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Do Board Gender Quotas Matter? Selection, Performance and Stock Market Effects

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ABSTRACT

Do Board Gender Quotas Matter? Selection, Performance and Stock Market Effects*

From business to politics and academia, the economic effects of the introduction of gender quotas are under scrutiny. We provide new evidence based on the introduction of mandatory gender quotas for boards of directors of Italian companies listed on the stock market. Comparing before and after the reform within firms, we find that quotas are associated with a higher share of female board directors, higher levels of education of board members, and a lower share of older 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, the share of female directors is associated with a lower variability of stock market prices. We also run event studies on the stock price reaction to both the announcement and the introduction of gender quotas. A positive effect of the quota law on stock market returns emerges at the date of the board's election. Our results are consistent with gender quotas giving rise to a beneficial restructuring of the board, which is positively received by the market.

JEL Classification: J20, J48, J78

Keywords: education, age, financial markets

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1 Introduction

Women are underrepresented among top leadership positions. The *glass ceiling* – the invisible barriers which prevent women from reaching upper-level positions – is still a dominant phenomenon. Even in countries in which women participate more in the labour market, only a minority makes it to highest positions. According to the World Economic Forum (2017), only 58% of the gender gap in economic opportunities has been closed around 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.

Gender quotas have been proposed to accelerate the process towards economic gender equality and to promote women's empowerment.[1] Norway pioneered the introduction of gender quotas for 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 consideration, while the debate is open in many other countries. However, gender quotas are controversial. They have been widely advocated for achieving a gender-balanced representation in the top economic positions, a fundamental element of economic gender equality around the world (see OECD, 2012; IMF, 2014). Yet, opponents of quotas argue that they violate meritocracy, with costly consequences. By equalizing outcomes rather than opportunities, quotas risk promoting less-qualified individuals, who are likely to perform poorly (Holzer an Neumark, 2000). For instance, if highly 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 unavoidable cost of achieving 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 at least 40% representation of each gender on the board of companies listed on its stock market (existing firms had to comply by January 2008, while new firms by January 2006). The Norwegian law imposed a dramatic and rapid transformation of the composition of boards of directors (Engelstad and Teigen, 2012; Huse and Seierstad 2013). Research has shown that the Norwegian law has been effective at increasing the number of women at the very top of the earnings distribution, but 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 in women on boards in Norway imposed a significant cost on the value of firms and stock market returns. A recent paper by Eckbo et al. (2016) discusses the validity of the result in Ahern and Dittmar (2012) and show that, by using a more robust specification, the negative market reaction in Norway becomes insignificant. Yet, Norway is a very particular case, being a top performer country in gender statistics worldwide. Thus the analysis of a different case looks promising to assess the effects of board gender quotas in a more general perspective.

This paper provides new evidence based on the introduction in July 2011 of board gender quotas

[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).

in Italian listed companies. The so-called "Golfo-Mosca" (by the names of the two proposers) law mandates gender-balanced representation on the board of directors and statutory auditors of publicly listed companies. Unlike in Norway, in Italy 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 1/5 for the first election after August 2012, to be increased to 1/3 for the following 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 in the labour force has remained stable, around only 47%, the lowest value in Europe, if we exclude Malta. In this context, the quota policy was perceived as the only possible way to start the process towards gender equality. But at which cost? A country with no economic growth certainly cannot afford to bear substantial economic costs. In this paper, we find no evidence of significant costs, neither for firms' performance nor for stock market returns, associated with the introduction of board gender quotas in Italy. On the contrary, we find positive effects on financial indicators.

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 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 three fundamental questions which allow us to evaluate the effectiveness of quotas in the process of promoting women's empowerment *vis-à-vis* their possible costs: 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 approval and to the implementation of board gender quotas?

Our results can be summarized as follows. First, we compare before- and after - reform changes in 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 fewer elderly members than before the quotas. Gender quotas trigger a more efficient selection process of the entire board. Despite having to select more females, we do not find an increase in board members belonging to the families of firms' owners, nor a clear increase in the average number of positions held by each board member.

Second, to assess the causal effect of gender quotas 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 after the introduction of gender quotas does not allow us to assess the long-term effects, we show that so far quotas in Italy have not been associated with different (for instance, worse, as in Norway) firm performance as measured by number of employees, assets, production, profits, ROA, Tobin's Q, and debts. However, when we consider the stock market performance, we show that gender quotas reduce the variability of companies' stock prices - a crucial dimension for listed companies, not explored before in connection with board gender quotas.

Third, we use an event study at the date of the approval of the law to compare Italian companies

with Spanish companies listed on the Madrid Stock Exchange. Differently from Italy, Spain adopted a voluntary approach and did not impose mandatory quotas. We do not identify significant different effects between Italy and Spain of this variable on the stock market returns at the day of the approval of the Italian law. Moreover, to provide a final assessment of the impact of gender quotas on the stock market returns, we perform an event study at the day of board elections, which happen on a different date for each firm. We find that the introduction of gender quotas in Italy is associated with better firm 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 closer to the target. In other words, the renewal of the board associated with gender quotas has positive effects on the stock market returns.

The paper is organized as follows: the next section reviews the related literature and Section 3 describes the Italian law. Section 4 presents the data that we will use throughout the different analyses performed in the paper. The three sections that follow present analysis and results related to our three 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 both the announcement and the board elections on stock market prices. Each of these sections presents first the empirical methodology adopted and then the results. Conclusions are in Section 8. 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 vast (see Profeta et al., 2014, Pande and Ford, 2011 for reviews). Gender quotas are a controversial policy. The main argument in favor of the adoption of gender quotas is their effectiveness as a means 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). Quotas are an instrument (often considered the only one) to break down the masculine monopolistic 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 is merely the result of women's choices, especially related to fertility and motherhood.[2] Thus, by equalizing outcomes rather than opportunities, affirmative

[2] A greater involvement of women in the economy may also have beneficial effects on cultural development. 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

action policies risk promoting less-qualified individuals, who very likely will perform poorly. Not only is there 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 perform successfully. Recent studies have also doubted the effectiveness of quotas in reducing gender inequalities in specific contexts (Bagues and Esteve-Volart, 2010). Bertrand et al. (2014) have found that gender quotas for listed companies in Norway have improved the representation of female employees at the very top of the earnings distribution within affected firms, while they had no trickle-down effects and no other significant effects on reducing gender gaps.[3] In the context of academia, Bagues et al. (2016) find that the gender composition of evaluation committees does not necessarily increase the chances for women to be promoted, thus limiting the effectiveness and desirability of gender quotas.

In the context of business, the study of the effects of board gender quotas is particularly meaningful for identifying the causal impact of women's representation on economic outcomes and to overcome the typical endogeneity concerns that 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 performance. 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 caused negative market reactions, because 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). Moreover, Eckbo et al. (2016) show that, once standard errors are properly clustered to take into account that the quota occurs for all firms on the same date, the negative result by Ahern and Dittmar (2012) vanishes.

Board gender quotas in Italy provide new evidence on the causal effects of women's empowerment in the corporate sector on economic outcomes. Not only our study contributes to understanding whether negative economic outcomes are a necessary cost to be paid for achieving more gender-balanced representation, but it also explores new outcomes from board gender quotas, such as the effects on the volatility of stock market prices - an important outcome for listed companies never explored in connection to gender quotas.[4]

In politics,[5] recent studies have shown that gender quotas are not at odds with meritocracy, as they help increase the quality of representatives. In the Italian political context, gender quotas have been associated with better-quality politicians (Baltrunaite et al., 2014), measured by their level of education. In the Swedish case, the 'zipper' quota requiring alternating a male and a

changes to the cultural process (Fernàndez, 2013; Fernàndez et al., 2004).

[3]See however Wang and Kelan (2013).

[4]Note that, as it will be clarified in the next section, in the Italian case elections do not occur for all firms on the same date, thus making the Italian case particularly interesting and safe against the estimation concerns raised by Eckbo et al. (2016).

[5]The Indian reservation system has been exploited as a useful case of analysis providing evidence on the impact of quotas not only on the number of female representatives (Beaman et al., 2009; Pande and Ford, 2011), but also on the policies implemented (Chattopadhyay and Duflo, 2004).

female candidate on the party's list of candidates has increased both female representation and, interestingly, the competence of male politicians (Besley et al., 2013). This paper contributes to understanding whether this result may be generalized to the business context.

A sizeable literature has analyzed the relationship between female leadership and firms' outcomes outside the context of gender quotas. Results are not fully conclusive. Having both men and women in top positions of a company may have positive consequences on performance. In a heterogeneous context, the perspectives are enlarged, the pool of talent and qualification are diversified, and the shareholders are better represented (Van der Walt and Ingley, 2003; Rose, 2007, Hoogendoorn et al., 2013). The female style of leadership, including higher levels of risk aversion (see Bertrand, 2011 for a survey), may also improve performance. 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 Tobin'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) when female directors are considered. 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, 2017), a positive interaction among female CEOs and women on boards (Amore et al., 2014) or among female CEOs and female employees (Flabbi et al., 2016).

Non-conclusive results also emerge when looking at the relationship between women's empowerment and stock market returns. Wolfers (2010) finds 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. Ryan and Haslam (2005) find a significant increase in share price following the appointment of a female director. However, women are more likely to be appointed in times of general financial downturn, and thus have a more precarious position (the so-called "glass cliff"). How the stock market reacts to the appointment of a female director is ambiguous: Chapple and Humphrey (2011) for Australia find no reaction, Adams et al. (2012) find a positive reaction, and Lee and James (2007) find a negative reaction.[6] Adams and Ferreira (2003) find that firms facing more variability in their stock returns have fewer women on their boards. Though not in connection with board gender quotas, stock price volatility has been previosly explored in the diversity literature (see for example Adams and Ragunathan, 2013 and Adams and Ferreira, 2003). Recently, Giannetti and Zhao (2017) find that boards with more ancestral diversity are associated with higher volatility.

Finally, our paper also speaks to the corporate governance literature, which has underlined the importance of diversity for boards' quality and their functioning (see Dhir, 2015). An old yet unanswered question is whether the composition of the board matters for performance and firm's value. Our results will suggest that quotas may be effective at increasing diversity and encouraging a better selection of board members. This is particularly important for countries such

[6]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.

as Italy (Consob, 2015), where the pre-quota situation was characterized by the presence of women almost exclusively being appointed on boards of family firms, and by a selection process not purely meritocratic (Bianco et al., 2015).

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 boards of directors of publicly listed companies was 7%, one of the lowest in Europe. Despite this context, Italy introduced board gender quotas in July 2011 (Law 120/2011). The law was first proposed in May 2009 by a member of the Chamber of Deputies, Lella Golfo, of the centre-right coalition; in November 2009, the draft was re-submitted by another member of the Chamber of Deputies, Alessia Mosca, of the centre-left coalition. However, it was only two years later that the draft began being discussed thoroughly by the Italian Parliament. 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, by an overwhelming majority. The act came into force, after publication in the Official Gazette, on August 12, 2011. We analyze news coverage of the quota law on Lexis-Nexis and find that news related to the law are concentrated around the dates of March 15, 2011 and June 28, 2011. Before March 15, 2011 it was very unlikely to anticipate the introduction of board gender quotas.

Law 120/2011, also known as the "Golfo-Mosca" law, mandates that publicly listed companies should have a minimum target of either gender on their boards of directors and statutory auditors.[7] Boards of companies listed on the Italian 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 for the following 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 responding to the second warning within the following three months, the law states that the appointment of every elected member will be invalidated. With this enforcement system, all companies have so far complied with the law. The law explicitely states that its effects become binding for listed firms one year after approval, specifically on August 12, 2012. We refer to the interval period between August 12, 2011 and August 12, 2012, as the "phase-in" period. On February 2012, the law was extended to state-owned companies, i.e. public

[7] 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 on the main market in 2013 and 94.8% in 2012), members of both boards are elected by the shareholders. On average, the board of directors is made up of 10 directors. For more details on how companies are regulated, see Profeta et al. (2014).

companies under the control of the government, with immediate effect.[8]

The crucial features of the law are as follows: time-limited nature, gradualism, sanctions, and the interaction between private and public. These features make the Italian law different from Norway's. In particular, the time-limited nature is consistent with the idea that gender quotas are a measure to shock and thus break up the male-dominated power, and to lead the market to a new, more gender-balanced, equilibrium. Gradualism is based on 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 came into force on August 2011 but was implemented the year after (August 2012), and as the boards are elected every three years, we can classify boards in three, almost equally distributed, groups: i) those changing their composition before August 2011, which we call "pre-reform"; ii) those appointing new members in the transition period (i.e., between August 2011 and July 2012), called "phase-in"; and iii) those renewing after August 2012, called "post-reform".[9] Each company can choose the date of the board election, i.e. elections do not happen on the same date for all companies, nor on a same date in a given year. 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 changed the date of the board election. 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

The list of companies to which the law applies 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 500,000 largest public and private companies by assets. From 2011 to 2014, the list of Italian publicly listed firms included roughly 245 firms each year. For each firm, we collected the election date of the board of directors by accessing the Corporate Governance section (*Relazione di Corporate Governance* or *Relazione sul governo societario e gli assetti proprietari*) of the company's website. When this was not available, we searched on the website of the Milan Stock Exchange (*Borsa Italiana*), in the section where official corporate documents were collected. If the Corporate Governance information was in the stock exchange records, the election date was collected from the convocation notice of the shareholder meeting for the board election in the official journal of record. Elections were held between April and June. For each firm, we collected from CONSOB the full names of the board members as

[8] We estimate around 4,000 state-owned companies that must comply with the gender quota law. For them, the Department of Equal Opportunities at the Presidency of Council of Ministries is in charge of the monitoring and sanctioning system. It is however unfeasible to obtain detailed information on these companies. Thus, our analysis concentrates on listed companies.

[9] All companies are subject to the law. Boards are elected every three years. Elections are typically held between April and June. Thus, "post-reform"companies are subject to the law for the first time at elections in 2013, "pre-reform" in 2014 and "phase-in" in 2015.

of June 30 for every year from 2007 to 2014. Most of the time, the gender of each member was unambiguously identified through the person's first name; when the first name was ambiguous, we searched for a photo of the person.

We collected three categories of data: individual, firm-level and stock market prices data. Information on the individual characteristics of board members is not available in an organized manner, and it is sparse among the documents that each company must provide to CONSOB when a board member is elected. We therefore manually collected the CVs 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 these different individuals, we collected individual data for each member of the board.[10] Following Ahern and Dittmar (2012) we aggregate individuals' characteristics at the board level and consider average values for the board for a set of characteristics: (i) the share of women on boards, whether this share exceeds the first target of the law, i.e. 20% (yes or no) and the presence of female presidents and CEOs; (ii) the share of board members with a university or a graduate degree,[11] the share of board members with a foreign university degree, the fields of study (economics, law, engineering, political science, and others) (all members, and female and male separately) and the Herfindahl index of field heterogeneity in each board[12]; (iii) the share of board members older than 60 or 70 years respectively (all, and female and male separately); (iv) the percentage of board members who belong to the family owners (all, and female and male separately); (v) the average number of board positions held by each member (all, and female and male separately).[13] Table 1 presents summary statistics of these indicators. We consider together all types of boards: boards of directors, boards of statutory auditors and the alternative forms of governance for the very few existing cases (see Footnote 7). The table also shows the percentage of retained members, i.e. those who were confirmed from the previous election.[14]

We then collected firm-level data on the outcomes of each company. This information, again, was not immediately available. We relied, when available, on data from Orbis-AIDA (Bureau van Dijk), which we integrated with data from Bankscope on banks. In the likely case of missing data, we hand collected the corporate documents available on the website of the Milan Stock Exchange or on the official budget balance sheets published on each company's website. We also collected the firm value measured by Tobin's Q from Datastream. The final dataset contains the following information for each company for the period 2010-2015: name, province of registered office, number of employees, production (thousands of euros), profits (thousands of euros), share of short-term and

[10] Despite the effort exerted to have a complete dataset, for a limited number of boards we were not able to obtain information on all members. However, we checked that our results did not substantially change when excluding companies with more than 10% of missing values on the education variable, which was the most critical to obtain.

[11] 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 one is the proportion of members with a PhD, a Master program, or MBA.

[12] 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).

[13] 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 in multiple positions, the so called 'golden skirt' phenomenon.

[14] The alternative would be to consider observations at the individual level (see Appendix A1 for summary statistics). Our main results would not change.

long-term debts, ROA, Tobin's Q, and asset, (thousands of euros) (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. We consider the following sectors: consumer discretionary, financial sector, industrials, and other sectors.[15] Table 2 presents summary statistics for the firms' outcomes.

Finally, we downloaded from Bloomberg the daily closing price of the FTSE MIB for the years 2009-2014.

To sum up, our final data consist of a panel dataset over the years 2010-2014 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, economic and financial outcomes, and the daily closing price. To check for pre-reform conditions, individual characteristics of board members were also collected for the period 2007-2009 and the daily closing price for the period 2009-2010. Firm-level outcome data are collected also for 2015. 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 collected information on the gender composition of the board of directors as of June 2011, from Orbis we collected financial and sector data and from Bloomberg we downloaded daily stock price data for these Spanish companies.

5 Part I. How boards of directors change

We start by analyzing the effects of the gender quota law on the characteristics of members of the board. Understanding how boards change after the quota is important to evaluate the "conventional wisdom" according to which 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.[16] This is in line with Bianco et al. (2015) for the Italian context, Adams and Ragunathan (2015) for the U.S., and corresponds with the literature on the selection of politicians (Galasso and Nannicini, 2011).[17] Nevertheless, the final assessment of which individual characteristic may signal a positive attribute will be left to the financial market (see Part III).

[15] 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 industrials include those 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, other sectors include energy, health care, IT, materials, telecommunication services, and utilities.

[16] We do not consider CEO experience, not only because of the extremely low number of female directors and CEOs in listed companies before the law, but also because having more women in top leadership positions, and thus giving them the opportunity to acquire experience, is exactly the goal of the law. Indicators based on the evaluation of the profession (rather than of the education level) are also difficult to apply in this context, as board members do not come from all professional backgrounds. Other indicators related to more detailed professional experience of each member would be difficult to compare.

[17] 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).

5.1 Methodology

In this section we exploit before-after reform changes for the same firm. 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 elected every three years, the first cohort changed boards in 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) are not affected by the quota law, while the third election is in the post-quota period (2013 and 2014 for the two cohorts respectively) . We observe our indicators (such as age, education....) at the three different board elections. For each indicator we compare the changes between the first and the second election (both without the quotas) to the changes between the second (without the quota) and the third election (with the quota).

We are aware that our indicators may evolve in the three-year period between one election and the successive due to time trends and indipendently from the introduction of the quotas. In absence of a control group of firms similar to the listed ones and not subject to the law, what we can do to limit this concern is a graphical analysis and some robustness checks (see Section 5.4). Moreover, in the Appendix A1 we provide an alternative identification strategy that exploits the existence in the same year of three random groups of firms with staggered board elections, and it is therefore robust to the existence of time trends. Results are similar to what obtained in this section.

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, $\left(\overline{I}_{t+3} - \overline{I}_t\right)$ would 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 directors 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 the regression at Equation 2 for the second cohort 2008-2011-2014, and together for the two cohorts of boards (2007-2010-2013 and 2008-2011-2014). If the before-after estimated

change (i.e. β) is similar across the two cohorts of boards staggered over one year, 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). Note also that in 2010, i.e. before the reform, a part from three items, the two cohorts of firms, which turn out to experience the reform in different years, do not show statistically different characteristics (Table A3).

The characteristics I of each board under evaluation are those explained in the previous section and listed in Table 1.

5.2 Results

Table 3 presents our results. The first column shows the estimates of 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 columns. Interestingly, the reform is also associated with an increase in the share of women on boards over the initial target of 20%.[18] We also see an increase of the share of female presidents and, for the cohort 2008-2011-2014 and for the full sample of boards, an increase in female CEOs. These results suggest that the reform increases women's empowerment beyond the simple numerical outcome.

Moving to our second group of outcome - education - the reform significantly increases the share of members with a university degree and graduate studies for the cohort 2008-2011-2014 and the full sample. This suggests that firms that have more time to adapt exploit fully the change. The higher average level of education of board members after the reform is mainly due to women, although we also observe an increase of men with graduate studies in the second cohort and the full sample. Similarly, in the second cohort and the full sample we observe an increase of board members who have studied abroad. When we consider fields of study, a robust result is that after the reform there are more women with a degree in economics and business as well as in law, while for other fields results are not robust across all our cohorts. We do not find significant change in the Herfindahl index.

Our next indicator is age. Gender quotas are associated with lower age, by including younger women on boards: this effect is clear when we consider individuals over the age of 60 in the cohort 2007-2010-2013 and in the comprehensive group. For the same subgroups we find a significant decrease in board members older than 70. This reduction is driven by women. Note that in Italy board members over age 70 are not an exception: in the pre-quota period they were roughly 15% of board members. The reduction in age as a spillover effect of gender quotas is particularly meaningful in this context (see Baltrunaite et al., 2015, in the context of politics). As the average age of directors is high (around 55 in the period 2009-2011), lowering the age of directors can be interpreted as an

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

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 a 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 allay this concern.

Finally, we examine whether gender quotas increase the holding of multiple positions. This is another common concern: if quotas result in the appointment of the same few women to all boards, they are not able to reach their goal of giving opportunities to all qualified individuals, men and women, and they risk producing a reduction in the quality of corporate governance. Table 3 shows that the average number of positions held 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 held by men in the first cohort (which may suggest a competition to attract the "best" men in all boards), and an increase in the number of positions held 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 gender quotas? We provide evidence that a possible mechanism lies in the selection process.

We focus on education and age, the two main variables where we have observed significant changes after quotas. We split our board members into three groups: retained, exiting, and new members.[19] Table 4 reports data for the average characteristics for each group, comparing in panel A for the first cohort of companies, the elections in 2010 (before quotas) and 2013 (after quotas) and, in panel B, for the second cohort, the elections in 2011 (before quotas) and 2014 (after quotas). In the pre-reform situation of the first cohort of companies (panel A), exiting members were more educated than retained ones, if we consider those with a university degree, and more educated than both new members and retained if we consider those with graduate education. After the reform, instead, new members are significantly more educated than both the exiting ones and the retained for both levels of education. For the second cohort of companies (panel B) the pre-reform pattern is less clear: retained members were not significantly different in education than exiting ones, as retention is probably based on different criteria. After the reform, new members are clearly more educated than both retained and exiting. Interestingly, for both cohorts, new male members appointed after the reform are significantly more educated than both retained and exiting male members. If we compare directly the three groups before and after the reform, all members after

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

the reform tend to be more educated than before.

Note that, when we consider the graduate level, the increase in education of board members after the reform is slightly stronger in boards with a lower level of male education before the reform (those with education below the median value).[20] This result is in line with gender quotas playing a role in improving the selection of board members, especially when there is more space for an improvement.

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 that 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 is significantly lower after the reform for both cohorts. After the reform, new members are a lower share of older people than retained members (males and females) and, especially if we consider males, than exiting members.

5.4 Robustness analysis

In this section we perform several robustness checks on 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. In Figures 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 (with board elections in 2007, 2010, and 2013), and the square indicates the second cohort (with board elections in 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. This third cohort is never affected by the reform in the period we analyze (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, specifically 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 female 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, this graphical analysis limits the concern that the presence of an omitted time-trend substantially drives our main results.

Second, we focus on the different industrial sectors (see Footnote 15). Given that the introduction of gender quotas may in part overlap with a period of economic crisis, one may be concerned that firms 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 was 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 should not. However, when we split our sample by sectors, we do not find

[20] Results are available upon request. For the other characteristics we do not detect significant heterogeneous effects in boards with a higher and lower level of male education before the reform.

any differential effect across sectors, thus showing that firms belonging to different sectors selected board members in a rather similar way.[21]

Third, we ensure 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% of the sample, mainly boards of auditors). All our significant effects related to women's empowerment, education, and age are even stronger (the coefficients are larger) if we only consider boards that had no women in the pre-reform period (50% of the sample), and thus had to implement more changes. The more substantial are the changes imposed by the quotas, the larger are the effects: what we observe are the consequences of a radical transformation of the status quo.[22]

Fourth, we also 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, our results do not differ between the two subgroups.[23]

Fifth, we check that our main results are robust to focusing on boards of directors or boards of statutory auditors separately. When we focus on boards 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 on each board. Alternatively, they may increase the size of the board in order to keep all male members. We check that this does not significantly happen in Italy.

6 Part II. The effects on performance

Do the changes induced by quotas in the boards translate into different performance? We turn to economic and financial outcomes and analyze the effects of gender quotas 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, and short-term debts. We also analyze the riskiness of the company measured by the variability of stock market prices, a dimension that has not been addressed in the Norwegian context. We are aware that the time span after the quota law is still limited, and a final assessment of the effects of the reform may need more time.

[21] Results are available upon request.
[22] Results are available upon request.
[23] Results are available upon request.
[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 7).

6.1 Methodology

We use data from 2010 to 2015 and regress the firm's outcome on the percentage of female directors on the board. We start from a simple OLS regression that shows the correlation between the percentage of women directors in a board and the indicators of performance. We then move to estimate the causal effect of women's presence on the boards on firms' outcomes. We build a dummy variable *reform period* which 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 changed their board in 2015. We first replace the percentage of female directors on the board with the dummy *reform period* and provide the intention-to-treat estimates of the OLS regression. Then we use the reform period as an instrument for the percentage of female directors and employ an instrumental variable approach with fixed effects for firms and years.[26] The validity of the exclusion restriction is guaranteed by the fact that the date of the reform is exogenous to firms' characteristics. We check that none of the outcomes measured in 2010, i.e. before the reform, is significantly related with the dummy *reform period* and that in 2010 the outcomes of the firms were not significantly different across the different cohort of firms (see Table A3).

As a second stage of the IV regression, we thus estimate the following equation:

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

where $y_{i,t}$ is the firm's outcome, represented by the number of employees, assets, production, profits, ROA, Tobin's Q, short-term debts and the monthly volatility in the stock price (computed as the monthly standard deviation in the stock price) for each firm i and time t, where t goes from year 2010 to 201**5** for all outcomes, a part from the volatility which is measured monthly; $percentage\, women\, directors_{i,t}$ is the proportion of women on the board; θ_i and τ_t represent firm and year (month for the volatility) fixed effects respectively; $\epsilon_{i,t}$ is a random error with normal distribution; and β is the parameter of interest.[27]

6.2 Results

Table 5 shows several negative and significant relationships between the percentage of women directors and the indicators of the firm economic performance (column 1-7) in the basic OLS regression. However, only some of them survive the inclusion of firm fixed effects. When we move to the causal analysis, in columns 1-7 none of the effects survive. The results of the instrumental variable regression with firm and year fixed effects show that all the considered performance outcomes are not

[26] Note that given the staggered board elections across Italian companies, we can use the reform period as an instrument, rather than being forced to rely on the pre-quota firms' percentage of female directors interacted with year dummies (which may raise endogeneity concerns), as in Ahern and Dittmar (2012) and Bertrand et al. (2014). Though the identification we use is stronger, we also check that our results are unchanged when we follow their identification strategy. This indirectly confirms that the negative effects of quotas on Tobin's Q arising in Ahern and Dittmar (2012) do not depend on the "weakness" of their instrument.

[27] Using firm fixed effects we do not need to include control variables.

significantly affected by the proportion of women on the board. Hence, in Italy, the negative effects found in Norway are not present.

When we consider the monthly volatility of stock prices, which is a measure of the riskiness of the company (column 8), we find that the OLS estimates are not significantly different from zero. However, when we move to more precise estimates to assess the causal impact of the share of women on the volatility of stock prices, we find a negative and significant effect. This may be interpeted as more gender-balanced boards being perceived by the market as less risky.[28] Yet the size of the effect is quite small: a one percent increase of women directors causes a reduction by 0.82 per cent of the stock price standard deviation. This result is robust to the Bonferroni correction which we use to take into account the presence of multiple-testing: the stock price standard deviation remains statistically significant at 5 percent.

Note that the first stage regression in Table A4 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 and thus a good IV variable.[29]

6.3 Robustness analysis

We perform several robustness checks. First, we exclude that the effect of the share of female directors on performance outcomes is non-linear. We also check that our results are unchanged when we use as dependent variable the distance of the share of women directors from the threshold required by the gender quota law, rather than the percentage of women directors.

Second, we examine whether the negative effect of the share of female directors on the volatility of stock prices is driven by firms of particular industrial sectors, which may also have different financial performance indipendently of the presence of quotas. 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 industrial and other sectors. We also run separate regressions distinguishing between firms with assets above (large firms) and below the median value of assets (small firms) in every year, and find that the reduction in stock price volatility is significant in both groups.

7 Part III. Stock market reactions

As we consider listed companies, a natural way of evaluating the effects of the reform is to analyze the reaction of the stock market prices. We first concentrate on the stock market reactions to the announcement of the introduction of the quota law and then to the reactions to the board elections.

[28] We instead do not find any significant effect of quotas on the variability of our performance measures. Results are available upon request.

[29] Due to limited number of observations for the outcome variables, the reform dummy is not a good instrument for the other individual characteristics considered in part I, although showing a significant relationship with some of them.

Our analysis has so far provided evidence that gender quotas trigger a number of changes in the boards, which may translate into economic or financial outcomes. To assess the effects of the reform on the stock market returns, we consider the distance of the pre-reform share of women from the required threshold (20%) as a proxy of the magnitude of these changes.

7.1 The announcement

Our analysis follows the 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 affected stock price data of Norwegian listed companies relative to U.S. and other Scandinavian (not Norwegian) companies. These countries were chosen as a comparison group, as the debate on gender quotas had not yet hit the political agenda in other Scandinavian countries.

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 were chosen after checking the news coverage of the quota law on Lexis-Nexis. Italian public opinion was confronted with the concrete possibility of the enforcement of board gender quotas for the first time on March 15, 2011. Similarly on June 28, 2011, the final approval of the law hit the news and generated a significant debate in the political arena. We consider for comparison the 135 Spanish companies listed on the Madrid Stock Exchange. We select Spain as a comparison group, because it is a Southern-European country similar to Italy with respect to cultural features and gender statistics. However, gender quotas in Spain were not in the spotlight 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 single-factor market model. In the field of law and economics, event studies using the single-factor market model 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 parameters α_i and $\beta_{i,T}$ in equation 4 are 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). Consistent with previous literature (Rossi and

Cebula, 2015, Adams, 2011), we use the (-250, -11) days estimation window for these estimates. 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 the abnormal returns over the corresponding event window, from day $-T$ to day T, where $T \geq 1$ and $T \leq 5$

$$CAR_{i,T} = \sum_{t=-T}^{T} AR_{i,t} \tag{7}$$

Consistent with previous studies, we use several event windows for robustness.[30]

We then 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 - measured by the distance of the share of board women from the threshold required by the law - and controlling for board size, the logarithm of assets and industrial sectors. More precisely. we estimate the following equation:

$$\begin{aligned} CAR_i = \alpha + \beta\, Italian_i + \gamma_i + \\ \delta\, Italian_i * distance\, from\, threshold_i + \phi \chi_i + \epsilon_i \end{aligned} \tag{8}$$

where $Italian_i$ is a dummy variable indicating whether the firm i is Italian (or Spanish) and $distance\, from\, threshold_i$ records the difference between its share of female directors at the announcement date and the first threshold required by the law, i.e. 20%, χ_i is a vector of control variables including the board size, the logarithm of assets and industrial sectors dummies, and ϵ_i represents the error term. Standard errors are clustered at the firm level. This 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.

Table 6 presents results of the estimates at Equation 8 which compares Italian and Spanish firms. There is no significant difference in the average stock price returns of Italian companies relative to Spanish companies at the approval of the law on June 28, 2011. On March 15, 2011 instead, Italian firms experienced significantly higher returns than Spanish ones. However, there was no significant difference in the stock price performance between more gender-diverse Italian and Spanish firms. Therefore, we are unable to cogently link the increase in the average stock price on March 15 to the approval by the Senate of the quota law.[31]

[30] We present results using the (+3; -3) event window. Yet results are similar if we use (+4;-4) or (+5;-5).

[31] In Appendix 2 we present two alternative methods of assessing the reaction of the financial market to the announcement of the introduction of the quota law: the first one is based on the comparison of Italian firms which are subject to the quota in different periods, and the second one compares firms with different shares of female board members at the date of the approval of the law. In neither case we find differential effects of gender quotas on stock market prices of these different firms.

7.2 The board elections

We now turn to stock market reactions to board elections. Although we have not found a significant stock market effect on the day of the announcement of the law (or a positive effect on March 15, though not clearly due to the policy), it may still be the case that, as boards change due to the introduction of women by the quota law (see Part I), if these changes are positively (negatively) perceived by the market, they translate into a positive (negative) effect on the stock market returns at the date of board election.[32]

We run an event study over each board election date[33] in the period 2011-2014 and compute the ARs and CARs for different event windows. We consider the three groups of companies identified by the existence of staggered elections: pre-reform, phase-in, and post-reform. We exploit the fact that board elections do not happen on the same date: each company can decide when to have elections during the year. This feature of the Italian case avoids the concern raised by Eckbo et al (2016) on the need to cluster the standard errors on the date of elections.

To analyze whether the changes induced by the quota law have any significant impact on companies' abnormal returns over the election days we run the following regression:

$$CAR_i = \alpha + \beta\, quota\, election_i + \gamma distance\, from\, threshold_i + \phi\chi_i + \epsilon_i \tag{9}$$

where $quota\, election_i$ is a dummy variable equal to 1 for elections with gender quotas and 0 otherwise, $distance\, from\, threshold_i$ is the usual variable that represents the difference between the target threshold of 20% and the share of women on the board before the election, χ_i is a vector of control variables that includes industrial sector dummies and ϵ_i represents the error term.

Table 7 shows the result of Equation9 separately for the full sample of board elections and the three subgroups of post-reform, phase-in and pre-reform elections. When looking at the full sample of board elections 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, our variable that captures the distance from the threshold is positive and highly significant: a higher distance from the threshold, i.e. a larger number of women appointed in order to comply with the quota results in higher returns over the election period.[34] We then split the sample and repeat the analysis to examine 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 subsample, we find that the distance from the threshold is positive and significant at the 1% level: after the implementation of the law, it becomes clear that firms with fewer women on boards will

[32] Board members' characteristics may have an impact *per se* on stock market returns. In appendix A3 and Table A8 we provide evidence that, in absence of the quotas, the election of board members with higher education and lower age was associated with better returns.

[33] To address the possible anticipation effect, we also use the date of announcement of the lists of candidates for board memberships. Results, available upon request, are very similar, although we miss some information due to more limited data availability.

[34] In table A9 results are similar when we add as controls the board member characteristics. Note however that these characteristics are endogenous to the reform (see Part I).

have to make more substantial changes to their board composition in order to comply with the quota target. These firms turn out to have higher returns. This effect appears already in the phase-in board elections, as many firms anticipate the increase of the share of women on boards.

8 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, and the stock market reaction to the announcement of the law and to board elections. We show that quotas are associated with a larger share of women directors, well above the required threshold, with higher education levels of all members of the board and lower ages. These results suggest that the gender quota law has introduced a new selection process for board members, which changed 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, while we observe a lower variability of stock market prices. As the policy was implemented in 2012, it is still too early to provide a final answer on firms' results. However, we find a positive reaction of stock market returns at board elections.[35]

Are our results related to the intrinsic characteristics of women or to the overall re-organization of the board after the introduction of quotas? Although it is difficult to fully disentangle the two channels, we have provided evidence that support the second one. More research is needed to isolate the contribution of women directors to the complex decision-making process of the after quotas restructured boards.

Are board gender quotas improving female representation beyond the boards, i.e.generating a cascade effect from top to bottom? Bertrand et al. (2014) doubt that this happened in Norway. Future research will assess whether similar doubts apply also to the Italian case. Yet, it is not appropriate to ask this question now, because of the limited time span.

Our results for the Italian case are particularly interesting, because the only pre-existing causal evidence on the effects of board gender quotas is on Norway. In Norway, Ahern and Dittmar (2012) identified a negative stock market effect of board gender quotas, which is however criticized by Eckbo et al. (2016) on the basis that standard errors should be clustered at the date of election, which is common to all companies. Not only Italy provides a better setting to identify the effect of board gender quotas on stock market outcomes, because elections do not happen on the same date in all companies, but it also offers a clear different scenario, thus contributing substantially to our broad knowledge of the economic effects of board gender quotas. Table 8 summarizes the status quo of boards of directors characteristics before the reform in Italy and Norway. Norway presents a clearly higher level of education and a lower average age of board members in the period preceding the reform compared to Italy. In both cases, the level of education increases after the

[35] Another unintended consequence of the Norwegian law is the delisting of companies (Bohern and Staubo, 2014). We do not find evidence of this effect for the Italian case.

introduction of the quota (Ahern and Dittmar, 2012),[36] while the change in age appears to be stronger in the Italian case. In other words, in Norway, the status quo before the reform was less critical than in Italy, where it was less favorable to qualified people. More generally, as Norway is nurtured by gender equality principles and Italy is far from that, consistently with our findings, the overall re-organization process induced by the reform is likely to be stronger in Italy. Note also that the Norwegian reform imposed a jump up to 40% in female representation (existing firms have to comply by January 2008, while new firms by January 2006), while the gradualism of the target imposed by the Italian law (20% and then 33%) helped firms to select the more appropriate candidates and to fully exploit the beneficial effects of the re-organization process. If we follow Ahern and Dittmar (2012) 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 are younger than exiting men. Thus, this substitution between men and women increases the qualifications of board members. 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 restructuring of the board that 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). The result that quotas may be associated with an increase in quality is a general one. Theoretically, quotas may have ambiguous effects on efficiency: one one side they are a constraint which may reduce quality if the status quo was already efficient, and on the other side they may improve quality if they force to change an inefficient status quo. Thus, as acknowledged by recent research (see Bagues et al., 2016), quotas may be desirable or not depending on the specific context. Our results show that boards may be in this second situation. Our argument is supported by some interesting additional evidence. During the discussion around the introduction of the Italian law, two facts rapidly became clear: first, the law has the potential to threaten the so-called "old-boys club", which dominated 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 CVs of board-ready women were collected by women's associations, institutions, and business schools (see Profeta et al., 2014). Our results suggest that gender quotas may be a means to exploiting 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, rather they may stimulate a beneficial restructuring of the ruling class.

As other countries, such as France and Germany, have recently introduced board gender quotas, 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

[36] 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 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.

the introduction of gender quotas will survive when quotas, which are temporary, are no longer in force.

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Figure 1: Timeline of implementation of the gender quota law

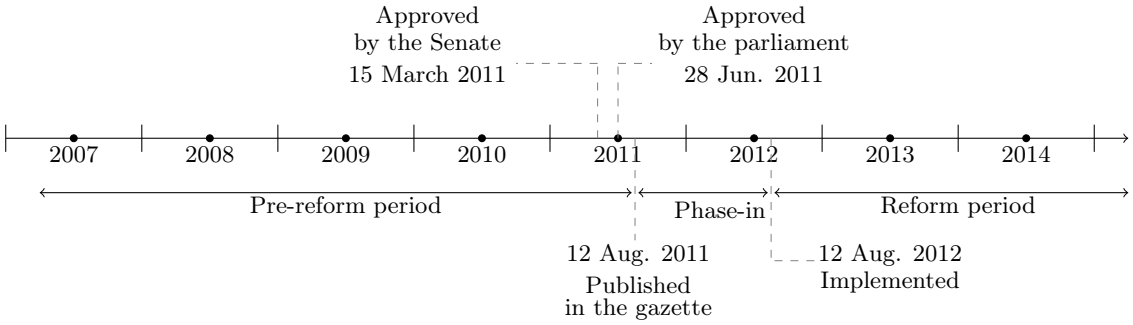
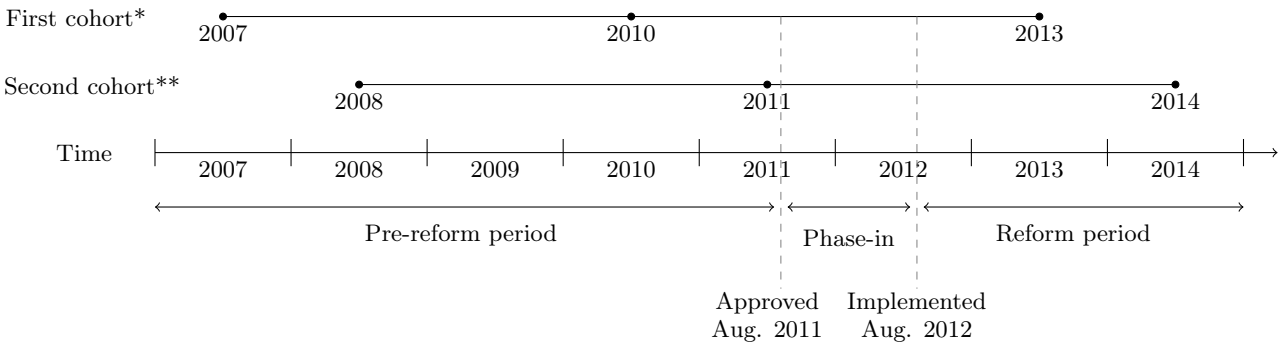
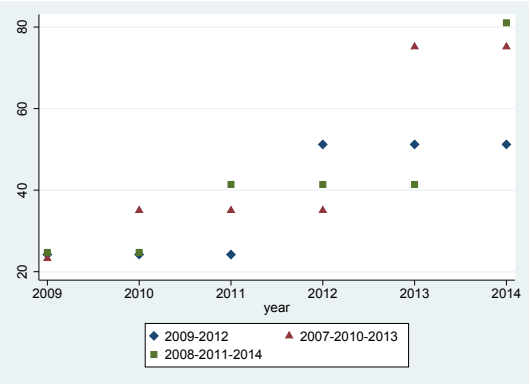


Figure 2: Timeline of board elections

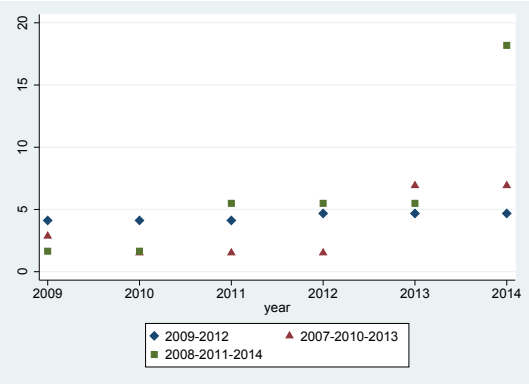


Notes: The figure represents the timeline of the implementation of the law (on the time axis) and the timing of board elections.
*Board elections in years 2007, 2010, and 2013, from April to June.
**Board elections in years 2008, 2011, and 2014, from April to June.

Figure 3: Effect on women's education

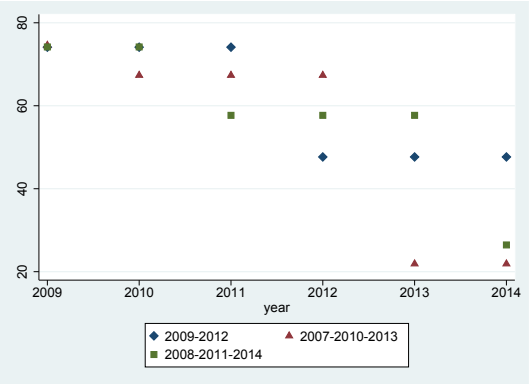


(a) Percentage of women with at least a degree

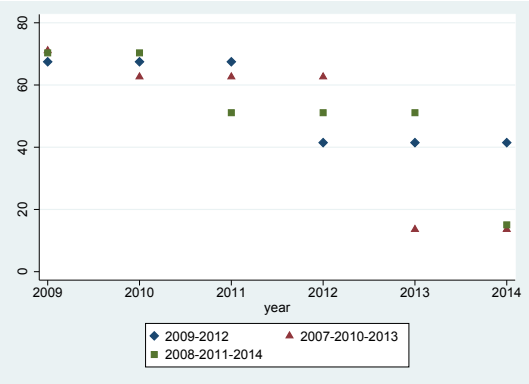


(b) Percentage of women with a graduate degree

Figure 4: Effect on women's age



(a) Percentage of women older than 60



(b) Percentage of women older than 70

Table 1: Summary statistics: board characteristics

		2009	2010	2011	2012	2013	2014
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
% 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
% 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
	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 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
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	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	2015
Firm characteristics						
Board size - board of directors	9.92	9.90	9.77	9.79	9.67	9.70
Board size - board of auditors	3.26	3.24	3.40	3.40	3.43	3.43
Employees	2,294	2,216	2,184	2,592	1,569	7,030
Production	680,478	757,198	789,670	744,226	709,874	3,851,005
Profits	140,679	6,552	79,922	4,935	34,681	52,100
Assets	7,434,404	7,121,694	7,255,573	6,853,101	6,559,175	20,063,749
ROA	1.00	-0.39	-1.18	-1.56	-0.11	2.14
ROE	2.63	0.62	0.82	-1.49	-2.45	-
Short-term debts	68%	63%	63%	70%	67%	-
Long-term debts	32%	37%	37%	30%	33%	-
Tobin's Q	0.64	0.65	0.62	0.59	0.65	-
Number of firms						
Industrial	37	36	36	38	40	40
Consumer	59	62	63	66	67	69
Financial	57	59	56	58	56	58
Other sectors	71	73	73	78	76	79
All firms	224	230	228	240	239	246

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 (1)	Boards changed in 2008-2011-2014 (2)	All boards 2007-2014 (3)
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)
% 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***
		(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)
% older than 60	All	-7.944***	-2.686	-5.426***
		(2.390)	(2.646)	(1.778)

Continued on next page

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)
	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 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
		(1.095)	(0.532)	(0.624)
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 coefficient β 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 regression 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. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

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		*	***			**
% $\geq$ 60 yrs	50.13	45.99	41.28		*	***	52.77	51.56	33.00		***	***			***
% $\geq$ 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			*			
% $\geq$ 60 yrs							25.00	40.00	15.91		*	*			
% $\geq$ 70 yrs							12.50	0.00	4.55			**			
Men															
% university							86.63	86.55	93.44		**	**			
% graduate							5.77	7.38	9.31			**			
% $\geq$ 60 yrs							55.56	51.82	42.28		**	***			
% $\geq$ 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 members' 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: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 5: The causal impact of women directors on economic performance and variability of stock market prices

	Firm fixed effects	Log(empl) (1)	Log(prod) (2)	Log(profits) (3)	Log(assets) (4)	ROA (5)	Tobins' Q (6)	Short-term debt (7)	Stock price st. dev. (8)
OLS		-0.655	-1.867**	-1.260	-1.790***	-8.197***	-0.544***	-0.112 ***	0.0013
		(0.698)	(0.798)	(0.970)	(0.683)	(3.150)	(0.197)	(0.097)	(0.0011)
OLS	Yes	-0.340	-0.547	1.435	0.004	0.150	0.005	-0.208**	-0.0016
		(0.471)	(0.617)	(0.799)	(0.196)	(3.762)	(0.150)	(0.082)	(0.0015)
ITT		0.231	0.261	0.452	0.301	0.773	0.022	-0.116***	-0.0023**
		(0.258)	(0.290)	(0.317)	(0.258)	(1.198)	(0.093)	(0.036)	(0.0011)
ITT	Yes	0.151	0.096	0.248	0.052	0.038	0.007	-0.030	-0.0029***
		(0.129)	(0.177)	(0.191)	(0.055)	(1.077)	(0.039)	(0.024)	(0.001)
IV		1.991	2.139	4.121	2.478	6.609	0.195	-0.963***	-0.0077***
		(2.187)	(2.402)	(2.964)	(2.159)	(10.076)	(0.816)	(0.317)	(0.003)
IV	Yes	0.957	0.595	1.619	0.324	1.639	0.065	-0.175	-0.0082***
		(0.850)	(1.151)	(1.249)	(0.354)	(6.763)	(0.250)	(0.151)	(0.003)
Number of observations		954	829	625	973	994	986	828	8,366

Notes: Results of the regressions of firms' performance measures (yearly observations from 2010 to 2015, column 1 to 7) and monthly standard deviation of stock prices (monthly observations, column 8) on the share of female directors (observations from 2010 to 2014). Year fixed effects are included for columns 1 to 7 and month fixed effects for column 8. The table shows estimates for OLS, OLS with firm fixed effects, Intention to treat (ITT), Intention to treat (ITT) with firm fixed effects, Instrumental variable (IV), Instrumental variable (IV) with firm fixed effects. The first stage of the IV regressions is reported in Table A4. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 6: 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	-0.008	-0.017	0.023*	0.023**
	(0.009)	(0.008)	(0.0128)	(0.009)
Distance from threshold	0.043		0.061	
	(0.042)		(0.078)	
Distance from threshold * Italian	-0.074		-0.052	
	(0.056)		(0.0905)	
Above median distance from threshold		0.008		0.013
		(0.009)		(0.013)
Above median distance from threshold * Italian		-0.012		-0.014
		(0.012)		(0.016)
Board size	0.002*	0.002	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.0012)
Log(assets)	-0.001	-0.001	0.0001	0.0002
	(0.0019)	(0.0019)	(0.0023)	(0.002)
Constant	-0.001	0.003	-0.002	-0.002
	(0.0272)	(0.026)	(0.033)	(0.031)
Industrial sectors	Yes	Yes	Yes	Yes
R-squared	0.075	0.071	0.074	0.072
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; *Distance from threshold* is a continuous variable constructed as 20% − percentage of women on board at the date of announcement. *Above median distance from threshold* is a dummy variable indicating whether the distance from the target of 20% was above the median value at the announcement date. Board size is the number of board members. Standard errors are clustered at the firm level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 7: Effect of the quota law on cumulative abnormal returns

Dependent variable: cumulative abnormal returns around the board election date				
	Full sample elections (1)	Post-reform elections (2)	Phase-in elections (3)	Pre-reform elections (4)
Quota election	−0.0004			
	(0.012)			
Distance from threshold	0.116***	0.128**	0.151**	0.073
	(0.0389)	(0.060)	(0.067)	(0.142)
Industrial sectors	Yes	Yes	Yes	Yes
R-squared	0.055	0.089	0.147	0.154
Observations	186	93	49	42

Notes: Regressions are cross-section OLS regressions of cumulative abnormal returns (CARs) of Italian listed companies on board 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; *Distance from threshold* is constructed as: 20% − percentage of women on board before the board election. Control variables include industrial sectors. Standard errors are clustered at the board election level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 8: 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 boards' of director 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's 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.

APPENDIX

A.1 Board characteristics

We introduce an alternative identification strategy to assess the impact of the gender quota law on board characteristics. For 2013, we present average values of board members' characteristics in the three groups of companies (pre-reform, phase-in and reform), which are exogenously selected. Results in Table A2 show that the share of women significantly increases in the reform sample (even more than the 20% initial target). The reform increases the share of members with graduate-level education, driven by men; it decreases the share of members older than 70; and it does not change the average number of board positions held by either men or women; it increases the percentage of family ties within the board, especially in the phase-in period. Our results also suggest an increase in the share of women with a degree in economics and an increase in field diversity. Note that in 2010, i.e. before the reform, we are able to reject the existence of significant differences among firms which will end up in different groups after the reform, for all but three characteristics (Table A3). The statistically significant differences which emerge in 2013 (Table A2) were not present in 2010 (Table A3).

A.2 Announcement of the gender quota law

We propose two alternative methods of assessing the reaction of the financial market to the announcement of the introduction of the gender quota law.

We first 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 affected by the law first may 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. In table A5 we calculate stock market returns at the two critical dates, June 28 and March 15, and make a comparison across companies in the three random groups: pre-reform, phase-in and post-reform (see section 3). Mean CARs are negative and significant for each group, confirming that there is no difference in stock price performance among Italian firms that changed their boards in 2013 — thus being first affected by the law — and other firms.[37] Moreover, we check whether there are statistically significant differences in the mean CARs between each of the three groups and the others, and find no significant differences between groups.

To provide additional evidence of the absence of a differential effect of the law on the three subgroups, we perform the following cross-section OLS regression for the full sample of companies and for the three subgroups:

$$CAR_{i,t} = \alpha + \beta\, Election\, in\, 2013_i + \phi\, \chi_i + \epsilon_{i,t} \tag{10}$$

where $Election\, in\, 2013_i$ is an indicator variable indicating whether the firm changed the board in 2013, namely in the year when the quota law became binding for firms; χ_i is a vector of control variables including board size, the logarithm of assets, and industrial sector dummies. ϵ_i represents the error term. Standard errors are clustered at the firm level. Results are in table A6 and show that, as expected, the law does not have any significant effect on the CARs of firms that were 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 had ambiguous effects on the phase-in group, as these firms changed their boards in 2012, after the approval of the law but before its actual enforcement. To address this concern, in columns 2 and 4 of Table A6, we drop the "phase-in" group from the sample, and find analogous results.

[37] 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.

As a second method, we compare firms with different shares of female board members at the date of approval of the law on June 28, 2011. The results of the event study in Table A7 show that 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. In order to examine whether the drop is driven by less gender-diverse firms, we compare the mean CARs of firms whose share of women directors was above the full sample median to CARs of firms that were below the median share of female directors at the approval of the quota law. We find that the mean CARs 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 average share of women on boards or the median number of women to be appointed by effect of the quota; similar results are also found when comparing firms that were already above the 20% target to firms that were not. 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. 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.

A.3 Stock market returns at elections and characteristics

In Table A8 we examine whether the election of board members with the characteristics considered in Part I have any impact *per se* on stock market returns. As Part I has proved that these characteristics are endogenous to the quota law, to understand how they are perceived by the stock market, we have to rely on pre-reform elections. Considering the pre-reform period in years not very far from the implementation of the law (2009-2011), but not influenced by the law, and controlling for board size and industrial sector (see also Adams, 2012), we regress CARs at board election for the usual 5-day window on the board member characteristics identified in Part I. We find that a larger share of members with a university degree and a smaller share of members older than 60 are, though weakly, significantly associated with better stock market performance. In other words, the elections of boards with more educated and younger members were associated, even in absence of the quota law, with better returns.[38] Thus, the positive effect of the quota law on stock market returns shown in Table 7 is in line with the changes induced by the quota law on the board, mainly the higher education and lower age of board members (see Part I), which are positively received by the market. Table A8 also supports the interpretation of higher education and lower age as a signal of quality, something on which we have been agnostic throughout the paper.[39] In fact, as we are considering listed companies, what really matters is the reaction of the financial market. If the stock market returns react positively to a given characteristic, as it turns out to be the case with more education and lower age, we can interpret this characteristic as being associated with quality.

[38] As the number of women on boards before the quota was very limited, it is not surprising that the share of women is not significant.

[39] 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 16.

Table A1 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
% 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
% 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 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
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	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

Continued on next page

Table A1 Summary statistics: board characteristics (individual level)

		2009	2010	2011	2012	2013	2014
	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
% 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
% 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 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
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	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 A2 Effect on board characteristics

		Pre-reform (1)	Phase-in (2)	Post-reform (3)
Share of women		10.5	14.6***	28.6***
More than 20% of women		3.3	4.0	17.1***
Female president		4.9	6.0	7.0
Female CEO		1.7	9.1	3.6
% 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
% degree in economics	All	57.7	58.8	56.0
	Women	42.1	51.0	54.0*
	Men	58.7	58.7	55.9
% degree in law	All	9.8	9.7	11.2
	Women	9.7	13.2	13.0
	Men	9.7	9.2	11.0
Field diversity	All	0.7	0.6	0.6*
% older than 60	All	39.8	36.3	35.6
	Women	18.4	17.0	12.3
	Men	42.0	38.8	45.6
% older than 70	All	21.4	15.6**	12.0***
	Women	5.9	3.1	4.3
	Men	23.0	17.2**	15.2***
% 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
Average number of positions	All	1.3	1.3	1.3
	Women	0.8	0.8	0.8
	Men	0.8	0.8	0.8

Notes: T-tests of the differences between the averages of members' characteristics in 2013 with respect to the pre-reform status quo. *Pre-reform* firms changed their board in 2011; *Phase-in* firms had elections in 2012 and *Post-reform* firms changed their board in 2013. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A3 Board and firm characteristics in 2010

	Firms of the first cohort, with elections in 2010 and 2013	Firms of the second cohort with elections in 2011 and 2014	
Board characteristics			
Share of women	7.24	9	
More than 20% of women (%)	0.02	0.02	
Female president	0.03	0.02	
Female CEO	0.037	0.036	
% university degree	78.65	79.75	
% graduate degree	3.9	5.8	
% study abroad	3.4	1.6	*
% degree in Economics	51.8	58.6	
% degree in Law	11.1	9.75	
% degree in Political Science	0.7	2.2	*
% degree in Engineering	8.6	7	
% older than 60	55.5	55.3	
% older than 70	79.4	81.1	
% family members	6.6	7.8	
Average number of positions	1.6	1.2	***
Firm characteristics			
Log(employees)	5.58	5.32	
Log(production)	11.02	10.81	
Log(profits)	9.94	9.38	
Log(assets)	13.3	12.86	
ROA	1.5	0.2	
Tobin's Q	0.93	0.86	
Short-term debt	0.68	0.66	

Notes: Average of members' characteristics in 2010. The first column refers to firms of the first cohort, which changed their board in 2010 and 2013 and the second column to firms of the second cohort, which changed their board in 2011 and 2014. We indicate if the difference between the values in the first and second column is statistically significant. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A4 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. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A5 Cumulative abnormal returns of Italian companies by date of election

	Full sample	Reform	Phase-in	Pre-reform
	(1)	(2)	(3)	(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 the 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. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A6 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. Regressions for the full sample are in columns 1-3. In columns 2-4 we dropped the phase-in group. Standard errors are clustered at the firm level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A7 Cumulative abnormal returns of Italian companies by gender diversity

	All firms	Above median distance	Below median distance	Difference (2)–(3)
	(1)	(2)	(3)	(4)
Panel A. Cumulative abnormal returns of Italian firms, 28 June 2011				
Mean	-0.0128***	-0.0121***	-0.0104**	0.0016
	(0.0036)	(0.0051)	(0.0056)	(0.0075)
Observations	224	124	100	224
Panel B. Cumulative abnormal returns of Italian firms, 15 March 2011				
Mean	0.0030	0.0055	0.0003	0.005
	(0.0038)	(0.0059)	(0.0056)	(0.0082)
Observations	203	102	100	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; columns 2 and 3 report the mean CAR of Italian firms whose distance from the target of 20% women directors is respectively above and below the median value. Column 4 shows the test of the difference in means between the values in columns 2 and 3. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A8 Effect of board characteristics on cumulative abnormal returns before the quota law (2009-2011)

Dependent variable: cumulative abnormal returns around the board election date	
	Full sample
	(1)
% women directors	-0.0005
	(0.0006)
% university degree	0.0006*
	(0.0003)
% graduate degree	-0.0003
	(0.0006)
% older than 60	-0.0007*
	(0.0004)
% older than 70	0.0006
	(0.0005)
% family members	-0.0003
	(0.0004)
Board size	0.00003
	(0.0020)
Industrial sectors	Yes
Year dummies	Yes
R-squared	0.1746
Observations	184

Notes: Regressions are cross-section OLS regressions of cumulative abnormal returns (CARs) of Italian listed companies on board variables. CARs are the sum of abnormal returns over the ten days surrounding the election of the board of directors ((-5;+5) event window). Control variables include industrial sectors and year dummies. Standard errors are clustered at the board election level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A9 Effect of the quota law on cumulative abnormal returns

Dependent variable: cumulative abnormal returns around the board election date				
	Full sample elections (1)	Post-reform elections (2)	Phase-in elections (3)	Pre-reform elections (4)
Quota election	-0.003			
	(0.120)			
Distance from threshold	0.111**	0.115*	0.198**	0.160
	(0.045)	(0.064)	(0.094)	(0.176)
Board size	-0.002	-0.001	-0.002	-0.002
	(0.020)	(0.002)	(0.003)	(0.004)
% university degree	0.67	-0.037	0.132	0.096
	(0.004)	(0.049)	(0.089)	(0.147)
% older than 70	0.004	-0.001	0.114	0.008
	(0.004)	(0.004)	(0.098)	(0.098)
% family members	0.056	0.019	0.011	0.107
	(0.046)	(0.040)	(0.057)	(0.129)
Log(assets)	0.002	0.004	-0.003	0.002
	(0.003)	(0.001)	(0.007)	(0.007)
ROA	-0.0001	-0.0001	0.0004	-0.005
	(0.0005)	(0.001)	(0.001)	(0.003)
Industrial sectors	Yes	Yes	Yes	Yes
R-squared	0.086	0.105	0.142	0.281
Observations	186	93	49	42

Notes: Regressions are cross-section OLS regressions of cumulative abnormal returns (CARs) of Italian listed companies on board 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; *Distance from threshold* is constructed as: 20% − percentage of women on board before the board election. Control variables include industrial sectors. Standard errors are clustered at the board election level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.