case are confirmed in other contexts. Further analyses are also needed to investigate whether the stock market reactions and changes in performance are persistent over time, and whether the new selection process initiated by the introduction of gender quotas will survive when quotas, which are temporary, will not be in force anymore.

10 Tables and figures
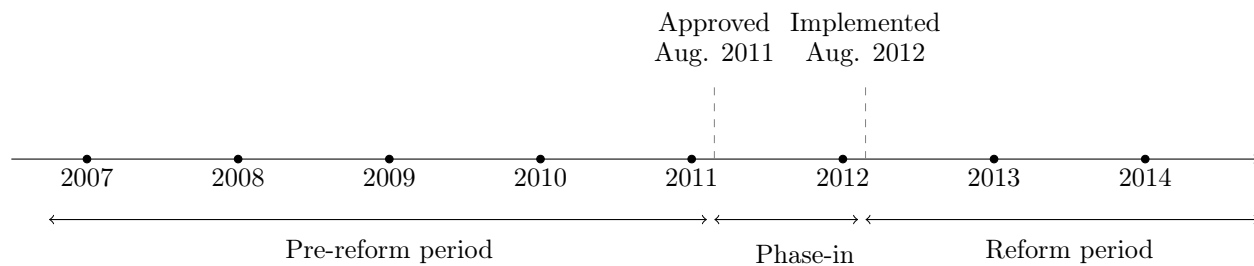
Figure 1: Timeline of implementation of the gender quota law
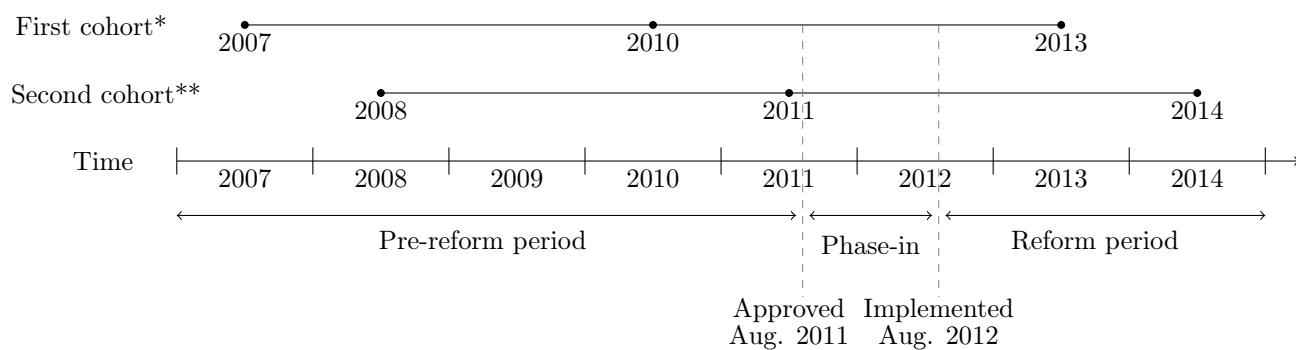
Figure 2: Timeline of board elections

Notes: The figure represents the timeline of the implementation of the law (on the time axis) and the timing of board elections.
*Board elections in years 2007, 2010 and 2013, from April to June.
**Board elections in years 2008, 2011 and 2014, from April to June.

Table 1: Summary statistics: board characteristics

		2009	2010	2011	2012	2013	2014
Women's empowerment							
Number of members		6.84	6.76	6.72	6.67	6.60	6.94
	Women	0.44	0.49	0.58	0.80	1.19	1.50
	Men	6.40	6.27	6.14	5.86	5.41	5.44
Share of women (%)		6.67	7.39	8.29	11.80	18.15	22.12
More than 20% of women (%)		1.52	1.65	2.29	3.15	8.12	11.24
Female president		3.55	3.07	3.43	3.83	6.04	1.19
Female CEO		6.53	6.88	6.19	5.70	5.42	8.70
Education							
% university degree	All	78.63	80.84	82.88	82.97	84.62	84.84
	Women	22.98	26.75	31.89	43.73	58.10	68.52
	Men	79.15	81.17	83.08	82.77	84.41	83.75
% graduate degree	All	5.11	5.28	5.41	5.14	5.37	6.98
	Women	2.89	2.50	3.30	3.75	5.91	9.51
	Men	5.05	5.27	5.33	5.10	5.09	5.90
Field diversity	All	0.66	0.66	0.66	0.67	0.67	0.65
% study abroad	All	2.30	2.30	2.40	2.89	2.85	4.04
	Women	2.30	2.20	2.32	2.63	2.48	3.16
	Men	0.76	1.12	1.68	2.82	3.21	5.45
% degree in economics	All	54.64	56.71	58.38	59.54	60.81	59.69
	Women	13.75	16.49	19.47	27.91	37.72	45.57
	Men	54.98	56.89	58.45	59.51	61.04	58.79
% degree in law	All	10.11	10.22	10.39	10.07	10.81	11.54
	Women	3.41	3.85	4.57	6.64	9.60	11.96
	Men	10.04	10.13	10.34	9.83	10.41	10.95
% degree in political science	All	1.97	2.20	2.47	2.19	2.09	2.31
	Women	1.10	1.14	1.98	1.86	2.23	2.19
	Men	2.10	2.37	2.53	2.21	2.09	2.34
% degree in engineering	All	6.63	6.88	7.00	6.50	6.30	6.19
	Women	1.02	1.42	1.89	2.57	2.60	2.50
	Men	6.88	7.14	7.37	6.92	7.00	7.26
Age							
% older than 60	All	38.05	38.28	37.02	39.46	36.81	35.23
	Women	75.25	72.89	67.07	59.99	58.55	31.59
	Men	30.72	39.25	37.62	42.23	41.71	42.30
% older than 70	All	15.79	15.28	14.12	17.42	15.81	14.04

Continued on next page

Table 1: Summary statistics: board characteristics

		2009	2010	2011	2012	2013	2014
	Women	70.60	67.57	61.68	50.33	33.90	23.38
	Men	15.95	15.77	14.94	18.95	17.93	17.12
Family ties							
% family members	All	4.38	4.35	4.31	6.76	6.31	6.83
	Women	4.75	4.54	4.67	7.38	6.77	6.84
	Men	3.95	3.92	4.03	6.29	6.10	6.69
Multiple positions							
Average number of positions	All	1.45	1.37	1.26	1.27	1.31	1.28
	Women	1.31	1.23	1.13	1.16	1.22	1.22
	Men	1.46	1.38	1.28	1.29	1.33	1.29
Retained members							
% retained	All				50.21	47.85	49.01
	Women				16.93	17.14	19.73
	Men				52.21	52.20	55.45
Number of boards		394	423	437	444	480	436
Number of firms		199	218	226	228	240	230

Notes: Averages of average board characteristics of Italian listed companies over the period 2009-2014.

Table 2: Summary statistics: firm characteristics

	2010	2011	2012	2013	2014
Log(employees)	5.42	5.41	5.40	5.37	5.29
Log(production)	10.76	10.76	10.67	10.66	10.71
Log(profits)	9.73	9.46	9.39	9.38	9.53
Log(assets)	13.03	13.04	13.04	13.05	13.01
ROA	-0.10	-0.76	-2.72	-2.12	-0.35
Tobin's Q	0.90	0.94	0.97	0.79	0.83
Short-term debt	0.69	0.64	0.63	0.69	0.67
Number of firms	243	243	243	243	243

Notes: Averages of firm characteristics of Italian listed companies over the period 2010-2014.

Table 3: Effect on board characteristics

		Boards changed in 2007-2010-2013	Boards changed in 2008-2011-2014	All boards 2007-2014
		(1)	(2)	(3)
Women's empowerment				
Share of women		17.997***	15.896***	16.991***
		(1.286)	(1.516)	(0.988)
More than 20% of women		0.152***	0.132***	0.142***
		(0.285)	(0.035)	(0.022)
Female president		0.051***	0.242***	0.142***
		(0.018)	(0.042)	(0.022)
Female CEO		0.018	0.132***	0.074***
		(0.031)	(0.043)	(0.027)
Education				
% university degree	All	2.928	4.239**	3.556***
		(1.948)	(1.716)	(1.304)
	Women	40.135***	39.652***	39.903***
		(4.516)	(4.838)	(3.297)
	Men	3.136	1.209	2.213
		(1.977)	(1.864)	(1.363)
% graduate degree	All	1.400	7.149***	4.154***
		(0.896)	(1.235)	(9.767)
	Women	5.404***	12.692***	8.895***
		(1.600)	(2.757)	(1.577)
	Men	1.333	3.684***	2.459***

Continued on next page

Table 3: Effect on board characteristics

		Boards changed in 2007-2010-2013	Boards changed in 2008-2011-2014	All boards 2007-2014
		(1)	(2)	(3)
		(1.095)	(0.919)	(0.721)
% study abroad	All	0.612	3.523***	2.006***
		(0.441)	(1.058)	(0.562)
	Women	1.768	7.582***	4.553***
		(1.317)	(1.695)	(1.074)
	Men	0.273	1.271*	0.751*
		(0.447)	(0.729)	(0.421)
% degree in economics	All	1.083	4.197**	2.574*
		(2.081)	(1.922)	(1.422)
	Women	25.683***	34.579***	30.465***
		(4.220)	(4.349)	(3.030)
	Men	0.774	-0.672	0.082
		(2.310)	(1.964)	(1.530)
% degree in law	All	2.104*	0.538	1.354*
		(1.180)	(1.130)	(0.819)
	Women	8.283***	5.806***	7.096***
		(2.165)	(2.125)	(1.518)
	Men	2.219	0.360	1.329
		(1.437)	(1.214)	(0.948)
Field diversity	All	-0.009	-0.016	-0.013
		(0.017)	(0.018)	(0.012)

Table 3: Effect on board characteristics

		Boards changed in 2007-2010-2013 (1)	Boards changed in 2008-2011-2014 (2)	All boards 2007-2014 (3)
Age				
% older than 60	All	-7.944***	-2.686	-5.426***
		(2.390)	(2.646)	(1.778)
	Women	-45.455***	-31.245***	-38.649***
		(4.433)	(5.349)	(3.457)
	Men	-1.458	3.427	- 0.882
		(2.616)	(2.883)	(1.939)
% older than 70	All	-4.817**	-0.495	-2.747*
		(2.141)	(2.207)	(1.537)
	Women	-49.040***	-36.044***	-42.816***
		(4.588)	(4.922)	(3.363)
	Men	-3.052*	2.260	-0.507
		(2.330)	(2.445)	(1.688)
Standard deviation of age	All	0.512	-0.284	0.129
		(0.498)	(0.365)	(0.299)
Family ties				
% family ties within the board	All	-0.001	0.223	0.106
		(0.957)	(0.654)	(0.582)
	Women	0.000	-2.015	-0.965
		(1.741)	(1.763)	(1.238)
	Men	0.873	0.763	0.821

Table 3: Effect on board characteristics

		Boards changed in 2007-2010-2013	Boards changed in 2008-2011-2014	All boards 2007-2014
		(1)	(2)	(3)
		(1.095)	(0.532)	(0.624)
Multiple positions				
Average number of positions	All	0.089**	-0.018	0.383
		(0.038)	(0.055)	(0.335)
	Women	0.055	0.214**	0.141**
		(0.099)	(0.100)	(0.070)
	Men	0.101**	-0.084	0.013
		(0.042)	(0.057)	(0.035)

Notes: The table reports the coefficients of the interaction term of the "before-after" adjusted OLS regression, where the dependent variable is represented by each of the variables reported in the table. Column 1 shows the results for boards with election date in 2007-2010-2013; column 2 the results for the subgroup 2008-2011-2014 and column 3 the results for all boards together. In column 1 we run the following regression: $I_{ijt} = \alpha_1 + \alpha_2 \, second_t + \beta \, second_t * reform_j + \varepsilon_{ijt}$ where I_{ijt} refers to the characteristic of board i (board of director and board of auditors) of each firm in period j ($j = 0, 1$, where $j = 1$ refers to the period 2010-2013 and $j = 0$ refers to the period 2007-2010) and year t ($t = 1$ refers to year 2013 if $j = 1$ and to year 2010 if $j = 0$; $t = 0$ refers to year 2010 if $j = 1$ and to year 2007 if $j = 0$). In column 2 we repeat the same regressione for the cohort 2008-2011-2014. In column 3 we run the regression for all boards together. The coefficient's standard error is reported in parenthesis * Significant at 10%; ** 5%; *** 1% .

Table 4: Characteristics of retained, exiting and new members

Panel A. 2010-2013 cohort

| | 2010 | | | | | | 2013 | | | | | | Difference 2010-2013 | | |
| | Ret. | Exit. | New | | | | Ret. | Exit. | New | | | | | | |
	(1)	(2)	(3)	1–2	2–3	1–3	(4)	(5)	(6)	4–5	5–6	4–6	1–4	2–5	3–6
All															
% university	82.35	91.54	89.41	***		***	86.45	86.90	92.96		**	***	*	**	**
% graduate	6.90	9.57	6.85	*	*		5.61	7.19	9.96		*	***			**
% ≥ 60 yrs	50.13	45.99	41.28		*	***	52.77	51.56	33.00		***	***			***
% ≥ 70 yrs	17.22	18.47	12.57		**	**	22.09	21.33	10.60		***	***	**		
Women															
% university							84.78	100.00	92.07			*			
% graduate							4.08	0.00	11.17			*			
% ≥ 60 yrs							25.00	40.00	15.91		*	*			
% ≥ 70 yrs							12.50	0.00	4.55			**			
Men															
% university							86.63	86.55	93.44		**	**			
% graduate							5.77	7.38	9.31			**			
% ≥ 60 yrs							55.56	51.82	42.28		**	***			
% ≥ 70 yrs							23.08	21.82	13.89		***	***			

Panel B. 2011-2014 cohort

	2011						2014						Difference 2011-2014		
	Ret.	Exit.	New				Ret.	Exit.	New						
	(1)	(2)	(3)	1–2	2–3	1–3	(4)	(5)	(6)	4–5	5–6	4–6	1–4	2–5	3–6
All															
% university	87.75	87.70	92.41		**	**	89.51	89.47	94.10		**	**			
% graduate	3.31	9.01	6.75	***		**	5.51	3.17	20.68	*	***	***	*	**	***
% $\geq$ 60 yrs	46.11	46.77	33.88		***	***	45.77	41.74	27.08		***	***			**
% $\geq$ 70 yrs	20.83	18.28	8.79		***	***	20.64	16.06	9.37	*	**	***			
Women															
% university							90.91	88.24	93.91						
% graduate							12.24	11.76	27.82		*	**			
% $\geq$ 60 yrs							22.98	5.88	12.50	*		**			
% $\geq$ 70 yrs							2.09	0.00	2.68						
Men															
% university							89.32	89.58	94.22		*	**			
% graduate							4.52	2.45	16.11		***	***			
% $\geq$ 60 yrs							49.09	44.78	36.36		**	***			
% $\geq$ 70 yrs							33.43	17.41	13.64	*		***			

Notes: Data are averages of board member's characteristics, distinguishing between retained, exiting and new members for each board election. Panel A shows the average characteristics of members of firms in the cohort 2007-2010-2013; Panel B shows the average characteristics of members of firms in the cohort 2008-2011-2014. *% university* indicates the share of members with at least a university degree; *% graduate* indicates the proportion of board members with a graduate degree (master program, PhD, MBA); *% geq 60* and *% geq 70* indicate the percentage of members aged or older than 60 or 70 respectively. The significance of the difference between groups 1, 2 and 3 is tested in the adjacent columns. Similarly, the level of significance of the difference between groups 4, 5 and 6 is shown in the adjacent columns. The last three columns test the difference between each group in different years. The level of significance of the difference resulting from the one-tailed t-test is reported as: * significant at 10%; ** 5%; *** 1% .
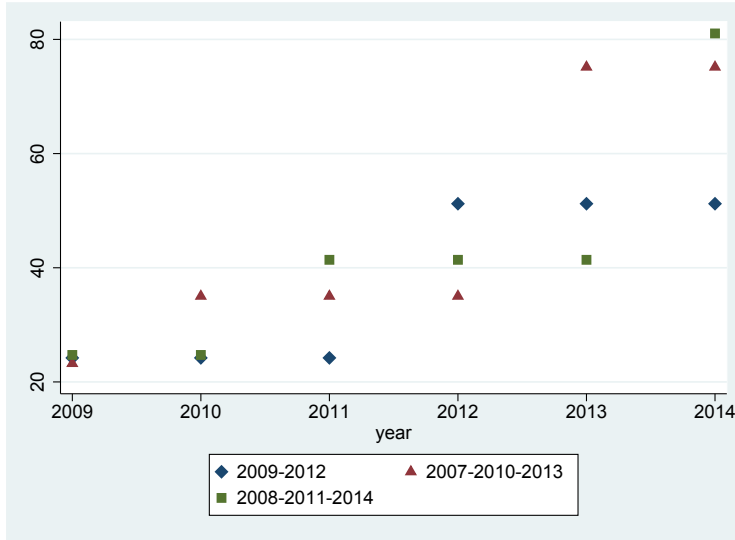
(a) Percentage of women with at least a degree
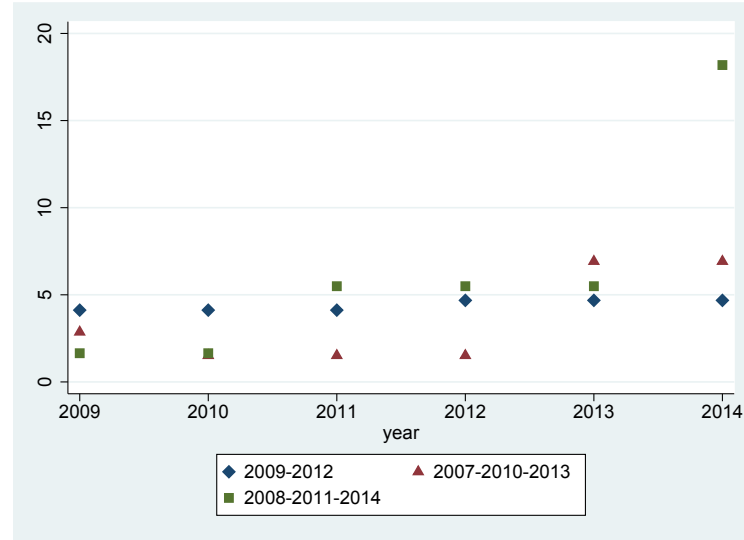
(b) Percentage of women with a graduate degree

Figure 3: Effect on women's education

Notes: Figures 1.a and 1.b show respectively the evolution of the percentage of women with a university degree over time and the evolution of the percentage of women with a graduate degree (PhD, master program, MBA) over time. The cohorts 2009-2012, 2007-2010-2013 and 2008-2011-2014 are represented by different markers. The diamond represents the 2009-2012 cohort, the triangle is the 2007-2010-2013 cohort and the square corresponds to the 2008-2011-2014 cohort.

(a) Percentage of women older than 60

(b) Percentage of women older than 70

Figure 4: Effect on women's age

Notes: Figures 1.a and 1.b show respectively the evolution of the percentage of women older than 60 and older than 70 over time. The cohorts 2009-2012, 2007-2010-2013 and 2008-2011-2014 are represented by different markers. The diamond represents the 2009-2012 cohort, the triangle is the 2007-2010-2013 cohort and the square corresponds to the 2008-2011-2014 cohort.

Table 5: IV regression: first stage

	% women directors
	(1)
Reform	0.1392***
	(0.0076)
Year dummies	Yes
Firm fixed-effects	Yes
F-statistic	147.55
Observations	1,162

Notes: Results of the first stage regression of the percentage of women directors on the reform. *Reform* is an indicator variable that takes on value 1 over the reform period, and 0 otherwise. Standard errors are reported in parenthesis. * Significant at 10%; ** 5%; *** 1% .

Table 6: IV regression: effect on performance

	Log(empl)	Log(prod)	Log(profits)	Log(assets)	ROA	Tobin's Q	Short-term debt
	(1)	(2)	(3)	(4)	(5)	(7)	(8)
% women directors	-0.105	0.069	-0.415	0.082	6.036	-1,510	-0.129
	(0.303)	(0.726)	(1.176)	(0.209)	(8.005)	(0.994)	(0.146)
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-statistic	2.54	0.50	1.10	0.29	3.88	1.27	4.89
Observations	954	829	625	973	994	986	828

Notes: Results of the IV regression of firms' performance measures on the share of female directors. Data are yearly observations from 2010 to 2014. * Significant at 10%; ** 5%; *** 1% .

Table 7: IV regression: effect on riskiness of stock prices

Dependent variable: monthly standard deviation in the stock price	
	Full sample
	(1)
Share of women directors	-0.0092***
	(0.0031)
Constant	0.0204***
	(0.0008)
Firm fixed effects	Yes
Month fixed effects	Yes
F-statistic	31.31
Observations	7,644

Notes: Results of the IV regression of the monthly standard deviation of stock prices on the share of female directors over the period 2011-2014. * Significant at 10%; ** 5%; *** 1% .

Table 8: Cumulative abnormal returns of Italian companies by gender diversity

	All firms	Above median share of women	Below median share of women	Difference (2)–(3)
	(1)	(2)	(3)	(4)
Panel A. Cumulative abnormal returns of Italian firms, 28 June 2011				
Mean	-0.0128***	-0.0127***	-0.0129***	-0.0002
	(0.0036)	(0.0051)	(0.00525)	(0.0073)
Observations	224	124	100	224
Panel B. Cumulative abnormal returns of Italian firms, 15 March 2011				
Mean	0.0030	0.0008	0.0056	0.0047
	(0.0038)	(0.0049)	(0.006)	(0.0077)
Observations	222	121	101	222

Notes: t-tests of the mean cumulative abnormal returns (CARs) in columns 1-3 and test of the difference in means in column 4. CARs are the sum of abnormal returns over the six days surrounding the announcement date ((-3;+3) event window). Column 1 reports the mean CAR of all Italian firms listed on the Italian stock exchange; column 2 and 3 report the mean CAR of Italian firms whose share of women on the board of directors is respectively above and below the median value. Column 4 shows the test of the difference in means between the values in column 2 and 3. * Significant at 10%; ** 5%; *** 1% .

Table 9: Effect of the announcement of the quota law on cumulative abnormal returns

Dependent variable: cumulative abnormal returns around the event date				
	June 28, 2011		March 15, 2011	
	(1)	(2)	(3)	(4)
Italian	-0.0203**	-0.0149***	0.0047	0.0031
	(0.008)	(0.00797)	(0.0123)	(0.0136)
% women directors	-0.0357		-0.0799	
	(0.0438)		(0.0711)	
% women directors * Italian	0.0605		0.0811	
	(0.0564)		(0.0903)	
Above median share of women directors		0.0038		-0.013
		(0.0089)		(0.0115)
Above median share of women directors * Italian		-0.0001		0.01477
		(0.0118)		(0.0153)
Board size	0.0018	0.00183	0.0001	0.0001
	(0.0011)	(0.00116)	(0.00115)	(0.0012)
Log(assets)	-0.0001	-0.0004	-0.0016	-0.0016
	(0.0018)	(0.0019)	(0.0025)	(0.00248)
Constant	-0.004	-0.0054	0.0424	0.0424
	(0.0233)	(0.0232)	(0.0367)	(0.0366)
Industrial sectors	Yes	Yes	Yes	Yes
R-squared	0.1120	0.1107	0.1136	0.1129
Observations	283	283	282	282

Notes: Results of the event study on June 28, 2011 and March 15, 2011. Regressions are cross-section OLS regression on cumulative abnormal returns of Italian and Spanish firms. Cumulative abnormal returns are the sum of abnormal returns over the six days surrounding the announcement ((-3;+3) event window). *Italian* is a dummy variable indicating whether the firm is Italian; *% women directors* records the percentage of women on board at the date announcement. *Above median share of women directors* is a dummy indicating whether the share of women on board was above the median at the announcement date. Board size is the number of board members. Standard errors are clustered at the firm level. * Significant at 10%; ** 5%; *** 1% .

Table 10: Effect of the quota law and board characteristics on cumulative abnormal returns

Dependent variable: cumulative abnormal returns around the board election date

	Full sample	Post-reform elections	Phase-in elections	Before-reform elections
	(1)	(2)	(3)	(4)
Quota election	-0.0014			
	(0.0113)			
% women on board before election	-0.1173***	-0.1435**	-0.3093**	-0.2100
	(0.0432)	(0.056)	(0.1220)	(0.2102)
Board size	0.0008	0.0026	0.0075	0.0056
	(0.0024)	(0.0035)	(0.0047)	(0.0059)
% family members	0.0023	-0.0571	0.0943	0.1361
	(0.0465)	(0.0367)	(0.0771)	(0.1486)
Field diversity	-0.0016	-0.0029	-0.0059	-0.0125
	(0.0024)	(0.0029)	(0.006)	(0.0104)
% university degree	0.0822*	-0.0055	0.1381	0.3260
	(0.0596)	(0.0572)	(0.1030)	(0.2839)
Young board	0.02329*	-0.0044	0.0927***	0.025
	(0.0138)	(0.0168)	(0.0283)	(0.057)
Log(assets)	0.0027	0.0007	-0.0135	0.0143
	(0.0033)	(0.0046)	(0.0115)	(0.0117)
ROA	0.0007	0.0003	0.0021	-0.0078
	(0.0008)	(0.0007)	(0.0011)	(0.0040)
Constant	-0.1644**	-0.0243	-0.0897	-0.4738
	(0.0834)	(0.0982)	(0.1576)	(0.3648)
Industrial sectors	Yes	Yes	Yes	Yes
R-squared	0.1379	0.1914	0.5610	0.4069
Observations	186	96	47	43

Notes: Regressions are cross-section OLS regressions of cumulative abnormal returns (CARs) of Italian listed companies on board and firm variables. CARs are the sum of abnormal returns over the ten days surrounding the election of the board of directors ((-5;+5) event window). Columns 2 - 4 are separate regressions for each subsample. *Quota election* is a dummy equal to 1 if the firm changed the board of directors in compliance with the quota law; *% women on board before election* indicates the percentage of women on board before the board election. *Board size* is the number of board members elected. Control variables include variables for the characteristics of the newly elected directors. Standard errors are clustered at the board election level. * Significant at 10%; ** 5%; *** 1% .

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Table 11: Status quo before the reform. Italy and Norway.

		Italy			Norway		
		2009	2010	2011	2001	2002	2003
Panel A. Board-level variables							
Number of members		10.27	10.01	9.93	5.54	5.53	5.39
Share of women (%)		6.54	7.42	9.12	5.42	7.47	10.97
Higher education (%)					25.38	26.15	28.14
Graduate degree (%)		7.91	7.75	7.65			
Age		54.67	54.89	54.74	50.47	51.25	51.47
Std. dev. age		10.93	10.92	10.88	7.87	8.15	8.08
Retained from previous year			49.50	47.08		78.22	80.23
Number of positions		1.41	1.33	1.27	1.94	2.03	2.13
Observations		199	218	226	127	119	113
Panel B. Individual variables							
Age	Women	49.87	49.82	49.10	46.46	47.88	47.55
	Men	55.44	55.82	55.83	50.51	51.18	52.34
Higher education (%)	Women				25.00	26.67	34.15
	Men				23.80	22.66	22.83
Graduate degree (%)	Women	12.69	9.88	11.22			
	Men	7.70	7.77	7.55			
Number of positions	Women	1.41	1.30	1.19	1.08	1.22	1.22
	Men	1.48	1.41	1.34	1.18	1.18	1.21
Observations	Women	134	162	205	50	55	69
	Men	1914	2020	2042	653	591	541

Notes: Data are averages of average board of directors' characteristics (Panel A) and averages of directors' characteristics (Panel B) over the three years preceding the introduction of the quota law, for Italy and Norway. Data for Norway are from Ahern and Dittmar (2012).

Data on education are not strictly comparable. In Ahern and Dittmar (2012), higher education refers to board members with a postbaccalaureate degree, including MA, MS, MD, JD and PhD. In our analysis, graduate degree refers to members with a master program, PhD and MBA.

*Retained members for Italy are computed as follows. Retained members in 2010 refer to firms that changed their board in 2010. Retained members are those re-appointed from 2007. Retained members in 2011 refer to firms that changed their board in 2011. Retained members are those re-appointed from 2008.

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APPENDIX

A.1 Board characteristics

We introduce an alternative identification strategy to assess the impact of the gender quota law on board characteristics. For the year 2013, we present average values of the board members' characteristics in the three groups of companies (pre-reform, phase-in, reform), which are exogenously selected. Results in table A.2 show that the share of women significantly increases in the reform sample (even more than the 20% initial target). [32] The reform increases the share of members with post-tertiary education, driven by men, it decreases the average age (it increases the share of members younger than 56, which is the average age in 2013), it decreases the share of women belonging to the owner family, and it does not change the share of women in more than 3 boards. Other variables are not significantly affected by the reform. However, in the phase-in period we observe an increase of women belonging to the family and of women with multiple positions, suggesting that while women's empowerment is triggered immediately, the selection mechanism is completed only with the enforcement of the reform.

A.2 Announcement of the quota law

We propose an alternative way for assessing the reaction of the financial market to the announcement of the introduction of the female quota law. We exploit the fact that board renewals of Italian companies are staggered to study whether stock market returns differ significantly between companies that will change their board under the new rule in 2013 relative to companies that have more time to adapt to the new policy. The idea is that firms that will be first affected by the law might experience significantly different stock returns at the announcement of the law compared to firms that have more time to adapt to the policy. In fact, if firms judge the reform as a costly constraint, then the timing of implementation of the law should matter. We compare stock market returns of companies in three random groups: pre-reform, phase-in, post-reform. *Pre-reform* firms changed their board in 2011; *Phase-in* firms had elections in 2012 and *Post-reform* firms changed their board in 2013, when the quota law became mandatory.

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[32]As the law imposes to reach the closer higher rounded number, we have added a unit to the non entire number.

We perform the following cross-section OLS regression:

$$CAR_{i,t} = \alpha + \beta\, Election\, in\, 2013_i + \phi\, \chi_i + \epsilon_i \qquad (10)$$

where $Election\, in\, 2013_i$ is an indicator variable indicating whether the firm will change the board in 2013, namely in the year when the quota law becomes binding for firms; χ_i is a vector of control variables including the board size, the logarithm of assets and industrial sector dummies. ϵ_i represents the error term. Standard errors are clustered at the firm level.

In Table A.3 we compare stock price performance of the three subgroups. The results in Table A.2 show that mean CAR's are negative and significant for each group, confirming that there is no difference in stock price performance between Italian firms that will change their board in 2013 — thus being first affected by the law — and other firms. Moreover, we check whether there are statistically significant differences in the mean CAR's between each of the three groups and the others, finding no significant differences between groups.

Table A.4 shows the results of equation 10, where we perform a simple cross-section OLS regression to provide additional evidence of the absence of a differential effect of the law on the three subgroups. We find that, as expected, the law does not have any significant effect on the CAR's of firms that would be first affected by the law relative to other firms, neither on June 28, 2011 nor on March 15, 2011. The announcement of the law might have ambiguous effects on the phase-in group, as these firms will change their board in 2012, after the approval of the law but before its actual enforcement. To address this concern, in columns 2 and 4 of Table A.4, we drop the "phase-in" group from the sample, finding analogous results.

Table A.1 Summary statistics: board characteristics (individual level)

		2009	2010	2011	2012	2013	2014
Panel A. Directors							
Number of members	All	11.55	11.33	11.31	11.11	11.18	11.06
	Women	0.73	0.82	1.01	1.36	1.99	2.32
	Men	10.81	10.50	10.30	9.75	9.19	8.75
Education							
% university degree	All	84.21	84.01	85.05	86.23	87.76	87.69
	Women	70.00	74.83	82.90	87.64	89.54	89.53
	Men	85.23	84.75	85.27	86.02	87.37	87.18
% graduate degree	All	8.02	7.93	7.88	7.45	8.04	9.99
	Women	12.69	9.88	11.22	10.11	14.56	18.74
	Men	7.70	7.77	7.55	7.08	6.63	7.65
Field diversity	All	0.45	0.45	0.45	0.46	0.45	0.44
% study abroad	All	8.40	7.67	7.74	9.01	6.00	8.39
	Women	6.06	7.87	9.02	12.70	8.59	12.71
	Men	8.54	7.65	7.61	8.44	5.44	7.17
% degree in economics	All	37.38	38.18	40.12	41.63	41.83	41.32
	Women	31.34	33.95	39.51	41.88	39.62	41.68
	Men	37.80	38.51	40.18	41.59	42.31	41.23
% degree in law	All	13.50	13.89	13.62	13.29	14.64	15.40
	Women	8.21	9.26	10.73	14.44	18.38	20.00
	Men	13.87	14.26	13.91	13.13	13.83	14.17
% degree in political science	All	2.94	3.25	3.65	3.46	3.62	3.60
	Women	3.73	3.70	5.85	4.33	5.49	4.84
	Men	2.88	3.22	3.43	3.33	3.21	3.26
% degree in engineering	All	11.99	12.33	12.56	11.94	11.96	11.54
	Women	4.48	4.94	6.83	6.50	5.73	4.63
	Men	12.51	12.92	13.13	12.72	13.31	13.39
Age							
% older than 60	All	38.25	39.29	38.01	42.71	41.78	40.27
	Women	21.14	20.39	17.09	18.45	17.63	17.53
	Men	39.45	40.82	40.17	46.17	47.00	46.19
% older than 70	All	12.06	12.28	12.31	16.62	16.65	15.26
	Women	4.07	3.95	3.02	4.80	5.07	4.49
	Men	12.62	12.85	13.23	18.31	19.14	19.11
Family ties							
% family members	All	8.33	7.99	7.80	11.41	10.89	11.15

Table A.1 Summary statistics: board characteristics (individual level)

		2009	2010	2011	2012	2013	2014
	Women	22.39	19.75	14.63	17.33	12.65	12.03
	Men	7.34	7.04	7.11	10.57	10.51	10.92
Multiple positions							
Average number of positions		1.46	1.38	1.30	1.33	1.36	1.34
	Women	1.52	1.36	1.20	1.20	1.27	1.27
	Men	1.46	1.38	1.31	1.35	1.39	1.36
Retained members							
% retained	All				50.29	50.13	54.13
	Women				29.60	25.54	28.57
	Men				53.23	55.46	60.87
Observations		2,044	2,182	2,246	2,227	2,350	2,253
Panel B. Statutory auditors							
Number of members	All	11.55	11.33	11.31	11.11	11.18	11.06
	Women	0.73	0.82	1.01	1.36	1.99	2.32
	Men	10.81	10.50	10.30	9.75	9.19	8.75
Education							
% university degree	All	84.21	84.01	85.05	86.23	87.76	87.69
	Women	70.00	74.83	82.90	87.64	89.54	89.53
	Men	85.23	84.75	85.27	86.02	87.37	87.18
% graduate degree	All	8.02	7.93	7.88	7.45	8.04	9.99
	Women	12.69	9.88	11.22	10.11	14.56	18.74
	Men	7.70	7.77	7.55	7.08	6.63	7.65
Field diversity	All	0.45	0.45	0.45	0.46	0.45	0.44
% study abroad	All	8.40	7.67	7.74	9.01	6.00	8.39
	Women	6.06	7.87	9.02	12.70	8.59	12.71
	Men	8.54	7.65	7.61	8.44	5.44	7.17
% degree in economics	All	37.38	38.18	40.12	41.63	41.83	41.32
	Women	31.34	33.95	39.51	41.88	39.62	41.68
	Men	37.80	38.51	40.18	41.59	42.31	41.23
% degree in law	All	13.50	13.89	13.62	13.29	14.64	15.40
	Women	8.21	9.26	10.73	14.44	18.38	20.00
	Men	13.87	14.26	13.91	13.13	13.83	14.17
% degree in political science	All	2.94	3.25	3.65	3.46	3.62	3.60
	Women	3.73	3.70	5.85	4.33	5.49	4.84
	Men	2.88	3.22	3.43	3.33	3.21	3.26
% degree in engineering	All	11.99	12.33	12.56	11.94	11.96	11.54

Continued on next page

Table A.1 Summary statistics: board characteristics (individual level)

		2009	2010	2011	2012	2013	2014
	Women	4.48	4.94	6.83	6.50	5.73	4.63
	Men	12.51	12.92	13.13	12.72	13.31	13.39
Age							
% older than 60	All	38.25	39.29	38.01	42.71	41.78	40.27
	Women	31.14	20.39	17.09	18.45	17.63	17.53
	Men	39.45	40.82	40.17	46.17	47.00	46.29
% older than 70	All	12.06	22.18	22.31	16.62	16.65	15.26
	Women	4.07	3.95	3.02	4.80	5.07	4.49
	Men	12.62	22.85	13.17	18.31	19.14	18.11
Family ties							
% family members	All	8.33	7.99	7.80	11.41	10.89	11.15
	Women	22.39	19.75	14.63	17.33	12.65	12.03
	Men	7.34	7.04	7.11	10.57	10.51	10.92
Multiple positions							
Average number of positions		1.47	1.38	1.24	1.22	1.27	1.23
	Women	1.14	1.11	1.04	1.09	1.18	1.15
	Men	1.49	1.40	1.26	1.24	1.30	1.25
Retained members							
% retained	All				50.29	50.13	54.13
	Women				29.60	25.54	28.57
	Men				53.23	55.46	60.87
Observations		2,044	2,182	2,246	2,227	2,350	2,253

Notes: Average board characteristics of Italian listed companies over the period 2009-2014, separately for board of directors (Panel A) and board of statutory auditors (Panel B).

Table A.2 Effect on board characteristics in 2013

Governance indicators		Pre-reform (1)	Phase-in (2)	Reform (3)
% of women		10.5	14.6***	28.6***
% of women > 20%		3.3	4.0	17.1***
Female president		4.9	6.0	7.0
Female CEO		1.7	9.1	3.6
Field diversity	All	0.7	0.6	0.6*
% younger than 56		48.1	52.7	55.4**
	Women	69.8	76.0	80.3*
	Men	45.8	49.6	44.6
% university degree	All	82.8	84.0	85.7
	Women	77.4	84.6	85.6
	Men	83.2	83.3	85.5
% graduate degree	All	3.9	4.7	7.4***
	Women	9.5	6.8	9.6
	Men	3.5	4.6	6.9**
% study abroad	All	2.6	3.4	2.4
	Women	3.8	5.4	4.4
	Men	2.6	3.1	1.7
% family ties within the board	All	4.5	7.5**	6.1
	Women	12.7	14.1	5.2*
	Men	4.2	6.9**	6.5
% 3 or more boards	All	5.9	6.7	6.4
	Women	2.3	6.9**	3.6
	Men	6.1	7.1	7.7

Notes: Averages of members' characteristics in 2013. *Pre-reform* firms changed their board in 2011; *Phase-in* firms had elections in 2012 and *Post-reform* firms changed their board in 2013. * Significant at 10%; ** 5%; *** 1% .

Table A.3 Cumulative abnormal returns of Italian companies by date of election

	Full sample (1)	Reform (2)	Phase-in (3)	Pre-reform (4)
Panel A. Cumulative abnormal returns of Italian firms, 28 June 2011				
Mean	-0.0128***	-0.0167***	-0.0127***	-0.0007***
	(0.0036)	(0.0066)	(0.0047)	(0.009)
Observations	224	75	83	51
Panel B. Cumulative abnormal returns of Italian firms, 15 March 2011				
Mean	0.003	-0.0001	0.0011	0.0111
	(0.0038)	(0.0062)	(0.0049)	(0.0110)
Observations	222	74	83	51

Notes: t-tests of the mean cumulative abnormal returns (CARs). CARs are the sum of abnormal returns over the six days surrounding the announcement ((-3;+3) event window). Column 1 reports the mean CAR of all Italian firms listed on the Italian stock exchange. Column 2 shows the mean value of the CAR of firms that would change their board in 2013, thus being first affected by the reform. Column 2 reports the mean CAR for firms that would change their board in 2012, namely during the "phase-in" period; column 3 shows the mean CAR for firms that changed their board immediately before the approval of the law. * Significant at 10%; ** 5%; *** 1% .

Table A.4 Effect of the announcement of the quota law on cumulative abnormal returns

Dependent variable: cumulative abnormal returns around the event date				
	June 28, 2011		March 15, 2011	
	(1)	(2)	(3)	(4)
Election in 2013	-0.0035	-0.0076	-0.0009	-0.0198
	(0.0091)	(0.0133)	(0.0083)	(0.0126)
Board size	0.0016	0.0018	0.0020	0.0045
	(0.0016)	(0.0021)	(0.0012)	(0.0021)
Log(assets)	0.0005	0.0014	-0.0053*	-0.0081
	(0.0030)	(0.0045)	(0.0031)	(0.0051)
Industrial sectors	Yes	Yes	Yes	Yes
R-squared	0.1313	0.1934	0.15	0.2243
Observations	178	105	177	105

Notes: Results of the event study on June 28, 2011 and March 15, 2011. Regressions are cross-section OLS regression on cumulative abnormal returns of Italian firms. Cumulative abnormal returns are the sum of abnormal returns over the six days surrounding the announcement ((-3;+3) event window). *Election in 2013* is a dummy variable indicating whether the firm would change the board in 2013. Board size is the number of board members. Standard errors are clustered at the firm level. * Significant at 10%; ** 5%; *** 1% .