Board gender quotas: can women realistically boost firm performance?

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January 2019

Abstract

In this paper, we investigate the impact of gender quotas on firm performance and corporate decisions using Belgium, France and Italy as a natural experiment. Our statistical analysis shows that the percentage of female directors significantly increases, and board members characteristics significantly change after the implementation of the gender quota. The results of our empirical analysis show evidence that gender quotas do not have a significant impact on both firm outcomes and corporate decisions. Our findings support the decision of policy-makers to use mandatory rules to force firm to achieve gender balance on corporate boards. Our results suggest that policy-makers create unrealistic expectations for women to boost firm performance, at least in the short-run when negative side effects of mandatory rules are potentially strongest.

JEL Classification: G34, G38.

Keywords: Corporate governance, gender quotas, firm performance.

1. Introduction

Gender imbalance on 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). Policy-makers have responded in many countries by imposing gender quotas for corporate boards partly for social justice, but also justifying this intervention by the positive economic effects expected from gender balance, in particular on firm profits.

The literature analysing the relationship between female directors and firm outcomes proposes numerous arguments to explain why the presence of women on boards should positively affect organisational 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); (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. Most policy-makers appeal to this "business case" argument to justify the imposition of quotas, ignoring counter-arguments of such affirmative action that might outweigh the expected positive effect of gender balance.

The desirability and efficacy of gender quotas is considered controversial. 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 firms' 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 (Ahern and Dittmar, 2012). Another critique of gender quotas is the risk of entrenchment of women directors if they feel secure in their position; they might then have less pressure than do 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 quotas 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.

A large strand of the literature has analysed the relationship between women directors and firm performance outside the context of gender quotas (see Kirsch, 2018 and Adams, 2016 for a survey). There is no clear empirical evidence that women affect firm performance, with some studies finding that the presence of women 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; Woffers, 2010; Chapple and Humphrey, 2014) or even a negative impact of gender diversity (Adams and Ferreira, 2009; Lee and James, 2007). The existing literature that examines the impact of gender quotas on firms' profits is scarce to date and concerns the Norwegian case, as this was the first country to impose gender quotas in 2003. Ahern and Dittmar (2012) and Matsa and Miller (2013) reach similar conclusions that the introduction of gender quotas in Norway had a negative effect on firm outcomes, while Eckbo et al. (2018) find that there is no change in operating profitability following quota compliance after extending the sample period beyond the recent financial crisis.

While many countries have followed the example of Norway by implementing gender quota legislation, there is limited empirical research on gender quotas in the field of corporate governance, with a focus on Norwegian firms. Our paper aims to complement the existing literature by analysing the case of three other European countries that implemented gender quotas in 2011 (Belgium, France and Italy) in order to determine whether promoting women on boards through mandatory rules has an influence on firms' profitability, risk-taking behavior and strategic corporate decisions. While policy-makers expect positive effects from the imposition of gender quotas, they can also create unrealistic expectations for women. The potential benefit of an increased in board diversity on firm outcomes could be outweighed by the cost to be paid when inducing gender balance through mandatory rules. We will also analyse how gender quotas legislation impacts the composition of boards and membership

characteristics (age, education, experience, etc), and how these changes influence the way gender quotas impact firms' performance and corporate decisions.

We use gender quotas in Belgium, France and Italy as a natural experiment to identify the effect of women directors on firms' performance and corporate decisions. We perform a difference-in-differences analysis to account for both cross-sectional heterogeneity and time trends by comparing a panel of 265 firms subject to quotas with a control group of 442 European firms localized in countries with no quotas (Austria, Greece, Ireland, Luxembourg, Portugal and Switzerland), before and after the introduction of the quota. Our results show that gender quotas have a neutral impact on firm performance, risk, and corporate strategic policies. Our results further show that this neutral effect holds after taking into account changes in directors' age, education, nationality or experience.

The remainder of the paper is structured as follows. Section 2 offers a background on gender quotas and firm performance; Section 3 presents our sample and a descriptive analysis on changes on boards' compositions and board members' characteristics after gender quotas; Section 4 describes our empirical methodology and presents the results; Section 5 examines further issues and carries out several robustness checks, and Section 6 concludes the paper.

2. Background on gender quotas and firm performance

The number of countries that have established quotas as a mean for reducing the gender gap has increased since the initial implementation of a quota in Norway in 2003 (see Table I). Some countries have quotas for firms listed on the stock market (Germany, Israel, Netherlands, Malaysia and Spain), others for state-owned firms only (Austria, Colombia, Finland, Greece, Ireland, Kenya, Panama, Slovenia, Taiwan, and the local government of Quebec), or for both listed firms and state-owned firms (Belgium, Denmark, France, Iceland, India, Italy, Greenland (Denmark), Norway, and UAE). The measures in these countries vary considerably with respect to 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).

Some countries refuse to implement mandatory rules to support board diversity 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) (Adams, 2016; Terjesen, Aguilera, & Lorenz, 2015). In Europe, a voluntary process for companies was 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 women 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, Kramer, and Erkut (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 women directors contribute to increase the level of firm innovation when the critical mass of at least three women directors is reached. This could explain the choice of policy-makers to impose gender quotas with a minimum threshold of 30%.

While gender quotas appear to be mainly motivated by economic arguments, the assertion that gender quotas have a positive impact on firm value or performance is highly contested. The "business case" argument that women can help to achieve the most economically satisfying outcome is based on the idea that male and female directors are different. There is a large amount of literature analysing gender differences in preferences for the general population (e.g. Bertrand, 2010). 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. If such differences exist between preferences of women and men directors, then it is possible that increasing board diversity may impact boards' decision-making and then firms' outcomes. 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). Deaves et al. (2009), who, when experiments are conducted on a group of economics, finance and business students, do not find differences between women and men preferences, and postulate that women may have a lot in comment with men in comparable positions It is therefore possible that women directors are different in their preferences than 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.

While female directors could be similar to male directors in terms of their preferences, the literature documents that they are different in their skills, age and experience. Female directors tend to have higher levels of education, with a higher percentage of female directors holding MBA and PhD 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 women 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 hard to observe a significant impact in the long run.

A sizeable literature has examined the relationship between female representation and performance outside the context of gender quotas with, so far, no consensus on their findings. Kirsch (2018) realized a mapping of journal articles on the gender composition of corporate boards until January 2017 and finds that 61 articles are concerned with the effects of board gender composition on firm financial performance. Some studies find that board gender diversity leads to better financial performance while others find a negative relationship or no effects (see surveys of Kirsch, 2018; Adams, 2016; Hermalin and Weisbach, 2003). There is a more limited number of studies on the impact of female board representation on firm risk-taking behavior (see the survey of Sila et al., 2016). Results are mixed with evidence of a negative impact of gender diversity on risk-taking (Wilson and Atanlar, 2011; Lenard, 2014; Chen et al., 2017), a positive impact (Berger et al., 2014 and Adams and Ragunathan, 2015 for financial institutions), or no effects (Sila et al., 2016).

The expected impact of the presence of women on corporate boards on firm outcomes is even less obvious when gender quotas are imposed to oblige firms to recruit a minimum number of female directors. As discussed above in the introduction, if mandatory quotas are associated with negative consequences for firm profits, this could outweigh any positive impact that could be associated with gender diversity. Matsa and Miller (2013) and Ahern and Dittmar (2012) investigate how the implementation of a gender quota of at least 40% in 2003 impacted upon 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 Matsa and Miller (2013) report a decline in operating profit caused by an increase in labor costs and employment level. Bohren and Staubo (2016) confirm that the imposition of a gender quota in Norway reduced firm value through an increase in board independence. 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, further find that operating profitability did not decline after quota compliance.

Our aim is to complement this literature by analysing the impact of gender quotas on the performance of firms located in three European countries that implemented gender quotas in 2011. Our objective is to determine if negative economic outcomes are a necessary cost to be paid for achieving more gender-balanced representation in corporate boards, in line with the findings of Matsa and Miller (2013) and Ahern and Dittmar (2012), or if gender quotas have a neutral effect on firm outcomes as found by Eckbo et al. (2018). Rather than limiting our analysis to the effects of gender quotas on profits, we follow Matsa and Miller (2013) and also explore how risk-taking behavior and corporate decisions (labor cost, employment, etc) change when the number of female directors is exogenously increased. We also compare the characteristics of female and male directors, before and after the implementation of the gender quota, and examine if changes on board members' characteristics have an influence on the way gender quotas impact firm outcomes and strategic corporate decisions.

3. Data and summary statistics on boards of directors

3.1. Presentation of the sample

Our study focuses on a group of three Western European countries (Belgium, France, and Italy) that implemented a gender quota in 2011. We restrict our analysis to these countries because they introduced gender quota in the same year and display a similar level of economic development and business environment. We also restrict our sample to Western European countries that impose comparable gender quota legislation and penalties for non-compliance, and target listed firms (see Table I for details).[1]

[1] Our selection criteria lead us to exclude Western European countries that implemented gender quotas in another year or with non-comparable quota legislation (the Netherlands with a legislation without sanctions; Austria and Greece that impose gender quotas only for state-owned firms; Norway, Spain and Germany that introduced gender quotas in 2003, 2007 and 2015, respectively; see Table I for further details).

We collect board of directors information for Belgian, French and Italian firms listed on the stock market from the BoardEx database over the period 2006 to 2017.[2] We follow the existing literature and exclude financial institutions as they are subject to specific regulation (see Hermalin and Weisbach, 1988; Farrell and Hersch, 2005; Matsa and Miller, 2013 or Bennouri et al., 2018)[3]. We furthermore do not include in our sample firms that are newly created over the period in order to compare the performance of the same group of firms before and after the imposition of the gender quotas. We then obtain data from BoardEx for 52 Belgian listed firms, 190 French listed firms, and 61 Italian listed firms for which we have all the information we need on their board members for the overall period.

Consolidated financial statements and market-based indicators are extracted from the database Bloomberg. We finally end up with a sample of 265 firms for which financial data are available for our main variables of interest (42 Belgian firms, 170 French firms, and 53 Italian firms). Financial variables are winsorized at the 1 percent tails, as it is common when working with accounting data.

3.2. How boards of directors change

A gender quota was implemented in Belgium, France and Italy in 2011, with differences in the threshold considered, the date of compliance and the type of sanction. In Belgium, the law requires state-owned and listed companies to have at least one third (33%) representation from each sex on their board. The date of compliance is 2017 for listed companies and 2019 for listed SMEs. In case of non-compliance, board members would lose financial and non-financial benefits until compliance with the law. In France the law requires listed companies 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 state-owned companies by 2015, with financial sanctions for non-compliant companies.

We examine in this section how the imposition of such gender quotas changes board composition and individual board members' characteristics of our sample of Belgian, French and Italian firms, using a large set of indicators defined in Table II. Given the large demand

[2] BoardEx also provides information for a small number of non-listed firms. We focus our analysis on listed firms as they are less able to avoid quotas. The existing literature shows that non-listed firms are more prone to change their organizational form to avoid the law (Matsa and Miller, 2013; Bohren and Staubo, 2014). This choice also allows us to use market data to compute our measures of performance and risk.

[3] In section 5, we investigate a sample consisting solely of financial institutions.

shock imposed by the quota, we expect board composition and characteristics to be different along many dimensions.

Table III compares the board gender composition of firms before and after reform changes. Firms in the three countries were far from the minimum number of women imposed by the quota before the law, with on average around 11%, 12% and only 6% of female directors in 2010 in Belgium, France and Italy, respectively. 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 three countries, indicating that firms replace male directors by female directors to comply with the law. We also observe from Table III that the percentage of female directors is on average below the legal quota at the date of compliance in Belgium (27%), France (38%) and Italy (25%); this could be explained by the relatively high number of firms that do not respect the quota (around 64% in Belgium in 2017, 39% in France in 2017, and 75.50% in Italy in 2015). However, we can see that in Italy the number of firms that do not comply with the law strongly decreases two years after the date of compliance (around 36%), suggesting that the sanctions potentially applied in 2016 and 2017 were effective to prompt a large number of firms to respect the quota.

We next analyze whether the compliance with gender quotas modifies other observable characteristics of firm board members, such as age, education and experience. As we find similar results for Belgian, French and Italian firms, we only report in Tables IV to VI the average statistics for all firms together (see Tables A.I to A.III in Appendix A for statistics by country). Table IV 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 six years younger than males after the quota. As we might expect, the time on boards of female directors (around 5 years) is shorter than male directors (almost 9 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 are also recruited outside the firms after the imposition of the quota, as outlined by the shorter time spent in the company, around 6 years against more than 10 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.

Table V further presents information on education and board experience of directors. In Table VI, 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 V and VI show that female directors are more highly educated than their male colleagues after the quota.

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 or vice-chairman compared to male directors, and these differences hold for both retained and new female directors. Surprisingly, we 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 to reduce the quality of corporate governance.

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 and board experience. We will explore, in the next section, if the impact of gender quotas on firm performance and corporate decisions is not driven by changes in these board members' characteristics.

4. How gender quotas affect firm outcomes and corporate decisions

4.1. Methodology

Identification of a control group

Our objective is to assess the effect of gender quotas legislation on firm performance and corporate decisions. We treat the reform as a natural experiment and identify changes in performance and corporate decisions for firms affected by the reform and compare them with changes observed for firms not affected by the reform. To carry out this investigation, we use a methodology relying on difference-in-differences comparisons with matched samples of firms. In this regard, we need to identify a group of firms not exposed to gender quotas (non-treated firms), to which treated firms may be compared. For that, we choose firms from other Western European countries as they are geographically and culturally close to the group of treated firms, they also have comparable business development and operate in analogous macroeconomic conditions. We remove countries that have enforced gender quota legislations or recommendations during the period of time (i.e. Denmark, Finland, Germany, Norway, The Netherlands, Spain, Sweden and The United Kingdom). This selection left us with six Western European countries having on average a low level of women on boards: Austria, Greece,

Ireland, Luxembourg, Portugal and Switzerland.[4] Similarly to the treated group (265 Belgian, French and Italian listed firms), we only consider listed firms in the non-treated group. We further exclude listed state owned firms in Austria and Greece as these firms are subject to gender quotas. Information on boards of directors is collected from BoardEx and financial data from Bloomberg.

We conduct our difference-in-differences analysis over the period 2008-2013. This period embraces three years before the implementation of gender quota (*pre-treatment period*) and three years after, including 2011 (*treatment period*). As in Schepens (2016), we limit the treatment period to reduce the likelihood that our results will be affected by other effects than quotas. We end up with a balanced sample of 442 non-treated firms with non-missing information over the period 2008-2013 (53 in Austria, 174 in Greece, 22 in Ireland, 4 in Luxembourg, 36 in Portugal, and 153 in Switzerland). Figure I shows that there is a significant difference in the proportion of women on boards between firms in the treated and non-treated group after the introduction of gender quotas in 2011.

To ensure similarity between the two samples of firms, and control for potential structural differences, we carry out a propensity score matching procedure. If treated and non-treated firms exhibit different characteristics before the implementation of gender quotas, this can lead to a substantial bias of estimated treatment effects when using a difference-in-differences approach. To ensure similarity between the two samples of firms, we need to pair each treated firm with some comparable non-treated firms. Appendix B describes the propensity score matching the procedure we used to carry out this pairing.

Model specifications

We use the following specification initially to compare changes in profitability, risk taking behavior and strategic corporate decisions between treated and non-treated firms, before and after the imposition of quota:

$$Y_{i,t} = \alpha + \beta_1 * Treated_i * Post_t + \beta_2 * Post_t + \beta_3 * Treated_i + \beta_4 * X_{i,t} + \varepsilon_{i,t} \quad (1)$$

[4] Greece and Austria implemented a gender quota in 2000 and 2011, respectively, but only for state-owned firms. The percentage of female directors for listed firms was on average very low in 2011, with only 5.37% of women on boards in Greece and 5.48% in Austria. Finland also implemented a quota for state-owned firms in 2005, but we exclude it from the control group because the percentage of female directors of listed firms was relatively high in 2011 (23.42%).

where subscript *i* denotes firm, *t* denotes the time period (t = 2008 to 2013), and $\varepsilon_{i,t}$ is the idiosyncratic error term.

$Y_{i,t}$, the dependent variable, is a set of variables to measure firm performance, risk-taking behavior and strategic corporate decisions. We proxy firm economic performance by using the return on assets (*ROA*), computed as the ratio of net income over total assets. We capture firm financial performance by using 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.[5] We also consider operating profits (*Operating Profits*), calculated as the ratio of earnings before interest and taxes over total assets. The level of risk is measured by the total market risk (*Risk*), defined as the standard deviation of monthly stock return. Corporate decisions are proxied by four variables measuring 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*).

$Treated_i$ is a dummy variable that takes the value of one for treated firms (i.e. firms located in Belgium, France and Italy), and zero for non-treated firms (i.e. firms from Austria, Greece, Ireland, Luxembourg, Portugal and Switzerland). $Post_t$ is a dummy variable that equals one in the post-treatment period (2011-2013), and zero in the pre-treatment period (2008-2010). Our coefficient of interest in this regression is the coefficient of the interaction variable (β_1). It assesses the impact of the implementation of gender quotas on performance and corporate decisions of treated firms.

$X_{i,t}$ is a set of control variables, including the number of directors on boards (*Board size*), the firm size (*Firm size*), the growth of sales (*Sales growth*), the level of capital (*Leverage*), and the growth of GDP (*GDP*). The detailed definition and calculation of these variables are given in the Table II.

To go further on our investigations, we examine whether the impact of gender quotas is not driven by changes in board members' characteristics other than gender. To address this concern, we estimate a triple-differences by augmenting the Equation (1) as following:

$$Y_{i,t} = \alpha + \beta_1 * Treated_i * Post_t * Z_i + \beta_2 * Treated_i * Post_t + \beta_3 * Post_t + \beta_4 * Treated_i + \beta_5 * Z_i + \beta_6 * X_{i,t} + \varepsilon_{i,t} \quad (2)$$

[5] Previous literature underlines the importance of using both accounting and market-based measures of performance, as market-based measures are influenced by investor perceptions on gender diversity (Kirsch, 2018; Bennouri et al., 2018).

Z denotes alternative dummy variables that depict changes in board members' characteristics after gender quotas. The analysis of board members' characteristics conducted in Section 3.2. show 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, and have less experienced on boards. We therefore consider the four 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; and (4) *dLowExperience* if the percentage of directors having experience as CEO or Chairman of a board is below the median of the group. We interact this dummy with dummies *Treated* and *Post*. Our coefficient of interest in this regression is the coefficient for the triple interaction variable (β_1) that shows how changes in board members' characteristics influence the way gender quotas impact firm outcomes.

4.2. Results

Results of Equations (1) are reported in Tables VII and VIII, using either OLS or firm fixed effects and standard errors clustered at either the firm level or the industry sector level. The dummy variable *Treated* cannot be included in regressions when fixed effects are considered.

We begin our analysis by examining whether the introduction of gender quotas has a significant impact on firm performance and risk. Table VII presents the results of difference-in-differences regressions that compare corporate performance and risk of treated and non-treated firms. Our results show that none of the considered performance measures are significantly affected by the imposition of gender quotas. These results are consistent with the argument that while gender diversity could positively affect firm outcomes, this seems to be outweighed by the cost of imposing mandatory rules to force firms to achieve gender balance. We further find that gender quotas do not significantly impact the risk-taking behavior of firms. These findings do not support the argument that women on boards are more risk-averse than men.

We furthermore analyse how corporate decision-making changes after the quota; results are reported in Table VIII. Again, the results show that the imposition of gender quotas does not significantly affect employment, labor or other costs, and revenues. 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 VII. These results suggest that women directors tend to be similar to men in their preferences.

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 in Table IX the regressions of Equation (2) using firm fixed effects and standard errors clustered at the firm level (we find similar results when using standard errors clustered at the sector level). Panels A, B, C and D 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, and a lower proportion of directors with more board experience. We find that none of these changes in board members' characteristics impacts the way gender quotas influence firm performance, risk and corporate decisions. Our results show that directors' age, education, nationality or experience are not channels for the quota's effect.

Overall, our empirical results show that the introduction of gender quotas does not impact firm outcomes and does not modify corporate strategic policies. Our findings are not therefore consistent with the previous work of Ahern and Dittmar (2012) and Matsa and Miller (2013) that gender quotas caused a decline in firm outcomes. We reverse this conclusion by supporting the argument that gender quotas have a neutral effect on firm performance, in line with the recent work of Eckbo et al. (2018).

5. Further investigations and robustness checks

5.1. Further issues

We now examine several additional factors that could also have an impact on how firm outcomes are influenced by gender quotas.

Compliance with the deadline

The statistical analysis conducted in Section 3.2 revealed that a number of firms do not respect the quota at the date of compliance (see Table III). We examine whether the neutral effect of gender quotas on firm outcomes 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 III). 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 (2015 for Italy, 2017 for Belgium and France). We estimate an expanded version of our triple-difference model (Equation (2)), using firm fixed effects and standard errors

clustered at the firm level. Results are reported in Table X (Panel A); our results are unchanged and confirm that gender quotas do not significantly impact firm outcomes and corporate decisions.

Distance from compliance

We follow Matsa and Miller (2013) and examine whether firms furthest from compliance in 2011 display a significant impact of gender quotas on their outcomes, as they were required to add a greater number of women to their boards before the deadline. In our sample, 45% of firms in Belgium and 52% in Italy had no women on their boards the year before the quota, while it is only around 28% of firms in France. 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 a triple-difference model 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 X (Panel B), indicate that gender quotas do not influence firm outcomes and corporate decisions, independently of their distance from compliance.

Impact of gender quotas on banks

We removed banks from our sample as they are subject to specific regulations. We further examine whether the imposition of a gender quota has a different impact on banks compared to non-financial firms. We were able to collect data on boards and financial statements for a sample of 54 treated banks, all listed on the stock market (11 in Belgium, 14 in France, and 29 in Italy). We end up with a sample of 70 non-treated banks (11 in Austria, 10 in Greece, 4 in Ireland, 1 in Luxembourg, 8 in Portugal, and 36 in Switzerland). A statistical analysis shows that we observe similar characteristics in the evolution of board composition of banks and non-financial firms after the introduction of gender quotas.[6] We carry out a propensity score matching procedure between treated and non-treated banks, and rerun Equations (1) and (2). Results are reported in Tables XI and XII; we find similar results to the analysis conducted on non-financial firms, with gender quotas having a neutral effect on bank performance, risk-taking and strategic corporate decisions. Specificities of banks do not therefore interfere in the way gender quotas impact (or here do not impact) firm outcomes.

[6] While we do not include this analysis in this section, it is available on request.

5.2. Robustness checks

We carry out several additional robustness checks on our empirical results.

Alternative dependent variables

We use alternative dependent variables to verify the robustness of our results. For the economic performance, we use the return on equity (ROE) as an alternative measure of profitability. We also use the Sharpe ratio as an alternative measure of firm risk. We rerun the matching procedure if necessary and then estimate Equations (1) and (2). We find that gender quotas do not have any impact on either the ROE or the Sharpe ratio (see Tables A.IV and A.V in Appendix A). Our results are therefore unchanged, with a neutral effect of gender quotas independently of the measure of performance and risk used.

Alternative treatment period

If firms have anticipated the introduction of gender quotas, they might have begun recruiting women the year before the quota. We test the robustness of our results by including 2010 in the treatment period (2010-2012), with a pre-treatment period going from 2007 to 2009. We rerun the matching procedure when necessary. Results are displayed in Tables A.VI (Equation (1)) and A.VII (Equation (2)). Our results again remain unchanged; gender quota legislation does not affect outcomes and corporate decisions of firms.

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 a natural experiment in Belgium, France and Italy to identify the impact of gender quotas on firm outcomes and strategic corporate decisions.

We first conduct a statistical analysis to examine how boards' composition and board members' characteristics are affected by the imposition of a gender quota. As expected, we find that quotas are associated with a strong increase in female directors, however below the required threshold in a large number of firms at the date of compliance. 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 and higher international exposure.

We next use a difference-in-differences approach to explore how firm performance and corporate decisions change when the number of female directors is exogenously increased. Our results show that the introduction of gender quotas does not significantly impact firm performance and risk, and does not modify corporate strategic policies. Our results for the Belgium, France and Italy cases challenge what we have learnt from Ahern and Dittmar (2012) and Matsa and Miller (2013) 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 and corporate decisions, in line with the recent study of Eckbo et al. (2018) on Norwegian firms. Our results further show that directors' age, education, nationality or experience are not channels for the quota's effect.

Overall, our study suggests that gender balance on corporate boards could be achieved by mandatory quotas without regulators expecting negative effects for firm performance. However, our study does not support the "business case" argument appealed by policy-makers 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. Policy-makers can create unrealistic expectations for women by ignoring the fact that the side effects of mandatory rules could outweigh the expected benefit of an increase in board diversity on firm outcomes. Our study also shows that a large number of firms do not respect the quota at the date of compliance, suggesting that stronger sanctions should be imposed to prompt firms to comply with the law.

Our empirical strategy does not allow us to analyze the long-term effects of gender quotas. Future research should look at the potential long-term effects as we might expect side effects of mandatory rules to decrease in the long run. Such analysis will however require the use of another approach than difference-in-differences analysis, with the risk to be exposed to the problem of joint endogeneity between board composition and firm performance.

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Table I. Countries with gender quotas on board of directors

Country	Quota	PTFs	SOEs	Passage Date	Compliance Date	Sanctions
Israel	1 FBD	Yes	No	April 19, 1999	None	None
	50%	No	Yes	March 11,2007	2010	None
Greece	33%	No	Yes	2000	None	None
Colombia	30%	No	Yes	2000	None	None
Norway	40%	Yes	Yes	Dec 19, 2003	2006: SOEs; 2008: PTFs	Refuse to register board; dissolve company; fines until compliance
Slovenia	40%	No	Yes	2004		None
Finland	40%	No	Yes	April 15, 2005	June 1, 2005	None
Québec (Canada)	50%	No	Yes	Dec 1, 2006	Dec 14, 2011	None
Ireland	CG Codes	No	Yes	2006	Immediate	None
Spain	40%	Yes	No	March 22, 2007	March 1, 2015: PTFs with 250+ employees	Lack of gender diversity will impact consideration for public subsidies and state contracts
	Own target	Yes	No	2014	None	None
Iceland	40%	Yes	Yes	March 4, 2010	Sep 1, 2013	Non
Kenya	33%	No	Yes	August 28,2010	None	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
Malaysia	30%	Yes	No	June 27,2011	2016: 250+ employees	None
Italy	33%	Yes	Yes	June 28,2011	Interim 20% by 2012; 2015	Fines; directors lose office
Belgium	33%	Yes	Yes	June 30,2011	2012: SOEs; 2017: PTFs	Void the appointment of any directors who do not conform to board quota targets; suspend director benefits
Netherlands	30%	Yes	No	June 6,2011	Jan 1,2016	Explain in annual report
Austria	35%	No	Yes	2011	Interim 25% by 2016; 2018: 35%	None
UAE	1 FBD	Yes	Yes	Dec,2012	Not specified	None
Denmark	Own target	Yes	Yes	Dec 12,2012	April 1,2013	Fines
India	1 FBD	Yes	Yes	August,2013	August 1, 2015	Fines
Greenland (Denmark)	50%	Yes	Yes	2013	Jan,2014	Not specified
Germany	30%	Yes	No	March,2015	2016: 110 biggest listed companies	Director sear must be left vacant
Panama	30%	No	Yes	2017	NA	NA
Taiwan	33%	No	Yes	NA	NA	NA

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

Table II. 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 (%) –min	Minimum percentage of female directors on boards	BoardEx
Female (%) –max	Maximum percentage of female directors on boards	BoardEx
Female (%) – SD	Standard deviation of percentage of female directors on boards	BoardEx
% Firms having female less than 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 female directors	BoardEx
Time on Board	Average time on board of directors	BoardEx
Time in Company	Average time in company of directors, considering all board and non-board positions	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
Year on Quoted BOD	Average number of years on 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

Risk	Standard deviation of monthly stock return	Bloomberg
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 number of workers in a firm	Bloomberg
Difference-in-differences variables		
Treated	Dummy variable that takes the value of one for firms in treated group (i.e. firms in Belgium, France, or Italy), and zero for firms in control group (i.e. firms in Austria, Greece, Ireland, Luxembourg, Portugal, Switzerland)	
Post	Dummy variable equals to one for the post-treatment period (2011-2013), and zero for the pre-treatment period (2008-2011)	
Control variables		
Board size	Natural logarithm of the number of directors on the board	BoardEx
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
GDP (%)	GDP Growth rate	World Bank
Triple-difference variables		
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 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
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 (2015 for Italian 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 in 2010 one year before the implementation of gender quota	BoardEx

Table III. Statistics on the presence of women directors on boards by year (gender quota in 2011)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Panel A: Belgium (33% in 2017)												
Board size	9.38	9.31	9.43	9.38	9.29	9.36	9.26	9.21	9.21	9.22	9.53	9.31
Female (%) - mean	7	7.62	7.49	9.48	10.76	12.50	15.76	16.95	19.77	22.58	26.22	27.48
Female (%) – min	0	0	0	0	0	0	0	0	0	0	0	0
Female (%) – max	50	50	50	50	50	50	50	50	50	50	50	60
Female (%) - SD	13.08	12.40	12.53	13.15	13.34	12.88	12.88	12.40	13.29	12.57	12.10	12.98
% Firms having female less than quota	91.89	92.86	90.48	90.48	88.10	88.10	88.10	88.10	85.71	78.05	68.42	64.29
Number of firms	42	42	42	42	42	42	42	42	42	42	42	42
Panel B: France (20% in 2014 and 40% in 2017)												
Board size	10.81	10.46	10.62	10.61	10.84	10.97	10.87	10.76	11.02	10.94	11.30	11.16
Female (%) - mean	8.08	9.41	9.92	10.28	12.12	17.02	20.61	23.93	27.83	29.77	34.31	37.84
Female (%) – min	0	0	0	0	0	0	0	0	6.25	0	14.29	15.38
Female (%) – max	75	75	75	75	75	75	75	75	75	75	75	75
Female (%) - SD	10.50	10.48	10.73	10.49	11.06	10.35	10.37	10.10	9.03	9.22	9.39	9.92
% Firms having female less than quota	99.35	98.82	98.24	98.82	97.65	97.06	97.06	94.12	89.41	85.88	66.67	38.92
Number of firms	170	170	170	170	170	170	170	170	170	170	170	170
Panel C: Italy (33% in 2015)												
Board size	11.00	10.57	10.79	11.13	11.19	11.08	10.94	10.91	10.30	10.62	10.94	10.79
Female (%) -mean	4.45	4.55	4.45	4.85	5.45	6.25	9.60	15.36	21.12	25.39	29.25	31.30
Female (%) – min	0	0	0	0	0	0	0	0	0	0	11.11	11.11
Female (%) – max	28.57	33.33	28.57	28.57	28.57	28.57	28.57	44.44	57.14	55.56	50	50
Female (%) - SD	7.62	8.05	7.17	7.25	7.28	7.59	8.33	11.64	12	8.08	7.78	7.93
% Firms having female less than quota	100	98.11	100	100	100	100	100	94.34	83.02	75.47	48	35.85
Number of firms	53	53	53	53	53	53	53	53	53	53	53	53

Notes. Variables are defined in Table II.

Table IV. Statistics on general board characteristics

		Pre quota period (2006-2010)	Post quota period (2011-2017)	Difference-period
Age	All	57.41	57.67	0.2605*
	Male	57.82	59.08	1.2673***
	Female	53.12	53.24	0.1187
	Difference-gender	-4.7***	-5.84***	
Foreign (%)	All	11.71	12.88	1.17***
	Male	11.93	12.10	0.16
	Female	9.34	15.17	5.83***
	Difference-gender	-2.59**	3.07***	
Tenure	All	5.16	5.63	0.4651***
	Male	5.08	6.20	1.1209***
	Female	6.08	4.04	-2.0369***
	Difference-gender	1***	-2.16***	
Time on Board	All	6.80	7.69	0.8964***
	Male	6.79	8.73	1.9385***
	Female	6.95	4.79	-2.1565***
	Difference-gender	0.16	-3.94***	
Time in Company	All	8.29	9.15	0.8531***
	Male	8.27	10.33	2.0507***
	Female	8.58	5.87	-2.7103***
	Difference-gender	0.31	-4.46***	

Notes. Variables are defined in Table II.

Table V: Statistics on board members' education and experience

Education

		Pre quota period (2006-2010)	Post quota period (2011-2017)	Difference-period
Bachelor (%)	All	37.26	35.41	-1.84**
	Male	38.56	37.42	-1.15*
	Female	23.83	28.90	5.06***
	Difference-gender	-14.73***	-8.52***	
PostGraduate (%)	All	36.68	41.55	4.87***
	Male	36.72	39.50	2.78***
	Female	36.29	47.49	11.20***
	Difference-gender	-0.43	7.99***	

Board experience

		Pre quota period (2006-2010)	Post quota period (2011-2017)	Difference-period
Directors having experience on board (%)	All	99.09	93.83	-5.26**
	Male	99.27	96.24	-3.03**
	Female	96.65	84.36	-12.29**
	Difference-gender	-2.62***	-11.88***	
Number BOD to Date	All	11.16	10.00	-1.1585**
	Male	11.64	11.42	-0.2243
	Female	6.27	5.66	-0.6086**
	Difference-gender	-5.37***	-5.76***	
Number current BOD (Occupation)	All	4.94	4.39	-0.5556**
	Male	5.11	4.81	-0.3017*
	Female	3.29	3.10	-0.1923*
	Difference-gender	-1.82***	-1.71***	
Year on Quoted BOD	All	2.40	2.67	0.2747***
	Male	2.51	3.09	0.5780***
	Female	1.28	1.41	0.1292
	Difference-gender	-1.23***	-1.68***	
CEO (%)	All	12.59	11.90	-0.69**
	Male	12.94	12.92	-0.01
	Female	7.54	7.21	-0.33
	Difference-gender	-5.4***	-5.71***	
Chairman (%)	All	20.28	18.94	-1.34***
	Male	20.43	20.10	-0.32**
	Female	18.21	13.85	-4.36***
	Difference-gender	-2.22**	-6.25***	
Vice Chairman/Vice CEO (%)	All	11.42	10.23	-1.19**
	Male	11.52	10.93	-0.59**
	Female	9.89	7.14	-2.74***
	Difference-gender	-1.63***	-3.79***	

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

Table VI: Statistics on the education and experience of new, retained and exiting directors

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: 2006-2010									
Bachelor (%)	21.42	24.77	15.57	39.01	40.03	38.97	-17.59*	-18.62**	-17.55*
Postgraduate (%)	54.30	34.67	44.00	43.27	37.40	37.95	11.04	16.90*	16.36*
Post quota period: 2011-2017									
Bachelor (%)	30.30	29.44	34.70	38.21	38.52	41.78	-7.92***	-8.22***	-11.49***
Postgraduate (%)	53.66	47.31	46.71	43.24	39.87	39.48	10.42***	13.79***	14.18***

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: 2006-2010									
Having BOD experience (%)	89.56	94.50	100.00	96.89	98.27	100.00	-7.33*	-8.71**	-10.44**
CEO (%)	15.85	14.35	10.19	31.05	33.77	31.54	-15.21***	-17.92***	-15.69***
Chairman (%)	33.56	36.03	29.82	45.21	54.17	52.22	-11.65*	-20.61***	-18.67**
Post quota period: 2011-2017									
Having BOD experience (%)	63.84	79.37	100.00	78.66	92.24	100.00	-14.82	-28.40***	-36.16***
CEO (%)	10.06	11.39	14.40	22.64	31.84	32.55	-12.58***	-21.78***	-22.49***
Chairman (%)	15.03	23.51	21.95	32.11	49.77	50.60	-17.08***	-34.74***	-35.57***

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

Table VII: Impacts of gender quota on corporate performance and risk-taking (Equation 1; Difference-in-differences estimates)

	Tobin Q			ROA			Operating Profit			Risk		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treated*Post	-0.0258	-0.0308	-0.0308*	-0.00215	-0.00177	-0.00177	-0.00859	-0.00688	-0.00688	0.0150	0.00606	0.00606
	(-0.52)	(-0.73)	(-1.87)	(-0.42)	(-0.27)	(-0.19)	(-0.36)	(-1.22)	(-0.93)	(1.52)	(0.49)	(0.41)
Post	0.0606**	0.0793**	0.0793*	0.00101	-0.00520	-0.00520	0.00796	0.00188	0.00188	-0.108***	-0.0836***	-0.0836***
	(2.00)	(2.21)	(2.07)	(0.39)	(-0.86)	(-0.68)	(0.66)	(0.40)	(0.30)	(-21.72)	(-7.42)	(-6.30)
Treated	0.0638*			-0.0081**			-0.00857			-0.00259		
	(1.83)			(-2.23)			(-0.51)			(-0.37)		
Board size		-0.155*	-0.155**		-0.00944	-0.00944		0.0110	0.0110		-0.0257	-0.0257
		(-1.74)	(-2.26)		(-0.58)	(-0.63)		(0.43)	(0.45)		(-0.62)	(-0.57)
Firm size		-0.259*	-0.259*		0.0154	0.0154		-0.0104	-0.0104*		-0.109***	-0.109**
		(-1.72)	(-1.87)		(1.25)	(1.16)		(-1.05)	(-1.87)		(-3.58)	(-2.55)
Sales growth		0.0014**	0.0014**		0.0068***	0.0068***		0.00713**	0.00713**		-0.0002**	-0.0002*
		(2.22)	(2.40)		(9.11)	(8.34)		(2.30)	(2.35)		(-2.18)	(-1.91)
Leverage		0.707**	0.707*		-0.278***	-0.278***		-0.124***	-0.124***			
		(2.32)	(2.10)		(-4.32)	(-3.66)		(-3.64)	(-3.22)			
GDP		0.00477	0.00477		0.0039***	0.0039***		0.0039***	0.0039***		-0.0110***	-0.0110***
		(1.42)	(0.77)		(5.48)	(5.81)		(7.34)	(4.31)		(-9.70)	(-10.93)
Constant	1.203***	3.158***	3.158**	0.0351***	0.0906	0.0906	0.105***	0.191**	0.191*	0.446***	1.341***	1.341***
	(55.86)	(2.96)	(3.12)	(19.20)	(0.85)	(0.72)	(12.43)	(2.10)	(2.08)	(127.31)	(5.85)	(4.59)
Observations	4163	3045	3045	6336	5835	5835	6312	5933	5933	6336	6074	6074
R-squared	0.00217	0.0602	0.0602	0.00204	0.169	0.169	0.000253	0.0922	0.0922	0.0851	0.293	0.293
Firm FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Cluster level		Firm	Industry sector		Firm	Industry sector		Firm	Industry sector		Firm	Industry sector

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

Table VIII: Impacts of gender quota on corporate strategy decisions (Equation 1; Difference-in-differences estimates)

Dependent variable	Revenues			Labor Cost			Other Cost			Employment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treated*Post	0.00914	-0.00493	-0.00493	0.00116	-0.00728*	-0.00728	-0.00528	-0.00678	-0.00678	-0.0664	-0.0205	-0.0205
	(0.26)	(-0.28)	(-0.19)	(0.12)	(-2.09)	(-1.73)	(-1.13)	(-1.15)	(-0.81)	(-0.55)	(-0.84)	(-0.76)
Post	0.00393	0.0169	0.0169	0.00427	0.0157***	0.0157**	0.00433*	0.00145	0.00145	0.0981	0.0146	0.0146
	(0.22)	(1.08)	(0.81)	(0.91)	(4.73)	(2.93)	(1.85)	(0.28)	(0.19)	(1.64)	(0.78)	(0.77)
Treated	-0.0449*			0.0218***			0.00108			0.251***		
	(-1.77)			(3.30)			(0.33)			(2.97)		
Board size		0.0445	0.0445		0.0130	0.0130		0.00946	0.00946		0.0560	0.0560
		(0.84)	(1.78)		(1.56)	(1.33)		(0.36)	(0.37)		(0.90)	(0.79)
Firm size		-0.217***	-0.217***		-0.0819**	-0.0819**		-0.00568	-0.00568		0.829***	0.829***
		(-4.28)	(-3.46)		(-3.02)	(-2.60)		(-0.37)	(-0.53)		(4.98)	(5.79)
Sales growth		0.0120**	0.0120**		-0.000055	-0.000058		0.0102***	0.0102**		0.000096	0.000096
		(2.41)	(2.34)		(-1.13)	(-1.20)		(3.19)	(2.84)		(0.16)	(0.15)
Leverage		-0.00748	-0.00748		-0.00748	-0.00748		-0.159***	-0.159**		0.510	0.510
		(-0.07)	(-0.06)		(-0.17)	(-0.19)		(-3.97)	(-3.15)		(1.08)	(1.14)
GDP		0.0110***	0.0110**		0.000601	0.000601		0.00369***	0.00369***		0.00330	0.00330
		(6.27)	(2.68)		(1.78)	(1.39)		(6.17)	(3.96)		(1.53)	(1.73)
Constant	0.923***	2.485***	2.485***	0.191***	0.818***	0.818**	0.0615***	0.177	0.177	8.377***	1.727	1.727
	(72.88)	(6.31)	(5.29)	(57.85)	(3.61)	(3.33)	(37.20)	(1.34)	(1.78)	(197.91)	(1.17)	(1.33)
Observations	6336	5855	5855	6312	6011	6011	6336	5970	5970	6336	5916	5916
R-squared	0.000835	0.105	0.105	0.00383	0.205	0.205	0.000620	0.106	0.106	0.00253	0.371	0.371
Firm FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Cluster level		Firm	Industry sector		Firm	Industry sector		Firm	Industry sector		Firm	Industry sector

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

Table IX: Impacts of changes in board characteristics on the influence of quotas on performance and corporate decisions (Equation (2), triple-difference)

Dependent variable	Tobin Q	ROA	Operating Profit	Risk	Revenues	Labor Cost	Other Cost	Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Relatively high proportion of younger directors								
Treated*Post*dLowAge	0.0457	-0.00396	0.00115	0.00864	-0.00214	0.00156	0.000228	-0.0127
	(0.81)	(-0.54)	(0.17)	(0.66)	(-0.08)	(0.27)	(0.03)	(-0.40)
Treated*Post	-0.0528	0.000153	-0.00745	0.00180	-0.00383	-0.00803*	-0.00690	-0.0143
	(-1.18)	(0.02)	(-1.09)	(0.13)	(-0.16)	(-1.66)	(-0.97)	(-0.55)
Post	0.0793**	-0.00520	0.00188	-0.0836***	0.0169	0.0157***	0.00145	0.0146
	(2.21)	(-0.86)	(0.40)	(-7.42)	(1.08)	(5.19)	(0.28)	(0.78)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3045	5835	5933	6074	5855	6011	5970	5916
R-squared	0.0609	0.169	0.0923	0.293	0.105	0.205	0.106	0.371
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Relatively high proportion of foreign directors								
Treated*Post*dHighForeign	0.0159	-0.00910	-0.00754	0.00860	0.00664	0.00255	-0.00717	-0.00731
	(0.36)	(-1.44)	(-1.21)	(0.68)	(0.27)	(0.46)	(-1.10)	(-0.19)
Treated*Post	-0.0392	0.00319	-0.00273	0.00130	-0.00858	-0.00865	-0.00283	-0.0166
	(-0.85)	(0.41)	(-0.40)	(0.09)	(-0.33)	(-1.57)	(-0.39)	(-0.45)
Post	0.0795**	-0.00523	0.00188	-0.0836***	0.0169	0.0157***	0.00145	0.0146
	(2.22)	(-0.86)	(0.40)	(-7.41)	(1.08)	(5.19)	(0.28)	(0.78)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3045	5835	5933	6074	5855	6011	5970	5916
R-squared	0.0609	0.170	0.0938	0.293	0.105	0.205	0.108	0.371
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel C: Relatively high proportion of directors with postgraduate degrees								
Treated*Post*dHighEducation	-0.0177	0.00403	-0.00164	-0.00694	0.0187	0.00711	-0.00194	0.0669*
	(-0.41)	(0.55)	(-0.27)	(-0.56)	(0.76)	(1.26)	(-0.30)	(1.86)
Treated*Post	-0.0203	-0.00374	-0.00604	0.00980	-0.0148	-0.0111**	-0.00576	-0.0552
	(-0.43)	(-0.57)	(-0.93)	(0.71)	(-0.65)	(-2.21)	(-0.86)	(-1.56)
Post	0.0792**	-0.00521	0.00189	-0.0836***	0.0169	0.0157***	0.00145	0.0146
	(2.21)	(-0.86)	(0.40)	(-7.42)	(1.08)	(5.19)	(0.28)	(0.78)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3045	5835	5933	6074	5855	6011	5970	5916
R-squared	0.0604	0.170	0.0923	0.293	0.105	0.205	0.108	0.372
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Panel D: Relatively low proportion of directors with CEO/Chairmain experience								
Treated*Post*dLowExperience	0.0417	0.00496	0.00928	0.0185	0.0255	0.00450	0.0103	-0.0273
	(0.79)	(0.60)	(1.43)	(1.29)	(1.40)	(0.94)	(1.46)	(-0.82)
Treated*Post	-0.0568	-0.00441	-0.0121*	-0.00442	-0.0204	-0.0101**	-0.0125*	-0.00689
	(-1.02)	(-0.55)	(-1.89)	(-0.28)	(-0.99)	(-2.10)	(-1.88)	(-0.21)
Post	0.0794**	-0.00518	0.00193	-0.0835***	0.0170	0.0157***	0.00149	0.0145
	(2.21)	(-0.85)	(0.41)	(-7.41)	(1.09)	(5.20)	(0.29)	(0.78)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3045	5835	5933	6074	5855	6011	5970	5916
R-squared	0.0610	0.170	0.0929	0.293	0.106	0.205	0.107	0.371
Firm 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 II; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table X: Impacts of compliance to the law (triple-differences estimates)

	Tobin Q	ROA	Operating Profit	Risk	Revenues	Labor Cost	Other Cost	Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Firms complying with the quota at the deadline								
Treated*post*dComply	-0.0163	-0.00497	-0.00372	0.0274*	0.0392	0.00535	-0.00156	0.0396
	(-0.29)	(-0.59)	(-0.47)	(1.85)	(1.20)	(0.72)	(-0.20)	(0.73)
Treated*post	-0.0195	0.00168	-0.00429	-0.0130	-0.0322	-0.0110	-0.00570	-0.0481
	(-0.33)	(0.18)	(-0.51)	(-0.78)	(-0.96)	(-1.52)	(-0.67)	(-0.90)
Post	0.0792**	-0.00523	0.00186	-0.0835***	0.0171	0.0157***	0.00144	0.0149
	(2.21)	(-0.86)	(0.39)	(-7.41)	(1.10)	(5.21)	(0.28)	(0.80)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3045	5835	5933	6074	5855	6011	5970	5916
R-squared	0.0603	0.169	0.0923	0.293	0.106	0.205	0.106	0.371
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Distance from compliance								
Treated*post*dDistCompliance	0.0298	-0.0154*	-0.00273	0.00595	0.00662	-0.00211	-0.00380	0.00166
	(0.58)	(-1.85)	(-0.36)	(0.43)	(0.24)	(-0.32)	(-0.50)	(0.04)
Treated*post	-0.0501	0.00818	-0.00512	0.00221	-0.00921	-0.00592	-0.00433	-0.0216
	(-1.05)	(0.88)	(-0.64)	(0.14)	(-0.32)	(-0.93)	(-0.52)	(-0.52)
Post	0.0794**	-0.00525	0.00188	-0.0836***	0.0169	0.0157***	0.00144	0.0146
	(2.21)	(-0.87)	(0.39)	(-7.41)	(1.08)	(5.19)	(0.28)	(0.78)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3045	5835	5933	6074	5855	6011	5970	5916
R-squared	0.0604	0.171	0.0923	0.293	0.105	0.205	0.106	0.371
Firm 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 II; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table XI: Impact of gender quotas on banks (Equation 1; Difference-in-differences estimates)

	Tobin Q	ROA	Operating Profit	Risk	Revenues	Labor Cost	Other Cost	Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated*Post	-0.0124	0.00555	0.00393	0.0639*	-0.0104	-0.00243	0.00173	0.0623
	(-0.45)	(0.76)	(0.17)	(1.68)	(-0.96)	(-0.44)	(0.26)	(0.74)
Post	-0.00760	-0.00477	-0.00332	-0.101***	0.0000357	0.00409*	0.00304	-0.100***
	(-0.31)	(-0.72)	(-0.41)	(-3.96)	(0.00)	(1.71)	(0.93)	(-2.68)
Treated								
Board size	-0.0398	-0.0177	0.194	-0.0344	-0.0320	-0.0274	0.0102	0.0200
	(-0.81)	(-0.98)	(1.03)	(-0.36)	(-1.52)	(-0.67)	(0.57)	(0.15)
Firm size	0.106	0.0289*	-0.0116	-0.000193	-0.0904**	-0.0273***	0.00758	0.407***
	(0.93)	(1.78)	(-0.43)	(-0.00)	(-2.53)	(-2.73)	(0.33)	(2.92)
Sales growth	0.00969	0.00577**	0.0126***	0.0107	0.0243***	0.00372***	0.00899***	-0.00594
	(1.61)	(2.38)	(3.15)	(0.99)	(4.57)	(3.24)	(5.13)	(-0.44)
Leverage	-0.302	-0.0508	-0.0293		0.269	0.0680	-0.140**	-0.0633
	(-0.72)	(-0.22)	(-0.44)		(1.45)	(1.23)	(-2.31)	(-0.13)
GDP	0.00118	0.00329	0.000979	-0.0155***	0.00146	0.000246	-0.000231	0.00236
	(0.32)	(1.00)	(0.28)	(-5.95)	(0.96)	(0.63)	(-0.29)	(0.66)
Constant	0.347	-0.198	-0.228	0.538	0.931**	0.331***	0.0223	3.792***
	(0.41)	(-0.71)	(-1.22)	(1.11)	(2.41)	(3.32)	(0.09)	(2.86)
Observations	529	945	369	1105	529	417	999	1029
R-squared	0.0279	0.0440	0.101	0.212	0.199	0.0291	0.0520	0.0935
Firm 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 II; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table XII: Impact of gender quotas on banks (Equation (2), triple-difference)

Dependent variable	Tobin Q	ROA	Operating Profit	Risk	Revenues	Labor Cost	Other Cost	Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Relatively high proportion of younger directors								
Treated*Post*dLowAge	-0.0264	-0.00883	-0.0303	0.106	-0.0148	0.00742	-0.00969	-0.125
	(-1.00)	(-0.64)	(-0.65)	(1.55)	(-0.97)	(0.80)	(-0.95)	(-0.78)
Treated*Post	0.00218	0.0107	0.0161	0.00665	0.00474	-0.00336	0.00740	0.132
	(0.08)	(0.86)	(0.50)	(0.12)	(0.34)	(-0.38)	(0.69)	(1.05)
Post	-0.00765	-0.00468	-0.00333	-0.101***	-0.0118	0.00393	0.00304	-0.100***
	(-0.31)	(-0.71)	(-0.41)	(-3.96)	(-1.54)	(1.35)	(0.93)	(-2.66)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	529	945	369	1105	1025	785	999	1029
R-squared	0.0290	0.0471	0.110	0.222	0.292	0.0717	0.0580	0.0986
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Relatively high proportion of foreign directors								
Treated*Post*dHighForeign	0.0113	-0.00383	-0.0254	-0.0256	0.0267*	0.00766	-0.00266	-0.150
	(0.34)	(-0.27)	(-0.56)	(-0.38)	(1.89)	(0.73)	(-0.23)	(-1.23)
Treated*Post	-0.0170	0.00764	0.0140	0.0770*	-0.0168	-0.00354	0.00329	0.144*
	(-0.53)	(0.64)	(0.67)	(1.91)	(-1.38)	(-0.36)	(0.34)	(1.83)
Post	-0.00773	-0.00478	-0.00312	-0.101***	-0.0120	0.00381	0.00305	-0.0997***
	(-0.32)	(-0.72)	(-0.38)	(-3.95)	(-1.56)	(1.31)	(0.93)	(-2.68)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	529	945	369	1105	1025	785	999	1029
R-squared	0.0289	0.0441	0.103	0.212	0.296	0.0706	0.0524	0.101
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel C: Relatively high proportion of directors with postgraduate degrees								
Treated*Post*dHighEducation	0.00499	0.00792	0.0403	-0.0801	-0.00491	-0.0130	-0.00321	0.0727
	(0.16)	(0.69)	(0.81)	(-1.25)	(-0.32)	(-1.45)	(-0.39)	(0.58)
Treated*Post	-0.0132	0.000800	-0.0342	0.0101	-0.00112	0.00618	0.00229	0.0295
	(-0.40)	(0.12)	(-0.75)	(1.12)	(-0.10)	(1.19)	(0.26)	(0.22)
Post	-0.00768	-0.00489	-0.00309	-0.100***	-0.0119	0.00389	0.00306	-0.101***
	(-0.32)	(-0.73)	(-0.37)	(-3.95)	(-1.55)	(1.35)	(0.94)	(-2.68)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	529	945	369	1105	1025	785	999	1029
R-squared	0.0289	0.0457	0.119	0.216	0.290	0.0736	0.0545	0.0954
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Panel D: Relatively low proportion of directors with CEO/Chairmain experience								
Treated*Post*dLowExperience	-0.0180	-0.000272	-0.0407	0.0116	-0.0421	0.000182	-0.00341	-0.0375
	(-0.65)	(-0.02)	(-0.92)	(0.29)	(-1.21)	(0.01)	(-0.23)	(-0.78)
Treated*Post	-0.00254	0.00649	0.0263	0.0581	0.0173	0.000408	0.00316	0.0985
	(-0.09)	(0.69)	(1.18)	(1.39)	(1.62)	(0.06)	(0.45)	(1.44)
Post	-0.00765	-0.00483	-0.00338	-0.101***	-0.0119	0.00388	0.00304	-0.101***
	(-0.32)	(-0.72)	(-0.42)	(-3.95)	(-1.55)	(1.33)	(0.93)	(-2.71)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	529	945	369	1105	1025	785	999	1029
R-squared	0.0283	0.0447	0.105	0.212	0.308	0.0697	0.0525	0.106
Firm 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 II; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A

Table A.I: Statistics on general board characteristics by country

		Pre quota period (2006-2010)	Post quota period (2011-2017)	Difference-period
Panel A : Belgium				
Age	All	56.17	56.73	0.5611**
	Male	56.56	57.78	1.2225***
	Female	52.01	52.15	0.1465
	Difference-gender	-4.54***	-5.66***	
Foreign (%)	All	18.62	20.42	1.80***
	Male	18.68	19.30	0.61
	Female	18.21	24.63	6.42***
	Difference-gender	-0.47	5.33***	
Tenure	All	4.99	5.10	0.1108
	Male	4.98	5.41	0.4325*
	Female	5.03	4.07	-0.9602**
	Difference-gender	0.05	-1.34***	
Time on Board	All	7.31	8.06	0.7500***
	Male	7.40	8.86	1.4615***
	Female	6.49	5.03	-1.4628***
	Difference-gender	-0.91**	-3.83***	
Time in Company	All	8.38	8.84	0.4624**
	Male	8.56	9.79	1.2298***
	Female	6.72	5.25	-1.4656***
	Difference-gender	-1.84***	-4.54***	
Panel B : France				
Age	All	57.56	57.86	0.3005**
	Male	58.02	59.39	1.3675***
	Female	53.48	53.73	0.2525
	Difference-gender	-4.54***	-5.66***	
Foreign (%)	All	13.20	14.25	1.05***
	Male	13.66	13.23	-0.43
	Female	9.09	16.78	7.69***
	Difference-gender	-4.57***	3.55***	
Tenure	All	5.54	5.99	0.4533***
	Male	5.45	6.70	1.2448***
	Female	6.38	4.24	-2.1344***
	Difference-gender	0.93**	-2.46***	
Time on Board	All	7.20	8.05	0.8493***
	Male	7.22	9.30	2.0807***
	Female	7.11	4.91	-2.1959***
	Difference-gender	-0.11	-4.39***	
Time in Company	All	8.97	9.83	0.8582***
	Male	9.00	11.29	2.2935***
	Female	8.84	6.18	-2.6588***
	Difference-gender	-0.16	-5.11***	

Panel C: Italy				
Age	All	57.87	57.73	-0.1346
	Male	58.13	59.13	0.9986***
	Female	52.33	51.94	-0.39
	Difference-gender	-5.8***	-7.19***	
Foreign (%)	All	4.06	5.45	1.39***
	Male	4.22	5.68	1.46***
	Female	0.86	4.45	3.59***
	Difference-gender	-3.36***	-1.23**	
Tenure	All	4.16	4.87	0.7139***
	Male	4.10	5.34	1.2415***
	Female	5.40	3.27	-2.1345***
	Difference-gender	1.3***	-2.07***	
Time on Board	All	5.32	6.32	1.0004***
	Male	5.23	6.99	1.7669***
	Female	7.10	4.26	-2.8460***
	Difference-gender	1.87***	-2.73***	
Time in Company	All	6.29	7.25	0.9574***
	Male	6.11	7.99	1.8803***
	Female	9.99	5.23	-4.7632***
	Difference-gender	3.88***	-2.76***	

Notes. Variables are defined in Table II.

Table A.II: Statistics on board members' education and experience by country

Education

		Pre quota period (2006-2010)	Post quota period (2011-2017)	Difference-period
Panel A: Belgium				
Bachelor (%)	All	28.56	23.20	-5.35***
	Male	30.12	24.45	-5.67***
	Female	12.10	18.25	6.15***
	Difference-gender	-18.02***	-6.2***	
PostGraduate (%)	All	55.36	61.02	5.67***
	Male	54.54	59.49	4.94***
	Female	63.73	66.93	3.20
	Difference-gender	9.19***	7.44***	
Panel B: France				
Bachelor (%)	All	34.47	34.26	-0.20
	Male	35.95	36.17	0.22
	Female	21.51	28.65	7.14***
	Difference-gender	-14.44***	-7.52***	
PostGraduate (%)	All	34.91	39.03	4.13***
	Male	34.94	36.53	1.59***
	Female	34.54	45.56	11.02***
	Difference-gender	-0.4	9.03***	
Panel C: Italy				
Bachelor (%)	All	50.94	47.13	-3.82*
	Male	50.87	49.51	-1.36
	Female	52.03	40.58	-11.45*
	Difference-gender	1.16	-8.93**	
PostGraduate (%)	All	30.69	37.29	6.60***
	Male	31.40	35.35	3.95***
	Female	16.85	41.28	24.43***
	Difference-gender	-14.55***	5.93	

Experience

		Pre quota period (2006-2010)	Post quota period (2011-2017)	Difference-period
Panel A: Belgium				
Directors having experience on board (%)	All	98.80	93.68	-5.13**
	Male	98.97	95.28	-3.70**
	Female	96.42	86.74	-9.68*
	Difference-gender	-2.55***	-8.54**	
Number BOD to Date	All	8.15	7.98	-0.1662
	Male	8.34	8.59	0.2485
	Female	6.27	5.65	-0.6230*
	Difference-gender	-2.07***	-2.94***	
Number current BOD (Occupation)	All	3.91	3.93	0.0150
	Male	4.03	4.21	0.1856***
	Female	2.75	2.83	0.0779
	Difference-gender	-1.28***	-1.38***	
Year on Quoted BOD	All	3.10	3.34	0.2383***
	Male	3.18	3.68	0.4989***
	Female	2.31	2.06	-0.2575
	Difference-gender	-0.87***	-1.62***	
CEO (%)	All	17.02	16.63	-0.40*
	Male	17.65	17.82	0.18
	Female	8.21	10.45	2.24***
	Difference-gender	-9.44***	-7.37***	
Chairman (%)	All	16.83	15.76	-1.07***
	Male	17.36	16.76	-0.60**
	Female	9.50	10.33	0.83**
	Difference-gender	-7.86***	-6.43***	
Vice Chairman/Vice CEO (%)	All	8.62	7.84	-0.78
	Male	8.73	8.01	-0.72
	Female	7.18	7.13	-0.05
	Difference-gender	-1.55***	-0.88	
Panel B : France				
Directors having experience on board (%)	All	99.10	93.56	-5.55**
	Male	99.34	96.37	-2.97**
	Female	96.22	83.26	-12.96**
	Difference-gender	-3.12***	-13.11***	
Number BOD to Date	All	12.57	11.03	-1.5329**
	Male	13.27	12.94	-0.3311
	Female	6.52	5.94	-0.5842**
	Difference-gender	-6.75***	-7***	
Number current BOD (Occupation)	All	5.46	4.70	-0.7534**
	Male	5.70	5.26	-0.4364**
	Female	3.37	3.19	-0.1855
	Difference-gender	-2.33***	-2.07***	
Year on Quoted BOD	All	2.32	2.62	0.3001***
	Male	2.47	3.09	0.6229***
	Female	1.04	1.36	0.3215*
	Difference-gender	-1.43***	-1.73***	

CEO (%)	All	11.52	10.80	-0.72**
	Male	11.82	11.73	-0.09
	Female	7.71	6.92	-0.78**
	Difference-gender	-4.11***	-4.81***	
Chairman (%)	All	21.28	19.83	-1.45**
	Male	21.41	21.17	-0.23
	Female	19.86	14.55	-5.31***
	Difference-gender	-1.55*	-6.62***	
Vice Chairman/Vice CEO (%)	All	11.52	10.35	-1.17**
	Male	11.65	11.22	-0.43*
	Female	9.91	6.87	-3.04***
	Difference-gender	-1.74***	-4.35***	
Panel C: Italy				
Directors having experience on board (%)	All	99.22	94.83	4.40*
	Male	99.21	96.47	2.74*
	Female	98.15	87.04	11.11
	Difference-gender	-1.06	-9.43***	
Number BOD to Date	All	9.39	8.53	-0.8656**
	Male	9.58	9.45	-0.1331
	Female	5.73	4.77	-0.9671***
	Difference-gender	-3.85***	-4.68***	
Number current BOD (Occupation)	All	4.22	3.86	-0.3552**
	Male	4.25	4.07	-0.1880*
	Female	3.51	3.02	-0.4806***
	Difference-gender	-0.74***	-1.05***	
Year on Quoted BOD	All	2.24	2.44	0.1998**
	Male	2.29	2.76	0.4710***
	Female	1.24	1.19	-0.0473
	Difference-gender	-1.05***	-1.57***	
CEO (%)	All	13.10	12.33	-0.78*
	Male	13.37	13.39	0.02
	Female	5.45	5.70	0.25
	Difference-gender	-7.92***	-7.69***	
Chairman (%)	All	19.33	18.14	-1.19***
	Male	19.38	19.01	-0.37
	Female	18.16	13.11	-5.04***
	Difference-gender	-1.22	-5.9***	
Vice Chairman/Vice CEO (%)	All	12.87	11.41	-1.46***
	Male	12.84	11.90	-0.94***
	Female	13.58	8.38	-5.20***
	Difference-gender	0.74	-3.52***	

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

Table A.III: Statistics by country on the education and experience of new, retained and exiting directors

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)
Panel A: Belgium									
Pre quota period: 2006-2010									
Bachelor (%)	12.50	13.35	0.00	20.72	30.30	26.64	-8.22	-17.80	-14.14
Postgraduate (%)	83.33	59.96	91.67	67.19	55.60	59.42	16.15	27.73	23.91
Post quota period: 2011-2017									
Bachelor (%)	16.44	18.69	20.36	23.11	24.66	29.32	-6.67	-8.22	-12.87*
Postgraduate (%)	71.38	65.75	70.42	60.08	59.90	57.16	11.30*	11.49***	14.22**
Panel B: France									
Pre quota period: 2006-2010									
Bachelor (%)	21.97	22.75	13.72	37.95	38.51	37.16	-15.98*	-16.54*	-15.19*
Postgraduate (%)	51.49	31.85	38.77	42.34	35.19	38.01	9.15	16.30	13.48
Post quota period: 2011-2017									
Bachelor (%)	31.99	28.77	32.75	45.46	37.29	37.71	-5.31**	-5.72***	-8.07***
Postgraduate (%)	50.92	45.85	45.46	40.05	40.39	37.19	10.53***	13.73***	14.08***
Panel C: Italy									
Pre quota period: 2006-2010									
Bachelor (%)	33.33	53.68	41.67	46.91	51.65	48.43	-13.58	-18.31	-15.09
Postgraduate (%)	29.17	17.83	45.83	38.63	31.52	29.55	-9.46	-2.35	-0.39
Post quota period: 2011-2017									
Bachelor (%)	35.87	45.46	54.29	46.97	50.93	50.19	-11.10*	-15.06**	-14.33**
Postgraduate (%)	52.22	36.24	33.88	40.39	33.93	37.48	11.83***	18.29***	14.74***

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)
Panel A: Belgium									
Pre quota period: 2006-2010									
Having BOD experience (%)	95.83	94.29	100.00	94.76	97.67	100.00	1.07	-1.84	-4.17
CEO (%)	17.86	14.08	41.67	46.37	43.56	36.90	-28.52**	-25.70**	-19.04*
Chairman (%)	30.36	16.46	8.33	38.54	43.00	46.67	-8.18	-12.64	-16.31
Post quota period: 2011-2017									
Having BOD experience (%)	62.37	81.78	100.00	75.86	90.22	100.00	-13.49	-27.85**	-37.63***
CEO (%)	14.12	18.21	12.26	29.09	41.88	49.43	-14.98**	-27.76***	-35.32***
Chairman (%)	18.10	17.14	17.98	26.99	38.82	48.49	-8.89*	-20.72***	-30.39***
Panel B: France									
Pre quota period: 2006-2010									
Having BOD experience (%)	88.03	93.69	100.00	96.54	98.50	100.00	-8.51*	-10.46**	-11.97**
CEO (%)	16.54	15.04	12.48	29.61	31.15	31.12	-13.07**	-14.61**	-14.58**
Chairman (%)	32.41	40.38	35.60	45.60	57.85	55.28	-13.19*	-25.44***	-22.87***
Post quota period: 2011-2017									
Having BOD experience (%)	61.15	77.98	100.00	76.30	92.48	100.00	-15.15	-31.33***	-38.85***
CEO (%)	9.45	10.96	11.77	18.90	29.37	29.91	-9.45***	-19.92***	-20.46***
Chairman (%)	15.49	25.20	20.52	31.94	53.45	51.72	-16.46***	-37.97***	-36.23***
Panel C: Italy									
Pre quota period: 2006-2010									
Having BOD experience (%)	83.33	100.00	100.00	98.80	97.97	100.00	-15.47	-14.64	-16.67
CEO (%)	8.33	8.92	8.33	29.01	35.49	31.95	-20.68*	-27.16**	-23.62**
Chairman (%)	12.50	39.97	20.83	44.61	52.04	47.43	-32.11*	-39.54**	-34.93**
Post quota period: 2011-2017									
Having BOD experience (%)	73.25	84.62	100.00	84.21	92.90	100.00	-10.96	-19.66**	-26.75***
CEO (%)	9.50	8.13	24.85	25.43	32.70	33.12	-15.93***	-23.20***	-23.62***
Chairman (%)	16.45	21.57	17.31	33.15	47.06	47.54	-16.70***	-30.61***	-31.09***

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

Table A.IV: Robustness test: alternative dependent variables (Equation (1); Difference-in-differences estimates)

	ROE			Sharpe ratio		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post	-0.0196	-0.0117	-0.0117	-0.254	0.451*	0.451
	(-0.94)	(-0.45)	(-0.29)	(-1.48)	(1.92)	(1.17)
Post	0.0166	0.00486	0.00486	0.584***	0.0901	0.0901
	(1.60)	(0.21)	(0.28)	(4.87)	(0.43)	(0.27)
Treated	-0.00160			-0.104		
	(-0.11)			(-0.86)		
Board size		-0.0916	-0.0916		-0.212	-0.212
		(-1.12)	(-1.39)		(-0.65)	(-1.13)
Firm size		-0.104	-0.104		0.316*	0.316*
		(-0.95)	(-1.56)		(1.96)	(2.17)
Sales growth		0.0134***	0.0134**		0.00536	0.00536
		(3.41)	(3.06)		(0.16)	(0.14)
Leverage		0.109	0.109			
		(0.50)	(0.44)			
GDP		0.0113***	0.0113***		-0.245***	-0.245***
		(3.45)	(4.18)		(-8.04)	(-4.61)
Constant	0.0646***	1.052	1.052	0.107	-2.053	-2.053*
	(8.81)	(1.11)	(1.71)	(1.26)	(-1.59)	(-1.93)
Observations	6336	5811	5811	3249	2166	2166
R-squared	0.000601	0.0264	0.0264	0.0117	0.109	0.109
Firm FE	No	Yes	Yes	No	Yes	Yes
Cluster level		Firm	Industry sector		Firm	Industry sector

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

Table A.V: Robustness test: alternative dependent variables (Equation (2); triple-differences estimates)

Dummy board characteristics	dLowAge		dHigheForeign		dHighEducation		dLowExperience	
Dependent variable	ROE	Sharpe ratio	ROE	Sharpe ratio	ROE	Sharpe ratio	ROE	Sharpe ratio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated*Post*dBC	0.0180	-0.0260	-0.00885	0.103	0.0234	-0.0237	0.0315	-0.0236
	(0.45)	(-0.21)	(-0.25)	(1.03)	(0.58)	(-0.22)	(0.92)	(-0.20)
Treated*Post	-0.0208	0.447*	-0.00662	0.401*	-0.0247	0.469*	-0.0322	0.463*
	(-0.76)	(1.85)	(-0.21)	(1.66)	(-0.96)	(1.95)	(-0.95)	(1.88)
Post	0.00479	0.0831	0.00494	0.0832	0.00485	0.0830	0.00498	0.0831
	(0.21)	(0.39)	(0.22)	(0.39)	(0.21)	(0.39)	(0.22)	(0.39)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5811	2166	5811	2166	5811	2166	5811	2166
R-squared	0.0286	0.119	0.0269	0.119	0.0267	0.119	0.0276	0.120
Firm 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 II; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. "dBC = Dummy Board Characteristics"

Table A.VI: Robustness test: alternative treatment period including the year before the quota (Equation (1); Difference-in-differences estimates)

	Tobin Q	ROA	Operating Profit	Risk	Revenues	Labor Cost	Other Cost	Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated*Post	-0.0141	0.000197	-0.00643	-0.00515	0.00794	0.00304	-0.00704	0.0312
	(-0.34)	(0.03)	(-1.18)	(-0.42)	(0.46)	(0.65)	(-1.37)	(0.99)
Post	0.00106	-0.00945	-0.00867	-0.131***	-0.0489***	0.000511	-0.00606	-0.0492
	(0.03)	(-1.61)	(-1.63)	(-10.37)	(-2.62)	(0.11)	(-1.23)	(-1.59)
Board size	-0.121	-0.0193	-0.0206	0.00265	0.0110	0.0184*	-0.00888	0.0832
	(-1.18)	(-1.22)	(-1.45)	(0.07)	(0.25)	(1.72)	(-0.58)	(0.96)
Firm size	-0.281	0.0169	0.00758	-0.0944***	-0.163***	-0.0701***	0.00745	0.893***
	(-1.62)	(0.93)	(0.53)	(-3.31)	(-3.67)	(-4.12)	(0.60)	(4.30)
Sales growth	0.0013**	0.000756*	0.0111**	0.00333	0.0148*	-0.0000245	0.0105***	0.000335
	(2.51)	(1.95)	(2.48)	(0.36)	(1.72)	(-0.07)	(3.58)	(0.24)
Leverage	0.794**	-0.297***	-0.187***		0.0746	0.0579*	-0.176***	0.670
	(2.23)	(-5.06)	(-3.82)		(0.75)	(1.88)	(-4.19)	(1.04)
GDP	0.00354	0.00523***	0.00623***	0.00473**	0.0184***	0.000213	0.00555***	0.0092**
	(1.09)	(6.24)	(6.47)	(2.27)	(7.00)	(0.37)	(6.45)	(2.23)
Constant	3.199**	0.117	0.162	1.201***	2.097***	0.684***	0.131	1.077
	(2.52)	(0.87)	(1.44)	(6.08)	(6.23)	(5.56)	(1.35)	(0.59)
Observations	2531	4987	5002	5115	5026	5084	4999	4956
R-squared	0.0621	0.151	0.157	0.389	0.117	0.121	0.147	0.275
Firm 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 II; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

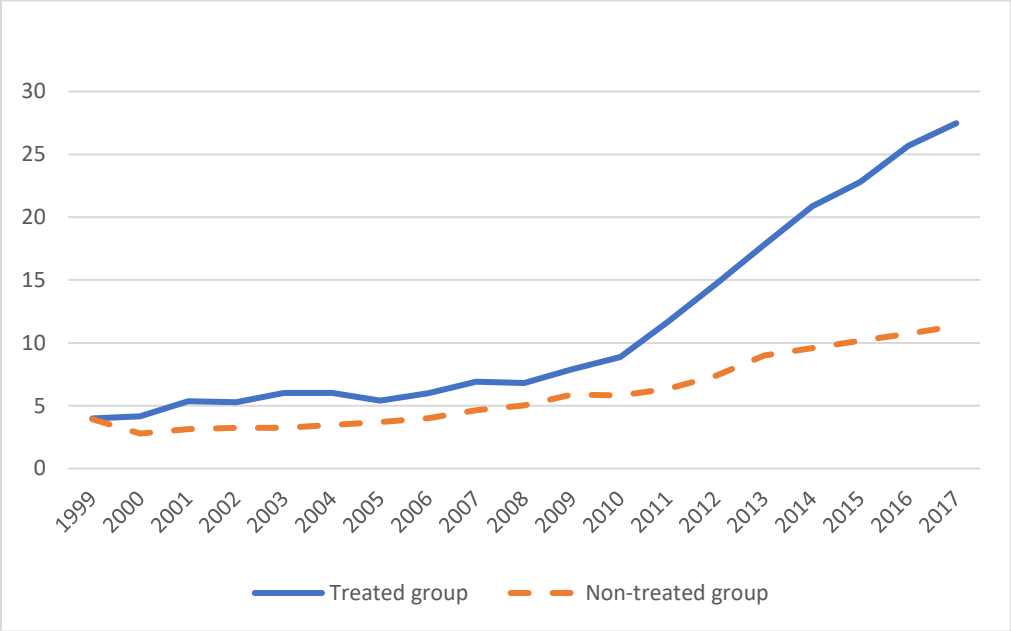
Table A.VII: Robustness test: alternative treatment period including the year before the quota (Equation (2); triple-differences estimates)

Dependent variable	Tobin Q	ROA	Operating Profit	Risk	Revenues	Labor Cost	Other Cost	Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Relatively high proportion of younger directors								
Treated*Post*dLowAge	0.0473	0.00481	0.00688	-0.000881	-0.000486	0.00439	0.00583	-0.0142
	(0.91)	(0.65)	(0.98)	(-0.07)	(-0.02)	(0.85)	(0.82)	(-0.48)
Treated*Post	-0.0722	-0.00215	-0.00972	-0.00459	0.00823	0.000869	-0.00982	0.0376
	(-1.47)	(-0.32)	(-1.51)	(-0.35)	(0.39)	(0.18)	(-1.55)	(1.09)
Post	0.141***	-0.00945	-0.00868	-0.131***	-0.0489***	0.000505	-0.00607	-0.0492
	(3.28)	(-1.61)	(-1.63)	(-10.37)	(-2.62)	(0.11)	(-1.23)	(-1.59)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2531	4987	5002	5115	5026	5084	4999	4956
R-squared	0.0868	0.151	0.158	0.390	0.117	0.122	0.147	0.276
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Panel B: Relatively high proportion of foreign directors								
Treated*Post*dHighForeign	0.0106	-0.00188	-0.0128*	0.00689	-0.00138	-0.00223	-0.0136*	0.00508
	(0.19)	(-1.17)	(-1.72)	(0.51)	(-0.06)	(-0.45)	(-1.76)	(0.15)
Treated*Post	-0.0537	0.0106	0.000850	-0.00925	0.00839	0.00421	0.000691	0.0287
	(-0.97)	(1.32)	(0.12)	(-0.64)	(0.35)	(0.75)	(0.10)	(0.71)
Post	0.141***	-0.00950	-0.00868	-0.131***	-0.0489***	0.000495	-0.00608	-0.0492
	(3.29)	(-1.62)	(-1.64)	(-10.36)	(-2.63)	(0.11)	(-1.24)	(-1.58)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2531	4987	5002	5115	5026	5084	4999	4956
R-squared	0.0854	0.153	0.160	0.390	0.117	0.121	0.150	0.276
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel C: Relatively high proportion of directors with postgraduate degrees								
Treated*Post*dHighEducation	-0.00538	0.0129	0.00660	-0.0156	0.0390*	0.00443	0.00679	0.0328
	(-0.11)	(1.62)	(0.92)	(-1.24)	(1.67)	(0.84)	(0.94)	(1.00)
Treated*Post	-0.0458	-0.00648	-0.00988	0.00303	-0.0122	0.000736	-0.0106*	0.0143
	(-1.00)	(-1.04)	(-1.53)	(0.22)	(-0.56)	(0.14)	(-1.72)	(0.36)
Post	0.141***	-0.00949	-0.00870	-0.131***	-0.0490***	0.000496	-0.00609	-0.0493
	(3.28)	(-1.62)	(-1.64)	(-10.36)	(-2.63)	(0.11)	(-1.24)	(-1.59)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2531	4987	5002	5115	5026	5084	4999	4956
R-squared	0.0852	0.152	0.158	0.390	0.118	0.122	0.147	0.276
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster level	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Panel D: Relatively low proportion of directors with CEO/Chairmain experience								
Treated*Post*dLowExperience	0.0105	-0.00275	0.00486	0.0141	0.0206	0.00287	0.00624	-0.00161
	(1.00)	(-0.31)	(0.66)	(0.95)	(1.06)	(0.58)	(0.86)	(-0.04)
Treated*Post	-0.0112	0.00181	-0.00948	-0.0142	-0.00568	0.00121	-0.0109	0.0306
	(-1.18)	(0.21)	(-1.36)	(-0.88)	(-0.26)	(0.22)	(-1.64)	(0.71)
Post	0.142***	-0.00946	-0.00866	-0.131***	-0.0489***	0.000512	-0.00604	-0.0494
	(3.29)	(-1.61)	(-1.63)	(-10.37)	(-2.63)	(0.11)	(-1.23)	(-1.59)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2531	4987	5002	5115	5026	5084	4999	4956
R-squared	0.0878	0.151	0.158	0.390	0.118	0.121	0.147	0.276
Firm 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 II; t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure I. Percentage of female directors in treated and non-treated groups



Appendix B: The matching procedure

The validity of the difference-in-differences analysis requires that control firms have similar characteristics than treated firms during the pre-treatment period. This implies that our dependent variables must follow a parallel trend over time for the two group of treated and non-treated firms. If it is not the case, our estimates might be biased by structural differences between these two groups of firms.

We therefore test for each dependent variable (*ROA*, *Tobin* Q, *Operating Profits*, *Risk, Labor Cost*, *Employment*, *Other costs* and *Revenues*) if there is a significant parallel trend between treated and control firms over the pre-treatment period, using mean tests and graphics (see Tables B.I to B.VIII and below). Our analysis shows that only one variable satisfies the parallel trend assumption, *Tobin Q*. For this variable, we can therefore directly run the difference-in-differences specifications. For the other variables, we need to carry out a propensity score matching procedure to identify a subsample of matched firms extracted from the group of 442 non-treated firms. We implement a nearest neighbor matching procedure as proposed by Rosenbaum and Rubin (1983) and applied by Roberts and White (2012), Schepens (2016) or Bennouri et al. (2018). We first estimate the following Probit model for the year of the quota:

$$Treated_{i,2011} = \alpha + \beta_1 * MV_{i,2008} + \beta_2 * MV_{i,2009} + \beta_3 * MV_{i,2010} + \beta_4 * Growth\_MV_{i,2009} + \beta_5 * Growth\_MV_{i,2010} + \beta_6 * GrowthMV_{i,2011} + \beta_7 * X_{i,2011} + \varepsilon_{i,2011} \quad \text{(i)}$$

where subscript *i* denotes firm and $\varepsilon_{i,2011}$ is the idiosyncratic error term; *Treated* is a dummy variable taking the value of one for treated firms, and zero otherwise; *MV* denotes the alternative outcomes variables (*ROA*, *Operating Profits*, *Risk*, *Labor Cost*, *Employment*, *Other costs* and *Revenue)* for which we consider the lagged value for 2008 ($MV_{i,2008}$), 2009 ($MV_{i,2009}$) and 2010 ($MV_{i,2010}$). *GrowthMV* is the annual growth rate of the alternative outcomes variables computed for the pre-treatment period. We include a set of control variables (*X*) to account for industries and countries characteristics: the firm size, the industry sector, and the GDP growth rate.

Probit regressions are used to determine a propensity score for each treated and non-treated firm. We use this score to perform a nearest neighbor matching by pairing each treated firm with the three closest firms in the control group. We use matching with replacement that allows a non-treated firm to be matched with several treated firms.

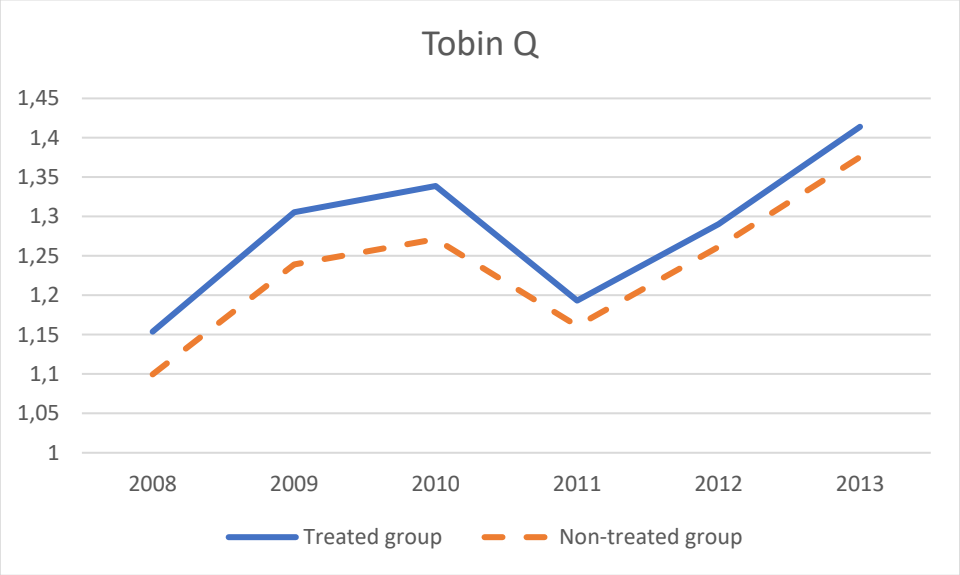
B.I. Parallel trend assumption for Tobin Q

Table B.I: Mean tests for Tobin Q for the pre-treatment period (before 2011)

	Treated group (1)			Control group (0)			Mean test	
	N	mean	std	N	mean	std	Diff in mean	p-value
Tobin Q	828	1.266	0.688	1269	1.203	0.717	-0.062	0.408
Tobin Q 2010	276	1.338	0.731	423	1.271	0.782	-0.067	0.254
Tobin Q 2009	276	1.305	0.725	423	1.239	0.784	-0.659	0.263
Tobin Q 2008	276	1.154	0.588	423	1.099	0.551	-0.054	0.216

Note: This table reports the mean tests for the variable Tobin Q during the pre-treatment period (2008-2010). It reports the number of observations (N), the mean and the standard deviation (std) of the treated and non-treated group. The last column shows that P-values are greater than 0.1, indicating that the means of Tobin Q of the two groups are not significantly different during the pre-treatment period.

Figure B.I: Evolution of Tobin Q for treated and non-treated group



Note: This figure depicts the evolution of the average of Tobin Q for treated and non-treated group from 2008 to 2013. The figure shows that both groups have a similar trend in their Tobin Q during the pre-treatment period.

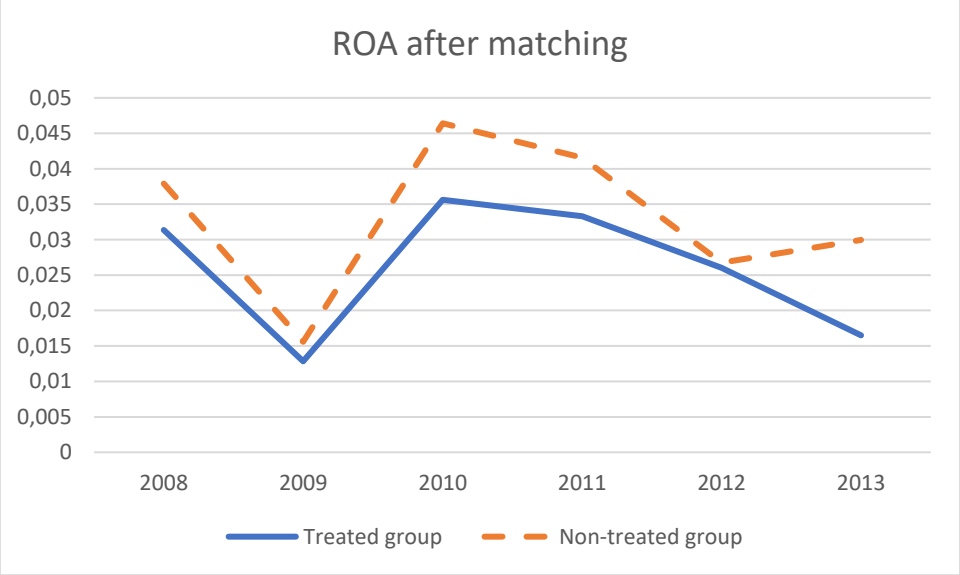
B.II. Parallel trend assumption for ROA

Table B.II: Propensity score matching diagnostics on ROA

		Treated group (1)		Control group (0)		Bias		Mean test	
		N	mean	N	mean	%	% reduction	t-stat	p-value
ROA	Unmatched	828	0.026	1269	0.004	43.5		5.31	0.000
	Matched	828	0.026	2484	0.033	-8.0	81.6	1.775	0.076
ROA 2010	Unmatched	276	0.035	423	0.008	31.3		3.97	0.000
	Matched	276	0.035	828	0.046	-12.1	61.4	-1.49	0.136
ROA 2009	Unmatched	276	0.013	423	-0.001	14.1		1.80	0.072
	Matched	276	0.013	828	0.155	-3.0	78.8	-0.73	0.713
ROA 2008	Unmatched	276	0.031	423	0.005	22.5		2.84	0.005
	Matched	276	0.031	828	0.038	-5.7	74.7	-0.75	0.453

Note: This table reports the mean test and matching diagnostics on the variable ROA during the pre-treatment period (2008-2010). The "unmatched" lines report the mean test results for ROA before matching procedure. The values of p-value in the last column in the "unmatched" lines illustrate that, without matching procedure, the means of ROA of the treated and the non-treated group are significantly different. The "matched" lines report the results of matching procedure. The column "Bias (%)" shows the percentage of difference of the sample means in the treated and non-treated group. The "Bias" is calculated as a percentage of the square root of the average of the sample variances in the treated and control groups (Rosenbaum and Rubin, 1985). The column "% reduction" reports the percentage change of the bias after matching. A positive value implies that the averages are lying closer to each other after matching (Schepens, 2016). The statistic results show a large reduction in the bias of ROA after the matching procedure (more than 70%). The p-values in "matched" lines show that there is no significant difference between the means of ROA of two groups after matching procedure.

Figure B.II: Evolution of ROA for treated and non-treated group after matching procedure



Note: This figure depicts the evolution of the average of ROA for treated and non-treated group from 2008 to 2013. The figure shows that both groups have a similar trend in their ROA during the pre-treatment period after the matching procedure.

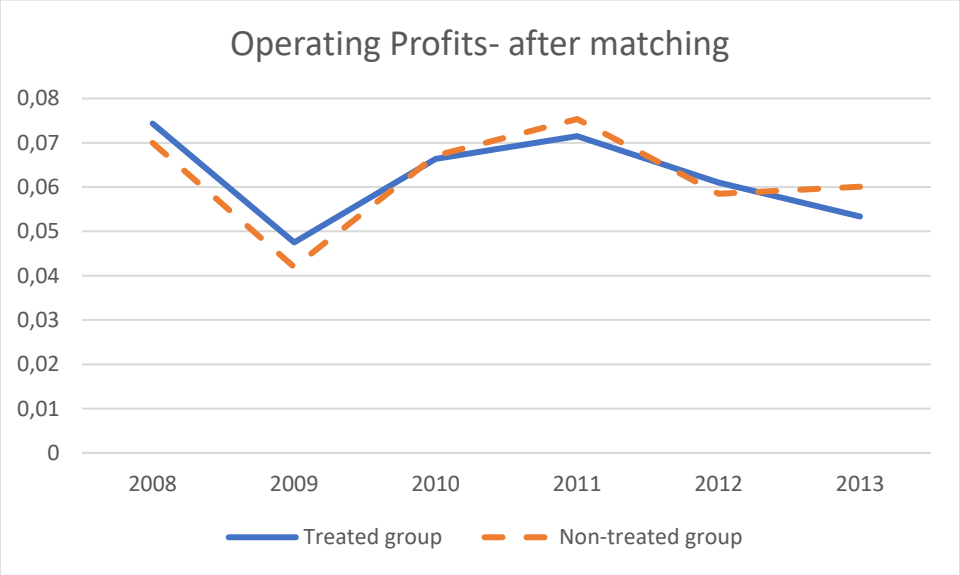
B.III. Parallel trend assumption for operating profits

Table B.III: Propensity score matching diagnostics on *Operating profits*

		Treated group (1)		Control group (0)		Bias		Mean test	
		N	mean	N	mean	%	% reduction	t-stat	p-value
OperProfit	Unmatched	792	0.062	1341	0.0316	51.8		-7.774	0.000
	Matched	792	0.062	2376	0.0596	-4.4	91.6	-0.63	0.530
OperProfit 2010	Unmatched	264	0.066	451	0.0314	41.9		-5.313	0.000
	Matched	264	0.066	792	0.0671	-0.9	97.8	-0.12	0.902
OperProfit 2009	Unmatched	264	0.047	446	0.0221	30.1		-3.760	0.000
	Matched	264	0.047	792	0.0419	6.6	78.2	0.80	0.423
OperProfit 2008	Unmatched	264	0.074	444	0.0413	34.4		-4.483	0.000
	Matched	264	0.074	792	0.0699	4.9	85.8	0.63	0.530

Note: This table reports the mean test and matching diagnostics on the variable *Operating profits* during the pre-treatment period (2008-2010). The "unmatched" lines report the mean test results for *Operating profits* before matching procedure. The values of p-value in the last column in the "unmatched" lines illustrate that, without matching procedure, the means of *Operating profits* of the treated and the non-treated group are significantly different. The "matched" lines report the results of matching procedure. The column "Bias (%)" shows the percentage of difference of the sample means in the treated and non-treated group. The "Bias" is calculated as a percentage of the square root of the average of the sample variances in the treated and control groups (Rosenbaum and Rubin, 1985). The column "% reduction" reports the percentage change of the bias after matching. A positive value implies that the averages are lying closer to each other after matching (Schepens, 2016). The statistic results show a large reduction in the bias of *Operating Profits* after the matching procedure (more than 70%). The p-values in "matched" lines show that there is no significant difference between the means of *Operating Profits* of two groups after matching procedure.

Figure B.III: Evolution of *Operating profits* for treated and non-treated group after matching procedure



Note: This figure depicts the evolution of the average of *Operating profits* for treated and non-treated group from 2008 to 2013. The figure shows that both groups have a similar trend in their *Operating profits* during the pre-treatment period after the matching procedure.

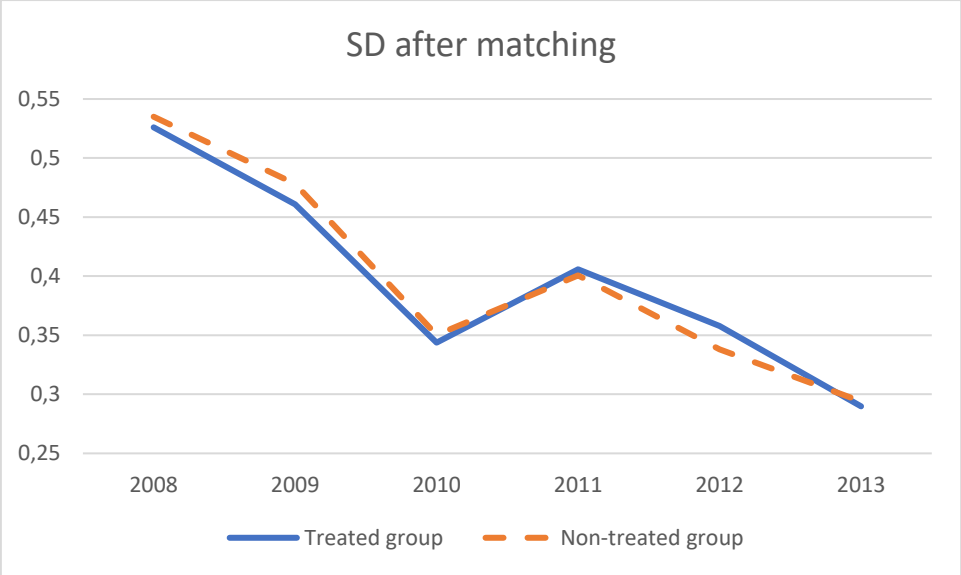
B.IV. Parallel trend assumption for firm risk (SD)

Table B.IV: Propensity score matching diagnostics on *SD*

		Treated group (1)		Control group (0)		Bias		Mean test	
		N	mean	N	mean	%	% reduction	t-stat	p-value
SD	Unmatched	828	0.044	1228	0.475	-33.8		-4.11	0.000
	Matched	828	0.044	2484	0.454	2.7	91.9	0.43	0.670
SD 2010	Unmatched	276	0.343	411	0.436	-56.0		-6.79	0.000
	Matched	276	0.343	828	0.350	-3.9	93.0	-0.62	0.536
SD 2009	Unmatched	276	0.461	411	0.487	-14.1		-1.76	0.080
	Matched	276	0.461	828	0.478	-9.0	36.6	-1.09	0.277
SD 2008	Unmatched	276	0.526	406	0.503	13.5		1.68	0.093
	Matched	276	0.526	828	0.534	-5.3	60.7	-0.60	0.548

Note: This table reports the mean test and matching diagnostics on the variable *SD* during the pre-treatment period (2008-2010). The "unmatched" lines report the mean test results for *SD* before matching procedure. The values of p-value in the last column in the "unmatched" lines illustrate that, without matching procedure, the means of *SD* of the treated and the non-treated group are significantly different. The "matched" lines report the results of matching procedure. The column "Bias (%)" shows the percentage of difference of the sample means in the treated and non-treated group. The "Bias" is calculated as a percentage of the square root of the average of the sample variances in the treated and control groups (Rosenbaum and Rubin, 1985). The column "% reduction" reports the percentage change of the bias after matching. A positive value implies that the averages are lying closer to each other after matching (Schepens, 2016). The statistic results show a large reduction in the bias of *SD* after the matching procedure (more than 70%). The p-values in "matched" lines show that there is no significant difference between the means of *SD* of two groups after matching procedure.

Figure B.IV: Evolution of *SD* for treated and non-treated group after matching procedure



Note: This figure depicts the evolution of the average of *SD* for treated and non-treated group from 2008 to 2013. The figure shows that both groups have a similar trend in their *SD* during the pre-treatment period after the matching procedure.

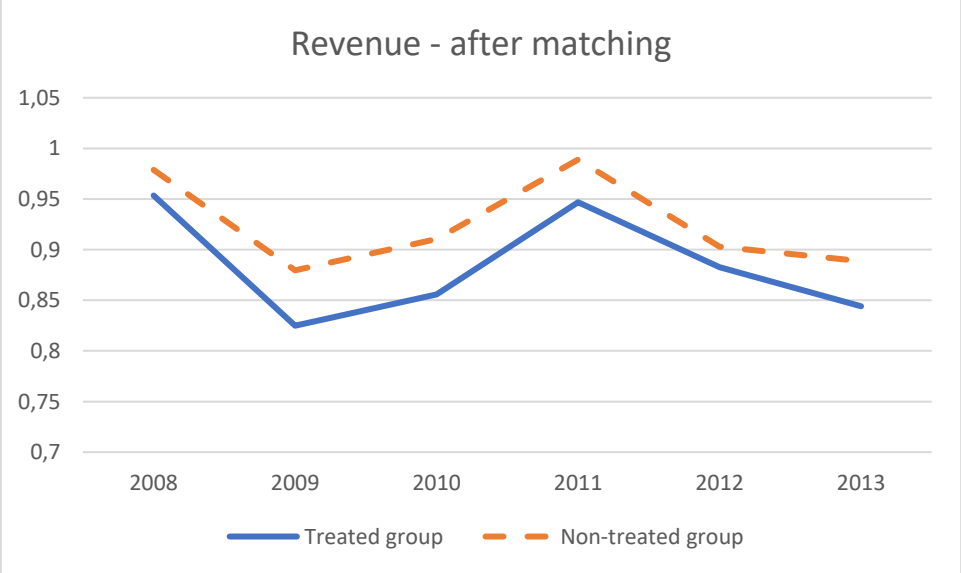
B.V. Parallel trend assumption for Revenue

Table B.V: Propensity score matching diagnostics on *Revenue*

		Treated group (1)		Control group (0)		Bias		Mean test	
		N	mean	N	mean	%	% reduction	t-stat	p-value
Revenue	Unmatched	792	0.878	1332	0.793	19.4		-3.16	0.001
	Matched	792	0.878	2376	0.922	-6.7	65.7	-0.76	0.450
Revenue 2010	Unmatched	264	0.855	448	0.735	18.7		-2.75	0.006
	Matched	264	0.855	792	0.910	-9.9	46.8	-1.09	0.277
Revenue 2009	Unmatched	264	0.824	443	0.752	12		-1.65	0.098
	Matched	264	0.824	792	0.879	-10.0	16.1	-1.16	0.247
Revenue 2008	Unmatched	264	0.953	441	0.892	6.8		-1.19	0.232
	Matched	264	0.953	792	0.978	-4.0	41.7	-0.47	0.636

Note: This table reports the mean test and matching diagnostics on the variable *Revenue* during the pre-treatment period (2008-2010). The "unmatched" lines report the mean test results for *Revenue* before matching procedure. The values of p-value in the last column in the "unmatched" lines illustrate that, without matching procedure, the means of *Revenue* of the treated and the non-treated group are significantly different. The "matched" lines report the results of matching procedure. The column "Bias (%)" shows the percentage of difference of the sample means in the treated and non-treated group. The "Bias" is calculated as a percentage of the square root of the average of the sample variances in the treated and control groups (Rosenbaum and Rubin, 1985). The column "% reduction" reports the percentage change of the bias after matching. A positive value implies that the averages are lying closer to each other after matching (Schepens, 2016). The statistic results show a large reduction in the bias of *Revenue* after the matching procedure (more than 70%). The p-values in "matched" lines show that there is no significant difference between the means of *Revenue* of two groups after matching procedure.

Figure B.V: Evolution of *Revenue* for treated and non-treated group after matching procedure



Note: This figure depicts the evolution of the average of *Revenue* for treated and non-treated group from 2008 to 2013. The figure shows that both groups have a similar trend in their *Revenue* during the pre-treatment period after the matching procedure.

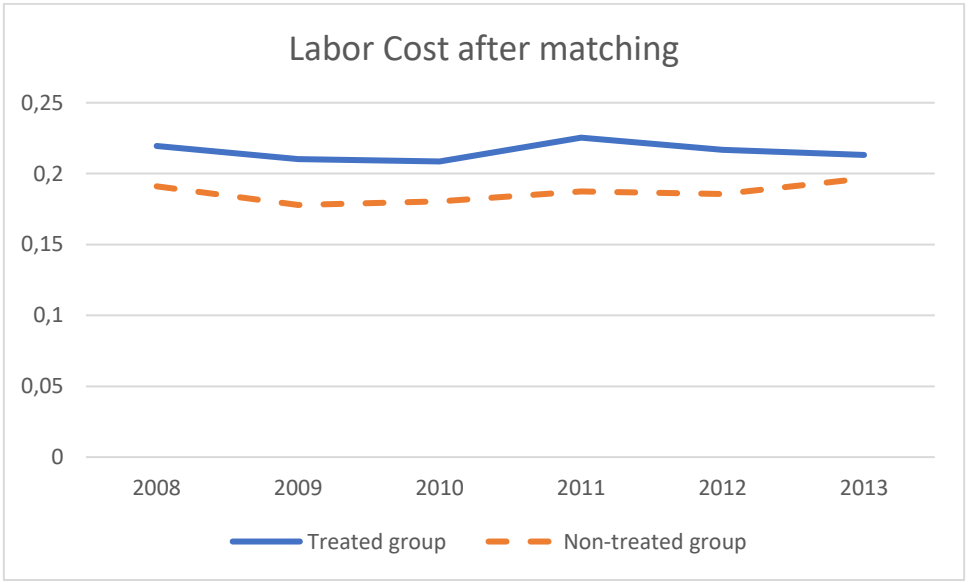
B.VI. Parallel trend assumption for Labor Cost

Table B.VI: Propensity score matching diagnostics on *Labor Cost*

		Treated group (1)		Control group (0)		Bias		Mean test	
		N	mean	N	mean	%	% reduction	t-stat	p-value
Labor	Unmatched	825	0.212	1024	0.176	12.6		-4.33	0.000
	Matched	825	0.212	2475	0.206	4.0	68.0	-0.86	0.385
Labor 2010	Unmatched	275	0.208	369	0.167	17.1		-2.97	0.003
	Matched	275	0.208	825	0.200	4.3	75.1	0.51	0.612
Labor 2009	Unmatched	275	0.210	334	0.172	18.3		-2.54	0.011
	Matched	275	0.210	825	0.203	3.8	79.4	0.46	0.647
Labor 2008	Unmatched	275	0.219	321	0.189	15.8		-1.94	0.05
	Matched	275	0.219	825	0.217	1.4	91.0	0.18	0.861

Note: This table reports the mean test and matching diagnostics on the variable *Labor Cost* during the pre-treatment period (2008-2010). The "unmatched" lines report the mean test results for *Labor Cost* before matching procedure. The values of p-value in the last column in the "unmatched" lines illustrate that, without matching procedure, the means of *Labor Cost* of the treated and the non-treated group are significantly different. The "matched" lines report the results of matching procedure. The column "Bias (%)" shows the percentage of difference of the sample means in the treated and non-treated group. The "Bias" is calculated as a percentage of the square root of the average of the sample variances in the treated and control groups (Rosenbaum and Rubin, 1985). The column "% reduction" reports the percentage change of the bias after matching. A positive value implies that the averages are lying closer to each other after matching (Schepens, 2016). The statistic results show a large reduction in the bias of *Labor Cost* after the matching procedure (more than 70%). The p-values in "matched" lines show that there is no significant difference between the means of *Labor Cost* of two groups after matching procedure.

Figure B.VI: Evolution of *Labor Cost* for treated and non-treated group after matching procedure



Note: This figure depicts the evolution of the average of *Labor Cost* for treated and non-treated group from 2008 to 2013. The figure shows that both groups have a similar trend in their *Labor Cost* during the pre-treatment period after the matching procedure.

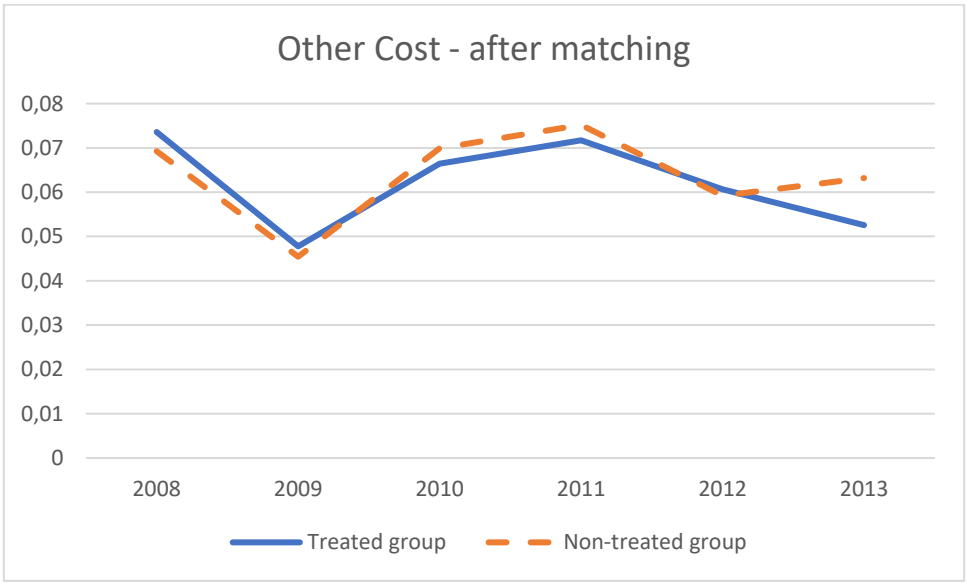
B.VII. Parallel trend assumption for Other Cost

Table B.VII: Propensity score matching diagnostics on *Other Cost*

		Treated group (1)		Control group (0)		Bias		Mean test	
		N	mean	N	mean	%	% reduction	t-stat	p-value
OtherCost	Unmatched	792	0.062	1344	0.029	49.6		-7.519	0.000
	Matched	792	0.062	2376	0.075	-3.5	92.9	-0.53	0.600
OtherCost 2010	Unmatched	264	0.066	452	0.030	40.2		-5.110	0.000
	Matched	264	0.066	792	0.069	-3.9	90.3	-0.53	0.593
OtherCost 2009	Unmatched	264	0.047	447	0.021	30.0		-3.765	0.000
	Matched	264	0.047	792	0.045	2.7	91.1	0.33	0.744
OtherCost 2008	Unmatched	264	0.073	445	0.037	32.5		-4.239	0.000
	Matched	264	0.073	792	0.069	4.2	87.0	0.57	0.569

Note: This table reports the mean test and matching diagnostics on the variable *Other Cost* during the pre-treatment period (2008-2010). The "unmatched" lines report the mean test results for *Other Cost* before matching procedure. The values of p-value in the last column in the "unmatched" lines illustrate that, without matching procedure, the means of *Other Cost* of the treated and the non-treated group are significantly different. The "matched" lines report the results of matching procedure. The column "Bias (%)" shows the percentage of difference of the sample means in the treated and non-treated group. The "Bias" is calculated as a percentage of the square root of the average of the sample variances in the treated and control groups (Rosenbaum and Rubin, 1985). The column "% reduction" reports the percentage change of the bias after matching. A positive value implies that the averages are lying closer to each other after matching (Schepens, 2016). The statistic results show a large reduction in the bias of *Other Cost* after the matching procedure (more than 70%). The p-values in "matched" lines show that there is no significant difference between the means of *Other Cost* of two groups after matching procedure.

Figure B.VII: Evolution of *Other Cost* for treated and non-treated group after matching procedure



Note: This figure depicts the evolution of the average of *Operating Cost* for treated and non-treated group from 2008 to 2013. The figure shows that both groups have a similar trend in their *Operating Cost* during the pre-treatment period after the matching procedure.

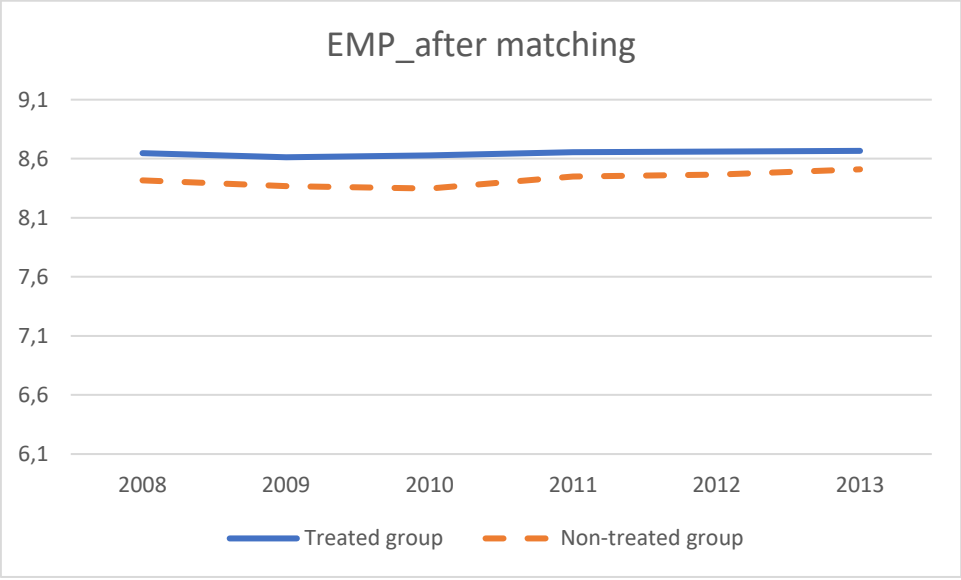
B.VIII. Parallel trend assumption for Employment

Table B.VIII: Propensity score matching diagnostics on *Employment*

		Treated group (1)		Control group (0)		Bias		Mean test	
		N	mean	N	mean	%	% reduction	t-stat	p-value
Employment	Unmatched	792	8.628	1313	6.634	98.9		-21.73	0.000
	Matched	792	8.628	2376	8.450	9.8	90.1	1.15	0.252
Employment 2010	Unmatched	264	8.627	442	6.594	98.8		-12.54	0.000
	Matched	264	8.627	792	8.347	13.6	86.3	1.54	0.124
Employment 2009	Unmatched	264	8.612	437	6.630	98.3		-12.43	0.000
	Matched	264	8.612	792	8.368	12.1	87.7	1.39	0.164
Employment 2008	Unmatched	264	8.646	434	6.677	99.4		-12.64	0.000
	Matched	264	8.646	792	8.416	11.6	88.3	1.35	0.178

Note: This table reports the mean test and matching diagnostics on the variable *Employment* during the pre-treatment period (2008-2010). The "unmatched" lines report the mean test results for *Employment* before matching procedure. The values of p-value in the last column in the "unmatched" lines illustrate that, without matching procedure, the means of *Employment* of the treated and the non-treated group are significantly different. The "matched" lines report the results of matching procedure. The column "Bias (%)" shows the percentage of difference of the sample means in the treated and non-treated group. The "Bias" is calculated as a percentage of the square root of the average of the sample variances in the treated and control groups (Rosenbaum and Rubin, 1985). The column "% reduction" reports the percentage change of the bias after matching. A positive value implies that the averages are lying closer to each other after matching (Schepens, 2016). The statistic results show a large reduction in the bias of *Employment* after the matching procedure (more than 80%). The p-values in "matched" lines show that there is no significant difference between the means of *Employment* of two groups after matching procedure.

Figure B.VIII: Evolution of *Employment* for treated and non-treated group after matching procedure



Note: This figure depicts the evolution of the average of *Employment* for treated and non-treated group from 2008 to 2013. The figure shows that both groups have a similar trend in their *Employment* during the pre-treatment period after the matching procedure.