

Are women directors inherently ESG friendly?

Evidence from board gender quotas*

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JEL Classification: G34, G38, J16, K38, M14

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1. Introduction

Investors are increasingly attentive to environmental, social, and governance (ESG) concerns when making investment selections.¹ As of the end of 2019, 2,698 investors were signatories of the United Nations' Principles for Responsible Investment (UNPRI) network, representing \$90 trillion in assets under management (compared to \$21 trillion in assets under management and 203 signatories in 2010).² Larry Fink, CEO of BlackRock, emphasized in his 2018 annual letter that “to prosper over time, every company must not only deliver financial performance but also show how it makes a positive contribution to society.” Furthermore, on the bondholder side, credit rating agencies have recently acquired several ESG agencies in order to include ESG risk in their assessment of credit risk.³ As ESG criteria become increasingly important for investors, they also become critical to the financing and investment decisions of corporations. Firms' ESG exposure shapes their ability to raise equity, their cost of capital, their reputational and operational risks, and finally, their value (Margolis, Elfenbein, and Walsh, 2009). There are several mechanisms available to investors to reduce companies' exposure to ESG risks. Investors can directly engage with the management of firms in which they invest to encourage them to reduce

¹ The literature often refers to Corporate Social Responsibility (CSR), which includes environmental and social issues (E&S), but not Corporate Governance. ESG is broader than CSR, as it combines CSR and corporate governance issues. In this paper, we use the term E&S to refer to CSR. Investments made in accordance with ESG principles are generally called Socially Responsible Investments (SRI).

² PRI signatories commit to incorporating ESG issues into investment analysis, decision-making processes, and ownership policies. They “believe that an economically efficient, sustainable global financial system is a necessity for long-term value creation. Such a system will reward long-term, responsible investment and benefit the environment and society as a whole.” (<https://www.unpri.org/pri>).

³ For example, S&P acquired Trucost, a provider of carbon and environmental data and risk analysis (2016), and the ESG ratings arm of RobecoSAM (2019). Moody's acquired Four Twenty Seven, a provider of data related to physical climate risks (2019), and Vigeo-Eiris, a provider of ESG data (2019).

risks stemming from ESG characteristics (Hoepner et al., 2017). They can propose shareholder resolutions on ESG issues at general meetings (He, Kahraman, and Lowry, 2019) or require the integration of ESG criteria into executive compensation (Flammer, Hong and Minor, 2019). Investors can also appoint directors who are ESG-oriented so that boards are more aligned with investors' desire to reduce ESG risks.⁴

In this paper, we examine how the presence of women on boards impacts firms' ESG performance. Analyzing the characteristics of the boards of high ESG performance firms, we find that the percentage of women on a board is one of the main drivers of ESG performance. To overcome the endogeneity issue that could result from ESG-friendly firms electing women directors and women self-selecting into more ESG-oriented firms, we use the implementation of a board gender quota in France as a natural experiment. The law was adopted in January 2011 and required that boards be composed of 40% women by 2017. We use two control groups for France: the US and Germany. Over the period we examine, the US is the largest developed country without a quota for female directors on boards. Furthermore, French and US boards have similar characteristics. However, because European regulations related to ESG may specifically affect the ESG performance of European firms, we also use Germany as a control group. Germany implemented a board gender quota five years after France, in 2016, and the quota applies only to the 100 largest listed companies. To measure ESG performance, we use data provided by Vigeo-Eiris, a global leader in ESG data that Moody's acquired in 2019.

⁴ In the PwC 2018 Annual Corporate Directors Survey, about one-third of directors reported that shareholders pay too much attention to ESG issues such as board diversity, corporate social responsibility and environmental or sustainability issues.

We find that after the introduction of the board gender quota in France, the ESG performance of French firms significantly increases, whether compared to the US or Germany. We observe an increase in the global ESG score and each of its components: environmental, social, and governance scores. Our results are both statistically and economically significant, as well as robust to the inclusion of year, industry, and firm fixed effects.

We then explore the channels through which women on boards have a positive effect on ESG performance. First, we find that the probability that a firm has an E&S (CSR) committee increases after the quota law. This law, by prompting firms to add women to boards, also made the establishment of an E&S committee more likely. Furthermore, the probability that women sit on and chair E&S committees also increases post quota. However, the presence of an E&S committee in itself does not increase ESG performance. These findings suggest that after the implementation of the board quota law and the increase in the percentage of women on boards, boards are structured to become more ESG-oriented. Women can, therefore, be considered ESG-friendly directors.

Our next question relates to the observable characteristics that lead women to be more ESG friendly. We find that compared to men, women have more experience in human resources (HR) jobs and that they more often work at universities, charities, and medical organizations (general interest occupations). They are also more frequently hired from sources outside of the traditional network (more often foreign, fewer family shareholder members, less tenured). We then examine whether these characteristics enhance firms' ESG performance. We find that the percentage of directors with HR experience increases the overall ESG ratings, as well as each of its components (E.S.G). However, when we consider boards with more than 85% men, HR experience has a positive effect that is limited to the social criteria and does not affect environmental and governance

scores. In contrast, hiring directors from outside of the traditional network has a positive impact on the global ESG score and its components, even when most directors are men. General interest occupations have a positive effect on the environmental score, but this result does not hold when most directors are men. Further, when including firm fixed effects, the impact of the characteristics of directors on ESG rating vanishes, meaning that the impact we observe without firm fixed effects stems from the matching between director characteristics and firm-specific expertise needs. Our results that women on board increase ESG performance can, therefore, plausibly be attributed to intrinsic differences between women and men and not to other characteristics that happen to be correlated with gender diversity. Our findings suggest that female directors have unique qualities, experiences, and social preferences that enable them to steer firms toward more ESG-oriented policies.

Several tests confirm the robustness of our results and associated conclusions. First, to control for time-invariant unobserved firm characteristics, we include firm fixed effects in our regressions, thus ensuring that omitted factors do not drive results. Second, our results may depend on the quality of the control groups we use in our natural experiment. One issue could be that ESG rated firms in France differ from rated firms in our control groups (US and Germany). To address potential sample selection bias, we report evidence from a propensity score matching model. We match French firms and firms from our control groups in 2009 (before the implementation of the quota). Our results remain similar and confirm the positive impact of women directors on ESG performance. We are, therefore, confident that our results are not merely due to a selection effect of the ESG rating agency.

Our paper contributes to several lines of research. First, this research is related to the literature on the drivers of ESG performance. Benabou and Tirole (2010) discuss three views of E&S. In the first view, E&S is motivated by management or board members being willing to engage in philanthropy even if doing so has a negative impact on profits. E&S expenses represent, in this case, an agency cost. If Cheng, Hong, and Shue (2019) and Di Gilui and Kostovetsky (2014) confirm the existence of private benefits from E&S expenses, most empirical results fail to find evidence that E&S policies reflect agency problems (Ferrell, Liang, and Renneboog, 2016).⁵ According to the second view of E&S, some stakeholders want corporations to engage in socially responsible behavior, and visible firms cater to their demand, which is consistent with profit maximization. The channels through which ESG affects firm value are then related to the awareness of customers (Luo and Bhattacharya 2006, Servaes and Tamayo, 2013, Dai, Liang and Ng, 2020), employees (Delmas and Pekovic, 2013, Flammer and Luo, 2017, and Levine, Lin and Wang 2018) and suppliers (Schiller, 2017, Cao, Liang and Zhan, 2019). According to the third view (doing well by doing good), socially responsible investors position themselves as long-term investors who monitor the CEO and correct short-termism, leading firms to adopt better ESG practices. Several papers confirm this view. Dyck, Lins, Roth, and Wagner (2018) find that greater institutional ownership is associated with higher firm-level environmental and social (E&S) scores. European investors and investors that are signatories to the UNPRI have a more substantial impact

⁵ There is a large literature examining the impact of ESG (or E&S) on firm performance. Most papers – but not all – find a positive impact of ESG ratings on firm value. For a review of these papers, see for example Orlitzky, Schmidt and Rynes (2003), Margolis, Elfenbein and Walsh (2009) and Christensen, Hail and Leuz (2019). ESG policies may affect firm value through reduction in firm risk (El Ghoul et al. 2012, Oikonomou, Brooks and Pavelin, 2012, Albuquerque, Koskinen and Zhang, 2019), an increase in the number of analysts following the firm (Durand, Paugam and Stolowy, 2019), and higher post-acquisition returns (Deng, Kang and Low, 2013).

on firms' E&S performance. Legal origin also seems to be an important determinant of E&S policies. E&S ratings are higher for firms located in civil law countries than for those in common-law countries (Liang and Renneboog, 2013). How can investors induce firms to adopt ESG policies? Investors often engage privately and in order to reduce downside risks (Dimson, Karakas and Li, 2016, Lins, Servaes and Tamayo, 2017, Hoepner et al., 2017, Barko et al., 2018). Shareholders also engage publicly by submitting E&S shareholder proposals at general meetings. He, Kahraman, and Lowry (2019) find that over the 2004 – 2016 period, more than 20% of all shareholder proposals relate to E&S issues. Even if they rarely receive the 50% support rate required to pass, the average support rate is increasing: from less than 5% in 2004 to 20% in 2016. Flammer, Toffel, and Viswanathan (2019) find that environmental shareholder activism increases the voluntary disclosure of climate change risks and is particularly effective if long-term and green institutional shareholders initiate it. Finally, Cavaco, Crifo, and Guidoux (2018) and Flammer, Hong, and Minor (2019) find that the integration of ESG criteria in executive compensation, a practice that has become more prevalent over time, leads to an increase in E&S performance. Different from direct investor engagements or CEO compensation schemes, our setting enables us to examine the way investors can influence firms' ESG performance by changing the composition of the board of directors and making it more ESG-oriented.

Second, our research also contributes to the literature that examines the relationship between board gender diversity and ESG performance. The role of boards is twofold. The primary responsibility of the board is to monitor the CEO to meet performance targets. The board also has to provide advice to the CEO. Directors' skills and expertise are valuable for the decision-making process and for developing the firm's network. Both roles – monitoring and advising – depend on

the composition of the board. Women directors can contribute to board performance through better monitoring (Adams and Ferreira, 2009; Schwartz-Ziv, 2017), thus reducing the potential for and amount of agency costs linked to E&S expenses. Women directors can also contribute through their advisory role by diversifying the types of expertise and skills on the board. Female directors are more likely to be benevolent, universally concerned and less power-oriented than male directors (Adams and Funk, 2012) and to possess skills in human resources and sustainability that are often missing from boards (Kim and Starks, 2016). Women also appear to act more ethically than men (Franke, Crown, and Spake, 1997) and appear to be more transformational leaders, eliciting more trust and confidence from a firm's stakeholders (Eagly, Johannesen, and Van Engen, 2003). These traits may help increase firms' ESG performance. In addition, women tend to be less overconfident than men (Huang and Kisgen, 2013), and firms led by overconfident executives achieve lower E&S performance (Tang, Qian, Chen and Shen, 2015), which makes it likely that gender-diverse boards generate higher E&S performance. Several empirical results confirm that this is the case. Atif, Hossain, Alam, and Goergen (2019) find that renewable energy consumption is positively related to the presence of women on the board. Liu (2018) shows that firms with greater board gender diversity are less often sued for environmental infringements. Dyck, Lins, Roth, Towner, and Wagner (2019) find that environmental performance increases by 14% with the introduction of a female director on the board. Francoeur, Labelle, Balti, and Bouzaidi (2019) find that the impact of gender-diverse boards on E&S performance differs across E&S dimensions. Women on boards lead to stronger E&S performance toward the environment, suppliers, and the community but have no impact on the employees' and customers' dimensions. Cronqvist and Yu (2017) even find that male executives partially internalize their daughters' experiences and values: the presence of a CEO who has a female child increases a firm's E&S rating by approximately 11.9% compared to a median firm, the effect being about one-third

of the effect of an executive herself being female. However, endogeneity issues affect the robustness of several of these results. Using the introduction of board quotas in France in 2011 allows us to conduct a natural experiment and to be confident that women on boards causally determine ESG performance.

Third, our paper also extends existing work that explores board committees⁶ and especially the presence of an E&S (or CSR) committee⁷ and its impact on ESG performance. There are few studies on E&S committees. Eccles, Ionnnou, and Serafeim (2014) find that the likelihood of forming a sustainability committee is greater for high-sustainability companies than for low-sustainability companies. Boards with an environmental committee lead to increased transparency related to environmental issues (Peters and Romi, 2014), enhanced environmental performance (Walls et al., 2012), and reduced industry fines (Davidson and Worrell, 2001). Burke, Hoitash, and Hoitash (2019) find that the presence of a sustainability committee improves corporate social performance. On the other hand, Berrone and Gomez-Mejia (2009) did not find any effect of environmental committees on the link between CEO pay and environmental performance. However, the presence of an E&S committee may only be an outcome of a prior ESG-oriented strategy, which could explain the mixed evidence in the literature. We find that the quota law, by prompting firms to add women to the board, also caused firms to create E&S committees without any direct improvement of ESG performance.

⁶ Chen and Wu (2016) analyze the structure of board committees, and Adams, Rangunathan and Tumarkin (2018) investigate the effects of committees on direction information, board decision-making and corporate performance. Kolev, Wangrow, Barker and Schepker (2019) review the literature on outcomes associated with board committees.

⁷ Each firm has its own name for this committee, for example “safety, health and environmental affairs,” “sustainability” or “ethics, environmental and social”. For simplicity, we just call each one an E&S committee. In all cases, we are referring to committees within boards of directors.

Finally, our paper is also related to a strand of research exploring the consequences of gender quotas in different institutional settings: Norway (Ahern and Dittmar, 2012, Matsa and Miller, 2013, Eckbo, Nygaard and Thorburn, 2016, Bertrand, Black, Jensen, and Lleras-Muney, 2019), France (Ferreira, Ginglinger, Laguna and Skalli, 2018, Reberioux and Roudaut, 2019) and more recently California (von Meyerinck, Niessen-Ruenzi, Schmid, and Solomon, 2019, Hwang, Simintzi, and Shivdasani, 2019). However, none of these papers examines the impact of board gender quotas on ESG performance.

The rest of the paper is structured as follows. In section 2, we present the institutional context of board quotas. In section 3, we present our dataset and variables. We analyze our empirical results in section 4, and section 5 concludes.

2. Board gender quotas

2.1. Board gender quotas in France

In France, the Zimmermann-Copé law, adopted on January 27, 2011, requires a minimum of 20% of women on company boards from January 2014 onward, increasing to 40% on January 1, 2017. The quota applies to all board members, insiders, and outsiders, except directors representing employees. The quota applies to all listed and nonlisted companies employing at least 500 employees or with revenues of at least EUR 50 million over the three previous years. The legal forms that are subject to this law are the three legal forms for listed companies: Sociétés Anonymes (limited liability corporations), Commandites par actions (limited partnerships), and Societas Europaea (the European company statutes). Nonlisted companies can opt for other legal forms that are not subject to quotas. The law was submitted to the French National Assembly on December

3, 2009 and adopted in the first reading on January 20, 2010. The parliamentary debates continued throughout 2010 to January 2011, when the law was formally adopted. As many companies anticipated the adoption of the law in 2010, we exclude this year when comparing the prequota period with the postquota period.

2.2. Board gender quotas in Europe

The question of quotas on the boards has been subject to extensive debates in Europe for several years. In 2003, Norway became the first country to adopt a law requiring that at least 40% of directors be of each gender, and that law was implemented in 2008. On 14 November 2012, the European Commission adopted a proposal for a directive setting a minimum objective that listed companies in Europe would have 40% of the underrepresented gender in nonexecutive board-member positions 2020. This directive is still under debate. Meanwhile, several countries adopted regulations regarding women on boards.

Because of the anteriority of the Norwegian law, most papers on gender quotas for boards examined the case of Norway. However, Norway is a small country with a limited number of listed companies, large state ownership, and more than half of companies belonging to the energy industry (see Odegaard, 2011 for details on the Norway market). Only public limited companies (ASA) have to comply with the quota law, and Bohren and Staubo (2014) find that several firms exited to an organizational form not exposed to the law (which triggered delisting, as ASA form is required for listed firms).

Germany, initially reluctant to adopt quotas, finally adopted a law establishing a quota of 30% effective in 2016 (after the end of the period we observe) for the 100 largest listed companies. As

most German firms have a dual board, quotas apply to supervisory boards. In this paper, we use German firms as one of our control groups.

2.3. Board gender quotas in the U.S.

In the absence of an ideal control group for director gender gaps in France, we also use US boards. There was no quota for female directors in the US during our sample period, which ends in 2016. However, in September 2018, California became the first state in the US to mandate female directors on the boards of listed firms. The law mandates all companies headquartered in the state to have at least one female director by the end of 2019. By the end of 2021, the law further requires that all firms have at least one female director if the board has four members or fewer, and two (three) female directors if the board has five (six or more) members.

Figure 1 shows the annual average percentage of female directors for French firms as well as for our control groups composed of US firms and German firms.

3. Data

3.1. ESG data

To measure ESG performance, we rely on the Vigeo-Eiris database. Vigeo-Eiris is the leading ESG rating agency in Europe, and Moody's acquired it in 2019.⁸ In 2019, Vigeo-Eiris covered 3853 firms in the world (among which 1488 were in Europe and 1226 were in North

⁸ The Vigeo-Eiris database has been used, among others, in Cavaco and Crifo (2014), Ferrell, Liang and Renneboog (2016) and Eccles and Strohle (2018).

America). The Vigeo-Eiris Corporate ESG dataset applies a positive screening approach to rate how a firm complies with the conventions, guidelines, and declarations of international organizations such as the United Nations (UN) and the Organization for Economic Cooperation and Development (OECD). The Vigeo-Eiris ratings cover six broad dimensions: human rights, human resources, business behavior toward customers and suppliers, corporate governance, environment, and community involvement. These dimensions are further broken down into 38 ESG criteria. For example, the environmental dimension is split into waste management, transportation, water, energy, and environmental strategy. For each criterion, Vigeo-Eiris uses a framework based on 3 pillars of questioning (leadership, implementation, and results) and nine angles of analysis (visibility, exhaustiveness, ownership, allocated resources, coverage, scope, indicators, stakeholder feedback, controversy management) to form the final score based on a scale of 0 to 100. The 38 ESG scores obtained are used to compute the corresponding ESG scores (environmental, social, and governance) by the mean of a weighted average. The weights correspond to the relevance of the ESG criteria among the sector of the company. Vigeo-Eiris provides continuous scores, on a scale from 0 to 100, and ratings, defined as a Z-score, which measures how far scores deviate from the average in the industry. Firms are rated relative to their industry peers from both domestic and international markets. Thus, the ratings do not depend on the cross-country differences in jurisdiction and regulation. In our paper, we rely on continuous scores.

Our primary motivation for using the Vigeo-Eiris database, beyond the quality of the data, is the historical coverage available for French companies. Indeed, to study the impact of the introduction of quotas in France, we need ESG scores of French companies before 2010. However, most other ESG data providers offer limited coverage for France before 2012. For example, the

MSCI data are characterized by a major change in data between 2011 and 2012 (from KLD to MSCI ESG); therefore, we cannot use them for our study. Vigeo-Eiris also offers good coverage for US and German firms, our control groups.

Finally, our question of the impact of female directors on ESG performance may generate mechanical correlations if ESG scores consider criteria related to diversity and board characteristics. Vigeo-Eiris granted us access to the detailed proprietary dataset, which enabled us to compute an adjusted score for social and governance scores, as well as for the overall score, excluding all items linked to diversity, gender, and boards of directors.

3.2. Board and financial data

We select all company-year observations in the Vigeo-Eiris database over the period 2008 to 2016 for France, Germany, and the US. In addition, we use the Management Diagnostic's BoardEx database to provide information about boards and directors (gender, tenure, age, education, role, or employment). Financial and accounting data are from Compustat. After merging these databases, we obtain a balanced panel of 4,822 firm-year observations (3,362 for the US, 824 for France, and 636 for Germany). Using a balanced sample is important for our question because we need to observe the impact of the quota law on firms already in the sample before the law. The sample also includes 53,286 director-firm-year observations (9,795 for France, 10,606 for Germany, and 32,885 for the US).

3.2. Descriptive statistics

Table 1 reports summary statistics regarding firm-year observations for France, Germany, and the US over the period 2008-2016. Due to the requirement for coverage by Vigeo, our sample is made up of large companies. There are no major differences in the financial characteristics (size, profitability, leverage) of the firms in the three countries under consideration, except that the market-to-book ratio is higher for US firms. Regarding ESG scores, French firms have the highest scores on environmental and social scores, whereas US firms perform better on the governance score.

Table 2 provides summary statistics on boards and directors over the period 2008-2016. German boards are, on average, larger and less independent than French and US boards. US boards appear to be more independent than French boards. Independent directors make up 83% of directors in the US before and after 2010, whereas they represent 45% of directors before 2010 (included) and 48% after 2010 in France. Over the whole period, the percentage of female directors is 22% in France, compared to 13% in Germany and 17% in the US. However, the trend differs between France and the two other countries, as Figure 1 shows. On average, the percentage of female directors in France is 9% before 2010 and 48% after 2010. In contrast, women represent 15% of directors in the US before 2010 and 18% after 2010. There are no major differences in the director characteristics in the three countries under consideration. Time on the board is longer for US directors, who are also older than French and German directors (62.48 compared to 58.56 and 56.08).

In Table 2, columns 4 to 8, we compare board and director characteristics according to their overall ESG performance being above or below the median. Compared to low-ESG firms, high-

ESG firms have larger boards (and are also larger firms), more independent directors, a shorter average time on the board of directors (except for Germany), and a larger network.

4. Empirical results

4.1. Determinants of ESG ratings

The descriptive statistics indicate that high-ESG firms have more female directors on their boards. However, as high-ESG firms are also larger, these firms may be more likely to hire female directors. We therefore measure the determinants of ESG ratings in a multivariate analysis. Our baseline test examines the relationship between the percentage of female directors on the board and firms' ESG performance, using the specification:

$$\text{ESG score}_{i,t+1} = \alpha + \beta X_{i,t} + \gamma Y_{i,t} + \Delta + \epsilon_{i,t} \quad (1)$$

where the dependent variable is one of the ESG scores of firm i in year $t+1$. $X_{i,t}$ is the percentage of female directors on the board in year t , $Y_{i,t}$ are a set of firm-level control variables in year t and Δ are year, country, and industry fixed effects or firm fixed effects. For firm-level control variables, we use firm size, market to book, leverage, ROA, percentage of independent directors on the board, average time on board of directors, and average board network (average number of years on other boards of listed firms where directors sit). As women cannot have an impact on the year they join the board, we add a lead by one year on ESG scores. We cluster standard errors at the firm level.

We report the results of these regressions in Table 3. In columns 1, 3, 5, and 7, we include year, country, and industry fixed effects. We find that the percentage of female directors on the

board significantly increases ESG performance, measured by the overall score and each of its components. We also find that firms that are larger, more profitable, and with more independent and less tenured boards achieve higher ESG performance.

However, the results we observe may be a consequence of endogenous matching of firms and directors. On the demand side, firms choose directors corresponding to their values and goals; for example, firms with greater concern for ESG issues and larger and more profitable firms are more likely to hire female directors. On the supply side, directors choose companies whose policies fit with their beliefs. If women are more sensitive to ESG issues, they will prefer to sit on boards of firms with a developed ESG culture. In both cases, the correlation between women's representation and the ESG scores of the firm does not result from a real effect of the presence of women but from a match between ESG-concerned directors and ESG-concerned firms. To address this issue, we include firm fixed effects in our regressions. Columns 2, 4, 6, and 8 of Table 3 report the results. Once we control for firm fixed effects, the percentage of female directors on the board is the only variable with a significant positive effect on the overall ESG performance and social performance. In addition to female directors, size remains a significant determinant of the environmental score. Governance scores are higher for more independent boards and less tenured boards, as well as for less leveraged firms. These findings underline that female directors are an important determinant of ESG performance.

4.2. Gender quota effects

In addition to using firm fixed effects to address endogeneity issues, we use the French Copé-Zimmerman law, introducing a gender quota on French boards as a natural experiment. As

the law applies to all listed companies, all of them have to hire female directors, allowing us to measure the real impact of female directors on ESG scores. We use a difference-in-differences methodology and run the following regression:

$$\text{ESG score}_{i,t+1} = \alpha + \beta_1 \text{Treated}_{i,t} + \beta_2 \text{Treated*Postquota}_{i,t} + \beta_3 X_{i,t} + \gamma Y_{i,t} + \Delta + e_{i,t} \quad (2)$$

We use as independent variables the overall adjusted ESG score and the decomposition of this score in environmental, social, and governance scores (without items linked to diversity, gender, and board of directors). To avoid bias resulting from several companies anticipating the law, as observed in Figure 1, we exclude the year 2010. Our posttreatment period variable is a dummy that equals one for all years from 2011 to 2016. The treated dummy equals one for French firms and zero for firms in our control groups (either US or Germany). The interaction between the posttreatment dummy and the treated dummy gives us the effect of the quotas on ESG performance. We add year fixed effects, industry fixed effects (alternatively firm fixed effects), and standard errors that are robust and clustered by firm. Firm-level control variables are the same as in equation (1), and we add a lead by one year on ESG scores.

Table 4 reports the results of these regressions for the overall adjusted score. The results in columns 1 to 4 use US firms as a control group, whereas the results in columns 5 to 8 use German firms as a control group. We find that after the quota law, ESG performance significantly increases the overall adjusted score, whether using the US or Germany as a control group. When considering industry fixed effects (columns 1 to 3 and 5 to 7), larger, more profitable firms have higher ESG performance. Noticeably, more independent boards lead to enhanced ESG scores. However, once

we consider firm fixed effects, independent boards no longer have any impact on ESG scores, whereas the coefficient for our postquota-treated variable is still significantly positive, indicating that the female directors significantly enhance ESG performance.

Tables 5 to 7 present the results for the detailed adjusted environmental, social, and governance scores. The results are similar to those highlighted in Table 4. Once we control for firm fixed effects, the postquota-treated variable remains significantly positive. Female directors significantly increase environmental, social, and governance performance.

4.3. Board quotas and E&S committees

We explore the channels through which female directors can enhance ESG performance. The first channel we consider is the probability of having an E&S committee. We use detailed data on committees available in the Boardex database. We classify as E&S committees all committees with denominations related to environmental and social issues, for example, “safety, health and environmental affairs” or “sustainability” or “ethics, environmental and social.” Figure 2 shows the average percentage of firms with E&S committees in France, the US, and Germany over the period 2008-2016. After the quota law, the percentage of French firms with an E&S committee increased, whereas US and German firms did not seem to change their use of E&S committees.

To confirm this observation, we estimate a regression analysis of the likelihood that each firm has an E&S committee in a given year. The independent variable is a dummy variable that equals one if the firm has an E&S committee. We add year fixed effects, industry fixed effects (alternatively firm fixed effects), and standard errors that are robust and clustered by firm. Firm-level control variables are the same as in equation (1). We use US firms as a control group. As

Figure 2 shows, German firms rarely adopt E&S committees, and we cannot use them as a control group for the present analysis.

Table 8 reports our results. The probability of having an E&S committee significantly increases after the gender quota, whatever fixed effects are included. Large firms are more likely to have an E&S committee, but once we consider firm fixed effects, size no longer has any impact on our results. Therefore, in addition to increasing the percentage of female directors, gender quotas also have an impact on board structure, as they induce firms to create E&S committees.

Figure 3 shows that the percentage of female directors sitting on E&S committees in France significantly increases after 2010, more so than the percentage of female directors sitting on the board itself and other committees. Table 9 provides descriptive statistics on committee membership at the director-year level for France and compares men and women before and after 2010. The results confirm that women sit more frequently on E&S committees after 2010. Furthermore, after 2010, female directors are more often the chairs of E&S committees than are male directors, which is not the case in other board committees (audit, compensation, nomination) in which male directors are more often chair.

Our next question is whether E&S committees enhance ESG performance. We rerun our regressions corresponding to specification (1) and add a dummy equal to one when the firm has an E&S committee. Table 10 reports our results. Once we consider firm fixed effects, we cannot highlight any effect on ESG performance of adding an E&S committee, regardless of whether we include the percentage of female directors on the board in the regression. Our results suggest that ESG performance is driven by female directors and not E&S committees, which appear to be merely symbolic. These results are in line with Berrone and Gomez-Mejia's (2009) findings.

4.4. Board quotas and director characteristics

Another channel through which female directors can enhance ESG performance is related to their characteristics. If female directors are more benevolent and more oriented toward general interests, increasing the percentage of women on boards may lead firms to be more ESG-oriented. We explore whether education, previous experiences and other characteristics may explain the results we observe. Table 11 reports descriptive statistics at the director-year level of French directors. Women appear to have more experience than men in the HR field, both before and after 2010, which could induce them to have a better sense of social issues. They also have more experience in universities, charities, or medical firms. These experiences can be classified as general interest occupations and may also explain the effect of women on ESG performance. Women are also more frequently hired from outside the traditional network (more often foreign, less family shareholder members, less tenured).

We rerun our regressions corresponding to specification (1), adding variables of experience, to verify whether the positive effect of female directors on ESG performance can be explained by past experience. Table 12, Panel A reports the results for all boards, and Panel B reports the results for boards with more than 85% men. When including year, industry, and country fixed effects, we find that the percentage of directors with HR experience increases the overall ESG ratings, as well as the rating of each component (E.S.G). However, when we consider boards with more than 85% men, HR experience has a positive effect that is limited to the social criteria and does not affect environmental and governance scores. In contrast, hiring directors from outside of the traditional network has a positive impact on the ESG global score and its components, even when most

directors are men. General interest occupations have a positive effect on the environmental score, but this result does not hold when most directors are men. Further, when including firm fixed effects, the impact of most of the characteristics of directors on the ESG rating vanishes, with the exception of the general interest effect, which continues to positively affect the environmental criterion. The latter result holds when considering all boards, but not those that are male-dominated. These results suggest that the impact we observe without firm fixed effects stems from the matching between director characteristics and firm-specific expertise needs. Our results that women on boards increase ESG performance can, therefore, plausibly be attributed to intrinsic differences between women and men and not to other characteristics that happen to be correlated with gender diversity. Our findings suggest that women have unique qualities and experiences that help firms improve their ESG ratings.

4.5. Robustness checks

French ESG-rated firms may differ from rated firms in our control groups (US and Germany). To address potential sample selection bias, we report evidence from a propensity score matching model. We match French firms and firms from our two control groups in 2009 (before the implementation of the quota) based on firm size, market to book, leverage, ROA, percentage of independent directors on the board, average time on board of directors and average board network. We re-estimate our model specification (2) on this matched dataset. Table 13 reports our results. The coefficient of our variable postquota-treated remains significantly positive and similar for the matched sample compared to our main sample. Our findings confirm the positive impact of female directors on ESG performance.

5. Conclusion

In this paper, we analyze the impact of female directors on firms' ESG performance. As a natural experiment, we use the 2011 French law introducing a mandatory board gender quota for all French firms. We find that after the introduction of the quota, French firms increase their ESG performance along the three dimensions of environmental, social, and governance. We investigate several channels to explain our results. After the quota, firms are more likely to have an E&S committee, and female directors are more likely to sit on this committee and to chair it. However, this committee seems merely symbolic, as it does not increase ESG scores. We also explore female directors' previous experiences, but once controlling for director-firm matching, we do not find any significant effect of these experiences on ESG performance. We interpret these findings as female directors having specific qualities, experiences, and social preferences that enable them to steer firms toward more ESG-oriented policies.

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Appendix.Variables definitions

Variables names	Definition
<i>Source: Compustat</i>	
<i>Firm Characteristics</i>	
Size	Logarithm of total asset in Millions of Euros
Market.to.Book	Market value of equity divided by book value of equity
Leverage	Long term debt divided by total asset
ROA	Net income divided by total asset of the previous year
<i>Source: Boardex</i>	
<i>Board Characteristics</i>	
Women	Percentage of women on board
Independent	Percentage of independent directors on board
Tenure	Average time on board of directors
Network	Average time that directors sit on the board of other listed companies
E&S.committee	Dummy equal to one if the firm has an E&S committee
Out.trad.network	Score to measure the “novelty” of board directors : +1 by foreign directors, -1 by family directors and + (company average time on board a given year – country average time on board a given year)/(country average time on board a given year)
<i>Source: Boardex</i>	
<i>Directors Characteristics</i>	
Exp.HR	Dummy equal to one if the director has worked or works in the Human Resources field
Influential	Dummy equal to one if the director has worked or works in a firm whose type is “Universities”, “Government” or/and “Charities ”
General.Interest	Dummy equal to one if the director has worked/sat or work/sit in a firm whose type is “Universities”, “Medical” or/and “Charities”)
Universities	Dummy equal to one if the director has worked or works in a firm whose type is “Universities”
Charities	Dummy equal to one if the director has worked or works in a firm whose type is “Charities”
Medical	Dummy equal to one if the director has worked or works in a firm whose type is “Medical”
Foreign	Dummy equal to one if the director has a different nationality than firm
Family	Dummy equal to one if the director shares the same family name as another director
<i>Source: Vigeo-Eiris</i>	
<i>ESG variables</i>	
ESG.Score	“Overall.score” : weighted average of Environment.Score, ESG Social.Score and Governance.Score
Environment.Score	“ESG ENV Score”
Social.Score	“ESG SOC Score”
Governance.Score	“ESG GOV Score”
ESG.Score adjusted	Weighted average of Environment.Score, Social.Score adjusted and Governance.Score adjusted

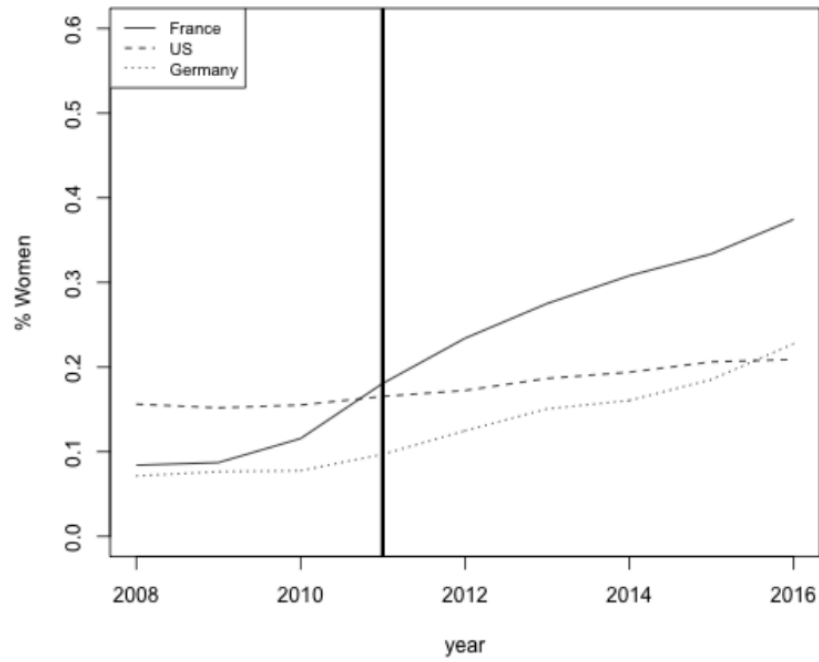


Figure 1: Average percentage of female directors in France, US and Germany

The figure shows the annual average percentage of female directors. The sample includes French, US and German firms covered by BoardEx and Vigeo-Eiris over the period 2008-2016.

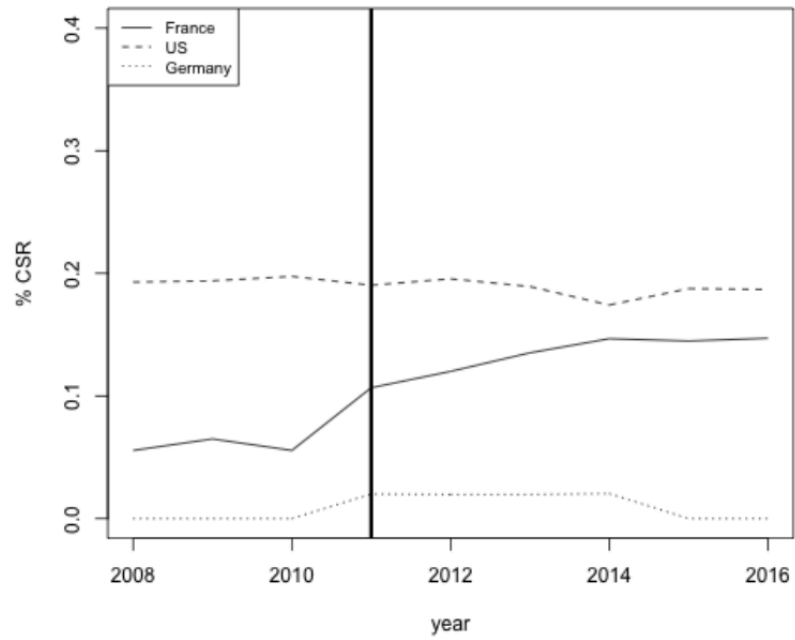


Figure 2: The presence of E & S board committees

The figure shows the annual fraction of firms with an E & S committee in France, US and Germany. The sample includes French, US and German firms covered by BoardEx and Vigeo-Eiris over the period 2008-2016.

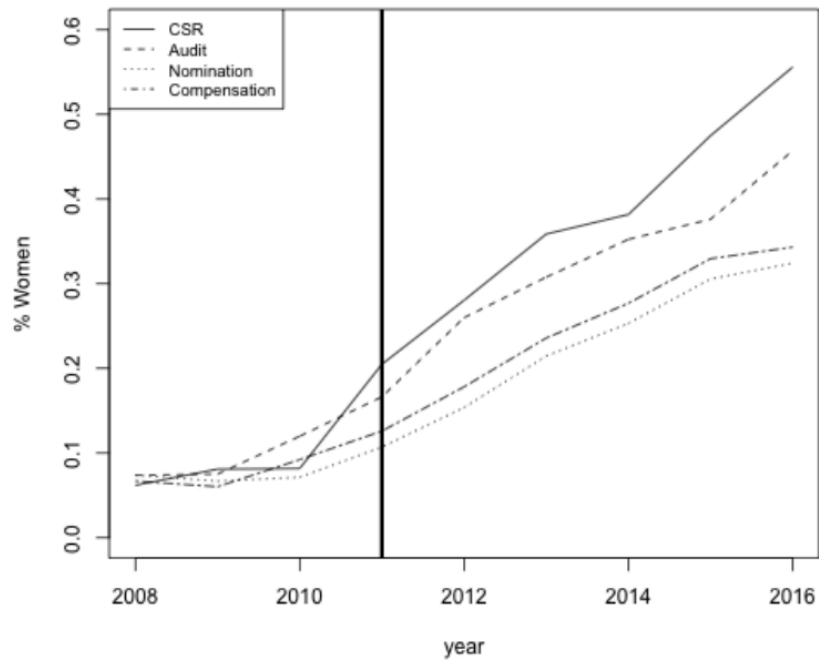


Figure 3: Female directors on board committees in France

The figure shows the annual average percentage of female directors on boards and board committees of French firms. The sample includes French firms covered by BoardEx and Vigeo-Eiris over the period 2008-2016.

Table 1: Summary statistics of firm characteristics

This table summarizes firm-year characteristics for 4,822 firm-year observations between 2008 and 2016 by country (France, the United States and Germany). Observations with missing information for at least one variable are excluded. The appendix provides the definition of variables.

	France			United States			Germany		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Size	824	9.39	1.58	3,362	9.79	1.23	636	9.39	1.71
ROA	824	0.03	0.04	3,362	0.06	0.06	636	0.04	0.05
Market to Book	824	1.70	1.19	3,362	3.64	4.99	636	2.16	1.92
Financial leverage	824	0.19	0.13	3,362	0.24	0.16	636	0.18	0.13
ESG.Score	824	44.16	11.37	3,362	31.20	7.48	636	36.87	12.29
Environment.Score	824	43.85	15.89	3,362	23.41	14.62	636	33.30	18.62
Social.Score	824	45.58	13.52	3,362	25.53	8.29	636	36.23	12.86
Governance.Score	824	42.32	10.49	3,362	46.78	7.68	636	41.55	11.95

Table 2: Summary statistics of board and director characteristics

This table reports board characteristics by country (France, the United States and Germany). We exclude observations with missing information for at least one variable. Panel A reports board characteristics for 4,822 firm-year observations and Panel B reports director characteristics for 53,286 director-firm-year observations. The sample period is 2008-2016. The appendix provides the definition of variables.

FRANCE	N	Mean	SD	Low.ESG	High.ESG	Diff	t.stat
<i>Panel A Board characteristics</i>							
Board size	824	13.32	3.43	12.26	14.36	-2.10	-9.24
Independent %	824	0.47	0.19	0.43	0.50	-0.07	-5.63
Women %	824	0.22	0.13	0.20	0.24	-0.05	-5.20
Network	824	3.69	1.80	3.48	3.91	-0.43	-3.46
Tenure	824	7.00	3.29	7.43	6.58	0.85	3.71
<i>Panel B Directors characteristics</i>							
Age	9,661	58.56	9.90	58.72	58.41	0.31	1.54
Independent	9,795	0.46	0.50	0.43	0.50	-0.06	-6.35
Foreign	8,867	0.20	0.40	0.18	0.21	-0.04	-4.36
Family	9,795	0.06	0.24	0.09	0.03	0.06	12.80
Women	9,776	0.24	0.42	0.21	0.26	-0.04	-5.14
Network	9,652	3.72	4.23	3.59	3.85	-0.25	-2.94
Tenure	9,776	6.83	6.77	7.36	6.31	1.04	7.62
<i>GERMANY</i>							
	N	Mean	SD	Low.ESG	High.ESG	Diff	t.stat
<i>Panel A Board characteristics</i>							
Board size	636	18.60	6.22	15.78	21.30	-5.52	-12.41
Independent %	636	0.16	0.24	0.14	0.18	-0.04	-2.01
Women %	636	0.13	0.09	0.11	0.15	-0.04	-5.52
Network	636	2.08	1.03	2.07	2.08	-0.003	-0.04
Tenure	636	6.11	2.24	6.29	5.94	0.35	1.95
<i>Panel B Directors characteristics</i>							
Tenure	10,470	6.00	5.21	6.12	5.89	0.23	2.24
Network	10,354	2.17	3.30	2.14	2.20	-0.06	-0.92
Age	9,082	56.08	8.49	56.06	56.09	-0.03	-0.15
Independent	10,606	0.15	0.36	0.11	0.19	-0.08	-11.40
Foreign	7,952	0.18	0.38	0.17	0.18	-0.01	-1.26
Family	10,606	0.02	0.15	0.03	0.02	0.01	3.36
Women	10,470	0.14	0.35	0.12	0.17	-0.04	-6.13
<i>UNITED STATES</i>							
	N	Mean	SD	Low.ESG	High.ESG	Diff	t.stat
<i>Panel A Board characteristics</i>							
Board size	3,362	10.96	2.32	10.32	11.48	-1.16	-14.59
Independent %	3,362	0.83	0.10	0.81	0.85	-0.04	-12.38
Women %	3,362	0.17	0.09	0.15	0.19	-0.05	-14.68
Network	3,362	4.80	1.65	4.60	4.96	-0.36	-6.25
Tenure	3,362	8.47	3.28	8.93	8.09	0.84	7.24
<i>Panel B Directors characteristics</i>							
Tenure	32,777	8.43	7.02	8.78	8.08	0.69	8.95
Network	32,680	4.86	4.49	4.70	5.01	-0.31	-6.22
Age	32,762	62.48	7.94	62.55	62.42	0.13	1.45
Independent	32,885	0.84	0.37	0.82	0.85	-0.04	-8.93
Foreign	24,825	0.09	0.28	0.07	0.10	-0.03	-7.62
Family	32,885	0.02	0.15	0.03	0.02	0.01	5.38
Women	32,777	0.18	0.38	0.15	0.20	-0.05	-10.82

Table 3: Determinants of ESG scores

This table reports OLS estimates of ESG scores on the percentage of female directors on the board and control variables. The sample includes all German, US and French firms covered by BoardEx and Vigeo-Eiris over the period 2008-2016. We deleted each observation with missing information and financial variables were trimmed at 1 %. In the first two columns, the dependent variable is the overall ESG score $_{t+1}$; in the third and the fourth columns the environmental score $_{t+1}$; in the fifth and sixth columns the social score $_{t+1}$; and in the last two columns, the governance score $_{t+1}$. All models include year fixed effects, country fixed effects and alternatively industry fixed effects or firm fixed effects. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1 %, ** 5 %, and *10 %. The appendix provides the definition of variables.

Scores	Overall $_{t+1}$		Environmental $_{t+1}$		Social $_{t+1}$		Governance $_{t+1}$	
Women	13.92*** (1.93)	7.73*** (1.90)	21.38*** (3.57)	6.72** (3.37)	12.99*** (2.12)	8.08*** (2.19)	12.80*** (2.04)	10.55*** (2.41)
Size	3.40*** (0.21)	0.99 (0.68)	5.70*** (0.36)	3.55** (1.44)	3.71*** (0.25)	0.98 (0.74)	1.35*** (0.21)	-0.68 (0.75)
Market.to.Book	0.05 (0.04)	0.03 (0.03)	0.07 (0.07)	0.05 (0.05)	0.05 (0.04)	0.01 (0.03)	-0.04 (0.03)	-0.01 (0.04)
Leverage	-2.48 (1.55)	-2.69 (1.93)	-3.04 (2.96)	1.66 (3.38)	-3.39** (1.69)	-1.77 (2.30)	-0.70 (1.44)	-5.78** (2.32)
ROA	8.75*** (3.18)	1.63 (2.26)	18.31*** (5.92)	4.90 (4.10)	7.64** (3.50)	2.73 (2.57)	5.80* (3.23)	1.42 (2.85)
Independent	6.60*** (1.87)	2.75 (2.75)	6.43** (3.01)	3.25 (3.92)	4.26** (1.98)	1.36 (3.08)	11.22*** (1.88)	6.53** (3.01)
Tenure	-0.24*** (0.07)	-0.09 (0.09)	-0.12 (0.12)	0.09 (0.16)	-0.11 (0.08)	-0.01 (0.11)	-0.53*** (0.07)	-0.27** (0.12)
Network	0.17 (0.15)	-0.12 (0.18)	0.20 (0.26)	-0.37 (0.38)	0.19 (0.16)	0.05 (0.19)	0.08 (0.14)	-0.13 (0.21)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes
Industry FE	Yes	No	Yes	No	Yes	No	Yes	No
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.5815	0.8723	0.5148	0.8438	0.6557	0.887	0.3237	0.6719
N	4822	4822	4822	4822	4822	4822	4822	4822

Table 4: The effect of the quota law on ESG scores

This table reports the OLS estimates of the treatment effects of the quota (postquota-treated) on the overall ESG score. The sample includes French firms and alternatively US and German firms as controls, covered by BoardEx and Vigeo-Eiris over the period 2008-2016. The year 2010 is excluded. The ESG score is the adjusted score (excluding items related to gender, diversity and board). We deleted each observation with missing information and financial variables were trimmed at 1%. In the fourth first (last) columns US (German) firms represent the control group. The post quota period begins in 2011. All models include year fixed effects, models 3 and 7 include industry fixed effects and models 4 and 8 include firm fixed effects. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%. The appendix provides the definitions of the variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Postquota.treated	4.46*** (0.98)	3.32*** (0.86)	3.28*** (0.81)	3.84*** (0.85)	7.67*** (1.64)	6.68*** (1.41)	5.68*** (1.38)	4.55*** (1.51)
Treated	11.23*** (1.26)	18.21*** (1.22)	17.21*** (1.06)	6.25*** (1.89)	2.11 (1.89)	1.74 (1.93)	1.49 (1.63)	29.40*** (2.84)
Size		2.27*** (0.20)	3.09*** (0.22)	1.50** (0.72)		3.88*** (0.35)	4.89*** (0.42)	2.94* (1.68)
Market.to.Book		0.08* (0.04)	0.03 (0.04)	0.02 (0.03)		0.35 (0.33)	0.34 (0.28)	0.60*** (0.23)
Leverage		0.87 (1.54)	-2.43 (1.56)	-2.21 (1.77)		-7.47* (4.26)	-13.21*** (4.45)	-1.49 (4.27)
ROA		20.78*** (3.51)	10.46*** (3.17)	1.61 (2.23)		8.11 (10.97)	5.59 (9.41)	4.11 (7.33)
Independent		12.31*** (2.17)	10.21*** (1.91)	2.59 (2.43)		6.19** (2.85)	5.53** (2.47)	1.04 (3.33)
Tenure		-0.25*** (0.07)	-0.20*** (0.06)	-0.09 (0.09)		-0.31 (0.21)	-0.39** (0.20)	-0.06 (0.25)
Network		0.24 (0.17)	0.22 (0.14)	-0.01 (0.16)		-0.07 (0.45)	-0.02 (0.40)	-0.06 (0.51)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	No	No	Yes	No
Control Group	US	US	US	US	Germany	Germany	Germany	Germany
Adjusted R ²	0.3366	0.4709	0.5965	0.8809	0.1307	0.4212	0.5984	0.852
N	3771	3771	3771	3771	1309	1309	1309	1309

Table 5: The effect of the quota law on environmental scores

This table reports the OLS estimates of the treatment effects of the quota (postquota-treated) on the environmental score. The sample includes French firms, and alternatively US and German firms as controls, covered by BoardEx and Vigeo-Eiris over the period 2008-2016. The year 2010 is excluded. We deleted each observation with missing information, and financial variables were trimmed at 1%. In the fourth first (last) columns US (German) firms represent the control group. The post quota period begins in 2011. All models include year fixed effects, models 3 and 7 include industry fixed effects and models 4 and 8 include firm fixed effects. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%. The appendix provides the definitions of the variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Postquota_treated	4.73*** (1.57)	3.28** (1.47)	3.38** (1.37)	2.78* (1.55)	13.31*** (2.55)	12.11*** (2.30)	10.65*** (2.30)	8.38*** (2.61)
Treated	18.10*** (1.80)	26.40*** (2.19)	24.99*** (1.93)	10.84*** (3.59)	1.87 (2.81)	1.50 (3.01)	0.88 (2.56)	37.65*** (5.34)
Size		3.86*** (0.36)	5.54*** (0.38)	3.99** (1.57)		4.87*** (0.51)	6.51*** (0.67)	5.44 (3.39)
Market.to.Book		0.15* (0.08)	0.05 (0.07)	0.03 (0.04)		0.11 (0.53)	0.19 (0.46)	0.73** (0.34)
Leverage		2.05 (3.08)	-3.70 (3.12)	-0.30 (3.16)		-11.58 (7.45)	-20.44*** (6.66)	-2.92 (7.01)
ROA		39.08*** (6.87)	21.73*** (6.25)	4.92 (4.28)		13.05 (16.88)	5.37 (14.42)	4.36 (13.25)
Independent		11.05*** (3.84)	11.19*** (3.28)	3.98 (4.07)		7.05 (4.60)	5.72 (3.76)	-0.11 (5.23)
Tenure		-0.23* (0.13)	-0.15 (0.11)	0.03 (0.17)		-0.14 (0.30)	-0.19 (0.30)	-0.14 (0.43)
Network		0.40 (0.31)	0.36 (0.26)	-0.27 (0.37)		-0.23 (0.67)	-0.15 (0.61)	0.11 (1.00)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	No	No	Yes	No
Control Group	US	US	US	US	Germany	Germany	Germany	Germany
Adjusted R ²	0.2635	0.3706	0.5212	0.8546	0.1423	0.3477	0.5487	0.8049
N	3771	3771	3771	3771	1309	1309	1309	1309

Table 6: The effect of the quota law on social scores

This table reports the OLS estimates of the treatment effects of the quota (postquota-treated) on the social score. The sample includes French firms, and alternatively US and German firms as controls, covered by BoardEx and Vigeo-Eiris over the period 2008-2016. The year 2010 is excluded. The social score is the adjusted score (excluding items related to gender and diversity). We deleted each observation with missing information and financial variables were trimmed at 1%. In the fourth first (last) columns US (German) firms represent the control group. The post-quota period begins in 2011. All models include year fixed effects, models 3 and 7 include industry fixed effects and models 4 and 8 include firm fixed effects. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%. The appendix provides the definitions of the variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Postquota.treated	4.36*** (1.15)	3.16*** (1.03)	3.10*** (0.99)	4.34*** (1.01)	6.64*** (1.81)	5.65*** (1.64)	4.63*** (1.56)	3.99** (1.65)
Treated	18.44*** (1.52)	25.64*** (1.46)	23.93*** (1.28)	5.72*** (1.98)	5.05** (2.10)	4.69** (2.12)	5.12*** (1.81)	27.47*** (2.77)
Size		2.39*** (0.24)	3.27*** (0.27)	1.51** (0.76)		4.26*** (0.40)	5.38*** (0.43)	2.64* (1.58)
Market.to.Book		0.10** (0.04)	0.03 (0.04)	0.01 (0.03)		0.28 (0.30)	0.24 (0.25)	0.48** (0.23)
Leverage		-0.38 (1.66)	-3.66** (1.65)	-1.94 (2.02)		-11.51*** (4.34)	-14.57*** (4.63)	-2.74 (4.94)
ROA		19.52*** (3.99)	6.85* (3.49)	1.71 (2.64)		14.22 (10.94)	8.73 (9.47)	8.46 (7.27)
Independent		12.55*** (2.54)	8.23*** (2.23)	2.29 (2.80)		4.88* (2.83)	4.04* (2.43)	0.95 (3.69)
Tenure		-0.16** (0.08)	-0.12* (0.07)	-0.02 (0.11)		-0.26 (0.22)	-0.35 (0.21)	0.06 (0.27)
Network		0.23 (0.19)	0.17 (0.15)	0.06 (0.19)		0.19 (0.45)	0.11 (0.40)	0.24 (0.44)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	No	No	Yes	No
Control Group	US	US	US	US	Germany	Germany	Germany	Germany
Adjusted R ²	0.4694	0.559	0.6753	0.8949	0.1614	0.45	0.6161	0.8491
N	3771	3771	3771	3771	1309	1309	1309	1309

Table 7: The effect of the quota law on governance scores

This table reports the OLS estimates of the treatment effects of the quota (postquota-treated) on the governance score. The sample includes French firms, and alternatively US and German firms as controls, covered by BoardEx and Vigeo-Eiris over the period 2008-2016. The year 2010 is excluded. The governance score is the adjusted score (excluding items related to board characteristics). We deleted each observation with missing information and financial variables were trimmed at 1%. In the fourth first (last) columns US (German) firms represent the control group. The post quota period begins in 2011. All models include year fixed effects, models 3 and 7 include industry fixed effects and models 4 and 8 include firm fixed effects. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%. The appendix provides the definitions of the variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Postquota.treated	6.40*** (0.90)	5.43*** (0.83)	5.47*** (0.83)	5.65*** (0.96)	5.61*** (1.54)	4.74*** (1.37)	4.04*** (1.41)	2.80* (1.45)
Treated	-7.76*** (1.15)	-1.99 (1.21)	-1.84 (1.19)	-1.94 (2.60)	-3.78** (1.79)	-4.79** (1.88)	-5.02*** (1.81)	25.57*** (2.43)
Size		0.81*** (0.17)	0.94*** (0.19)	-0.69 (0.80)		2.23*** (0.36)	2.74*** (0.46)	1.96 (1.60)
Market.to.Book		-0.04 (0.03)	-0.03 (0.04)	-0.01 (0.04)		0.39 (0.40)	0.48 (0.40)	0.64** (0.28)
Leverage		0.34 (1.33)	-0.45 (1.41)	-4.08 (2.58)		-2.29 (4.04)	-6.10 (4.56)	0.77 (4.73)
ROA		7.29** (2.90)	7.97*** (2.91)	3.10 (2.98)		-4.81 (12.44)	2.61 (10.77)	-2.60 (8.62)
Independent		13.68*** (2.15)	13.07*** (2.06)	3.49 (3.10)		8.53*** (2.80)	7.02*** (2.69)	1.72 (3.34)
Tenure		-0.38*** (0.07)	-0.37*** (0.06)	-0.20* (0.12)		-0.70*** (0.21)	-0.75*** (0.20)	-0.36 (0.24)
Network		0.10 (0.15)	0.15 (0.13)	-0.07 (0.20)		-0.08 (0.47)	0.12 (0.41)	0.01 (0.50)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	No	No	No	Yes
Industry FE	No	No	Yes	No	No	No	Yes	No
Control Group	US	US	US	US	Germany	Germany	Germany	Germany
Adjusted R ²	0.1	0.2033	0.2887	0.6279	0.01051	0.2042	0.3863	0.7399
N	3771	3771	3771	3771	1309	1309	1309	1309

Table 8: The effect of the quota law on the presence of an E & S committee

This table reports the OLS estimates of the treatment effects of the quota (postquota-treated) on the probability of having an E & S committee. The sample includes French firms and US firms, covered by BoardEx and Vigeo-Eiris over the period 2008-2016. The year 2010 is excluded. We deleted each observation with missing information and financial variables were trimmed at 1%. The post quota period begins in 2011. All models include year fixed effects, model 3 includes industry fixed effects and model 4 includes firm fixed effects. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%. The appendix provides the definition of variables.

	(1)	(2)	(3)	(4)
Postquota_treated	0.10*** (0.03)	0.09*** (0.03)	0.08** (0.03)	0.08** (0.03)
Treated	-0.11*** (0.03)	-0.0003 (0.04)	-0.02 (0.05)	0.87*** (0.09)
Size		0.04*** (0.01)	0.05*** (0.01)	0.05 (0.03)
Market.to.Book		0.002 (0.002)	0.001 (0.002)	0.001 (0.001)
Leverage		0.06 (0.06)	-0.03 (0.07)	0.03 (0.07)
ROA		0.06 (0.14)	-0.01 (0.11)	0.11 (0.09)
Independent		0.16** (0.08)	0.08 (0.08)	-0.10 (0.13)
Tenure		-0.0002 (0.003)	0.0003 (0.003)	0.002 (0.005)
Network		0.01* (0.01)	0.01* (0.01)	-0.002 (0.01)
Constant	0.17*** (0.02)	-0.46*** (0.11)	-0.36* (0.19)	-0.31 (0.21)
Year FE	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes
Industry FE	No	No	Yes	No
Control Group	US	US	US	US
Adjusted R ²	0.001978	0.04042	0.14	0.7696
N	3771	3771	3771	3771

Table 9: Female directors and board committees

This table details director characteristics related to committees on French boards before and after the quota law, by male and female directors. Panel A reports the statistics related to directors being a member of a board committee, and Panel B reports statistics on directors chairing a board committee. The sample includes French firms covered by BoardEx over the period 2008-2016. We deleted each observation with missing information. The appendix provides the definition of the variables.

Panel A : Chair	N	Mean	SD	Men	Women	Diff	t.stat
<i>Before 2010</i>							
E & S	2,272	0.01	0.12	0.02	0	0.02	5.70
Audit	2,272	0.07	0.25	0.07	0.03	0.04	3.15
Compensation	2,272	0.07	0.25	0.07	0.04	0.02	1.51
Nomination	2,272	0.06	0.23	0.06	0.06	0.004	0.21
<i>After 2010</i>							
E & S	7,523	0.02	0.15	0.02	0.03	-0.01	-1.99
Audit	7,523	0.07	0.26	0.08	0.05	0.03	4.88
Compensation	7,523	0.07	0.25	0.07	0.05	0.03	4.31
Nomination	7,523	0.06	0.24	0.06	0.05	0.02	2.68
Panel B : Members	N	Mean	SD	Men	Women	Diff	t.stat
<i>Before 2010</i>							
E & S	2,272	0.07	0.25	0.07	0.04	0.02	1.42
Audit	2,272	0.28	0.45	0.28	0.26	0.03	0.90
Compensation	2,272	0.26	0.44	0.27	0.20	0.07	2.24
Nomination	2,272	0.23	0.42	0.24	0.20	0.04	1.38
<i>After 2010</i>							
E & S	7,523	0.09	0.28	0.08	0.12	-0.04	-5.46
Audit	7,523	0.29	0.46	0.28	0.33	-0.05	-4.06
Compensation	7,523	0.27	0.44	0.28	0.26	0.02	1.82
Nomination	7,523	0.25	0.43	0.26	0.22	0.04	3.68

Table 11: Summary statistics of French directors' social characteristics

This table details French directors' social characteristics before and after the quota law, by male and female directors. The sample includes French firms covered by BoardEx over the period 2008-2016. The year 2010 is excluded. We deleted each observation with missing information. The appendix provides the definitions of the variables.

	N	Mean	SD	Men	Women	Diff	t.stat
Before 2010							
Exp.HR	2,272	0.02	0.14	0.02	0.06	-0.04	-2.52
Influential	2,272	0.35	0.48	0.36	0.27	0.09	2.67
Universities	2,272	0.09	0.29	0.09	0.10	-0.01	-0.64
Charities	2,272	0.01	0.11	0.01	0.02	-0.01	-0.87
Medical	2,272	0.005	0.07	0.003	0.02	-0.02	-1.71
Foreign	2,126	0.19	0.39	0.19	0.12	0.07	2.80
Family	2,272	0.05	0.21	0.04	0.08	-0.04	-1.90
Tenure	2,266	6.55	6.44	6.53	6.74	-0.21	-0.39
General.Interest	2,272	0.11	0.31	0.10	0.14	-0.04	-1.62
After 2010							
Exp.HR	7,523	0.03	0.17	0.02	0.06	-0.04	-7.18
Influential	7,523	0.33	0.47	0.34	0.32	0.02	1.31
Universities	7,523	0.09	0.28	0.08	0.11	-0.04	-4.65
Charities	7,523	0.01	0.10	0.01	0.02	-0.01	-1.95
Medical	7,523	0.005	0.07	0.002	0.01	-0.01	-3.83
Foreign	6,741	0.20	0.40	0.18	0.26	-0.08	-7.24
Family	7,523	0.07	0.25	0.07	0.05	0.03	4.35
Tenure	7,510	6.91	6.86	8.06	3.96	4.10	27.98
General.Interest	7,523	0.10	0.30	0.09	0.13	-0.05	-5.56

Table 12: Director social characteristics and ESG scores

This table reports OLS estimates of ESG scores on the average characteristics of directors on board and control variables. The sample includes all US, German and French firms covered by BoardEx and Vigeo-Eiris over the period 2008-2016. We deleted each observation with missing information and financial variables were trimmed at 1%. In columns 1-4, the dependent variable is the overall ESG score_{t+1}; in columns 5-8, the environmental score_{t+1}; in columns 9-12 the social score_{t+1}; and in columns 13-16, the governance score_{t+1}. All models include year fixed effects, country fixed effects and alternatively industry fixed effects or firm fixed effects. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%. The appendix provides the definitions of the variables.

	Overall _{t+1}				Environmental _{t+1}				Social _{t+1}				Governance _{t+1}			
Panel A : All firms																
Exp.RH	15.89*** (5.16)	-1.26 (5.15)	19.51** (8.72)	-3.82 (8.92)	15.39*** (5.30)	-3.10 (5.39)	17.66*** (5.71)	6.89 (6.87)								
General Interest		1.90 (1.92)	5.69*** (1.95)	7.76** (3.40)	11.97*** (3.94)	1.88 (2.15)	2.91 (2.19)							-2.86 (1.75)	3.75 (2.57)	
Adjusted R ²	0.5688 4823	0.8688 4823	0.8695 4823	0.8434 4823	0.5054 4823	0.8445 4823	0.6586 4823	0.8856 4823	0.2674 4823	0.6452 4823	0.2611 4823	0.6453 4823				
Panel B : Men directors > 85%																
Exp.RH	17.28* (9.30)	4.08 (8.56)	16.44 (14.95)	2.09 (11.60)	22.91*** (8.47)	2.07 (10.16)	18.26 (12.00)	9.74 (13.78)								
General Interest		-1.96 (2.81)	1.35 (3.57)	1.50 (4.66)	5.60 (7.37)	-3.31 (3.01)	-1.19 (3.73)							-3.43 (2.66)	-2.15 (5.25)	
Adjusted R ²	0.5355 2004	0.8779 2004	0.8778 2004	0.8466 2004	0.4691 2004	0.8468 2004	0.6324 2004	0.8929 2004	0.2987 2004	0.691 2004	0.2945 2004	0.6907 2004				
Panel A : All firms																
Out.trad.network	0.68*** (0.14)	-0.003 (0.17)	0.96*** (0.23)	-0.33 (0.24)	0.61*** (0.15)	0.14 (0.19)	0.57*** (0.15)	0.05 (0.20)								
Independent		7.11*** (1.93)	3.63 (2.55)	8.44*** (3.05)	4.47 (3.79)	5.30*** (1.98)	3.46 (2.86)							9.73*** (1.95)	5.30* (2.94)	
Adjusted R ²	0.5688 4823	0.8688 4823	0.8695 4823	0.8434 4823	0.5054 4823	0.8445 4823	0.6586 4823	0.8856 4823	0.2674 4823	0.6452 4823	0.2611 4823	0.6453 4823				
Panel B : Men directors > 85%																
Out.trad.network	0.71*** (0.21)	-0.07 (0.45)	0.87*** (0.33)	-0.71 (0.73)	0.56*** (0.21)	0.32 (0.43)	0.86*** (0.23)	-0.11 (0.52)								
Independent		7.05*** (2.14)	2.13 (3.33)	8.93** (3.76)	4.66 (4.64)	5.34** (2.18)	4.11 (4.09)							9.31*** (2.30)	1.14 (5.40)	
Adjusted R ²	0.5395 1890	0.8767 1890	0.8779 2004	0.8445 1890	0.4693 2004	0.8467 2004	0.6274 1890	0.8915 1890	0.6276 2004	0.318 1890	0.6881 1890	0.6908 2004				
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Firm FE	No	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	
Industry FE	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	No	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Table 13: The effect of the quota law on ESG scores ? propensity score matching

This table reports the OLS estimates of the treatment effects of the quota (postquota-treated) on ESG scores. The sample includes French firms, and alternatively US and German firms as controls, covered by BoardEx and Vigeo-Eiris over the period 2008-2016. The year 2010 is excluded. The ESG scores are the adjusted scores (excluding items related to gender, diversity and board). We deleted each observation with missing information and financial variables were trimmed at 1 %. In the fourth first (last) columns US (German) firms represent the control group. We match French firms and firms from our control groups in 2009 based on firm size, market to book, leverage, ROA, percentage of independent directors on the board, average time on board of directors and average board network. The post quota period begins in 2011. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1 %, ** 5 %, and * 10 %. The appendix provides the definition of the variables.

	Overall _{t,t+1}		Environmental _{t,t+1}		Social _{t,t+1}		Governance _{t,t+1}	
Postquota	4.39***	4.41***	2.96	8.16***	4.97***	3.95**	6.49***	2.53*
-treated	(0.93)	(1.42)	(1.85)	(2.23)	(1.17)	(1.67)	(1.10)	(1.47)
Treated	13.22***	23.71***	43.03***	2.45	31.59***	6.63***	-5.79***	2.90***
-treated	(1.58)	(0.72)	(1.39)	(3.30)	(1.74)	(2.37)	(1.40)	(1.96)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	No	Yes	No	No	No
Ind FE	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Cont Grp	US	Germany	US	Germany	US	Germany	US	Germany
Adjst R ²	0.5948	0.8907	0.8404	0.3456	0.9115	0.3541	0.2358	0.6244
N	1175	1175	1175	840	1175	840	1175	840