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Abstract

In this paper, we investigate the impact of gender quotas on firm performance using countries worldwide that have introduced a gender quota with sanction as a quasi-natural experiment. Our statistical analysis shows that board members' characteristics significantly change after the implementation of the gender quota. The results of our empirical analysis provide evidence that gender quotas have a neutral impact on firm performance in the short term and in the longer term, independently of changes in directors' age, education, nationality, experience or independence. Our findings provide evidence that policymakers can use mandatory quotas to force firms to achieve gender balance on corporate boards without a negative impact on firm performance. Our results also suggest that policymakers create unrealistic expectations for women to boost firm performance.

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1. Introduction

Gender imbalance in corporate boards remains an undeniable fact for a large number of companies worldwide, despite significant advances for women in education, labor force and political participation across the globe. Women only represented 11.9% of boards of directors in European companies in 2010, dropping to 9.9% in the Americas, 6.5% in the Asia-Pacific Region and 3.2% in the Middle East and North Africa (Corporate Women Directors International, 2010). Policymakers have responded in many countries by imposing gender quotas for corporate boards partly for ethical principles and social justice, but also justifying this intervention by the positive economic effects expected from gender balance, in particular on firm profits. However, some critics of board reforms argue that mandatory rules could be unnecessary and potentially harmful if existing board practices reflect the optimal choice of firms after considering all factors. The average effect of gender quotas on firm performance is, therefore, an empirical question. Existing research focuses on a single country and yields mixed results. We extend this research by comparing the effect of gender quotas across all countries that imposed gender quotas with sanctions using a staggered difference-in-differences approach. We aim to reconcile the mixed findings in prior single-country studies and answer questions that the current literature is unable to address. Do firm values and profitability increase or decrease as a result of the new board structure imposed by the law in both the short and the long term? Could mandatory quotas be used to force firms to achieve gender balance without a negative impact on firm performance? Should policymakers realistically expect female directors to boost firm performance?

The literature analyzing the relationship between female directors and firm performance outside the context of gender quotas proposes numerous arguments to explain why the presence of women on boards should positively affect organizational outcomes. They include: (i) influence on decision making with women adopting more ethical, risk-averse and long-term oriented points of view (Rosener, 1990); (ii) women directors bringing resources and strategic input that male directors are not able to provide (Bilimoria, 2000); (iii) increased diversity of opinions in the boardroom (Francoeur et al. 2008); (iv) women directors improving monitoring of managers if they are more independent than their male counterparts, by not being part of "old boys' networks" (Higgs, 2003; Post and Byron, 2015; Adams, 2016); and (v) signalling the stakeholders and the market that a company places a high value on women (Burgess and Tharenou, 2002; Kirsch, 2018). All these arguments support the "business case" argument that firms with more women on boards should perform better. The empirical literature analyzing the relationship between female directors and firm performance (see Kirsch, 2018 and Adams, 2016

for a survey) does not, however, provide clear evidence that women improve firm performance; some studies find that the presence of female directors has positive consequences on performance (e.g. Ryan and Haslam, 2005), while others find no differences in performance (e.g. Farrell and Hersch, 2005; Chapple and Humphrey, 2014) or even a negative impact of gender diversity (Adams and Ferreira, 2009; Lee and James, 2007). These mixed results could be explained by the argument provided by Adams (2016) that board diversity could positively affect firm performance only if female directors are different from their male counterparts.

There is a large amount of literature analyzing gender differences in preferences for the general population. These studies provide evidence that women tend to be more averse to risk (see the surveys of Byrnes et al. 1999, and Croson and Gneezy, 2009), more long-term oriented (e.g. Silverman, 2003), more altruistic (e.g. Andreoni and Vesterlund, 2001), have less of a taste for competition (e.g. Niederle, 2014), and are more ethical in their decisions (e.g. Ambrose and Schminke, 1999) than are men. However, it may be a fact that particular gender differences exist in the general population, it is less obvious whether these differences apply to corporate directors (Adams, 2016; Sila et al. 2016; Kirsch, 2018). Some studies show that women reaching the top of the corporate ladder are different from those in the general population. Deaves et al. (2009), who conduct experiments on a group of economics, finance and business students, do not find differences between women's and men's preferences and postulate that women may have a lot in common with men in comparable positions. It is, therefore, possible that women directors are different in their preferences from women in the general population, presenting characteristics that have helped them to access top positions in the corporate world. Adams and Funk (2012) support this argument by showing that female directors in Sweden are more risk-loving, less security- and tradition-oriented, and more self-direction- and stimulation-oriented than male directors, while the opposite holds for women in the general population. The literature further documents that female directors are different in their skills, age, and experience. They tend to have higher levels of education, with a higher percentage of female directors holding MBA and Ph.D. degrees compared to their male peers, and they have substantially more international experience (Burgess and Tharenou, 2002; Singh et al. 2008). It also appears that female directors tend to be younger than their male colleagues (e.g. Adams & Ferreira, 2009; Adams & Funk, 2012; Ahern & Dittmar, 2012), and may bring new ideas and strategies (Burke, 1994; Ibrahim and Angelidis, 1994). Adams (2016) argues that some of these differences between female and male directors are likely to vanish over time; if the impact of gender diversity on firm outcomes derives only from these differences, it would be then hard to observe a significant impact in the long run.

Most policy-makers appeal to the "business case" argument to justify the imposition of quotas even if there is no clear empirical evidence that women's presence on boards improves firm performance, ignoring the fact that female directors might not have performance-enhancing powers by virtue of their gender. Policymakers also neglect counter-arguments on the desirability and efficacy of gender quotas. The first argument used to question the imposition of gender quotas refers to the contract theory of the firm, supposing that firms maximize profits prior to the imposition of quotas. As the introduction of a gender quota forces firms to modify their decision regarding the share of women on the board, it might reduce firm profits if they were already at a point where profits were maximized (Pande and Ford, 2011; Gopalan and Watson, 2015). Another argument against quotas is based on studies explaining that under-representation of women on boards is not due to discrimination but the result of women's choices, mainly for fertility and motherhood reasons (Burke, 1994; Bertrand et al. 2010; Miller, 2011). In this context, if there are not enough women with the appropriate qualifications that will accept being appointed, gender quotas might promote less-qualified individuals who might perform poorly, and this could result in firms' decreased profits. Another critique of gender quotas is the risk of entrenchment of female directors if they feel secure in their position; they might then have less pressure than their male counterparts to represent shareholders' interest (Coate and Loury 1993; Matsa and Miller 2013). It is also plausible that gender diversity would exacerbate conflicts and make consensus more difficult to be attained, and this can result in more erratic outcomes (Arrow, 1951; Bernile et al., 2018). Business ethics arguments are furthermore used to question gender quotas, as these could be undemocratic (Dubbink, 2005) and discriminatory (Gopalan & Watson, 2015). Quotas are then justified as a rational "last response" to the problem of gender imbalance on corporate boards.

The effect of gender quotas on firm performance is still an open debate. This paper uses the adoption of gender quotas with sanctions in several countries as a quasi-natural experiment to determine whether promoting women on boards through mandatory rules has an influence on boards characteristics (age, education, experience, nationality, independency, etc) and how these changes influence the way gender quotas impact firm performance. To obtain a clear picture we examine the impact of gender quotas on market valuation and operating profits. While policymakers expect positive effects from the imposition of gender quotas, they can also create unrealistic expectations for women. We should only expect gender quotas to improve firm performance if male and female directors are different other than in their gender and if the cost to be paid when including gender balance through mandatory rules is not too high. Moreover, as firms have usually several years to comply with the gender quotas, potential

changes in performance could materialize several years after the reforms have become effective. We address this issue of timing and duration of the gender quotas effect by analyzing the changes in performance in the years following the introduction of the laws as well as the cumulative effect over longer time windows. We furthermore investigate whether the impact of board gender quotas can manifest through different channels (changes in board members' characteristics, distance from compliance, corporate decisions, critical mass, size and level of performance of the firm).

Despite the importance of understanding the desirability of mandatory rules to address women's under-representation on boards, there is limited empirical research on gender quotas in the field of corporate governance, with a focus on Norway that was the first country to impose a gender quota. A first-of-its-kind law was passed in 2003 requiring Norwegian listed firms to have at least 40% of women on boards of directors by July 2005. The law became compulsory in 2006 after voluntary compliance failed. Ahern and Dittmar (2012) find that the constraint imposed by the quota caused a significant decrease in the stock price at the announcement of the first-of-its-kind law in 2003 and a decrease in Tobin's Q over the following years, using instrumental variables estimations to deal with endogeneity issues.[2] Matsa and Miller (2013), using a difference-in-differences method, further find that short-run operating profit declined after the compulsory law of 2006 because of increased labor costs and higher relative employment. Yang et al. (2019), using the same approach than Matsa and Miller (2013), find a negative effect of gender quota on firm performance and on firm risk. On the contrary, Eckbo et al. (2018), using the same IV analysis as Ahern and Dittmar (2012), find that there is no change in operating profitability following quota compliance after extending the sample period beyond the recent financial crisis. They furthermore show that quota-induced changes in market valuation were economically and statistically insignificant.

Our paper makes the following contributions to the literature. First, we extend the literature that investigates the link between gender quotas and firm performance by providing the first study that examines this for a cross-country sample. We also contribute to the literature by examining not only the short term effect of gender quotas on firm performance as in the existing literature but also the longer-term effect. Our results relate to the policy debate concerning the increasing tendency of national legislatures to introduce boardroom gender quotas. Second, our paper contributes to the literature on the inconclusive debate over board gender diversity and firm performance. We focus for that on a country-level shock that can be considered as quasi-

[2] The instrument used is the firm's percentage of female directors in 2002 interacted with year dummies.

natural experiments. While board reforms are not necessarily exogenous in terms of timing or origin, they are exogenous to the individual firms within a country as these firms are affected disregarding shareholders' intention (Fauver et al., 2017). Gender quotas, therefore, provide an identification strategy that alleviates the endogeneity issues present when examining the correlation between the presence of female directors and firm performance. Third, we contribute more generally to the economic literature that aims to understand what happens when public policies help women overcome existing barriers to professional advancement and occupy positions at the top of the corporate ladder. We, therefore, expand on previous research analyzing the impact of gender quotas on political positions (see Pande and Ford, 2011 for a survey).

To conduct our empirical analysis, we consider, at the worldwide level, which countries have adopted a law to impose a gender quota at least to listed firms and state-owned firms between 2003 and 2018, and with sanctions in the case of non-compliance. We limit our analysis to countries that impose gender quotas with sanctions as we observe otherwise that the presence of women on boards remains very limited, far below the quota. Because the gender quotas are adopted at different points in time, we use a staggered difference-in-differences (DID) research design to estimate the impact of the reforms on firm performance. Our results show that gender quotas have a neutral impact on firm performance in the short term and in the longer term. Our results further show that this neutral effect holds after taking into account changes in directors' age, education, nationality, experience or independence, and also if we consider a critical mass effect, the distance to the compliance, and the size and the level of performance of the firm. Our findings, therefore, provide evidence that policymakers can use mandatory quotas to promote and increase gender balance on the boards of companies without a negative impact on firm performance either in the short term or in the longer term. These results also provide evidence that an exogenous increase in the number of female directors does not lead to an increase in firm performance, as expected by policymakers. Female directors do not seem to be "superheroes" (in reference to Adams, 2016) having the power to increase performance just by virtue of their gender. Our results are robust to various sensitivity analyses, such as the use of alternative DID methodologies, pseudo reform years during the pre- and post-reform period separately, and alternative samples.

The remainder of the paper is structured as follows. Section 2 offers background on board gender quotas; Section 3 presents our sample and a descriptive analysis on changes in boards' compositions and board members' characteristics after gender quotas; Section 4 describes our

empirical methodology, presents the results and carries out several robustness checks; Section 5 provides additional investigations, and Section 6 concludes the paper.

2. Background on board gender quotas

The primary function of the board of directors is to hire and fire executives, and to advise them. The board is ultimately responsible for ensuring firms create value for shareholders. An important question is therefore what makes boards effective. For many years, independent directors have been seen as the "magical" solution to answer this question and solve many corporate governance problems (Adams, 2016). However, the empirical research does not support the high expectations that policymakers have put on the value of board independence (see De Haan and Vlahu, 2016 for a discussion). Following the "business case" argument, policymakers thought that the presence of women on boards is an alternative solution to ameliorate corporate governance and improves decision-making processes within firms (Adams, 2016). Despite significant advances in education and political participation, women remain relatively underrepresented on boards. Policymakers in many countries have therefore decided to take measures to promote and increase gender balance on the boards of firms, through either legislative measures that set quotas or voluntary initiatives.

Norway was the first country to impose a gender quota in 2006, with sanctions in the case of non-compliance. From 2008 it obliged listed companies to have women in at least 40% of board seats. Over the next years more than twenty countries, mostly western European, adopted gender quotas, however with important differences with respect to the firms in question (state-owned firms only and/or publicly listed firms), the threshold (30 to 50%), deadlines for compliance (1 to 8 years) and sanctions (from no sanction to warnings, fines, the suspension of benefits for directors, the nullification of board elections, etc) (see Table 1). Some other countries refuse to implement mandatory rules to support board diversity as the desirability and efficacy of such affirmative action is discussed controversially, and instead introduce voluntary-based measures through governance code amendments (Sweden, Switzerland, Thailand, and the UK), or disclosure requirements (Australia, Denmark, New Zealand and the USA[3]) (Adams, 2016; Terjesen, Aguilera, & Lorenz, 2015). In Europe, a voluntary process for companies was

[3] The only exception in the USA is California that mandated in October 2018 that publicly listed firms headquartered in California include at least one woman on their boards by the end of 2019, at least two women for boards with five members and at least three women on boards with six or more members by the end of July 2021. Firms that fail to comply will face significant fines. Greene et al. (2020) find that the introduction of this quota is associated with a drop in firm stock prices at the announcement date. This result is confirmed by Hwang et al. (2019) and Meyerinck et al. (2019).

proposed in 2012 by the European Commission to reach the goal of 30% women board members by the year 2015 and 40% by 2020 (European Commission, 2012).

Cross-country studies show that legal mandates have been more potent than voluntary-based measures to increase women's representation on boards (The European Union Progress Report, Gender balance in decision-making positions, 2012). Voluntary initiatives do not generally allow a critical mass of female directors on boards to be achieved, as in the United States where the number of women has remained stagnant over the period 2012-2016 with on average 2.1 women per board (Global Board Diversity Analysis, Egon Zehnder, 2016). The theoretical literature demonstrates that if the number of women on a board is too small, problems of tokenism arise (hypervisibility, stereotyping, exclusion), resulting in a negative impact on organizational outcomes (Kanter, 1977). Konrad et al. (2008) argue that the critical mass of women to have a positive effect on organizational outcomes is three directors (around 30%). Torchia et al. (2011), in line with this argument, find for a panel of Norwegian firms that female directors contribute to increase the level of firm innovation when the critical mass of at least three female directors is reached.

The limited presence of female directors in many countries leads to a consideration of whether and how public policy should respond. We need to understand the benefits and costs of enabling women to become directors to answer these questions. One way to obtain such an understanding is to evaluate the impact of direct policy interventions such as gender quotas. While the literature on the effects of gender quotas in the context of business and/or politics is vast (see Profeta et al., 2014 and Pande and Ford, 2011 for reviews), the literature examining the impact of board gender quotas on firm outcomes is scarce to date and only concerns the Norwegian case. Matsa and Miller (2013), Ahern and Dittmar (2012) and Yang et al. (2019) investigate how the implementation of a gender quota of at least 40% impacted the performance of Norwegian firms over the period 2003-2009. Ahern and Dittmar (2012) find that the announcement of the quota caused negative market reactions, and Yang et al. (2019) and Matsa and Miller (2013) report a decline in operating profit, caused by an increase in labor costs and employment level. Bertrand et al. (2019) further find that the gender gap in earnings within boards fell substantially after the reform, but they do not find robust evidence that the quota benefited the larger set of women employed in these companies. Bøhren and Staubo (2014) also provide evidence that mandatory gender balance produces firms with inefficient organizational forms and suboptimal board composition. These studies conclude therefore that profitability fell after women were brought onto corporate boards because of a quota, in line with the argument that regulations forcing firms to do things they currently do not are likely to impose

some costs. Bøhren and Staubo (2014) further find that the imposition of a gender quota in Norway reduced firm value through an increase in board independence.[4] However, Nygaard (2011) shows that this effect depends on asymmetric information between independent members of the boards and the companies' managers. Eckbo et al. (2018), who extend their sample beyond the financial crisis of 2007-2008, find that Norwegian firm market values and operating profitability did not decline after quota compliance. They show that the decline in performance reported by previous studies appears to be a phenomenon limited to the financial crisis years.

The question of whether gender quotas have a positive, negative or neutral impact on firm outcomes has not therefore been extensively studied and remains unclear despite its importance for policymakers. To characterize the influence of board gender quotas on firm performance, we need a better understanding of the differences between female and male directors, and how diversity affects firm performance not only in the short term but also in the longer term. If differences exist between female and male directors, then it is possible that increasing board diversity may impact boards' decision-making and then firms' outcomes, but it also depends on the costs induced by the imposition of mandatory rules. We examine in this paper whether board gender quotas have a meaningful impact on boards and firm performance for countries that have implemented gender quotas with sanctions.

[Insert Table 1]

3. Data and summary statistics on boards of directors

3.1. Presentation of the sample

Our study focuses on the group of countries at the world level which has adopted a gender quota with sanctions for publicly listed firms and state-owned firms (SOEs) over the period 2003-2018 (see Table 1 for details). We exclude countries that have adopted a gender quota without sanctions because we find that the percentage of women on boards of directors remains far below the quota even after the date of compliance, showing the important role of sanctions to force firms to comply with gender quotas. We furthermore do not include countries that have adopted a gender quota with sanctions but without imposing a certain threshold (e.g. India that

[4] Bøhren and Staubo (2016) justify their results with the findings of both the existing theoretical literature (Adams and Ferreira 2007) and empirical literature (Linck et al. 2008; Duchin et al. 2010) showing that optimal board independence requires a trade-off between the value of advice provided by inside directors and the value of monitoring provided by independent directors. The imposition of a gender quota could increase the number of independent directors above its optimal level.

only imposes having one female director, and Denmark that lets firms set their own threshold). We are left with a panel of Belgian, French, German, Italian and Norwegian firms.

A gender quota with sanctions was implemented in Belgium, France Germany, Italy, and Norway, with differences in the threshold considered, the date of compliance and the type of sanction (see Table 1). Norway was the first country in the world to impose a gender quota in 2003 on a voluntary basis, and then made mandatory in 2006. The law requires that SOEs and listed firms achieve 40 percent board representation by women, and firms that did not comply by January 2008 would be forced to dissolve. In Belgium, the law requires SOEs and listed companies to have at least one third (33%) representation from each sex on their board. The date of compliance is 2012 for SOEs, 2017 for listed companies and 2019 for listed SMEs. In cases of non-compliance, board members would lose financial and non-financial benefits until compliance with the law. In France, the law requires listed companies and SOEs to include 40% of women on their board by 2017, with an intermediate target of 20% by 2014. The penalty for non-compliant companies is the annulment of board appointments. In Italy, the law imposes a gender quota of 33% for listed companies and SOEs by 2015, with financial sanctions for non-compliant companies. In Germany, a law enshrines a 30% minimum quota of women on the board of directors for the 110 biggest listed companies by 2016. In case of non-compliance, the seats on the board will remain empty or the firm might face administrative fines.

We collect board of directors' information for Belgian, French, German, Italian and Norwegian firms listed on the stock market from the BoardEx database over the period 2003 to 2018 (see Table 3 for the number of firms per country and per year). We follow the existing literature and exclude financial institutions as they are subject to specific regulation (see Hermalin and Weisbach, 1998; Farrell and Hersch, 2005; Matsa and Miller, 2013 or Bennouri et al., 2018). For Germany, we select for each year the 110 biggest listed firms based on their total assets; after excluding financial institutions, we are left with 70 German firms in our sample in 2018 (see Table 3).

Consolidated financial statements and market-based indicators are extracted from the database Bloomberg. Financial variables are winsorized at the one percent tails, as it is common when working with accounting data.

3.2. How boards of directors change

We examine in this section how the imposition of a gender quota with sanction changes board composition and individual board members' characteristics. Given the large demand

shock imposed by the quota, we expect board composition and characteristics to be different along many dimensions; we, therefore, use a large set of indicators, all defined in Table 2.

Table 3 compares for each country considered the board gender composition of firms before and after the imposition of the quota. Firms were on average far from the minimum number of women imposed by the quota before the law. As expected, the percentage of female directors increases after the introduction of the quota. Interestingly, we find that the average board size remains mostly constant over the period in the five countries, indicating that firms replace male directors with female directors to comply with the law. We also observe from Table 3 that the percentage of female directors is on average below the legal quota at the date of compliance in Belgium (26%), France (35%), Germany (22%), Italy (26%) and Norway (37%); this could be explained by the relatively high number of firms that do not respect the quota (around 63% in Belgium, 49% in France, 73% in Germany, 77% in Italy, and 43% in Norway). However, we can see that in Norway and Italy the number of firms that do not comply with the law strongly decreases three years after the date of compliance, suggesting that the sanctions potentially applied were effective to prompt a large number of firms to respect the quota.

We next analyze whether compliance with gender quotas modifies other observable characteristics of firm board members, such as age, education, experience, and independence. As we find similar results for Belgian, French, German, Italian and Norwegian firms, we only report in Tables 4 to 6 the average statistics for all firms together.[5] Table 4 shows, in line with the existing literature, that female directors are younger than their male colleagues, and this holds before and after the imposition of a gender quota. Female board members are on average about five years younger than males after the quota. As we might expect, the time on boards of female directors (around 4 years) is shorter than male directors (around 7 years) after the introduction of gender quotas, indicating that new females are recruited with a shorter tenure than male directors. A larger number of female directors is also recruited outside the firms after the imposition of the quota, as outlined by the shorter time spent in the company, around 5 years against more than 8 years for male directors. We also observe that the number of foreign female directors increases significantly after the gender quota, to become superior to the number of foreign male directors. Our statistics further show that the proportion of female directors who are independent strongly increased after the quotas, to the point of becoming larger than the proportion of independent male directors.

[5] Statistics by country are available on request.

Table 5 further presents information on education and board experience of directors. In Table 6, we split our board members into retained, exiting, and new members and report data on education and board experience for each group before and after quotas. Tables 5 and 6 show that female directors are more highly educated than their male colleagues, with a stronger difference after the quota. This finding does not support the argument that the binding constraint imposed by the quota forces firms to hire less qualified women. Interestingly, we also find that there are more men with higher education than before the law. These findings support the idea that gender quotas may encourage a better selection mechanism, mainly by increasing the level of education of the entire board. We also find that female directors have significantly less experience on boards, have significantly less CEO experience and are less likely to be chairman compared to male directors and these differences hold for both retained and new female directors. However, we observe that women have the same opportunity to be vice-chairman or vice-CEO than male directors after the quotas. We furthermore do not find that women serve on more boards after the introduction of quotas. These findings show that gender quotas give opportunities to a large number of women to serve on boards, and do not force firms to appoint the same few women with the risk of reducing the quality of corporate governance. These findings also provide evidence that the primary constraint on female directors is not the lack of interest in such positions by women.

Overall, our analysis shows that gender quotas have altered, as expected, the gender composition of boards but also other board members' characteristics, such as age, nationality, education, board experience, and independency. We will explore, in the next section, whether the imposition of a board gender quota has an impact on firm performance and whether this impact depends on the changes we observed in board members' characteristics.

[Insert Tables 2 to 6]

4. How gender quotas affect firm performance

4.1. Methodology

The DID baseline specification

We use a DID model with a staggered adoption system since it accounts for the gender quotas staggered over time. This methodology is consistent with studies having staggered treatment events (e.g., Bertrand and Mullainathan 2003; Fauver et al. 2017; Jiang et al. 2019). The treated group is listed firms that are affected by a gender quota. This approach implicitly considers in the control group all listed firms located in a country without reforms at time *t*, even if it will

have a reform in the future.[6] We, therefore, compare changes in firm performance following the adoption of a gender quota with changes in firm performance in countries without gender quotas during the same year. By doing so, we aim to separate the effect of gender quotas from other factors potentially affecting firm performance.

We consider three measures of performance, based on both accounting and market-based measures of performance, as they are not perfect measures of firm performance when it comes to analyzing the outcome of board changes (Kirsch, 2018; Bennouri et al., 2018). We consider the most common market-based measure of performance, the Tobin's Q (*Tobin Q*), defined as the book value of assets minus the book value of equity plus the market value of equity, divided by the book value of assets. Market-based measures incorporate investor perceptions and they might be influenced by sexism and stereotype beliefs about women's suitability for directorship. Such measures might then capture the market's reaction to the quota rather than changes in board performance. We therefore also consider two accounting-based measures, the return on assets (*ROA*), computed as the ratio of net income over total assets, and the operating profit (*Operating Profit*), calculated as the ratio of earnings before interest and taxes over total assets. However, accounting-based measures are sensitive to any discretionary behavior such as earnings management.

We first use the following specification to compare changes in performance between treated and non-treated firms, before and after the imposition of quota:

$$Y_{ijt} = \beta + \beta_1 DQuota_{jt} + \sum \beta_m Control_{ijt} + \sum \beta_n FE_{it} + \varepsilon_{ijt} \quad (1)$$

where the subscript *i* denotes firm, *j* denotes country, *t* denotes the time period, and ε_{ijt} is the idiosyncratic error term. Y_{ijt}, the dependent variable, is either *Tobin Q*, *ROA* or *Operating Profits*. $DQuota_{jt}$ is a dummy variable taking the value of one when the gender quota is introduced in country *j* and thereafter, and zero otherwise. We include a full set of firm fixed effects and time fixed effects. The firm and year fixed effects take into account the within-firm and within-year change in firm performance between treated and non-treated firms when countries impose gender quotas. We also cluster the standard errors at the firm level to allow for serial dependence in the error correlation structure within firms.

Our coefficient of interest in this regression is β_1. It assesses the impact of the implementation of gender quotas on the performance of treated firms. We mitigate the correlated omitted variable problem by including in our specification a set of time-varying,

[6] We alternatively consider in the control group firms located in European countries that did not implement a gender quota (see Section 4.4.).

firm-level and country-level variables commonly used in the existing literature to explain firm performance: the firm size (*Firm size*), the growth of sales (*Sales growth*), the level of capital (*Leverage*), the ratio of cash divided by total assets (*Cash*), the ratio of property, plant, and equipment divided by total sales (*PPE*), and the growth of GDP (*GDP*). The detailed definition and calculation of these variables are given in Table 2.

The DID specification to differentiate the short and long term effects

As it could take several years for firms to comply with the gender quota, the expected impact on their performance might be different in the years directly following the reform, and years further in the future. To address this concern, we replace the dummy variable *DQuota* in our DID specification (1) with two timing dummies that track the short and long term effects of the gender quota. More specifically, we test whether there is a significant change in firm performance in the three years following the gender quota including the year the reform becomes effective ($DQuota_{[0, +2]}$), and from the fourth year after the imposition of the gender quota onward ($DQuota_{[+3, T]}$). T denotes the end of the sample period.

The role of board characteristics

We next examine whether the impact of gender quotas is not driven by changes in board members' characteristics other than gender. To address this concern, we augment the Equation (1) with an interaction term between the dummy variable *DQuota* (or $DQuota_{[0, +2]}$ and $DQuota_{[+3, T]}$) and one of the dummy variables that depict changes in board members' characteristics after gender quotas. The analysis of board members' characteristics conducted in Section 3.2 shows that compliance with the gender quota forced firms to appoint a higher proportion of directors who are younger, come from foreign countries, have postgraduate degrees, have less experience on boards, and are more independent. We, therefore, consider the five following alternative dummy variables: (1) *dLowAge* takes the value of one if the average age of directors of a board is below the median value of the group; (2) *dHighForeign* takes the value of one if the average percentage of foreign directors of a board is above the median value of the group; (3) *dHighEducation* takes the value of one if the percentage of directors of a board having postgraduate degrees is above the median of the group; (4) *dLowExperience* if the percentage of directors having experience as CEO or Chairman of a board is below the median of the group; and (5) *dHighIndependent* if the percentage of independent directors is above the median of the group. Our coefficient of interest in this regression is the coefficient for the

interaction variable that shows how changes in board members' characteristics influence the way gender quotas impact firm performance.

4.2. Results

Table 7 reports the estimation results of Equation (1) where the performance is measured by either the Tobin's Q, the ROA or the operating profit. Model (1) is the baseline model where the effect of the gender quota is captured for the entire period following the reform by the coefficient of the dummy variable *DQuota*. Model (2) disentangles the short and the long term effects of the imposition of a gender quota with the two dummy variables $DQuota_{[0,\,+2]}$ and $DQuota_{[+3,\,T]}$. We include in both models firm and year fixed effects, and standard errors are clustered at the firm level.

Our results show that none of the considered performance measures are significantly affected by the imposition of a gender quota. We observe these results when we consider the effect of the imposition of a gender quota on the entire period after the reform (Model (1)), as well as for the short and the longer periods (Model (2)). This neutral effect of board gender quotas on firm performance provide evidence that the costs associated with the imposition of gender quotas on boards are not too high and do not induce a negative impact on firm profits. Our findings are not therefore consistent with the previous work of Ahern and Dittmar (2012), Matsa and Miller (2013) and Yang et al. (2019) that the enforcement of a gender quota in Norway caused a decline in firm outcomes. We instead find that gender quotas have a neutral effect on firm performance, in line with the recent work of Eckbo et al. (2018).

We next examine whether the impact of gender quotas becomes significant when we consider the influence of changes in board members' characteristics other than gender. We report the estimation results in Table 8 using firm and year fixed effects and standard errors clustered at the firm level. Panels A, B, C, D and E report the results when allowing for differential effects for treated firms when they have, respectively, a higher proportion of younger board members, a higher proportion of foreign directors, a higher proportion of directors with postgraduate degrees, a lower proportion of directors with more board experience, and a higher proportion of independent directors. We find that none of these changes in board members' characteristics impact the way gender quotas influence firm performance on the entire period after the reform (Model (1)), and for the short and the longer periods (Model (2)).

Overall, our empirical results show that the introduction of gender quotas has a neutral impact on firm performance both in the short and the long term, and that changes in directors'

age, education, nationality, experience or independency have no impact on the quota's effect. Our findings support the argument that policymakers can force firms to achieve a gender-balanced representation on corporate boards through a mandatory quota without generating negative effects on their performance in the short and long term. Moreover, our findings do not support the expectations of policymakers that female directors can increase firm performance in the short term or in the long term, showing that policymakers might create unrealistic expectations for female directors.

[Insert Tables 7 to 8]

4.4. Robustness checks

We carry out several robustness checks in order to verify the neutrality of the relationship between board gender quotas and firm performance.

Parallel trend assumption

The parallel trend assumption underlying our DID design supposes that, in the absence of treatment, the average change in firm performance would have been the same for the treated and the control groups. We follow Fauver et al. (2017) and assess this assumption by conducting two placebo tests. The first test limits the analysis to the pre-reform periods and applies the pseudo reform effective year as three years prior to the actual reform year. The second placebo test we realized considers the post-reform periods, with the pseudo reform year fixed as three years after the actual reform year. The results of these two placebo tests are reported in Table A1 in the Appendix. We observe no evidence of significant changes in firm performance subsequent to the two pseudo reform years we considered. These results suggest that, in the absence of treatment, our treatment and control groups display a similar trend in performance.

Alternative DID specification

We first use an alternative DID design where we consider as control group listed firms from other European countries that are not affected by a gender quota (Austria, Greece, Ireland, Luxembourg, Portugal, and Switzerland). As these firms are from other Western European countries, they are geographically and culturally close to the group of treated firms, and they also have comparable business development and operate in analogous macroeconomic conditions. We remove countries that have enforced gender quota legislation for listed firms without sanctions or with no threshold (Denmark, The Netherlands, and Spain) or just made recommendations (Sweden and The United Kingdom). We also exclude Finland from the control group because the percentage of female directors in this country is relatively high.

The validity of this difference-in-differences approach requires that control firms have similar characteristics to treated firms during the pre-treatment period. This implies that our dependent variables must follow a parallel trend over time for the two groups of treated and non-treated firms. If it is not the case, the estimates might be biased by structural differences between these two groups of firms. We, therefore, test for each dependent variable if there is a significant parallel trend between treated and control firms over the pre-treatment period, using mean tests (see Table A2, Panel A, in the Appendix). We find that there is no difference in *ROA*, *Tobin* Q and *Operating Profit* between the two groups of firms before the reform. These results, therefore, indicate that the parallel trends of our dependent variables before the treatment period are validated.

Our difference-in-differences regression is the following, with the pseudo reform year to the control group based on the reform year of the treated group:

$$Y_{ijt} = \alpha + \alpha_1 Treated_{ij} * Post_{jt} + \alpha_2 Post_{jt} + \sum \alpha_m Control_{ijt} + \sum \alpha_n FE_{it} + \varepsilon_{ijt} \quad (2)$$

where $Treated_{ij}$ is a dummy variable that takes the value of one for the treated firms and zero for firms in the control group, and $Post_t$ is a dummy variable that equals one in the post-treatment period, and zero in the pre-treatment period. The coefficient α_1 assesses the impact of the adoption of a gender quota on the performance of treated firms. We consider the same set of control variables as in Equation (1). We introduce firm and year fixed effects, and standard errors clustered at the firm level. As we include firm fixed effects, we drop the variable $Treated_j$ as there is no within-variation of this variable. Panel B of Table A2 reports the regression results. We find that the coefficient associated with the interaction term $Treated_{ij} * Post_t$ is not significant for the three performance measures we consider. These results are consistent with our previous results that the introduction of gender quotas has a neutral impact on firm performance.

We next define a new specification that allows us to capture the year-specific effect of a gender quota on firm performance. We replace in the Model (2) of Equation (1) the three years post-gender quota dummy variable $DQuota_{[0,+2]}$ by a set of three dummies ($DQuota_0$, $DQuota_1$, and $DQuota_2$) that take the value of one for the year in which the gender quota becomes effective, first and second years after, respectively. We report the estimation results of this Model (3) in Table A3 in the Appendix, using the same methodology as in Models (1) and (2). The coefficient associated with each pre- and post-reform window dummies are not significant. The results of Model (3) therefore confirm the absence of a short-term and long-term effect of the introduction of a gender quota on firm performance.

We furthermore cluster the standard errors at either the country level or the industry sector level[7]. These results confirm those we found previously with standard errors clustered at the firm level (see Table A4).

Sub-sample analysis

We finish our robustness test analysis by presenting the results using three alternative samples. First, we exclude France from the initial sample as we have a relatively high number of firms in this country (see Table A5 Panel A in the Appendix). Second, we restrict our sample period to five years before and after the introduction of a gender quota to reduce the likelihood that our results will be affected by other effects than this reform (see Table A5, Panel B). Third, we use, as in Fauver et al. (2017), a restricted sample that requires a firm to appear at least one year in the pre-period and one year in the post-period (see Table A5, Panel C). We find that our conclusions are robust to changes in the initial sample, with a neutral impact of gender quotas on firm performance.

5. Additional investigations

We now examine several additional factors that could also have an impact on the relationship between the imposition of a gender quota and firm performance.

Compliance with the quota

The statistical analysis conducted in Section 3.2 revealed that several firms do not respect the quota at the date of compliance (see Table 3). We examine whether the neutral effect of gender quotas on firm performance is driven by the large number of firms that do not comply with the law, with some firms still having a low percentage of female directors at the date of compliance (see Table 3). We create the dummy variable *dComply* taking the value of one if a firm has a percentage of female directors respecting the gender quota at the date of compliance. We estimate an expanded version of our Equation (1) for Models (1) and (2), using firm and year fixed effects and standard errors clustered at the firm level. Results are reported in Table 9 (Panel A); our results are unchanged and confirm that gender quotas have a neutral impact on firm performance both in the short and the long term.

We also have some firms that already have enough women on their boards before the treatment year to respect the threshold imposed by the mandatory quota (8 firms in Belgium,

[7] We use Standard Industrial Classification (SIC) provided by Bloomberg to classify industries into categories and group firms of similar nature together.

13 firms in France, 5 firms in Germany, 2 firms in Italy, and 14 firms in Norway). Our results remain unchanged if we exclude these firms from our sample (see Panel B in Table 9).

Distance from compliance

We next examine whether firms furthest from compliance at the date of the reform display a significant impact of gender quotas on their performance, as they were required to add a greater number of women to their boards before the deadline. In our sample, 25% of firms in Belgium and 28% in Italy had no women on their boards the year before the quota, while it is only around 15% of firms in France, 14% in Norway, and 7% in Germany. We create the dummy variable *dDistCompliance* that takes the value of one if a firm has no female director on its board the year before the implementation of the gender quota. Again, we estimate Models (1) and (2) of the Equation (1) to examine whether treated firms with no women on their boards before the law was adopted exhibited significant effects of gender quotas. Results, reported in Table 9 (Panel C), indicate that gender quotas have a neutral impact on firm performance in the entire period after the reform and in the short and longer period, independently of their distance from compliance.

Corporate policies

We examine whether corporate decision-making changes after the quota. We follow Matsa and Miller (2012) by considering four variables to measure different dimensions of firm policies: the ratio of labor cost over total assets (*Labor cost*), the level of employment (*Employment*) calculated as the natural logarithm of number of workers in a firm, the ratio of other costs over total assets (*Other costs*), and the ratio of revenues over total assets (*Revenues*). Results are reported in Table 10 and show that the imposition of gender quotas does not significantly affect employment, labor or other costs, and revenues in the entire period, and in the short and longer periods. Our findings support the argument that the presence of women on boards does not affect corporate policy decisions, and therefore does not influence organizational outcomes, as highlighted in Table 7.

Critical mass effect

As the critical mass theory suggests, there must be at least three women on a board before the women really make a difference, otherwise, they can still be considered as tokens. The statistical analysis we conducted in Section 3.2 shows that a large number of firms do not respect the quota, even after the date of compliance. Moreover, firms with a small number of

directors might also have less than three female directors even if they comply with the gender quota. We, therefore, have a large number of firms that have less than three female directors on their boards. We test the critical mass argument by estimating an expanded version of our Equation (1) for Models (1) and (2), where we include an interaction term between our dummy variables for the introduction of a gender quota and the dummy variable *dCriticalMass* taking the value of one for firms having more than three female directors. The results are reported in Table 11. The coefficient associated with the interaction term is positive and significant in Model (1) and in Model (2) for the longer-term effect ($DQuota_{[+3,\ T]}$), but Wald tests are not significant. Our results, therefore, show that the total effect of the introduction of a gender quota on firm performance is insignificant, even if the number of female directors is above the critical mass.

Firms' characteristics

We finally examine whether the neutral impact of gender quotas on firm performance is not driven by the size of the firm or the level of its performance. We create the two dummy variables *dsize* and *dPerformance* that take the value of one if the logarithm of sales or the ROA of a firm is above the median sample at the date of the implementation of the quota, respectively. Results, reported in Tables 12 and 13, indicate that gender quotas have a neutral impact on firm performance, independently of their size or their level of performance.

6. Conclusion

Governments in many countries have adopted or are considering using mandatory rules to force firms to increase gender diversity on corporate boards. We exploit in this paper countries worldwide that have imposed a gender quota with sanction as a quasi-natural experiment to identify the impact of gender quotas on firm performance, to determine in particular if gender balance imposed through a mandatory rule is not associated with a negative impact on firm performance.

We first conduct a statistical analysis to examine how boards' composition and board members' characteristics are affected by the imposition of a gender quota with sanctions. As expected, we find that quotas are associated with a strong increase in female directors, with a board size that remains mostly constant over the period. Our statistics further show that board members' characteristics significantly change after gender quotas, with higher education levels of all members, lower age, lower board experience, higher international exposure, and higher independence. Our findings also show that gender quotas do not force firms to appoint from

only a limited pool of women, providing evidence that the primary constraint of women to become a director is not the lack of interest in such positions. We also find that a large number of firms do not respect the quota at the date of compliance, but this number decreases in the following years when the sanctions are applied.

We next use a staggered difference-in-differences approach to explore how firm performance changes when the number of female directors is exogenously increased, both in the short and the long term. We expect gender quotas to have a positive impact on firm performance if male and female directors are different other than in their gender and if the cost associated with mandatory rules is not too high. Our results show that the introduction of gender quotas has a neutral impact on firm performance, both in the short term and in the longer term. Our results further show that directors' age, education, nationality, experience or independence have no impact on the quota's effect. Even if we find that female directors tend to be younger, to have higher levels of education, to have more international experience, and to be more independent than their male counterparts, these differences do not seem to have a significant impact on the way gender quotas influence firm performance. Our findings furthermore provide evidence that forcing radical gender balance on corporate boards through a mandatory quota does not adversely influence the performance of firms either in the short term or in the long term. Our results from a cross-country analysis challenge what we have learned from Ahern and Dittmar (2012), Matsa and Miller (2013) and Yang et al. (2019) on the Norwegian case, that gender quotas caused a decline in firm outcomes. Our findings are consistent with gender quotas inducing a neutral effect on firm performance, in line with the recent study of Eckbo et al. (2018) on Norwegian firms.

Overall, our study suggests that gender balance on corporate boards could be achieved by mandatory quotas without policymakers expecting negative effects for firm performance either in the short term or in the longer term. However, our study does not support the "business case" argument appealed by policymakers to justify the imposition of gender quotas, as we do not find that the presence of more women on boards is associated with an increase in firm performance. Policymakers can create unrealistic expectations for women as our study provides evidence that an increase in the number of female directors does not help to improve firm performance. Policymakers should instead rely on ethical principles and social justice to justify their decision to impose gender balance on the boards of companies. Our study also shows that a large number of firms do not respect the quota at the date of compliance, suggesting that strong sanctions need to be imposed to prompt firms to comply with the law.

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Table 1. **Countries with gender quotas on board of directors**

Country	Quota	PTFs	SOEs	Passage Date	Compliance Date	Sanctions
Austria	35%	No	Yes	2011	Interim 25% by 2016; 2018: 35%	None
Belgium	33%	Yes	Yes	June 30, 2011	2012: SOEs; 2017: PTFs 2019: listed SMEs	Void the appointment of any directors who do not conform to board quota targets; suspend director benefits
Colombia	30%	No	Yes	2000	None	None
Denmark	Own target	Yes	Yes	Dec 12, 2012	April 1, 2013	Fines
Finland	40%	No	Yes	April 15, 2005	June 1, 2005	None
France	40%	Yes	Yes	Jan 13, 2011	Jan 1, 2014: 20%; Jan 1, 2017: 40%	The appointment is null and void; Fees will not be paid to directors
Germany	30%	Yes	No	March 2015	2016: 110 biggest listed companies	Director sear must be left vacant
Greece	33%	No	Yes	2000	None	None
Greenland (Denmark)	50%	Yes	Yes	2013	Jan 2014	Not specified
Iceland	40%	Yes	Yes	March 4, 2010	Sep 1, 2013	None
India	1 FBD	Yes	Yes	August 2013	August 1, 2015	Fines
Italy	33%	Yes	Yes	June 28, 2011	Interim 20% by 2012; 2015 33%	Fines; directors lose office
Israel	1 FBD	Yes	No	April 19, 1999	None	None
	50%	No	Yes	March 11, 2007	2010	None
Kenya	33%	No	Yes	August 28, 2010	None	None
Malaysia	30%	Yes	No	June 27, 2011	2016: 250+ employees	None
Netherlands	30%	Yes	No	June 6, 2011	Jan 1, 2016	Explain in annual report
Norway	40%	Yes	Yes	Dec 19, 2003	2006: SOEs; 2008: PTFs	Refuse to register board; dissolve company; fines until compliance
Panama	30%	No	Yes	2017	Not specified	Not specified
Slovenia	40%	No	Yes	2004	Not specified	None
Spain	40%	Yes	No	March 22, 2007	March 1, 2015: PTFs with 250+ employees	None
Taiwan	33%	No	Yes	NA	Not specified	Not specified
UAE	1 FBD	Yes	Yes	Dec 2012	Not specified	None

Notes. Updated from Terjesen, Aguilera, and Lorez (2016); PTFs: publicly traded firms; SOEs: state-owned enterprises; 1 FBD: At least one female board director is required to be on the board.

Table 2. Variable definitions and data sources

Variables	Definition	Source
Evolution of female directors on boards		
Board size	Average number of board members	BoardEx
Female (%) -mean	Average percentage of female directors on boards	BoardEx
Female (%) – SD	Standard deviation of percentage of female directors on boards	BoardEx
% Firms below quota	Percentage of firms with a percentage of female directors below the legal quota	BoardEx
Board members characteristics		
Age	Average age of directors	BoardEx
Foreign (%)	Percentage of foreign directors over the total number of directors	BoardEx
Tenure	Average tenure of directors	BoardEx
Time on Board	Average time on board of directors in the company	BoardEx
Time in Company	Average time in the company of directors, considering all board and non-board positions	BoardEx
Independent	Percentage of independent directors over the total number of directors	BoardEx
Bachelor (%)	Percentage of directors having as highest diploma a bachelor over the total number of directors	BoardEx
Postgraduate (%)	Percentage of directors having a Master or a PhD degree over the total number of directors	BoardEx
Having board experience (%)	Percentage of directors having experience on any board positions over the total number of directors	BoardEx
Number BOD to Date	Average number of board positions of directors up to date	BoardEx
Number current BOD (Occupation)	Average number of other current board positions of directors	BoardEx
CEO (%)	Percentage of directors having experience as CEO over the total number of directors	BoardEx
Chairman (%)	Percentage of directors having experience as Chairman over the total number of directors	BoardEx
Vice-Chairman /Vice President (%)	Percentage of directors having experience as Vice Chairman or Vice President over the total number of directors	BoardEx
Dependent variables		
Tobin Q	Book value of assets minus the book value of equity plus the market value of equity, divided by the book value of assets	Bloomberg
ROA	Ratio of net income over total assets	Bloomberg
Operating Profits	Ratio of earnings before interest and taxes (EBIT) over total assets	Bloomberg
Difference-in-differences variables		
DQuota	Dummy variable that takes the value of one for firms when the gender quota is introduced and thereafter	
$DQuota_{[0, +2]}$	Dummy variable that takes the value of one for firms for the year of the gender quota is enacted and the two following years	

$DQuota_{[+3, T]}$	Dummy variable that takes the value of one for firms from the fourth year after the imposition of the gender quota and onward	
$DQuota_0$	Dummy variable that takes the value of one for firms for the year of the gender quota is enacted	
$DQuota_1$	Dummy variable that takes the value of one for firms for one year after the quota	
$DQuota_2$	Dummy variable that takes the value of one for firms for two years after the quota	
Control variables		
Firm size	Natural logarithm of firm total assets	Bloomberg
Sales growth	Annual growth rate of total sales	Bloomberg
Leverage	Ratio of debt to total assets	Bloomberg
Cash	Ratio of cash to total assets	Bloomberg
PPE	Ratio of property, plant, and equipment to total assets	Bloomberg
GDP (%)	GDP growth rate	World Bank
Firm policies variables		
Revenue	Ratio of revenues over total assets	Bloomberg
Labor Cost	Ratio of labor cost over total assets	Bloomberg
Other Costs	Ratio of other costs over total assets	Bloomberg
Employment	Natural logarithm of the number of employees in a firm	Bloomberg
Dummy variables on board characteristics		
dLowAge	Dummy variable taking the value of one if the average age of board members of a firm is below the median age of the group	BoardEx
dHighForeign	Dummy variable taking the value of one if the average percentage of foreign directors on the board of a firm is above the median percentage of foreign directors of the group	BoardEx
dHighEducation	Dummy variable taking the value of one if the average percentage of directors having a post-graduate degree on the board of a firm is above the median percentage of high qualified directors of the group	BoardEx
dLowExperience	Dummy variable taking the value of one if the average percentage of directors having experience as CEO or Chairman on the board of a firm is below the median percentage of high position experienced directors of the group	BoardEx
dHighIndependent	Dummy variable taking the value of one if the average percentage of independent directors on the board of a firm is above the median percentage of independent directors of the group	BoardEx
Other dummy variables (additionnal investigations)		
dComply	Dummy variable taking the value of one if a firm has a percentage of female directors respecting the gender quota at the date of compliance (2008 for Norwegian firms, 2015 for Italian firms, 2016 for German firms, 2017 for Belgian and French firms)	BoardEx
dDistCompliance	Dummy variable taking the value of one if a firm has no female director on its board the year before quota (2005 for Norwegian firms, 2010 for Belgian, French and Italian firms, 2015 for German firms)	BoardEx
dCriticalMass	Dummy variable taking the value of one if a firm has at least three women on its board at the date of compliance	BoardEx

dSize	Dummy variable taking the value of one if the logarithm of sales of a firm is above the median sample at the date of the implementation of the quota	Bloomberg
dPerformance	Dummy variable taking the value of one if the ROA of a firm is above the median sample at the date of the implementation of the quota	Bloomberg

Table 3. Statistics on the presence of women directors on boards by year

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
NORWAY (2006 – 2008 : 40%)																
Board size	7.70	7.38	7.32	7.33	7.08	7.36	7	7.08	7.25	7.15	7.26	7.05	7.02	6.97	6.74	6.73
Female (%) -mean	12.10	14.95	20.80	26.43	36.51	37.23	35.92	38.82	40.62	39.37	39.23	39.28	40.66	40.58	41.21	41.25
Female (%) - SD	12.43	12.58	14.22	15.45	13.03	10.58	12.14	10.24	9.41	9.13	9.58	6.86	8.27	7.11	8.31	8.72
% Firms below quota	94.94	91.46	85	78.08	42.25	43.08	41.07	40.63	30.43	31.75	31.03	31.34	27.27	21.21	20.69	27.06
Number of firms	79	82	80	73	71	65	56	64	69	63	58	67	66	66	87	85
BELGIUM (2011-2017 : 33%)																
Board size	8.91	9.26	8.63	8.96	9.04	9.07	9	8.91	8.97	9.05	9.07	9.14	9.05	9.11	9.03	9.49
Female (%) -mean	6.10	6.43	6.02	7.50	7.19	7.97	8.96	9.80	11.06	13.58	16.05	18.08	19.38	22.19	26.42	29.37
Female (%) - SD	11.47	10.71	10.99	11.96	11.72	11.88	12.46	12.36	11.96	12.60	12.16	12.91	13	12.90	14.05	11.51
% Firms below quota	94.34	96.30	94.44	92.16	92.59	91.23	89.47	89.47	91.38	91.07	90.91	87.50	79.45	75	62.86	57.14
Number of firms	53	54	54	51	54	57	57	57	58	56	55	56	73	72	70	63
FRANCE (2011-2017 : 40%)																
Board size	11.02	11.02	10.57	10.42	10.13	10.20	10.25	10.43	9.97	9.91	9.80	9.88	8.93	8.83	8.76	8.81
Female (%) - mean	9.57	8.49	8.07	8.09	8.79	9.40	10.13	11.74	16.20	19.39	22.41	25.81	25.71	28.98	34.91	36.26
Female (%) - SD	13.01	11.91	10.99	10.90	10.47	10.76	10.95	11.34	10.73	11.12	10.56	10.12	12.36	13.56	13.76	13.71
% Firms below quota	95.09	95.43	94.88	94.64	95.47	95.06	95.85	94.21	94.49	92.81	91.47	87.63	83.05	71.69	49.65	44.76
Number of firms	163	175	215	224	243	243	241	242	272	278	293	299	419	431	429	420
ITALY (2011-2015 : 33%)																
Board size	11.32	11.53	11.16	10.82	10.67	10.76	11.26	11.14	11.24	11.03	10.88	10.16	10.32	10.31	10.43	10.52
Female (%) -mean	3.65	4.14	4.35	4.87	5.18	5.25	5.84	5.83	6.74	10.04	15.92	21	25.82	29.59	31.34	35.35
Female (%) - SD	5.72	5.98	7.37	7.57	7.79	7.43	7.55	7.32	7.63	8.50	11.41	10.96	7.99	8.99	9.58	7.74
% Firms below quota	100	100	98.04	100	98.55	100	100	100	100	98.53	92.75	84.38	77.32	52.04	38.78	18.56
Number of firms	37	38	51	57	69	68	65	69	68	68	69	96	97	98	98	97
GERMANY (2015-2016: 30%)																
Board size	18.32	17.68	17.45	17.57	16.19	16.23	16.38	15.44	15.90	16.07	15.80	16.02	15.90	16.28	15.90	15.59
Female (%) -mean	6.23	6.45	6.58	6.63	7.22	5.62	6.09	7.23	9.12	12.69	13.84	14.84	17.08	22.16	22.58	24.30
Female (%) - SD	8.51	8.30	8.02	8.88	8.95	6.34	6.12	7.21	7.67	9.64	9.70	8.84	9.30	10.32	10.96	10.48
% Firms below quota	96.67	95.16	96.97	95.38	93.85	98.39	96.55	95	98.39	91.53	91.67	95.08	87.50	72.73	79.41	71.43
Number of firms	60	62	66	65	65	62	58	60	62	59	60	61	64	66	68	70

Notes. Variables are defined in Table 2.

Table 4. **Statistics on general board characteristics**

		Pre quota period	Post quota period	Difference-period
Age	All	64.63	59.82	-4.81***
	Male	66.62	62.31	-4.30***
	Female	61.40	57.08	-4.32***
	Difference-gender	5.21***	5.23***	
Foreign (%)	All	8.85	10.81	1.96***
	Male	8.97	9.88	0.90**
	Female	8.65	11.84	3.18***
	Difference-gender	0.31	-1.96***	
Tenure	All	4.74	4.64	-0.10
	Male	4.86	5.52	0.66***
	Female	4.55	3.66	-0.88***
	Difference-gender	0.31**	1.85***	
Time on Board	All	5.99	5.89	-0.10
	Male	6.40	7.39	0.98***
	Female	5.33	4.25	-1.08***
	Difference-gender	1.07***	3.14***	
Time in Company	All	7.30	6.87	-0.43***
	Male	7.73	8.59	0.86***
	Female	6.60	4.98	-1.62***
	Difference-gender	1.13***	3.61***	
Independent (%)	All	32.85	45.55	12.70***
	Male	33.41	37.26	3.85***
	Female	31.94	54.68	22.73***
	Difference-gender	1.46	-17.41***	

Notes. Variables are defined in Table 2.

Table 5. **Statistics on board members' education and experience**

Panel A: Education

		Pre quota period	Post quota period	Difference-period
Bachelor (%)	All	40.14	40.94	0.80
	Male	43.06	42.78	-0.27
	Female	35.39	38.92	3.53***
	Difference-gender	7.66***	3.85***	
PostGraduate (%)	All	24.60	31.04	6.44***
	Male	23.66	28.60	4.93***
	Female	26.13	33.73	7.59***
	Difference-gender	-2.46**	-5.12***	

Panel B: Board experience

		Pre quota period	Post quota period	Difference-period
Having board experience (%)	All	86.80	84.12	-2.67***
	Male	87.97	85.82	-2.14***
	Female	84.90	82.25	-2.65***
	Difference-gender	3.06***	3.57***	
Number BOD to Date	All	9.57	8.30	-1.27***
	Male	11.16	10.41	-0.75***
	Female	6.98	5.97	-1.01***
	Difference-gender	4.17***	4.43***	
Number current BOD (Occupation)	All	4.29	3.88	-0.40***
	Male	4.81	4.52	-0.29***
	Female	3.43	3.18	-0.24***
	Difference-gender	1.37***	1.33***	
CEO (%)	All	5.22	7.93	2.70***
	Male	6.36	9.41	3.05***
	Female	3.37	6.30	2.92***
	Difference-gender	2.98***	3.11***	
Chairman (%)	All	12.47	13.39	0.92**
	Male	15.13	18.20	3.06***
	Female	8.14	8.11	-0.03
	Difference-gender	6.98***	10.08***	
Vice Chairman/Vice CEO (%)	All	14.07	17.94	3.87***
	Male	14.68	18.14	3.46***
	Female	13.08	17.72	4.64***
	Difference-gender	1.59**	0.41	

Notes. Variables are defined in Table 2; BOD = board of directors.

Table 6. **Statistics on the education and experience of new, retained, and exiting directors**

Panel A: Education

	Female			Male			Differences		
	New	Retained	Exiting	New	Retained	Exiting	New Female – New Male	New Female – Retained Male	New Female – Exiting Male
	(1)	(2)	(3)	(4)	(5)	(6)	(1) - (4)	(1) - (5)	(1) - (6)
Pre quota period									
Bachelor (%)	36.17	37.98	27.12	43.43	44.91	37.41	-7.26***	-8.74***	-1.24
Postgraduate (%)	31.98	23.99	24.86	26.54	23.83	22.44	5.44**	8.14***	9.53***
Post quota period									
Bachelor (%)	39.51	40.18	37.38	39.31	44.79	39.64	0.22	-5.25***	-0.10
Postgraduate (%)	36.74	32.55	36.17	33.15	27.60	28.29	3.61**	9.17***	8.48***

Panel B: Board experience

	Female			Male			Differences		
	New	Retained	Exiting	New	Retained	Exiting	New Female – New Male	New Female – Retained Male	New Female – Exiting Male
	(1)	(2)	(3)	(4)	(5)	(6)	(1) - (4)	(1) - (5)	(1) - (6)
Pre quota period									
Having board experience (%)	86.43	83.40	88.98	87.70	87.16	89.35	-1.54	-0.56	-2.38
CEO (%)	5.38	3.13	4.05	9.00	5.96	9.03	-3.49**	-0.30	-3.69**
Chairman (%)	7.00	10.99	9.32	15.30	15.64	15.32	-9.20***	-9.40***	-8.98***
Post quota period									
Having board experience (%)	82.84	81.59	83.75	87.30	85.07	86.93	-4.41***	-1.87***	-3.70***
CEO (%)	7.84	5.42	6.98	14.74	8.22	11.35	-6.53***	-0.29	-3.35***
Chairman (%)	6.86	7.45	10.76	17.29	17.85	18.30	-10.85***	-11.29***	-11.64***

Notes. Variables are defined in Table 2; BOD = board of directors.

Table 7. Impact of gender quota on firm performance (staggered difference-in-differences estimates)

	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
DQuota	-0.00252		-0.00570		-0.00641	
	(-0.05)		(-0.75)		(-0.88)	
$DQuota_{[0;+2]}$		-0.00676		-0.00543		-0.00627
		(-0.15)		(-0.72)		(-0.87)
$DQuota_{[+3;T]}$		0.0388		-0.00824		-0.00779
		(0.59)		(-0.75)		(-0.72)
Firm size	-0.423***	-0.424***	0.0445***	0.0445***	0.0520***	0.0520***
	(-5.91)	(-5.91)	(4.43)	(4.42)	(5.08)	(5.08)
Sales growth	0.0433	0.0433	0.0267***	0.0267***	0.0255***	0.0255***
	(1.58)	(1.58)	(6.97)	(6.98)	(7.01)	(7.01)
Leverage	0.799***	0.796***	-0.295***	-0.295***	-0.218***	-0.218***
	(4.73)	(4.72)	(-7.78)	(-7.79)	(-6.33)	(-6.33)
Cash	1.262***	1.264***	0.00286	0.00281	-0.0279	-0.0280
	(6.24)	(6.25)	(0.08)	(0.08)	(-0.81)	(-0.82)
PPE	0.0387	0.0407	-0.0372	-0.0373	-0.00960	-0.00968
	(0.16)	(0.17)	(-0.86)	(-0.86)	(-0.19)	(-0.19)
GDP	0.00132	0.00139	0.00133	0.00133	-0.000529	-0.000530
	(0.14)	(0.15)	(0.81)	(0.81)	(-0.35)	(-0.35)
Constant	3.389***	3.396***	-0.0922*	-0.0926*	-0.142***	-0.142***
	(9.57)	(9.58)	(-1.81)	(-1.82)	(-2.87)	(-2.87)
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.189
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8. **Impact of gender quotas and changes in board characteristics on firm performance (staggered difference-in-differences estimates)**

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
Panel A: Relatively high proportion of younger directors						
DQuota	0.0166		-0.00348		-0.00446	
	(0.34)		(-0.44)		(-0.60)	
DQuota*dLowAge	-0.0593		-0.00577		-0.00539	
	(-1.33)		(-1.05)		(-1.04)	
$DQuota_{[0;+2]}$		0.0105		-0.00479		-0.00670
		(0.21)		(-0.61)		(-0.89)
$DQuota_{[0;+2]}$* dLowAge		-0.0533		-0.000754		0.00221
		(-1.08)		(-0.12)		(0.38)
$DQuota_{[+3;T]}$		0.0581		-0.00507		-0.00417
		(0.87)		(-0.46)		(-0.38)
$DQuota_{[+3;T]}$* dLowAge		-0.0624		-0.00906		-0.0109*
		(-1.18)		(-1.33)		(-1.80)
Control variables	Yes	Yes			Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.189	0.189	0.190	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Relatively high proportion of foreign directors						
DQuota	0.0161		-0.00106		-0.00233	
	(0.28)		(-0.13)		(-0.32)	
DQuota*dHighForeign	-0.0322		-0.00602		-0.00601	
	(-0.81)		(-1.00)		(-1.11)	
$DQuota_{[0;+2]}$		0.0166		-0.00165		-0.00534
		(0.28)		(-0.20)		(-0.70)
$DQuota_{[0;+2]}$* dHighForeign		-0.0422		-0.00417		0.00110
		(-1.00)		(-0.65)		(0.18)
$DQuota_{[+3;T]}$		0.0554		-0.00261		0.0000555
		(0.72)		(-0.22)		(0.01)
$DQuota_{[+3;T]}$* dHighForeign		-0.0270		-0.00732		-0.0120*
		(-0.57)		(-0.99)		(-1.90)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.189	0.189	0.190	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8. Impact of gender quotas and changes in board characteristics on firm performance (staggered difference-in-differences estimates), continued

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
Panel C: Relatively high proportion of directors with postgraduate degrees						
DQuota	-0.0173		-0.00539		-0.00593	
	(-0.35)		(-0.71)		(-0.83)	
DQuota*dHighEducation	0.0435		-0.0000708		-0.00113	
	(1.10)		(-0.01)		(-0.23)	
$DQuota_{[0;+2]}$		-0.00735		-0.00776		-0.00820
		(-0.14)		(-1.02)		(-1.14)
$DQuota_{[0;+2]}$* dHighEducation		0.000558		0.00801		0.00632
		(0.01)		(1.27)		(1.05)
$DQuota_{[+3;T]}$		0.0148		-0.00623		-0.00568
		(0.22)		(-0.56)		(-0.53)
$DQuota_{[+3;T]}$* dHighEducation		0.0704		-0.00492		-0.00603
		(1.50)		(-0.84)		(-1.06)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Panel D: Relatively low proportion of directors with CEO/Chairman experience						
DQuota	-0.00844		-0.00514		-0.00511	
	(-0.17)		(-0.67)		(-0.69)	
DQuota*dLowExperience	0.0100		-0.000841		-0.00371	
	(0.35)		(-0.19)		(-0.87)	
$DQuota_{[0;+2]}$		-0.000493		-0.00549		-0.00771
		(-0.01)		(-0.70)		(-1.04)
$DQuota_{[0;+2]}$* dLowExperience		-0.0267		0.00108		0.00494
		(-0.72)		(0.20)		(1.03)
$DQuota_{[+3;T]}$		0.0235		-0.00722		-0.00447
		(0.34)		(-0.64)		(-0.40)
$DQuota_{[+3;T]}$*dLowExperience		0.0308		-0.00193		-0.00915*
		(0.91)		(-0.39)		(-1.84)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8. Impact of gender quotas and changes in board characteristics on firm performance (staggered difference-in-differences estimates), continued

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
Panel E: Relatively high proportion of independent directors						
DQuota	-0.0167		-0.00624		-0.00640	
	(-0.33)		(-0.81)		(-0.89)	
DQuota* dHighIndependent	0.0433		0.00229		0.000287	
	(0.97)		(0.43)		(0.05)	
$DQuota_{[0;+2]}$		-0.0168		-0.00774		-0.00942
		(-0.32)		(-0.99)		(-1.33)
$DQuota_{[0;+2]}$* dHighIndependent		0.0299		0.00789		0.0105
		(0.71)		(1.24)		(1.64)
$DQuota_{[+3;T]}$		0.0232		-0.00720		-0.00526
		(0.34)		(-0.65)		(-0.49)
$DQuota_{[+3;T]}$* dHighIndependent		0.0525		-0.00122		-0.00669
		(0.96)		(-0.19)		(-1.08)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9. **Impact of compliance with the law (staggered difference-in-differences estimates)**

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
Panel A: Firms complying with the law at the date of compliance						
DQuota	-0.0268		-0.00229		-0.00444	
	(-0.55)		(-0.29)		(-0.56)	
DQuota*dComply	0.0736		-0.0105*		-0.00605	
	(1.41)		(-1.71)		(-0.98)	
$DQuota_{[0;+2]}$		-0.0256		-0.00382		-0.00757
		(-0.52)		(-0.49)		(-1.02)
$DQuota_{[0;+2]}$* dComply		0.0580		-0.00518		0.00364
		(1.13)		(-0.81)		(0.58)
$DQuota_{[+3;T]}$		0.0106		-0.00372		-0.00382
		(0.16)		(-0.32)		(-0.33)
$DQuota_{[+3;T]}$* dComply		0.0820		-0.0138*		-0.0129
		(1.28)		(-1.76)		(-1.59)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Exclude firms that respect the quota before the law						
DQuota	-0.00247		-0.00642		-0.00672	
	(-0.05)		(-0.77)		(-0.85)	
$DQuota_{[0;+2]}$		-0.00583		-0.00623		-0.00677
		(-0.12)		(-0.75)		(-0.87)
$DQuota_{[+3;T]}$		0.0300		-0.00813		-0.00624
		(0.43)		(-0.68)		(-0.53)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11639	11639	12529	12529	12112	12112
R-squared	0.167	0.167	0.188	0.188	0.191	0.191
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Distance from compliance						
DQuota	0.00795		-0.00589		-0.00638	
	(0.17)		(-0.77)		(-0.88)	
DQuota*dDistCompliance	-0.0608		0.00112		-0.000195	
	(-0.92)		(0.13)		(-0.02)	
$DQuota_{[0;+2]}$		0.0081		-0.0049		-0.00639
		(0.17)		(-0.66)		(-0.89)
$DQuota_{[0;+2]}$* dDistCompliance		-0.0969		-0.0040		0.0011
		-(1.73)		(-0.52)		(0.15)
$DQuota_{[+3;T]}$		0.0459		-0.0090		-0.0076
		(0.70)		(-0.83)		(-0.72)
$DQuota_{[+3;T]}$* dDistCompliance		-0.0398		0.0043		-0.00102
		(-0.47)		(0.38)		(-0.09)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10. **Impact of gender quota on corporate strategy decisions (staggered difference-in-differences estimates)**

	Revenue		Labor Cost		Other Costs		Employment	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
DQuota	-0.0177		-0.00189		-0.0151		0.0320	
	(-1.00)		(-0.34)		(-0.96)		(0.79)	
$DQuota_{[0;+2]}$		-0.0157		-0.00248		-0.0141		0.0325
		(-0.89)		(-0.45)		(-0.87)		(0.81)
$DQuota_{[+3;T]}$		-0.0361		0.00460		-0.0250		0.0269
		(-1.57)		(0.61)		(-1.29)		(0.45)
Firm size	-0.152***	-0.152***	-0.0801***	-0.0803***	-0.199***	-0.199***	0.704***	0.705***
	(-7.91)	(-7.89)	(-9.31)	(-9.33)	(-12.60)	(-12.56)	(20.72)	(20.77)
Sales growth	0.0294***	0.0294***	-0.0101***	-0.0101***	-0.00357	-0.00356	-0.0448***	-0.0448***
	(3.86)	(3.86)	(-3.87)	(-3.87)	(-0.60)	(-0.60)	(-3.51)	(-3.51)
Leverage	0.132**	0.133**	0.120***	0.120***	0.313***	0.314***	0.268**	0.269**
	(1.98)	(2.00)	(4.41)	(4.40)	(6.41)	(6.43)	(2.30)	(2.32)
Cash	-0.170	-0.171	-0.0572	-0.0570	-0.245***	-0.245***	-0.173	-0.173
	(-1.63)	(-1.64)	(-1.64)	(-1.64)	(-3.22)	(-3.22)	(-1.21)	(-1.21)
PPE	0.146	0.145	0.0476	0.0480	-0.0106	-0.0111	0.116	0.116
	(1.32)	(1.31)	(1.32)	(1.33)	(-0.12)	(-0.12)	(0.41)	(0.41)
GDP	0.00136	0.00137	0.00141	0.00142	0.00393	0.00394	-0.00469	-0.00470
	(0.42)	(0.42)	(1.52)	(1.55)	(1.18)	(1.18)	(-0.63)	(-0.63)
Constant	1.838***	1.835***	0.672***	0.673***	1.872***	1.870***	2.960***	2.959***
	(15.55)	(15.53)	(15.22)	(15.27)	(17.79)	(17.76)	(13.06)	(13.13)
Observations	13151	13151	12626	12626	13131	13131	13009	13009
R-squared	0.126	0.126	0.240	0.241	0.209	0.209	0.341	0.341
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 11. Role of a critical mass effect

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
DQuota (β_1)	-0.0495		-0.00125		-0.00301	
	(-0.97)		(-0.15)		(-0.38)	
DQuota*dCriticalMass (β_2)	0.0974**		-0.00935		-0.00722	
	(2.07)		(-1.56)		(-1.24)	
$DQuota_{[0;+2]}$ (β_3)		-0.0435		-0.00088		-0.00361
		(-0.81)		(-0.10)		(-0.45)
$DQuota_{[0;+2]}$* dCriticalMass (β_4)		0.0709		-0.00943		-0.00528
		(1.53)		(-1.56)		(-0.89)
$DQuota_{[+3;T]}$ (β_5)		-0.0139		-0.00420		-0.00407
		(-0.20)		(-0.36)		(-0.36)
$DQuota_{[+3;T]}$* dCriticalMass (β_6)		0.118**		-0.00952		-0.00877
		(2.05)		(-1.28)		(-1.23)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.165	0.165	0.188	0.188	0.189	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Wald tests:						
$\beta_1 + \beta_2 = 0$	0.047		-0.010		-0.010	
	(0.37)		(0.19)		(0.19)	
$\beta_3 + \beta_4 = 0$		0.027		-0.010		-0.009
		(0.57)		(0.17)		(0.21)
$\beta_5 + \beta_6 = 0$		0.104		-0.013		-0.012
		(0.16)		(0.23)		(0.26)

Note. *Variables are defined in Table 2; t* statistics in parentheses (p-values are in parentheses in the Wald tests), * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12. Role of firms' size

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
DQuota	-0.0637		-0.00533		-0.00575	
	(-0.89)		(-0.51)		(-0.57)	
DQuota*dSize	0.0682		0.00190		0.00233	
	(1.19)		(0.20)		(0.26)	
$DQuota_{[0;+2]}$		-0.0211		-0.00781		-0.0113
		(-0.26)		(-0.71)		(-1.05)
$DQuota_{[0;+2]}$* dSize		0.00283		0.00539		0.0100
		(0.04)		(0.58)		(1.10)
$DQuota_{[+3;T]}$		-0.0800		-0.00255		0.00136
		(-0.89)		(-0.17)		(0.10)
$DQuota_{[+3;T]}$* dSize		0.113*		-0.000278		-0.00283
		(1.74)		(-0.02)		(-0.26)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.109	0.109	0.164	0.164	0.146	0.146
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 13. Role of firms' performance

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
DQuota (β_1)	-0.0619		0.00351		0.000785	
	(-1.26)		(0.39)		(0.09)	
DQuota*dPerformance (β_2)	0.101**		-0.0159**		-0.0124*	
	(2.22)		(-2.27)		(-1.93)	
$DQuota_{[0;+2]}$ (β_3)		-0.0285		-0.0115		-0.0117
		(-0.49)		(-1.17)		(-1.22)
$DQuota_{[0;+2]}$* dPerformance (β_4)		0.0428		0.00853		0.00785
		(0.90)		(1.15)		(1.12)
$DQuota_{[+3;T]}$ (β_5)		-0.0412		0.00927		0.00722
		(-0.60)		(0.78)		(0.61)
$DQuota_{[+3;T]}$* dPerformance (β_6)		0.140**		-0.0317***		-0.0268***
		(2.43)		(-3.70)		(-3.46)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.165	0.165	0.189	0.192	0.190	0.193
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Wald tests:						
$\beta_1 + \beta_2 = 0$	0.0395		-0.0124		-0.0116	
	0.462		0.115		0.115	
$\beta_3 + \beta_4 = 0$		0.0143		-0.00298		-0.00385
		0.769		0.676		0.555
$\beta_5 + \beta_6 = 0$		0.0988		-0.0225		-0.0195
		0.183		0.0533		0.0816

Note. *Variables are defined in Table 2; t* statistics in parentheses (p-values are in parentheses in the Wald tests), * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A

Table A1. Robustness test 1: placebo tests (staggered difference-in-differences estimates)

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
Panel A: Placebo test, pre-reform period						
DQuota	0.0303		-0.00489		-0.00902	
	(0.57)		(-0.59)		(-1.14)	
$DQuota_{[0;+2]}$		0.0309		-0.00439		-0.00854
		(0.59)		(-0.54)		(-1.10)
$DQuota_{[+3;T]}$		0.0253		-0.00969		-0.0143
		(0.35)		(-0.80)		(-1.20)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.189
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Placebo test, post-reform period						
DQuota	0.0450		-0.00331		-0.00209	
	(0.96)		(-0.41)		(-0.28)	
$DQuota_{[0;+2]}$		0.0516		-0.00521		-0.00357
		(1.12)		(-0.65)		(-0.47)
$DQuota_{[+3;T]}$		0.00335		0.00826		0.00823
		(0.05)		(0.73)		(0.73)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.189
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A2. **Robustness test 2: alternative control group (difference-in-differences estimates)**

Panel A: Mean tests on dependent variables to check the parallel trend

Variables	**Mean of Treated group**	**Mean of Control group**	**Difference p-value**
Tobin-Q	1.449	1.391	0.499
ROA	-0.0004	0.0051	0.375
Operating Profit	0.026	0.031	0.414

Panel B: Difference-in-differences regressions

Dependent variables	Tobin Q (1)	ROA (2)	Operating Profits (3)
Treated*Post	0.00783	-0.00516	0.00783
	(0.20)	(-0.97)	(0.20)
Post	0.0196	0.00208	0.0196
	(1.19)	(0.76)	(1.19)
Control variables	Yes	Yes	Yes
Observations	22280	23599	22280
R-squared	0.122	0.165	0.122
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A3. **Robustness test 3: the year-specific effect of a gender quota (staggered difference-in-differences estimates)**

Dependent variables	Tobin Q (1)	ROA (2)	Operating Profits (3)
$DQuota_0$	0.0286	0.00389	-0.00304
	(0.59)	(0.47)	(-0.48)
$DQuota_1$	-0.00748	-0.00382	-0.00557
	(-0.14)	(-0.53)	(-0.73)
$DQuota_2$	-0.0411	-0.0162	-0.0103
	(-0.71)	(-1.52)	(-0.97)
$DQuota_{[+3;T]}$	0.0382	-0.00838	-0.00781
	(0.58)	(-0.76)	(-0.72)
Control variables	Yes	Yes	Yes
Observations	12248	13149	12714
R-squared	0.164	0.188	0.189
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A4. Robustness test 4: standard errors clustered at either the country level or the industry sector level (staggered difference-in-differences estimates)

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
Panel A: Standard errors cluster by industry sector						
DQuota	-0.00252		-0.00570		-0.00641	
	(-0.06)		(-1.00)		(-1.65)	
$DQuota_{[0;+2]}$		-0.00676		-0.00543		-0.00627
		(-0.17)		(-1.03)		(-1.71)
$DQuota_{[+3;T]}$		0.0388		-0.00824		-0.00779
		(0.51)		(-0.59)		(-0.70)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.189
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Industry	Industry	Industry	Industry	Industry	Industry
Panel B: Standard errors cluster by country						
DQuota	-0.00252		-0.00570		-0.00641	
	(-0.11)		(-0.95)		(-1.35)	
$DQuota_{[0;+2]}$		-0.00676		-0.00543		-0.00627
		(-0.36)		(-1.00)		(-0.44)
$DQuota_{[+3;T]}$		0.0388		-0.00824		-0.00779
		(0.75)		(-0.85)		(-0.98)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12248	12248	13149	13149	12714	12714
R-squared	0.164	0.164	0.188	0.188	0.189	0.189
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Country	Country	Country	Country	Country	Country

Table A5. Robustness test 5: sub-sample analysis (staggered difference-in-differences estimates)

Dependent variable	Tobin Q		ROA		Operating Profit	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
Panel A: Exclude French firms						
DQuota	-0.00236		-0.00658		-0.00792	
	(-0.04)		(-0.79)		(-0.99)	
$DQuota_{[0;+2]}$		-0.00931		-0.00634		-0.00780
		(-0.18)		(-0.77)		(-0.99)
$DQuota_{[+3;T]}$		0.0374		-0.00788		-0.00863
		(0.49)		(-0.69)		(-0.78)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5711	5711	6108	6108	5927	5927
R-squared	0.155	0.155	0.188	0.188	0.210	0.210
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Using the [-5; 5] sample						
DQuota	-0.00793		0.000670		-0.00207	
	(-0.37)		(0.17)		(-0.54)	
$DQuota_{[0;+2]}$		0.0159		0.00482		0.000659
		(0.65)		(1.10)		(0.16)
$DQuota_{[+3;+5]}$		0.101		0.0198*		0.0106
		(1.51)		(1.87)		(1.12)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7297	7297	7858	7858	7823	7823
R-squared	0.195	0.196	0.165	0.166	0.187	0.187
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm
Panel C: At least one observation per firm in the pre-period and in the post-period						
DQuota	0.00755		-0.00192		-0.00249	
	(0.20)		(-0.25)		(-0.35)	
$DQuota_{[0;+2]}$		0.00647		-0.00200		-0.00253
		(0.17)		(-0.26)		(-0.36)
$DQuota_{[+3;T]}$		0.0207		-0.000961		-0.00203
		(0.37)		(-0.09)		(-0.19)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11585	11585	12309	12309	11948	11948
R-squared	0.168	0.168	0.188	0.188	0.190	0.190
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm

Note. *Variables are defined in Table 2; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.