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Finance Working Paper N° 760/2021
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ECGI Working Paper Series in Finance

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Abstract

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Keywords: board of directors, gender quotas, gender diversity, critical mass theory, board committees, environmental and social committee, environmental and social performance, corporate social responsibility (CSR), director skills

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

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Women directors and E&S performance: Evidence from board gender quotas[1]

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1. Introduction

Investors are becoming increasingly attentive to environmental and social (E&S) concerns when making investment selections. Sustainable investments represent 35.9% of global assets under management at the end of 2020, a 55% increase from 2016 to 2020.[2] Investors may have a preference function that guides them toward E&S stocks and bonds but may also be aware of the positive impacts of E&S policies on firm value that prior literature documents. E&S policies can enhance firm value through a reduction in firm risk (El Ghoul et al. 2011, Oikonomou, Brooks and Pavelin, 2012, Albuquerque, Koskinen and Zhang, 2019), better access to financing (Cheng, Ioannou and Serafeim, 2014), higher resilience during crisis periods (Lins, Servaes et Tamayo, 2017, and Albuquerque et al, 2020), an increase in the number of analysts following the firm (Durand, Paugam and Stolowy, 2019), and higher postacquisition returns (Deng, Kang and Low, 2013). They can also increase a company's value because they meet the expectations of stakeholders, including customers (Servaes and Tamayo, 2013, and Dai, Liang and Ng, 2021), employees (Delmas and Pekovic, 2013, and Flammer and Luo, 2017) and suppliers (Schiller, 2017, and Cao, Liang and Zhan, 2019).[3]

While investors are increasingly emphasizing the importance of E&S issues, the actual implementation of E&S actions varies substantially across firms, raising questions regarding the

[2] Global Sustainable Investment Review 2020.

[3] A large stream of literature is focused on examining the impact of E&S on the firm performance. Most papers note that E&S ratings positively influence firm value. For a review of these papers, see, for example, Orlitzky, Schmidt and Rynes (2003), Margolis, Elfenbein and Walsh (2009) and Gillan, Koch and Starks (2021). In addition to the negative view of E&S expenses being seen as an agency cost, Benabou and Tirole (2010) discuss two views of E&S policies that are consistent with shareholder value maximization, where E&S policies represent either a response to stakeholder demands or the result of pressure from long-term socially responsible investors. In this paper, we do not examine the question of whether firms are attentive to the demands of shareholders or stakeholders. The two may be difficult to disentangle, particularly if investors choose companies whose value increases because they meet the E&S demands of stakeholders. We focus on the choice of board directors, which is a prerogative of shareholders.

means for investors to ensure that the companies in their portfolios are acting in accordance with their E&S expectations. Several mechanisms are available for investors to reduce companies' E&S risk exposure. Investors can directly engage with the management of the firms in which they invest to encourage them to reduce risks stemming from E&S characteristics (Hoepner et al., 2023, Dimson, Karakas and Li, 2018, Lins, Servaes and Tamayo, 2017). They can propose shareholder resolutions on E&S issues at general meetings (He, Kahraman, and Lowry, 2023) or require the integration of E&S criteria into executive compensation (Flammer, Hong and Minor, 2019). Transmitting the E&S message throughout the appointment of E&S-oriented directors on the board is the most immediate and direct way to drive shareholder favored orientations. The monitoring and advisory roles of directors in E&S fields can help improve E&S performance. Previous literature and several surveys underline a gender gap in how social and environmental issues are viewed and suggest that female directors have more E&S-related skills.[4]

In this paper, we test the hypothesis that appointing female directors enhances firms' E&S performance by taking the adoption of a board gender quota in France as a natural experiment. The quota law was adopted in January 2011 and required that 20% (40%) of the boards be composed of women by 2014 (2017). Relying on the implementation of a board gender quota in France allows us to overcome the endogeneity issue that could result from E&S-friendly firms electing women

[4] According to the PWC 2022 Annual Corporate Directors Survey, 66% of female directors say that reducing the impact of climate change is a priority even if it impacts short-term performance, compared to 45% of male directors. 65% of female directors are likely to see the link between E&S and strategy versus only 55% for male directors. Women are more personally concerned than men about climate change and are more willing to change their lifestyles to reduce the effects of climate change. https://www.pewresearch.org/fact-tank/2015/12/02/women-more-than-men-say-climate-change-will-harm-them-personally/. Women express greater concern over climate change than men (McCright, 2010). Women also appear to act more ethically than men (Franke, Crown, and Spake, 1997) and to be more transformational leaders, eliciting more trust and confidence from a firm's stakeholders (Eagly, Johannesen, and Van Engen, 2003). The presence of female directors increases corporate philanthropic contributions, probably because women more than men value the external stakeholder relationships that such donations allow (Marquis and Lee, 2013).

directors and women self-selecting into more E&S-oriented firms. The use of quotas, which force companies to recruit several women directors within a limited period, also enables us to build on the critical mass theory introduced by Kanter (1977), according to which women need to be added in sufficient proportion to counteract the effects of tokenism. The threshold of board diversity to positively impact performance is estimated at a minimum of 15% of members by Kanter (1977) or a minimum of three women by Konrad, Kramer and Erkut (2008) and Schwartz-Ziv (2017).

We employ a difference-in-differences estimation approach to explore changes in the E&S performance of French firms after the board gender quota implementation relative to firms unaffected by the quota law. Firms in other European countries would have been the most intuitive choice as a control group. However, over the target period, most European countries implemented board gender quotas (for example, 40%, 30%, and 33% in Spain, Netherlands, and Italy, respectively) or adopted soft laws (for example, goals of parity in the UK corporate governance code). Therefore, we consider two control groups that we believe remain comparable and unaffected by board diversity policies during the target period. First, we use a sample of US firms matched by their size, industry, and E&S score prior to the implementation of the quota law. Over the target period, the US represents the largest developed country with no quota for female directors on boards. Furthermore, the French and US boards have similar characteristics (Ferreira et al, 2018). However, because French regulations related to E&S may specifically affect the E&S performance of firms operating in France, we consider firms listed in Paris that are headquartered abroad and not subject to the quota law as an alternative control group. As the ESG ratings from different providers disagree substantially (Berg, Kölbel and Rigobon, 2022), we rely on two data providers to evaluate E&S performance: Asset 4 (Refinitiv) and Vigeo-Eiris (Moody's).

We find that after the introduction of the board gender quota in France, the E&S performance of French firms is significantly enhanced compared to both the US matched sample and the sample of firms listed in Paris that are not subject to the quota law. To control for time-invariant unobserved firm characteristics, we include firm fixed effects in our regressions, thereby ensuring that the omitted factors do not drive the results. We find an increase in the global E&S score and each of its components: environmental scores and social scores. Our results are both statistically and economically significant. Consistent with critical mass theory, our results confirm that it is indeed the addition of several women to a board that leads to an increase in E&S performance. The first steps of the quota law are those that allow companies to cross the critical threshold of the number of women on their boards, which enables them to influence E&S policies.

Subsequently, we explore the channels through which women on boards positively influence E&S performance. First, we find that the probability that a firm has an E&S committee[5] increases after the institution of the quota law. This law, by prompting firms to add women to boards, renders the establishment of an E&S committee more likely. Furthermore, the probability that women take part in and chair E&S committees also increases post quota. However, E&S committees are not the only channel through which the inclusion of women influences E&S performance, since even in the absence of an E&S committee, the presence of female directors enhances E&S performance. After the implementation of the board quota, the authority of the women on the board increases. Women are more often members of the main committees (audit, compensation, and nomination). These committees play a key role in terms of E&S. In particular,

[5] 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 refer to such committees as E&S committees. In all these cases, we refer to committees within the boards of directors.

the audit committee monitors the E&S disclosure and control, and the nomination committee oversees the screening in terms of expertise and skills related to E&S. If female directors are more oriented toward E&S policies, their increased power in board committees enables them to promote these policies. Our findings suggest that the implementation of the board quota law enabled women to reach a critical mass on boards and to enhance their monitoring and advising role in E&S matters. Overall, boards become more E&S oriented, whether the decisions are instructed in an E&S committee or directly discussed at either the board level or in the main committees.

Our next question relates to the characteristics that lead women directors to be more E&S friendly. In our main regressions, we control for independence, age, tenure, and network. Female directors more frequently have diverse careers and experiences in organizations that are not solely business oriented (Hillman, Cannella, and Harris, 2002, Laufer et al. 2003). Female directors are more likely to possess skills in human resources and sustainability that are often lacking on boards (Kim and Starks, 2016).[6] From a consumer perspective, Brough et al. (2016) highlight a green-feminine stereotype that may cause men to avoid green behaviors as a threat to their gender identity, which may explain the overrepresentation of women in environment-related activities. The arrival of several women helps create a new balance on the board and overcomes the possible male reluctance to initiate E&S policies. To proxy for these E&S dimensions, we consider directors' experience in positions related to E&S issues, such as sustainability managers or human resources managers, as well as their prior experience on board E&S committees. We also measure the length of the experience as the number of years during which the director held positions related to E&S activities. We find that female directors have significantly more E&S experience than male

[6] Adams, Akyol and Verwijmeren (2018) find that 1.6% of the directors of their sample (US firms, 2010-2013) have sustainability skills, but they do not provide this percentage by gender.

directors, and their experience spans a longer period. Our findings suggest that once they join boards, female directors' prior experience increases boards' overall expertise in E&S issues and enables them to steer firms toward more E&S-oriented policies. Our findings indicate that the E&S performance of boards, where E&S expertise was weak prior to the quota law, see the most benefit from the arrival of female directors. Board gender quotas enable women to act with more authority, enabling them to assert their E&S priorities.

Our paper contributes to several lines of research. First, this research is related to the literature examining the relationship between gender diversity and E&S performance. Firms with greater board gender diversity have higher environmental performance (Francoeur et al. 2019, Dyck et al. 2023), use more renewable energy (Atif et al., 2021), and are less frequently sued for environmental infringements (Liu, 2018). Altunbas et al. (2022) find that firms with more female managers reduce their carbon emissions, especially after the Paris Agreement. Cronqvist and Yu (2017) even find that male executives partially internalize their daughters' experiences and values, with an effect on E&S ratings being approximately one-third that of an executive being female. Considering the introduction of board quotas in France in 2011 as a natural experiment allows us to test the impact of female directors on E&S performance.

Second, this research also contributes to the literature highlighting that a critical mass of women on boards exerts tangible effects on boardroom dynamics and corporate decision-making. In addition to the seminal article by Kanter (1977), it thus complements other results showing that a critical mass of women on boards increases both board activity and the likelihood of replacing underperforming CEOs (Schwartz-Ziv, 2017), affects renewable energy consumption (Atif et al. 2021), allows female directors to be more informed (Mobbs, Tan and Zhang, 2021), decreases bank misconduct (Arnaboldi et al, 2021), increases acquirer gains in banking sector M&A transactions

(Tampakoudis et al, 2022), and enhances the level of organizational innovation (Torchia, Calabro and Huse, 2011). Our results show that the implementation of quotas enables boards to rapidly reach a critical mass of women and to benefit from their greater experience in E&S issues to increase E&S performance.

Third, our paper extends the existing work that explores women's roles on board committees. We find that quotas increase women's likelihood of holding key positions on the board, which resonates with the findings of papers showing that once the emphasis is placed on greater board gender diversity, the role of women on committees increases (Gormley et al, 2023, after the Big Three gender diversity campaign, Kedia and Pareek, 2023, after electoral wins by women candidates, and Giannetti and Wang, 2023, after heightened public attention to gender equality). However, while women's power has increased post quota, they are still less often committee chairpersons (except the E&S committee), which is in line with Field, Souther and Yore's (2020) results. Our paper also contributes to the analysis of board structure, since we show that the quota law, by prompting firms to add women to the board, causes firms to create E&S committees. Only a few researchers have focused on E&S committees, with most of them reporting a positive effect of these committees on E&S performance (Eccles, Ioannou, and Serafeim, 2014, Walls, Berrone and Phan, 2012, Burke, Hoitash, and Hoitash, 2019).

Finally, our paper is related to a strand of research that explores the consequences of gender quotas on director characteristics and skills in different institutional settings: Norway (Ahern and Dittmar, 2012, Matsa and Miller, 2013), France (Ferreira et al, 2018), and more recently, California (Greene, Intintoli and Kahle, 2020, Hwang, Simintzi, and Shivdasani, 2021, and von Meyerinck et al, 2022). Most of these articles show that implementing quotas does not lower the quality of boards because the supply of skilled female directors is sufficient to meet the demand without affecting

quality. Our paper highlights the fact that women bring specific E&S skills to the board, which are characteristics often overlooked in the extant quota literature. These skills enable the firm to increase its E&S performance. Our results also suggest a potential reason why some major asset managers (The Big Three) have called on US companies to recruit more female directors since 2017, leading to a sharp increase in board gender diversity in subsequent years. Notably, Gormley et al. (2023) conclude that the motives underlying The Big Three's activism are worthy topics for future research. Seeking increased E&S performance may be an answer insofar as we show that female directors contribute to enhancing E&S performance, which investors increasingly consider a key factor in their long-term performance.

The remaining paper is structured as follows. Section 2 describes the institutional context of board quotas. Section 3 presents the considered dataset and variables. Section 4 describes the analysis of the empirical results, and section 5 presents the concluding remarks.

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, with that proportion increasing to 40% on January 1, 2017. The quota applies to all board members, insiders, and outsiders, aside from 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 three legal forms for listed companies, namely, Sociétés Anonymes (limited liability corporations), Commandites par actions (limited partnerships), and Societas Europaea (the

European company statutes) are subject to this law. 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. The quota law does not apply to companies that are not headquartered in France. Therefore, our first control group includes firms listed in Paris but headquartered outside France, involving French and foreign firms.

2.2. Board gender quotas in Europe

The issue of quotas on 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 are female, which was implemented in 2008. Furthermore, several European countries have adopted regulations regarding women on boards (Italy, Spain, Netherlands, Belgium, Austria). Germany, which was initially reluctant to adopt quotas, finally adopted a law establishing a quota of 30% effective in 2016 for the 100 largest listed companies. As most German firms have a dual board, quotas apply to supervisory boards. Soft laws are also frequently adopted; corporate governance codes recommend a goal of equal gender representation on boards in Luxembourg, the UK, and Sweden. On November 14, 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 by 2020. After being blocked in the Council for a decade, this directive was adopted in November 2022 and will enter into force starting in 2026.

2.3. Board gender quotas in the US.

No quota for female directors existed 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 that all companies headquartered in the state have at least one female director by the end of 2019. Moreover, the law requires that by the end of 2021, all firms with a board of four members or fewer have at least one female director, and those firms with a board of five (six or more) members are required to have two (three) female directors. However, a Californian court invalidated this gender quota in May 2022. As US firms are not subject to quotas over our sample period, our second control group is composed of US firms that have been matched to French firms by size, E&S scores, and industry before the implementation of the quota law. Figure 1 shows the annual average percentage of female directors for French firms, US firms, and our control groups comprising matched US firms and firms listed in Paris but headquartered abroad.

3. Data

3.1. E&S data

To evaluate E&S performance, we consider two databases: the Asset 4 (Refinitiv) and the Vigeo-Eiris (Moody's) database. Examining the impact of the introduction of quotas in France requires the E&S scores of French companies before 2010. Unfortunately, several ESG data providers offer limited coverage for France prior to 2012. For example, the coverage of the RobecoSAM databases for companies in our sample does not start until 2010, depriving us of a

prequota period. The ESG data from MSCI are characterized by major changes between 2011 and 2012 (from KLD to MSCI ESG). Consequently, these two databases are not usable in our study, and we select the Asset 4 and Vigeo-Eiris datasets, which offer reasonably high coverage for French firms around the board gender quota law.

Asset 4 database

In 2020, the Asset 4 database covered 70% of the global market cap, resulting in more than 9,000 companies included in the leading equity indices, such as S&P 500, DJ STOXX, FTSE 250, or CAC 40. Asset 4 ESG scores rely on the screening of each company by more than 150 research analysts across 450 ESG data points, using publicly available and verifiable data such as annual reports, CSR reports, company websites, or NGO websites. Among these 450 metrics, which can be either categorical or continuous (e.g., for the workforce category, the metrics can be a dummy for the existence of a training policy or the average training hours), the 186 most relevant and comparable data points are compiled into ten categories. Prior to the compilation, the value of each ESG data point is converted into a percentile score depending on other companies within the industry. Thus, the best and worst companies have scores of one and zero, respectively. Next, the scores of the ten subthemes are obtained by adding the pertinent percentile scores for the category. This sum is converted into a percentile score by using the same approach as that for the data points. The categories include resource use, emissions, innovation, workforce, human rights, community, product responsibility, management, shareholders, and CSR strategy. Finally, the category scores are organized into three pillars (environment, social, and governance) and aggregated by a weighted average using industry-dependent weights (e.g., if a category is more important for a given industry, it is assigned a higher weight). The final ESG score, ranging from 0 to 100,

represents the relative average of the category scores. Furthermore, Asset 4 provides ESG ratings based on ESG scores, with each grade being assigned according to a range of scores. In this study, we focus only on continuous scores.

To construct our environmental, social, and E&S scores, we follow several steps. First, to avoid any mechanical correlation between the women directors and E&S scores, we generate E&S scores that are free of any gender or female-related measures (e.g., the gender pay gap percentage or number of women employees). Due to the granularity of the data provided by Asset 4, we can locate all the gender-based measures and generate category scores without any of these measures, thereby obtaining a social and an E&S score unaffected by gender-based items. Second, as there is no academic reason to retain the weight provided by Asset 4, rather than aggregating the relevant category scores into the social or environmental pillar score by a weighted average, we assign the same weight to each category. Following Cheng, Ioannou, and Serafeim, 2014, our E&S score is the equally weighted average of the social and environmental scores.

Vigeo-Eiris database

Vigeo-Eiris is the leading ESG rating agency in Europe.[7] In 2019, Vigeo-Eiris covered 3853 firms globally (1488 in Europe and 1226 in North 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 Organization for Economic Cooperation and Development (OECD). The Vigeo-Eiris ratings cover six broad dimensions: human rights, human resources, business behavior toward customers and

[7] The Vigeo-Eiris database has been used by Ferrell, Liang and Renneboog (2016) and Eccles and Stroehle (2018), among other researchers.

suppliers, corporate governance, environment, and community involvement. These dimensions are further divided 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 three pillars of questioning (leadership, implementation, and results) and nine dimensions of analysis (visibility, exhaustiveness, ownership, allocated resources, coverage, scope, indicators, stakeholder feedback, and controversy management) to form the final score based on a scale of 0 to 100. The 38 ESG scores are used to compute the corresponding ESG scores (environmental, social, and governance) through 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 a rating, defined as a Z score, which measures how far the 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 this paper, we rely on continuous scores.

Finally, as in the case of Asset 4, our question of the impact of female directors on ESG performance can generate mechanical correlations if the E&S scores consider the criteria related to diversity. Vigeo-Eiris granted us access to the detailed proprietary dataset, which enabled us to compute an adjusted score for the social score and E&S score by excluding all items linked to diversity and gender. Furthermore, as implemented in the case of Asset 4, and to make the results more comparable across the two databases, we compute equally weighted social, environmental, and E&S scores.

The two ESG data providers differ in several aspects. Asset 4 was created and designed by a financial data provider: Thomson Reuters. The adopted best-in-class method, which is focused

on institutional investors and asset managers, is both pragmatic and quantitative. In contrast, the Vigeo-Eiris database was born from the merger of a foundation created by churches and charities (EIRIS) and the first French socially responsible investing (SRI) rating agency created by the former secretary-general of a French labor union. Vigeo-Eiris is more heavily focused on stakeholders, and its approach is more qualitative. The use of these two databases allows us to test our results on the two main types of ESG data providers: values-based (Vigeo-Eiris) and value-based (Asset 4) (Eccles and Stroehle, 2018).

3.2. Financial data and matching procedure

Separate matched samples for the US and headquartered abroad groups are built according to the availability of E&S ratings. In each sample, we provide summary statistics for the French and the control subgroups. We obtain information regarding boards and directors (gender, tenure, age, education, role, and employment) from the Management Diagnostic's BoardEx database and financial and accounting data from Compustat. We select nonfinancial firms for the US and France and firms listed in Paris in 2010 or 2011 and headquartered abroad. We obtain a total of 33,990 firm-year observations from 5,364 firms over the period 2007–2016. After the merger with Asset 4 (Vigeo-Eiris) and after removing all observations with missing values, we obtain a total of 8,093 (3,965) firm-year observations and 1,589 firms (700). We match each French firm to a US firm, year by year, in 2007, 2008, and 2009, through propensity score matching based on three criteria: E&S score, size, and industry. The nearest neighbor method is adopted. For the years after 2009, we retain only the firms matched in 2009. We obtain 659 (687) and 654 (709) firm-years for the US and France, respectively. The French sample is composed of two parts: a sample matched with the US sample, which represents 654 (709) firm-years and is used as the treatment group with the

US matched sample, and a total sample of 718 (828), which is used as the treatment group with the headquarters abroad sample.

3.3. Descriptive statistics

Table 1 reports the summary statistics regarding firm-year observations for France and the US, the matched US firms and the headquarters abroad sample over the period 2007–2016. Panels A and B report the statistics for the samples covered by Asset 4 and Vigeo-Eiris, respectively. Due to the requirement for coverage by Asset 4 or Vigeo-Eiris, our sample constitutes large companies. The financial characteristics (size, profitability, and leverage) of the firms in the treated and control groups are similar, except that the market-to-book ratio is higher for US firms. French boards are, on average, less independent (48%) than US boards (81%) and headquarters abroad boards (68%). Over the entire period, the percentage of female directors is 21% in France, compared to 17% in the US and 16% in the headquarters abroad sample. However, as shown in Figure 1, the trend differs between France and the control groups. On average, the percentage of female directors in France is 10% and 28% before and after 2010, respectively (Asset 4 sample). Moreover, the director characteristics in the three countries under consideration are similar. Time on the board is longer for US directors, who are also older than French and headquarters abroad directors (63 compared to 59 and 61).

Our matching procedure between French and US firms uses E&S scores in addition to the size and industry. The Asset 4 sample corresponds to similar grades for French firms and US firms, whereas the firms listed in Paris and headquartered abroad exhibit higher E&S scores. In contrast, as the average Vigeo E&S scores are significantly lower for US firms than for French firms and Vigeo's coverage of US companies prior to 2010 was limited even after the matching procedure,

the E&S scores of US firms remain lower than those of French firms. In contrast, on average, the Vigeo scores are similar for French firms and for firms listed in Paris but headquartered abroad. In summary, the matching quality of French/US companies is better for the Asset4 data sample, while foreign-headquartered companies are more comparable to French companies in the Vigeo data sample.

4. Empirical results

4.1. Gender quota effects on the E&S scores

Examining the relationship between the percentage of women on boards and E&S performance is challenging because of the endogenous matching of firms and directors. On the demand side, firms choose directors who exemplify their values and goals; for example, firms with greater concern for E&S issues and larger and more profitable firms are both 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 E&S issues, they prefer to sit on boards of firms with developed E&S cultures. In either case, the correlation between women's representation and the E&S scores of the firm does not result from a real effect of the presence of women but rather from a match between E&S-concerned directors and E&S-concerned firms. To address these concerns, we take the French Copé–Zimmerman law, which introduces a gender quota on French boards, as a natural experiment. As the law applies to all French listed companies, all companies face the requirement to hire female directors, regardless of the firm's E&S culture, thus allowing us to measure the real impact of female directors on the E&S scores.

We consider a difference-in-differences methodology and run the following regression:

$$E\&S\ score_{i,t+1} = \alpha + \beta\ Treated*Postquota_{i,t} + \gamma Y_{i,t} + \Delta + e_{i,t} \quad (1)$$

We use, as independent variables, the overall adjusted E&S score and decompose this score into environmental and social scores (without items linked to diversity and gender). We add a lead by one year on E&S scores. Modifying the production processes may take longer than one year. However, some environmental policy choices can have relatively rapid effects, such as waste management, reduced paper and plastic use, energy savings, or switching to a green electricity supplier. Some social decisions can also be implemented in the short term, such as a responsible number of working hours or the introduction of employee participation. Philanthropy may also be quick to implement.

To avoid the bias resulting from several companies anticipating the law, we exclude the year 2010. Our posttreatment period variable is a dummy that equals one for all years from 2011 to 2016 and 0 otherwise. The treated dummy equals one for French firms and zero for firms in our control groups. The interaction between the posttreatment dummy and the treated dummy yields the effect of the quotas on the E&S performance. $Y_{i,t}$ are a set of firm-level control variables in year t, and Δ are year and firm fixed effects. For firm-level control variables, we consider the firm size, market to book, leverage, ROA, percentage of independent directors on the board, average time on board of directors, average board network (average number of years on other boards of listed firms in which the directors sit) and average director age. We cluster standard errors at the firm level. β is equal to the change in the E&S ratings for French firms relative to firms belonging to the control groups (either US matched firms or firms listed in France but headquartered abroad) following the quota law. The captured effect indicates the impact of being a French firm after the quota law while controlling for the firms' characteristics and year and firm fixed effects.

To assess the plausibility of the parallel trends assumption, we graphically examine the E&S ratings for firms in the control groups and treatment group (France). We run the following regression:

$$\text{E\&S scores}_{i,t} = \alpha + \sum_{t=2007}^{2016} \beta_t \cdot \text{Treated}_{i,t} \times 1[\text{Year} = t] + \Delta + e_{i,t} \qquad (2)$$

where Δ represents the year and firm fixed effects. We obtain a treatment effect in each period in our sample to assess whether the parallel trend assumption is violated. All the treatment effects are relative to 2007. Figure 2a shows the results of this regression examining the impact on E&S scores of being a French firm compared to the US matched firms. The solid line curve indicates the coefficient estimates, and the dotted lines are the bands of a 95% confidence interval around these estimates. The treatment effect is not significantly different from zero in the prequota period and becomes significantly positive after the quota law implementation. Figure 2b highlights similar results for the control group of firms listed in Paris and headquartered abroad. These figures provide reasonable evidence that the parallel trend hypothesis is satisfied.

Table 2 reports the results of the difference-in-differences regressions for the overall score (columns 1 to 4), environmental score (columns 5 to 8), and social score (columns 9 to 12). We use the Asset 4 and Vigeo scores alternately. The results displayed in columns 1, 3, 5, 7, 9, and 11 and columns 2, 4, 6, 8, 10, and 12 correspond to the use of US firms and the firms headquartered abroad control group, respectively. Larger firms exhibit higher E&S performance. After the quota law, the E&S performance of French firms, evaluated using the overall score, significantly increases, regardless of whether the US or headquartered abroad firms are used as the control group. The results are similar when considering environmental and social scores for both Asset 4 and Vigeo scores.

In the internet Appendix, Table IA1, we replicate these tests using the sample of French firms alone. The results are similar to those established through the matched samples and show that the E&S performance of French firms increases after the introduction of the quota of women on boards.

As an additional test, we also report in the internet Appendix, Table IA2, the basic relationship between the percentage of female directors on the board and firms' E&S scores using the following specification:

$$\text{E\&S score}_{i,t+1} = \alpha + \beta X_{i,t} + \gamma Y_{i,t} + \Delta + e_{i,t} \qquad (3)$$

where $X_{i,t}$ 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 and firm fixed effects. The firm-level control variables are the same as those in equation (1). Columns 1, 3, and 5 reflect Asset4 scores, and columns 2, 4 and 6 reflect Vigeo scores. We find a positive impact of the percentage of female directors on the board for the following year's E&S performance as measured by the overall score and each of its components.

4.2. E&S scores and the critical mass theory

To analyze in greater detail how adding women to the board increases E&S scores, we conduct several tests of the critical mass theory. First, Figure 3 shows the dynamic treatment effects on E&S scores before and after the firm crosses a certain threshold of women on its board. We first examine the impact on E&S performance of moving from an all-male board to a board with one or more women (threshold of 0) and then the impact of moving to a critical number of women. To approximate this number, we use a threshold of 15% of the board, as suggested by Kanter (1977)

to avoid tokenism, which represents 2 or 3 women depending on the size of the board. Figure 3a shows the estimate once the firm starts recruiting women (threshold of 0% and less than 15% of the board), and Figure 3b shows the results for firms crossing the threshold of 15% women on their boards. Figure 3c shows similar results for the sample of French firms alone. The results highlight a significant increase in E&S scores after crossing the 15% threshold but not after the firm starts recruiting women, suggesting that the presence of women only has an impact when there are several of them on the board. These findings thus support the notion of a critical mass that enables an effective impact of women on boards. Given these results, a fortiori, the first threshold of the law, which is 20% of the board, should allow us to observe significant effects on E&S performance.

The previous test highlights the impact of a threshold crossing in the proportion of women on the board. In an additional test, we examine the impact of the arrival of several women on the board. Table IA3 reports the results. We start with companies that have no women on the board at the beginning of our study period and examine the impact of adding one, two or three women to the board (Table IA3, columns 1 to 3). In columns 4 to 6, the addition of women corresponds to the net increase in the number of women on the board; i.e., it considers arrivals and departures upon at least one woman being appointed to the board. We find that the addition of a single woman in a given year does not change the E&S score of the following year but rather the score increases as soon as a second woman is added (when considering the net increase), and the E&S score increase is even larger when a third woman joins the board (Table IA3, column 6). Furthermore, we also test the crossing of the 0 and 15% thresholds of women on boards (columns 7 and 8) and find that E&S scores significantly increase after the crossing of the 15% threshold. These results are consistent with the previous results, showing that it is the addition of several women to boards that has a positive effect on firm E&S performance.

4.3. Board quotas and E&S committees

We explore the channels through which female directors can enhance E&S performance. The first channel is the probability of having an E&S committee. We use detailed data on committees available in the Boardex database. We classify all committees with denominations related to environmental and social issues (for example, "safety, health and environmental affairs," "sustainability" or "ethics, environmental and social") as E&S committees. Figure 4 shows the average percentage of firms with E&S committees in France, the US total sample, the US matched group and the group headquartered abroad over 2008–2016. After the quota law, the percentage of French firms with an E&S committee increased, whereas the control group firms did not exhibit notable changes in the E&S committees.[8]

To confirm this observation, we perform 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 and firm fixed effects, and the standard errors are robust and clustered by firm. Alternately, we perform a probit regression. Firm-level control variables are the same as those in equation (1). Table 3 reports our results. Large firms are more likely to have an E&S committee. For both E&S scores and the two control groups, the probability of having an E&S committee significantly increases after the institution of the gender quota. Therefore, in addition to increasing the percentage of female directors, gender quotas also influence the board structure, as they induce firms to create E&S committees. In internet

[8] The percentage of firms with E&S committees in the United States is stable over time at approximately 20% and is higher in the sample of matched US firms. The fact that the criterion of E&S scores before the quota was used in the matching procedure causes an overselection among US companies toward companies with pro-E&S policies (compared to average US companies), which more frequently have E&S committees.

Appendix Table IA4, we replicate these tests on the sample of French firms alone. The results are similar to those found on the matched samples and show that the likelihood that French firms create an E&S committee increases after the introduction of the quota of women on boards.

To confirm our results from a dynamic perspective and to ensure that it is the addition of women rather than any other reasons that explains the creation of an E&S committee, Figures 3d and 3e show the dynamic treatment effects on the likelihood of having an E&S committee before and after the firm crosses a certain threshold (0% and 15%) of women on its board. Figure 3e shows that crossing the 15% threshold leads to a significant increase in the likelihood of having an E&S committee, which is not observed when firms move from an all-male board to a board with at least one woman (Figure 3d). Figure 3f shows similar results for the sample of French firms alone. The 2011 gender quota law was precisely the event that led firms to recruit several women to their boards after 2011.

Figure 5 shows that the percentage of female directors sitting on E&S committees in France significantly increases after 2010, more than the percentage of female directors sitting on other committees. Internet Appendix Table IA5 provides descriptive statistics on committee membership at the director-year level for France and compares the proportion of men and women before and after 2010 for both Asset 4 and Vigeo-Eiris samples. The results confirm that women sit more frequently on E&S committees after 2010. The increase in female directors on E&S committees stems from the increase in the number of E&S committees but also from the proportion of female directors on each committee. Before 2010, 5% of male and female directors were E&S committee members. After 2010, 8% of male directors and 14% of female directors were E&S committee members. The proportion of female directors who are members of audit committees increases from 27% to 34% (Asset 4) and from 25% to 33% (Vigeo). Furthermore, after 2010, female directors

more often serve as the chairs of E&S committees than male directors. The regression results reported in Table 4 for the Asset 4 sample underline that the quota law significantly increases the likelihood that a woman chairs the E&S committee (columns 1 to 4) and the percentage of women on the main committees (columns 5 and 6). Table IA6 reports similar results for the Vigeo sample. These results highlight that women are assigned significant responsibilities on boards after the quota law, which has given more power to women and enabled them to better assert their priorities.

Our next question is aimed at understanding whether the effect of women on E&S performance occurs exclusively through the E&S committee or whether it can also occur in the absence of such a committee. It is challenging to separate the committee effect from the women's effect, as the quota increases the likelihood of setting up an E&S committee. Therefore, we examine the impact of the quota law on firms without an E&S committee during the period of 2007–2016. We rerun our regressions corresponding to specification (1) on the subsample of firms without an E&S committee. Internet Appendix, Table IA7 reports the obtained results. The E&S performance significantly increases after the quota law, even for firms without an E&S committee. These results suggest that the finding that the E&S performance is enhanced after the gender quota law is driven by the increase in the number of female directors and not simply by the increased number of E&S committees following the implementation of the gender quota. If the mission of an E&S committee is to oversee the entire E&S strategy of the company, the other committees also have important roles to play. The audit committee monitors E&S disclosure and control, the compensation committee oversees the E&S criteria integration into executive compensation plans, and the nomination committee oversees the screening in terms of expertise and skills related to E&S. The fact that women are on these committees in greater numbers enables them to influence corporate

decisions towards their priorities. If women are more oriented toward E&S policies, the quota law increases their power within the board, thus enabling them to promote these policies.

4.4. Board quotas and director characteristics

To explain the influence of female directors on E&S policies, we examine director characteristics, especially those that may be related to E&S. We define two main variables: E&S experience and the length of this experience. We define the variable E&S experience as a dummy that is equal to one when a director held a position related to environmental and social issues, such as a sustainability manager or a human resources manager or a prior position on a board's E&S committees, and to zero otherwise. The experience acquired by women in their previous positions benefits firms that appoint them to the position of director, thus representing a transfer of E&S expertise between firms. Table 5 reports the descriptive statistics at the director-year level of French directors before and after 2010 for the Asset4 sample (Panel A) and the Vigeo sample (Panel B). As highlighted at the board level, female directors are more independent, younger, and have smaller networks than male directors. Female directors have significantly more E&S experience than male directors both before and after the quota law. Furthermore, women's E&S experience is also longer than men's experience, especially after the implementation of the quota law.

We confirm these results using a regression on a sample of director-year observations to show that even when controlling for other director characteristics, women have more E&S experience (Table 6, columns 1 to 4), and their experience spans a longer period (Table 6, columns 5 to 8). As a result, the E&S experience of the board as a whole increases after the implementation of the law due to the addition of women who have more experience in this area, as the results reported in the internet Appendix, Table IA8, show. We find that after the implementation of the

quota law, the average percentage of directors with E&S experience increases for the entire board (Table IA8, columns 1 to 4) and increases even more for the subsample including the more powerful directors who are members or chairs of committees (Table IA8, columns 5 to 8). Using director-level tests, we find that directors with E&S experience increase the likelihood of the firm establishing an E&S committee (Table 7, columns 1 and 2), are more likely to be members of the E&S committee (Table 7, columns 3 and 4) and are more likely to chair the E&S committee (Table 7, columns 5 and 6).

If their prior E&S experience is the main explanation for the impact on the E&S performance of women on the board, then boards that already had this type of expertise before the quota law should be little impacted by the law. We test this prediction by separating our sample into two subsamples based on the E&S expertise of the board before the law. The first subsample includes companies with less than 10% of directors with E&S expertise in 2009, and the second includes companies with more than 10% of directors with E&S expertise. We rerun our regressions using specification (1) on both subsamples. Table 8 reports the results. We find that when the company's board has little past E&S experience, the effect of the quota law strongly and significantly increases E&S scores in all data configurations and control samples (Table 8, columns 1 to 4). On the other hand, when the board already has E&S experience, the addition of women no longer exerts a significant effect on E&S scores in most cases (Table 8, columns 5 to 8).

Overall, our findings suggest that prior to joining the board, female directors have more E&S experience, which makes them more likely to support E&S policies. The quota law increases the number of female directors on boards and assigns them more power, which they can use to pursue their E&S priorities.

4.5. Robustness checks

In our main tests, we use two control groups for our difference-in-differences analysis. As a robustness check, we re-estimate our model specification (1) on the total US firm sample (instead of a matched sample). The coefficient of our postquota treated variable remains significantly positive and similar to the coefficient pertaining to the matched US sample. As an alternative control group, we build a culturally related sample comprising foreign firms with either a French CEO or at least 10% French directors, directors who have studied in France, or directors who have worked for at least 3 years in France. Social and environmental concerns are deeply rooted in French culture.[9] When run by French people, foreign companies not subjected to quota laws may be more likely to be aware of E&S issues. Our findings confirm the positive impact of female directors on E&S performance. Currently, our sample covers the period ranging from 3 years before the quota law to 6 years after. Unfortunately, the E&S and board data do not cover sufficient French companies prior to 2009, and we cannot extend the prequota period. To balance the sample pre- and postquota, we rerun our tests on a sample covering the period of 3 years before to 3 years after the quota, and our results remain qualitatively similar. French companies can choose between unitary boards and dual boards (Belot et al, 2014). As gender quotas apply to supervisory boards but not to management boards, companies could opt for a supervisory board to maintain an all-male management board. We verify that no firm in our sample switched its board structure to a dual board after the gender quota law was implemented. Finally, we conduct a placebo analysis by running the same regressions over the period 2007–2009, assuming that the exogenous change

[9] Social rights have been recognized in France since the 1946 constitution (Herrera, 2009). Environmental concerns have existed for a long time in France, with developed ecological movements and a Ministry of the Environment as early as 1970. In 2005, the environment charter was included in the constitution.

(quota law) occurred in 2008 (pseudoevent year). The coefficient on the variable "postquota*treated" is never significantly different from zero in this placebo analysis.

5. Conclusion

We analyze the impact of female directors on firms' E&S performance. We take the 2011 French law introducing a mandatory board gender quota for all French firms as a natural experiment. We find that after the introduction of the quota, the E&S performance of French firms is enhanced. We investigate several channels to explain our results. After the quota, firms are more likely to establish an E&S committee, and female directors are more likely to sit on this committee and chair it. However, the E&S committee is not the only channel to increase E&S, as E&S scores increase after the quota law even for firms without an E&S committee over the entire period. After the quota law, women increasingly serve as members of major committees and wield greater power on the board. Prior to joining a board, women are more likely than men to have experience in E&S positions. After the implementation of the quota and the appointment of several women on a board, the E&S expertise of that board increases, and the resulting decisions enhance firm E&S performance. The quota law empowers female directors and enables them to promote their priorities, such as E&S policies.

Appendix: Variable definitions

Variable names	Definition
Firm characteristics	*Source: Compustat*
Size	Logarithm of total assets in millions of Euros
Market.to.Book	Market value of the equity divided by book value of the equity
Leverage	Long-term debt divided by total assets
ROA	Net income divided by total assets of the previous year
Board characteristics	*Source: Boardex*
Women	Percentage of women on the board
Boardsize	Number of directors on the board
Independent	Percentage of independent directors on the board
Tenure	Average time of directors on the board
Network	Average time that directors sit on the board of other listed companies
Age	Average age of directors sitting on the board
E&S committee	Dummy equal to one if the firm has an E&S committee
First (Second, Third)Woman	Dummy equal to one if the first (second, third) woman joins the board
Pc.Prev.ES.EXP	Percentage of directors with E&S experience
Board committees	*Source: Boardex*
Committee chairwoman	Dummy equal to one if the chairperson of the committee is a woman
Percentage of women members	Percentage of women sitting on the committee
Pc.Prev.ES.EXP.HJ	Percentage of directors members or chairs of committees with E&S experience
E&S members	Dummy equal to one if the director is a member of an E&S committee
Audit members	Dummy equal to one if the director is a member of an audit committee
Compensation members	Dummy equal to one if the director is a member of a compensation committee
Nomination members	Dummy equal to one if the director is a member of a nomination committee
E&S chairperson	Dummy equal to one if the director is the chairperson of an E&S committee
Audit chairperson	Dummy equal to one if the director is the chairperson of an audit committee
Compensation chairperson	Dummy equal to one if the director is the chairperson of a compensation committee
Nomination chairperson	Dummy equal to one if the director is the chairperson of a nomination committee
Director characteristics	*Source: Boardex*
Prev.ES.Exp	Dummy equal to one when a director held a position related to environmental and social issues, such as sustainability or human resources manager, or held a prior position on board E&S committees
Nbyear.ES.Exp	Number of years of E&S experience of the director
E&S variables	*Source: Vigeo-Eiris/Asset 4*
E&S.Score	Equiweighted average of the environmental and social scores free from any diversity measure
Social.Score	Equiweighted social score free from any diversity measure
Env.Score	Equiweighted environmental score

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Figure 1: Average percentage of female directors in France.

This Figure shows the annual average percentage of female directors in French firms and our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. The sample includes all firms covered by BoardEx and Asset4 over the period 2008-2016.

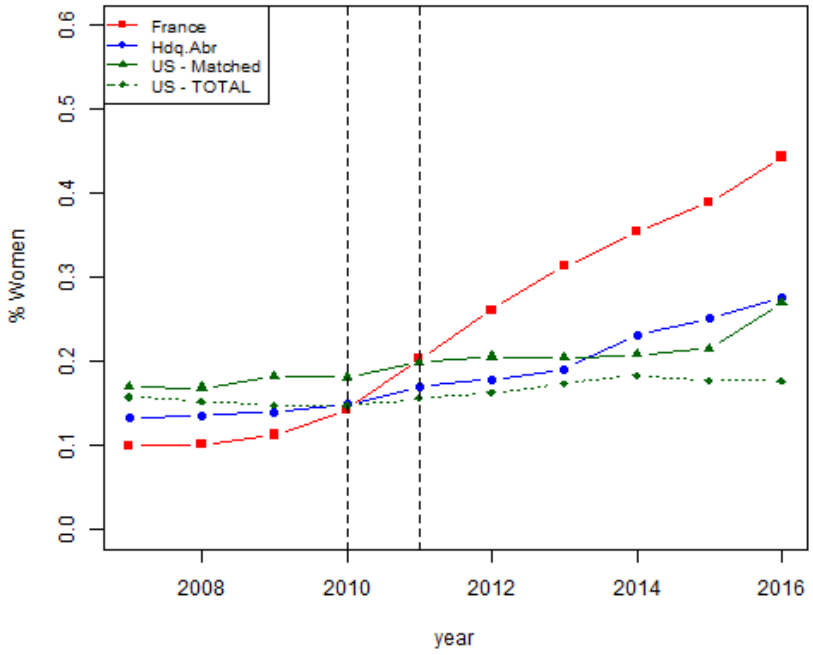
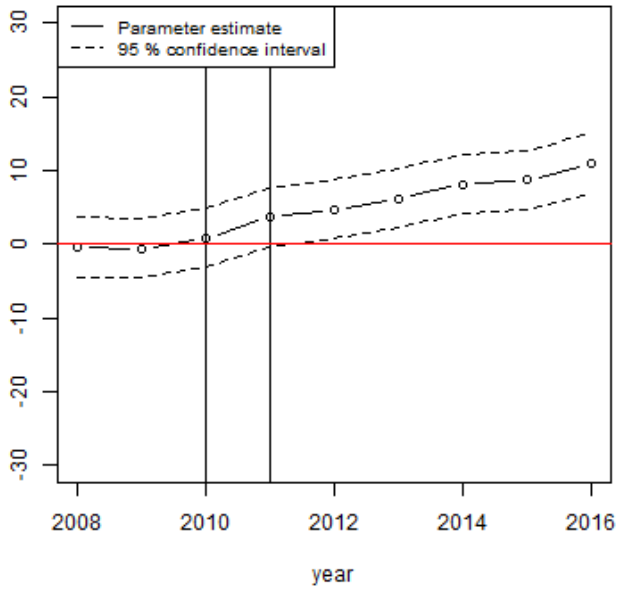


Figure 2: Parallel trends.

Figure (a) shows the regression coefficients from $E\&Sratings_{i,t} = \alpha + \sum_{t=2007}^{2016} \times \beta_t \cdot Treated_{i,t} 1[Year = t] + \Delta + e_{i,t}$ with Δ year and firm fixed effects. The control group is the matched US sample, and we plot all the interaction terms. Figure (b) represents coefficients from the same regression; however, the control group is the headquartered abroad sample. The sample includes all firms covered by BoardEx and Asset4.

(a) France vs US matched sample



(b) France vs headquarter abroad sample

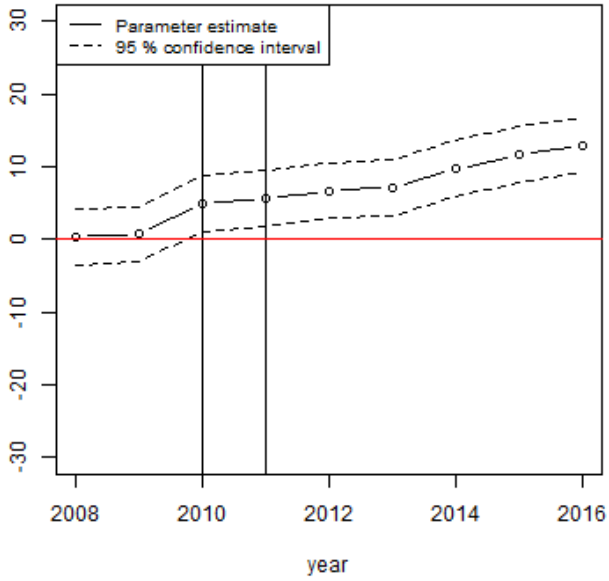
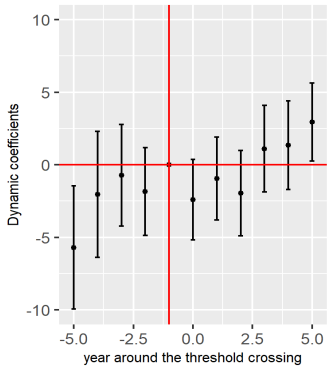


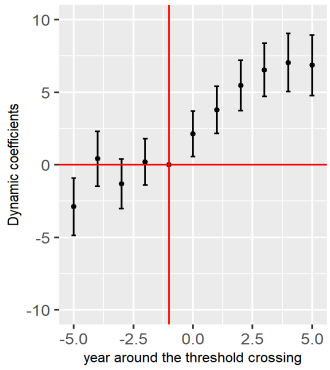
Figure 3: Women on boards, E&S scores and E&S committees.

This Figure shows the dynamic treatment effects before and after the company reaches a certain threshold of women directors in their boards on the E&S score and E&S committee creation. More specifically, we use the following regression: $Y_{i,t+1} = \alpha + \sum_{k=-5}^{-2} \times \beta_k \cdot Treated_{i,k} 1[Time = k] + \sum_{k=0}^{5} \times \beta_k \cdot Treated_{i,k} 1[Time = k] + \beta_1 X_{i,t} + \Delta + e_{i,t}$ with Δ year and firm fixed effects and $X_{i,t}$ a vector of firm-level controls. $Y_{p,t+1}$ represents the E&S score in Figures (a), (b), and (c) or a dummy equal to one if the firm has an E&S committee in Figures (d), (e), and (f). $Treated_{i,k}$ is a dummy equal to one if the firm nominates at least one woman and up to 15% of women in Figure (a) and (d), a dummy of one if the firm nominates more than 15% of women in Figure (b) and (e),and a dummy of one if a French firm nominates more than 15% of women in Figure (c) and (f). The year of reference is t = -1, and the confidence intervals for standard errors are computed at the 90% level. The sample includes all firms covered by BoardEx and Asset4 over the period 2007−2016.

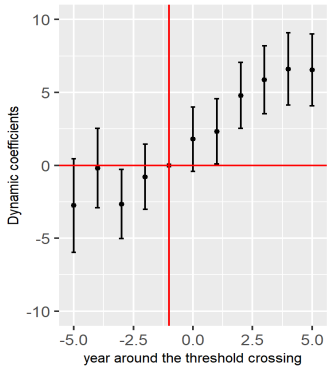
Panel A: E&S score



(a) >1 woman < 15% of women

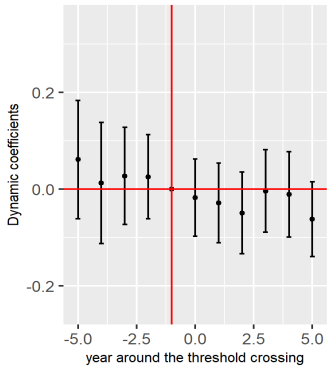


(b) >15% of women

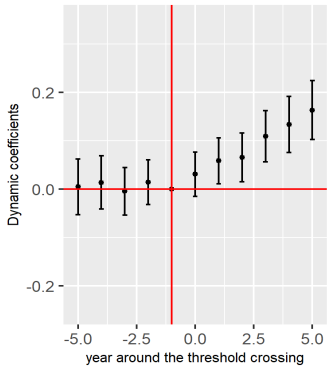


(c) >15% of women France

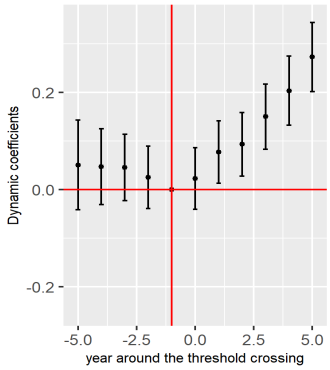
Panel B: E&S committee



(d) >1 woman < 15% of women



(e) >15% of women



(f) >15% of women France

Figure 4: Average percentage of firms with E&S committees.

This Figure shows the annual average percentage of firms with E&S committees for French and US firms and our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. The sample includes all firms covered by BoardEx and Asset4 over the period 2008-2016.

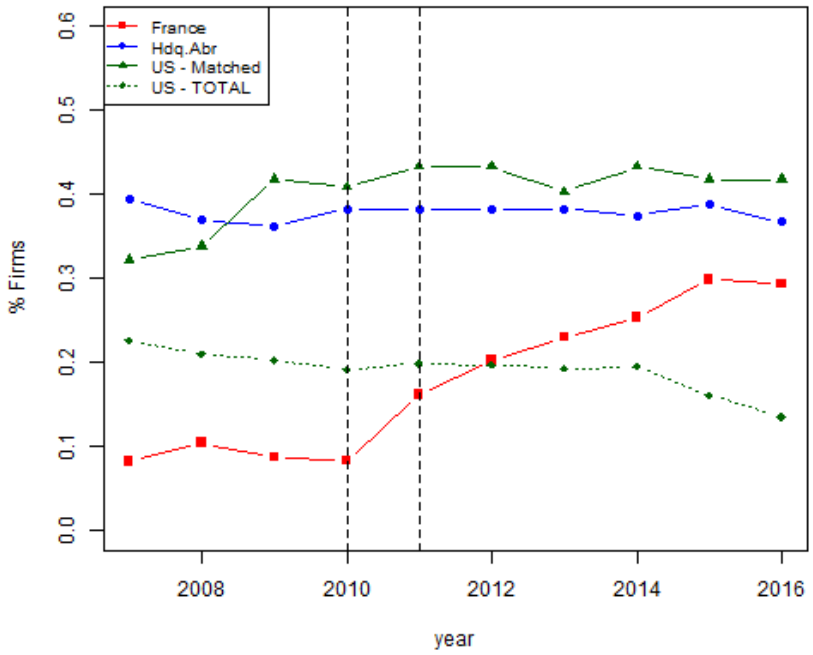


Figure 5: Average percentage of female directors sitting on board committees in France.

This Figure shows the annual average percentage of female directors sitting on a given board committee in France for firms that have such a committee. The sample includes all firms covered by BoardEx and Asset4 over the period 2008-2016.

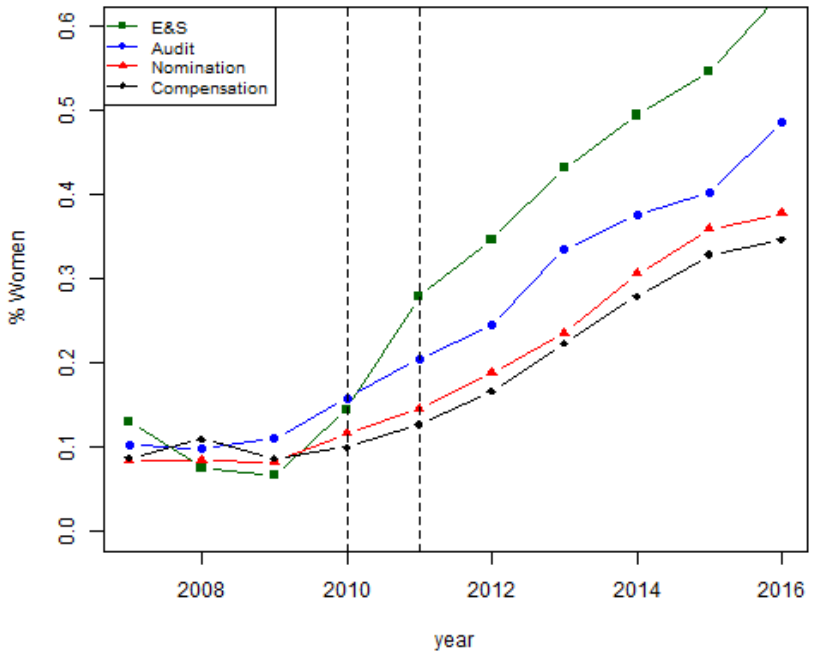


Table 1: Summary statistics.

This table summarizes firm-year characteristics for France and US and our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. Panels A and B report the statistics for the samples covered by Asset 4 and Vigeo-Eiris, respectively. Observations with missing information are excluded. The appendix provides the definitions of the variables.

Panel A: Asset 4	France			US - Matched			Headq.abroad			US - Total		
Firm characteristics	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Size	718	23.11	1.30	659	23.13	1.25	470	24.33	1.31	7,066	22.40	1.32
Market.to.Book	718	2.11	1.68	659	4.08	6.37	470	3.20	7.97	7,066	3.58	7.19
Leverage	718	0.20	0.15	659	0.22	0.14	470	0.22	0.14	7,066	0.24	0.18
ROA	718	0.04	0.05	659	0.06	0.08	470	0.06	0.06	7,066	0.05	0.10
Board characteristics												
Women	718	0.25	0.16	659	0.20	0.12	470	0.19	0.11	7,066	0.17	0.12
Boardsize	718	13.39	3.38	659	11.15	2.10	470	13.75	5.38	7,066	9.98	2.12
Independent	718	0.57	0.21	659	0.97	0.07	470	0.77	0.30	7,066	0.94	0.11
Tenure	718	6.58	3.25	659	7.99	2.92	470	6.51	2.47	7,066	8.08	3.80
Network	718	3.90	1.91	659	4.98	1.49	470	4.45	1.78	7,066	4.70	1.98
Age	718	59.03	4.44	659	62.74	3.12	470	60.86	3.56	7,066	62.59	4.04
ES characteristics												
E&S.Score	718	59.83	20.51	659	55.94	21.58	470	69.62	21.25	7,066	35.70	22.30
Social.Score	718	59.76	21.58	659	59.61	20.51	470	73.29	20.36	7,066	42.12	20.48
Env.Score	718	59.91	23.24	659	52.28	25.76	470	65.95	24.45	7,066	29.27	26.85

Panel B: Vigeo	France			US - Matched			Headq.abroad			US - Total		
Firm characteristics	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Size	828	22.86	1.43	678	23.58	1.04	418	24.56	1.02	2,864	23.36	1.05
Market.to.Book	828	2.03	1.69	678	4.81	8.45	418	3.26	8.05	2,864	3.84	8.10
Leverage	828	0.19	0.14	678	0.24	0.14	418	0.22	0.13	2,864	0.26	0.17
ROA	828	0.03	0.06	678	0.07	0.07	418	0.06	0.06	2,864	0.06	0.10
Board characteristics												
Women	828	0.24	0.16	678	0.21	0.10	418	0.19	0.11	2,864	0.19	0.11
Boardsize	828	12.97	3.46	678	11.58	2.10	418	14.26	5.37	2,864	10.84	2.04
Independent	828	0.55	0.21	678	0.97	0.07	418	0.76	0.30	2,864	0.96	0.09
Tenure	828	6.80	3.25	678	8.55	2.67	418	6.55	2.49	2,864	8.27	3.15
Network	828	3.81	2.00	678	5.36	1.70	418	4.45	1.80	2,864	5.05	1.69
Age	828	59.16	4.49	678	63.14	3.00	418	60.65	3.46	2,864	63.03	3.58
ES characteristics												
E&S.Score	828	40.55	12.37	678	29.43	9.58	418	41.82	10.70	2,864	26.20	9.06
Social.Score	828	41.19	13.12	678	27.97	8.85	418	40.90	11.40	2,864	24.64	8.15
Env.Score	828	39.90	12.83	678	30.90	12.10	418	42.75	11.64	2,864	27.75	11.69

Table 2: Effect of the quota law on the E&S scores.

This table reports the OLS estimates of the treatment effects of the quota (post_quota_treated) on the E&S score, environmental score, and social score. The sample includes French firms and, alternately, one of our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. The results are reported for both Asset 4 and Vigeo samples over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period starts in 2011, and the year 2010 is excluded. All models include year and firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	E&S.Score$_{t+1}$				Env.Score$_{t+1}$				Social.Score$_{t+1}$			
Post_quota_treated	7.75***	8.22***	4.08***	4.05***	4.49*	6.35***	3.28**	4.59***	11.01***	10.08***	4.87***	3.51***
	(2.03)	(1.84)	(0.99)	(1.21)	(2.67)	(2.32)	(1.36)	(1.55)	(2.15)	(2.22)	(0.97)	(1.22)
Size	5.42***	5.99***	3.65***	3.63**	5.29**	6.51***	3.78**	4.15*	5.55**	5.47**	3.53***	3.10**
	(2.06)	(1.92)	(1.06)	(1.49)	(2.56)	(2.11)	(1.72)	(2.24)	(2.47)	(2.53)	(0.90)	(1.25)
Market.to.Book	−0.07	−0.02	−0.02	−0.02	−0.11**	−0.12*	−0.02	−0.04	−0.03	0.07	−0.03	0.01
	(0.07)	(0.06)	(0.01)	(0.03)	(0.05)	(0.07)	(0.02)	(0.04)	(0.11)	(0.05)	(0.02)	(0.02)
Leverage	−2.61	2.17	−1.77	−2.41	−8.01	2.12	0.91	−1.92	2.79	2.22	−4.45	−2.89
	(6.58)	(7.53)	(2.72)	(3.77)	(7.58)	(8.22)	(3.28)	(4.31)	(7.79)	(8.48)	(2.86)	(3.98)
ROA	−1.31	−8.64	−2.75	−6.56	3.69	−11.12	−3.48	−9.29	−6.31	−6.16	−2.01	−3.84
	(9.27)	(9.42)	(3.70)	(4.79)	(12.88)	(13.42)	(4.39)	(6.37)	(8.69)	(10.32)	(3.71)	(4.71)
Independent	5.46	2.08	2.16	−0.07	5.29	4.95	1.83	0.60	5.63	−0.79	2.49	−0.75
	(4.72)	(3.52)	(2.15)	(2.43)	(5.87)	(3.91)	(2.91)	(3.52)	(6.37)	(4.77)	(2.35)	(2.11)
Tenure	0.44	0.33	0.06	0.13	0.48	0.30	−0.004	0.10	0.41	0.37	0.13	0.16
	(0.37)	(0.42)	(0.15)	(0.20)	(0.47)	(0.51)	(0.18)	(0.23)	(0.40)	(0.45)	(0.17)	(0.23)
Network	−0.42	−0.33	0.23	0.40	−0.26	−0.21	0.35	0.56*	−0.59	−0.45	0.11	0.24
	(0.48)	(0.49)	(0.22)	(0.25)	(0.61)	(0.60)	(0.29)	(0.32)	(0.49)	(0.53)	(0.21)	(0.24)
Age	0.07	0.01	−0.18	−0.22	0.02	−0.06	−0.17	−0.31*	0.12	0.08	−0.19	−0.13
	(0.29)	(0.25)	(0.13)	(0.14)	(0.37)	(0.32)	(0.15)	(0.16)	(0.30)	(0.28)	(0.16)	(0.17)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Group	US	Hq.Abr	US	Hq.Abr	US	Hq.Abr	US	Hq.Abr	US	Hq.Abr	US	Hq.Abr
E&S scores	A4	A4	Vigeo	Vigeo	A4	A4	Vigeo	Vigeo	A4	A4	Vigeo	Vigeo
Observations	1,180	1,069	1,236	1,121	1,180	1,069	1,236	1,121	1,180	1,069	1,236	1,121
Adjusted R^2	0.88	0.89	0.91	0.89	0.86	0.86	0.85	0.84	0.84	0.85	0.92	0.89

Table 3: Effect of the quota law on the E&S committee presence.

This table reports the probit and OLS estimates of the treatment effects of the quota (post_quota_treated) on the probability of having an E&S committee. The sample includes French firms and, alternately, one of our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. The results are reported for both the Asset 4 and Vigeo samples over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period starts in 2011, and the year 2010 is excluded. All models include year fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	E&S committee$_{t+1}$							
	probit	*OLS*	*probit*	*OLS*	*probit*	*OLS*	*probit*	*OLS*
Post_quota_treated	1.06***	0.25***	0.69**	0.19***	1.01***	0.20***	0.59**	0.12*
	(0.23)	(0.05)	(0.29)	(0.07)	(0.22)	(0.06)	(0.26)	(0.06)
Treated	−1.21***		−0.86**		−0.57*		−0.26	
	(0.39)		(0.39)		(0.31)		(0.29)	
Size	0.38***	0.04	0.44***	0.07	0.34***	0.02	0.28***	−0.09
	(0.09)	(0.07)	(0.10)	(0.11)	(0.10)	(0.07)	(0.09)	(0.12)
Market.to.Book	0.01	−0.004*	0.0005	0.003	0.03*	0.01*	0.03	0.01**
	(0.01)	(0.002)	(0.01)	(0.003)	(0.02)	(0.003)	(0.02)	(0.003)
Leverage	0.83	−0.09	−0.28	−0.20	0.12	−0.12	0.24	−0.22
	(0.68)	(0.14)	(0.66)	(0.19)	(0.80)	(0.14)	(0.69)	(0.21)
ROA	−0.53	−0.25	−1.04	0.02	−0.32	0.01	0.65	0.05
	(1.05)	(0.21)	(0.89)	(0.26)	(1.85)	(0.30)	(1.55)	(0.26)
Independent	−0.22	−0.11	−0.004	−0.20	0.87**	0.10	0.59	0.03
	(0.62)	(0.23)	(0.60)	(0.23)	(0.43)	(0.18)	(0.39)	(0.20)
Tenure	−0.01	0.002	0.01	−0.01	−0.005	−0.003	−0.003	−0.01
	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
Network	0.04	0.001	0.03	−0.003	0.02	−0.01	0.01	−0.01
	(0.05)	(0.02)	(0.05)	(0.02)	(0.05)	(0.02)	(0.05)	(0.02)
Age	0.02	0.001	0.01	0.0001	0.002	0.001	−0.0004	0.004
	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes
Control Group	US	US	US	US	Hq.Abr	Hq.Abr	Hq.Abr	Hq.Abr
E&S scores	A4	A4	Vigeo	Vigeo	A4	A4	Vigeo	Vigeo
Observations	1,180	1,180	1,236	1,236	1,069	1,069	1,121	1,121
Adjusted R^2		0.68		0.64		0.66		0.63
Log Likelihood	−590.66		−619.31		−537.28		−564.71	
Akaike Inf. Crit.	1,219.32		1,276.62		1,112.56		1,167.41	

Table 4: Effect of the quota law on the presence of women on board committees.

This table reports the treatment effects estimates of the quota (post_quota_treated) on the probability of having a woman chair the committee and the percentage of women members in the committee. The dependent variable in columns 1 to 4 is a dummy equal to one if the committee chairperson is a woman. The dependent variable in columns 5 and 6 is the percentage of women on the committee. The sample includes French firms and, alternately, one of our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. The results are reported for the Asset 4 sample over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period begins in 2011, and the year 2010 is excluded. All models include year and firm fixed effects and our usual controls: Size, Market.to.Book, Leverage, ROA, Independent, Tenure, Network, Age. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	Committee chairwoman				%women members	
	probit	*OLS*	*probit*	*OLS*	*OLS*	
Panel A: E&S committee						
Post_quota_treated	6.66***	0.38*	5.46***	0.45*	0.25***	0.30***
	(0.76)	(0.23)	(0.61)	(0.24)	(0.07)	(0.07)
Treated	−7.56***	−0.70	−4.93***	−0.96	−0.39*	0.03
	(1.06)	(0.48)	(0.54)	(0.59)	(0.21)	(0.31)
Observations	357	357	286	286	357	286
Adjusted R^2		0.68		0.61	0.65	0.69
Log Likelihood	−190.49		−140.27			
Akaike Inf. Crit.	418.99		318.53			
Panel B: Audit committee						
Post_quota_treated	0.69*	0.08	0.88**	0.10	0.16***	0.15***
	(0.38)	(0.07)	(0.42)	(0.06)	(0.04)	(0.05)
Treated	−1.09**	−0.76***	−0.73*	−0.32**	−0.32***	0.19
	(0.43)	(0.15)	(0.41)	(0.16)	(0.08)	(0.13)
Observations	990	990	810	810	990	810
Adjusted R^2		0.62		0.65	0.63	0.63
Log Likelihood	−406.51		−343.15			
Akaike Inf. Crit.	851.01		724.30			
Panel C: Compensation committee						
Post_quota_treated	0.57	0.03	0.57	0.02	0.08**	0.07*
	(0.36)	(0.07)	(0.42)	(0.07)	(0.04)	(0.04)
Treated	−0.18	−0.51***	−0.15	−0.30	−0.12	−0.02
	(0.44)	(0.12)	(0.52)	(0.22)	(0.10)	(0.09)
Observations	974	974	766	766	974	766
Adjusted R^2		0.57		0.58	0.56	0.56
Log Likelihood	−389.54		−268.29			
Akaike Inf. Crit.	817.08		574.58			
Panel D: Nomination committee						
Post_quota_treated	0.62**	0.06	0.72**	0.09	0.09**	0.03
	(0.30)	(0.08)	(0.33)	(0.08)	(0.04)	(0.05)
Treated	−0.16	0.03	−0.23	−0.82***	−0.15*	−0.27***
	(0.38)	(0.13)	(0.38)	(0.23)	(0.08)	(0.10)
Observations	827	827	672	672	827	672
Adjusted R^2		0.56		0.58	0.56	0.59
Log Likelihood	−378.42		−293.25			
Akaike Inf. Crit.	794.83		624.51			
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	Yes	Yes
Control Group	US	US	Hq.Abr	Hq.Abr	US	Hq.Abr
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Director characteristics.

This table summarizes director-year characteristics regarding boards of French firms over the period 2007–2016. Panel A reports means for 9,587 director-year observations in the Asset 4 sample and Panel B reports means for 10,703 director-year observations in the Vigeo sample. The appendix provides the definitions of the variables.

Panel A: Asset 4	*Before2010*			*After2010*			*Before-After*	
	Men	Women	t.stat	Men	Women	t.stat	t.statMen	t.statWomen
Independent	0.42	0.48	- 2.04	0.43	0.67	- 17.39	- 0.35	- 6.42
Tenure	6.59	6.12	1.29	8.18	4.14	24.98	- 10.23	5.33
Network	3.82	1.67	9.68	4.61	2.22	22.10	- 7.89	- 2.44
Age	59.20	54.11	8.44	60.21	54.68	19.94	- 4.38	- 0.92
Prev.ES.Exp	0.11	0.18	- 3.31	0.10	0.22	- 10.98	1.14	- 1.94
Nbryear.ES.Exp	2.18	2.78	- 1.40	2.22	3.95	- 6.75	- 0.23	- 2.48
Panel B: Vigeo	*Before2010*			*After2010*			*Before-After*	
	Men	Women	t.stat	Men	Women	t.stat	t.statMen	t.statWomen
Independent	0.42	0.46	- 1.23	0.41	0.64	- 17.15	0.96	- 6.48
Tenure	6.92	7.02	- 0.25	8.29	4.16	25.54	- 8.90	6.78
Network	3.79	1.69	9.80	4.41	2.15	22.11	- 6.62	- 2.13
Age	59.48	54.93	7.71	60.10	54.59	20.54	- 2.84	0.55
Prev.ES.Exp	0.10	0.18	- 3.93	0.09	0.21	- 11.10	0.46	- 1.42
Nbryear.ES.Exp	1.98	3.02	- 2.37	2.10	3.80	- 7.13	- 0.77	- 1.64

Table 6: E&S experience of female directors.

This table reports the OLS estimates of the impact of being a female director on the E&S experience. The results are reported at the director level for French firms over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. All models include year and firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	Prev.ES.Exp				Nbryear.ES.Exp			
Women	0.11***	0.10***	0.10***	0.09***	1.37***	1.40**	1.40***	1.42**
	(0.02)	(0.03)	(0.02)	(0.02)	(0.53)	(0.61)	(0.51)	(0.58)
Independent		0.07***		0.06***		2.04***		1.85***
		(0.02)		(0.02)		(0.51)		(0.49)
Tenure		−0.001		−0.001		0.03		0.02
		(0.002)		(0.001)		(0.05)		(0.05)
Network		0.001		0.002		0.05		0.07
		(0.002)		(0.002)		(0.06)		(0.05)
Age		0.001		0.0002		0.04**		0.02
		(0.001)		(0.001)		(0.02)		(0.02)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
E&S scores	A4	A4	Vigeo	Vigeo	A4	A4	Vigeo	Vigeo
Observations	9,367	9,367	10,413	10,413	9,367	9,367	10,413	10,413
Adjusted R^2	0.08	0.09	0.08	0.09	0.06	0.08	0.06	0.08

Table 7: E&S experience of women directors and E&S committees.

This table reports the OLS estimates of the impact of being a director with E&S experience on E&S committees. The results are reported at the director level for French firms over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. All models include year and firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firm are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	E&S committee member		E&S committee chair		E&S committee	
Prev.ES.Exp	0.05***	0.05***	0.02*	0.02*	0.02**	0.02*
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Independent	0.01	0.01	0.02**	0.02**	−0.02**	−0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Tenure	0.0003	−0.001	−0.0001	−0.0001	−0.0005	−0.001
	(0.001)	(0.001)	(0.0004)	(0.0003)	(0.001)	(0.001)
Network	−0.003**	−0.002	−0.0002	0.0002	−0.0005	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.001	0.001*	0.001**	0.001**	0.001	0.001
	(0.001)	(0.0005)	(0.0003)	(0.0003)	(0.0005)	(0.0005)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
E&S scores	A4	Vigeo	A4	Vigeo	A4	Vigeo
Observations	9,367	10,413	9,367	10,413	9,367	10,413
Adjusted R^2	0.24	0.24	0.06	0.06	0.62	0.60

Table 8: Quota law and E&S scores: Breakdown between firms with a high and low percentage of directors with E&S experience.

This table reports the OLS estimates of the treatment effects of the quota (post_quota_treated) on the E&S score. The sample includes French firms and our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. The results are reported for both Asset 4 and Vigeo samples over the period 2007−2016. Columns (1) to (4) report the results for firms with less than 10% of directors with E&S experience in 2009, and columns (5) to (8) for the others. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period starts in 2011, and the year 2010 is excluded. All models include year and firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	Low.Prev.ES.EXP				High.Prev.ES.EXP			
	E&S.Score$_{t+1}$							
Post_quota_treated	14.06***	11.73***	4.28***	4.05**	1.08	2.01	4.09***	2.65
	(2.93)	(2.72)	(1.60)	(1.70)	(3.35)	(2.95)	(1.29)	(1.83)
Treated	−10.39*	−1.29	14.05***	2.98	3.96	−8.25*	11.37***	1.59
	(5.36)	(5.08)	(3.08)	(2.60)	(5.71)	(4.46)	(2.83)	(3.38)
Size	7.29***	11.78***	5.24***	5.16***	9.98***	9.54***	5.58***	5.42***
	(1.43)	(1.46)	(0.77)	(0.77)	(1.67)	(1.22)	(0.75)	(0.76)
Market.to.Book	0.02	−0.16	0.01	−0.10	0.33	−0.08*	−0.04	−0.07
	(0.10)	(0.21)	(0.06)	(0.10)	(0.24)	(0.05)	(0.05)	(0.05)
Leverage	−26.69**	−22.65*	−7.53	−13.72**	−10.07	3.46	1.74	−6.69
	(12.89)	(13.08)	(4.92)	(6.05)	(9.60)	(9.96)	(5.69)	(7.26)
ROA	−17.73	10.78	10.15	3.11	17.93	−41.27*	3.42	−14.20
	(17.61)	(20.58)	(6.74)	(7.36)	(11.80)	(23.44)	(6.10)	(13.41)
Independent	−7.77	0.55	1.54	−0.64	2.70	8.10	−0.81	−0.05
	(8.69)	(4.76)	(5.16)	(3.07)	(8.48)	(6.93)	(4.80)	(4.67)
Tenure	−0.27	0.25	0.36	0.12	−0.02	0.87**	0.14	0.20
	(0.60)	(0.63)	(0.33)	(0.37)	(0.48)	(0.39)	(0.26)	(0.28)
Network	0.44	1.08	0.29	0.25	0.77	1.07	0.77	1.54**
	(0.80)	(1.03)	(0.47)	(0.51)	(0.94)	(1.17)	(0.50)	(0.61)
Age	0.78**	0.20	−0.23	−0.09	−0.23	−0.32	−0.59**	−0.50*
	(0.32)	(0.42)	(0.20)	(0.20)	(0.41)	(0.38)	(0.30)	(0.29)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Group	US	Hq.Abr	US	Hq.Abr	US	Hq.Abr	US	Hq.Abr
E&S scores	A4	A4	Vigeo	Vigeo	A4	A4	Vigeo	Vigeo
Observations	601	553	632	580	579	516	604	541
Adjusted R^2	0.54	0.67	0.65	0.58	0.66	0.68	0.80	0.68

Internet Appendix to:

Women directors and E&S performance: Evidence from board gender quotas

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Table IA1: Effect of the quota law on the E&S scores: sample with only French firms.

This table reports the OLS estimates of the treatment effects of the quota (post_quota) on the E&S score, environmental score, and social score. The sample includes French firms. The results are reported for both the Asset 4 and Vigeo samples over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period starts in 2011, and the year 2010 is excluded. All models include industry or firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	E&S.Score$_{t+1}$				Env.Score$_{t+1}$				Social.Score$_{t+1}$			
Post_quota	10.46***	9.33***	3.41***	3.25***	9.71***	8.16***	5.16***	4.70***	11.21***	10.50***	1.66**	1.80**
	(1.59)	(1.66)	(0.69)	(0.67)	(1.92)	(2.15)	(0.81)	(0.82)	(1.80)	(1.98)	(0.75)	(0.76)
Size	6.57***	12.36***	4.99***	8.33***	5.84***	11.02***	4.83***	8.87***	7.31***	13.71***	5.15***	7.78***
	(1.05)	(2.54)	(0.54)	(1.32)	(1.25)	(2.87)	(0.65)	(2.19)	(1.32)	(3.40)	(0.59)	(1.30)
Market.to.Book	−0.17	0.43	−0.41	0.19	−0.71	0.13	−0.43	0.10	0.37	0.73	−0.38	0.29
	(0.78)	(0.61)	(0.26)	(0.20)	(0.75)	(0.69)	(0.30)	(0.23)	(0.89)	(0.74)	(0.26)	(0.25)
Leverage	−9.80	−1.00	−6.36	−0.35	−6.85	−4.96	−3.46	1.48	−12.75	2.95	−9.27	−2.17
	(11.12)	(9.88)	(6.31)	(4.92)	(12.43)	(10.43)	(6.67)	(5.40)	(11.49)	(12.72)	(6.47)	(5.45)
ROA	−32.08	−42.00**	10.64	−10.75*	−28.61	−43.16*	7.78	−11.18	−35.55	−40.84***	13.50*	−10.32*
	(25.54)	(17.10)	(7.20)	(5.77)	(21.92)	(24.90)	(7.75)	(7.26)	(34.49)	(14.45)	(7.93)	(5.50)
Independent	4.58	7.93	0.77	2.67	8.88*	11.39**	0.78	3.58	0.28	4.47	0.76	1.76
	(6.08)	(5.17)	(3.50)	(2.51)	(5.28)	(5.50)	(3.69)	(3.13)	(8.16)	(7.15)	(3.78)	(2.85)
Tenure	−0.12	0.43	−0.17	0.04	−0.57	0.59	−0.29	−0.06	0.32	0.27	−0.04	0.14
	(0.55)	(0.58)	(0.25)	(0.22)	(0.54)	(0.69)	(0.29)	(0.23)	(0.66)	(0.66)	(0.27)	(0.27)
Network	0.97	−0.48	0.78	0.70***	1.21	−0.60	0.69	0.80***	0.73	−0.35	0.88*	0.61*
	(0.91)	(0.54)	(0.50)	(0.27)	(0.93)	(0.66)	(0.51)	(0.30)	(1.03)	(0.59)	(0.53)	(0.32)
Age	0.81***	−0.10	−0.09	−0.41***	0.81***	−0.23	−0.06	−0.46***	0.81**	0.02	−0.11	−0.37*
	(0.25)	(0.34)	(0.19)	(0.15)	(0.27)	(0.43)	(0.22)	(0.14)	(0.32)	(0.38)	(0.19)	(0.19)
Industry FE	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
E&S scores	A4	A4	Vigeo	Vigeo	A4	A4	Vigeo	Vigeo	A4	A4	Vigeo	Vigeo
Observations	646	646	747	747	646	646	747	747	646	646	747	747
Adjusted R^2	0.60	0.84	0.66	0.89	0.62	0.81	0.60	0.85	0.48	0.80	0.66	0.88

Table IA2: Women on boards and E&S scores.

This table reports the OLS estimates of the percentage of female directors on the E&S score, environmental score, and social score. The results are reported for both the Asset 4 and Vigeo samples over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. All models include year and firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	E&S.Score$_{t+1}$		Env.Score$_{t+1}$		Social.Score$_{t+1}$	
Women	14.74***	6.24***	11.07**	4.89*	18.40***	7.58***
	(4.22)	(2.17)	(4.62)	(2.85)	(4.91)	(2.22)
Size	5.13***	2.82***	5.65***	3.04*	4.61**	2.59***
	(1.67)	(1.03)	(1.91)	(1.55)	(2.10)	(0.92)
Market.to.Book	−0.04	−0.03*	−0.11**	−0.04	0.02	−0.03
	(0.04)	(0.02)	(0.05)	(0.02)	(0.05)	(0.02)
Leverage	−3.92	−3.14	−5.70	−1.68	−2.15	−4.60*
	(5.97)	(2.41)	(6.56)	(2.81)	(6.65)	(2.61)
ROA	−0.29	−4.03	1.56	−5.91	−2.14	−2.15
	(6.92)	(3.50)	(9.07)	(4.15)	(7.13)	(3.51)
Independent	1.78	−0.17	2.44	−0.35	1.12	0.001
	(3.69)	(2.58)	(3.87)	(3.52)	(4.90)	(2.24)
Tenure	0.31	0.13	0.34	0.13	0.29	0.13
	(0.30)	(0.14)	(0.36)	(0.17)	(0.34)	(0.16)
Network	−0.04	0.28	0.04	0.41	−0.13	0.16
	(0.40)	(0.24)	(0.48)	(0.31)	(0.45)	(0.23)
Age	0.07	−0.15	0.08	−0.18	0.07	−0.12
	(0.22)	(0.13)	(0.26)	(0.14)	(0.25)	(0.14)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
E&S scores	A4	Vigeo	A4	Vigeo	A4	Vigeo
Observations	1,788	1,844	1,788	1,844	1,788	1,844
Adjusted R^2	0.89	0.91	0.87	0.85	0.85	0.91

Table IA3: New women on boards and E&S score.

This table reports the OLS estimates of the effect of adding more female directors to the board or reaching a certain percentage of women on the E&S score. The sample includes all companies covered by BoardEx and Asset4 over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. Columns (1) and (4) refer to the inclusion of one woman, columns (3) and (5) of two women, and columns (2) and (6) of three women on the board during our periods of interest. Column (7) refers to companies that pass the zero percent women threshold, and column (8) the fifteen percent women threshold. All models include year and firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	E&S.Score$_{t+1}$							
	Entry			*Entry-Exit*			*Threshold*	
FirstWoman	−1.66			−0.64				
	(1.12)			(1.19)				
SecondWoman		1.52			2.23*			
		(1.35)			(1.18)			
ThirdWoman			4.30**			3.42**		
			(1.80)			(1.66)		
Above0							1.92	
							(1.65)	
Above15								3.79***
								(1.07)
Size	5.37***	5.33***	5.29***	5.39***	5.37***	5.29***	5.35***	5.38***
	(1.72)	(1.72)	(1.72)	(1.71)	(1.71)	(1.73)	(1.72)	(1.70)
Market.to.Book	−0.05	−0.05	−0.05	−0.05	−0.05	−0.05	−0.05	−0.05
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Leverage	−5.35	−5.38	−5.70	−5.20	−5.50	−5.36	−5.46	−5.00
	(6.17)	(6.18)	(6.15)	(6.19)	(6.15)	(6.19)	(6.14)	(6.01)
ROA	−1.25	−1.05	−1.13	−1.03	−0.74	−1.08	−1.38	−1.26
	(7.03)	(7.12)	(6.99)	(7.11)	(7.12)	(7.08)	(7.13)	(6.95)
Independent	3.84	3.80	3.37	3.81	3.91	3.32	3.57	2.78
	(4.06)	(4.05)	(3.87)	(4.08)	(4.04)	(3.90)	(4.00)	(4.07)
Tenure	0.33	0.31	0.33	0.32	0.30	0.34	0.28	0.36
	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)
Network	−0.43	−0.41	−0.32	−0.42	−0.39	−0.37	−0.38	−0.35
	(0.51)	(0.51)	(0.46)	(0.52)	(0.50)	(0.50)	(0.52)	(0.48)
Age	−0.00	−0.005	0.03	−0.002	−0.01	0.03	0.01	0.02
	(0.23)	(0.23)	(0.23)	(0.23)	(0.22)	(0.23)	(0.23)	(0.22)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,788	1,788	1,788	1,788	1,788	1,788	1,788	1,788
Adjusted R^2	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89

Table IA4: Effect of the quota law on the E&S committee presence: sample with only French firms.

This table reports the OLS estimates of the treatment effects of the quota (post_quota) on the probability of having an E&S committee. The sample includes French firms. The results are reported for both the Asset 4 and Vigeo samples over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period starts in 2011, and the year 2010 is excluded. All models include industry or firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%..

	E&S committee$_{t+1}$					
	probit	*OLS*		*probit*	*OLS*	
Post_quota	0.87***	0.18***	0.19***	0.55**	0.14***	0.17***
	(0.21)	(0.05)	(0.06)	(0.22)	(0.04)	(0.05)
Size	0.38***	0.09***	0.01	0.29***	0.09***	−0.08
	(0.12)	(0.03)	(0.10)	(0.10)	(0.02)	(0.14)
Market.to.Book	0.04	−0.01	0.005	−0.001	−0.01	−0.01
	(0.05)	(0.02)	(0.02)	(0.05)	(0.01)	(0.01)
Leverage	−0.67	−0.05	−0.02	−0.37	−0.12	−0.08
	(1.22)	(0.25)	(0.15)	(0.94)	(0.23)	(0.25)
ROA	−2.68	−0.28	−0.36	−0.21	−0.09	−0.17
	(3.02)	(0.58)	(0.41)	(1.55)	(0.29)	(0.30)
Independent	−0.24	−0.08	−0.10	−0.43	−0.19	−0.13
	(0.58)	(0.16)	(0.22)	(0.50)	(0.12)	(0.24)
Tenure	−0.08*	−0.02*	−0.003	−0.06*	−0.02	−0.01
	(0.04)	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)
Network	−0.03	−0.01	−0.01	−0.03	−0.01	−0.01
	(0.06)	(0.02)	(0.02)	(0.05)	(0.01)	(0.02)
Age	0.03	0.01	0.001	0.02	0.01	0.002
	(0.04)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)
Industry FE	Yes	No	No	Yes	No	No
Firm FE	No	Yes	Yes	No	Yes	Yes
E&S scores	A4	A4	A4	Vigeo	Vigeo	Vigeo
Observations	646	646	646	747	747	747
Adjusted R^2	0.17	0.59	0.58	0.14	0.55	0.55

Table IA5: Female directors and board committees.

This table summarizes director-year characteristics regarding board committees for France over the period 2007–2016. Panel A reports summary statistics for 9,587 director-year observations present in the Asset 4 sample and Panel B reports summary statistics for 10,703 director-year observations present in the Vigeo sample. The appendix provides the definitions of the variables.

Panel A: Asset 4							
Before 2010	N	Mean	SD	Men	Women	Diff	t.stat
E&S members	3,573	0.05	0.22	0.05	0.05	-0.003	-0.27
Audit members	3,573	0.26	0.44	0.26	0.27	-0.003	-0.13
Compensation members	3,573	0.24	0.43	0.25	0.23	0.01	0.61
Nomination members	3,573	0.22	0.42	0.23	0.20	0.03	1.14
E&S chairman	3,573	0.01	0.11	0.01	0.003	0.01	2.91
Audit chairman	3,573	0.07	0.25	0.07	0.04	0.03	3.09
Compensation chairman	3,573	0.06	0.25	0.07	0.06	0.01	0.73
Nomination chairman	3,573	0.06	0.23	0.06	0.07	-0.01	-0.92
After 2010	N	Mean	SD	Men	Women	Diff	t.stat
E&S members	6,014	0.10	0.30	0.08	0.14	-0.06	-6.29
Audit members	6,014	0.30	0.46	0.28	0.34	-0.06	-4.43
Compensation members	6,014	0.27	0.44	0.27	0.26	0.01	1.05
Nomination members	6,014	0.25	0.43	0.26	0.23	0.03	2.86
E&S chairman	6,014	0.02	0.16	0.02	0.03	-0.01	-2.14
Audit chairman	6,014	0.07	0.26	0.08	0.06	0.02	2.66
Compensation chairman	6,014	0.07	0.25	0.07	0.05	0.02	3.51
Nomination chairman	6,014	0.06	0.24	0.06	0.05	0.01	1.96
Panel B: Vigeo							
Before 2010	N	Mean	SD	Men	Women	Diff	t.stat
E&S members	3,858	0.05	0.22	0.05	0.06	-0.01	-0.64
Audit members	3,858	0.28	0.45	0.28	0.25	0.03	1.12
Compensation members	3,858	0.26	0.44	0.26	0.22	0.04	1.65
Nomination members	3,858	0.23	0.42	0.24	0.20	0.03	1.53
E&S chairman	3,858	0.01	0.11	0.01	0.003	0.01	3.30
Audit chairman	3,858	0.07	0.26	0.08	0.03	0.05	4.74
Compensation chairman	3,858	0.07	0.25	0.07	0.05	0.02	1.67
Nomination chairman	3,858	0.06	0.24	0.06	0.06	0.0001	0.004
After 2010	N	Mean	SD	Men	Women	Diff	t.stat
E&S members	6,845	0.09	0.29	0.08	0.13	-0.05	-6.20
Audit members	6,845	0.30	0.46	0.29	0.33	-0.04	-3.02
Compensation members	6,845	0.27	0.44	0.27	0.26	0.01	0.70
Nomination members	6,845	0.25	0.43	0.25	0.23	0.03	2.26
E&S chairman	6,845	0.02	0.15	0.02	0.03	-0.01	-2.50
Audit chairman	6,845	0.07	0.26	0.08	0.06	0.03	3.90
Compensation chairman	6,845	0.07	0.25	0.07	0.05	0.02	2.75
Nomination chairman	6,845	0.06	0.24	0.06	0.05	0.01	1.23

Table IA6: Effect of the quota law on the presence of women on board committees (Vigeo).

This table reports the treatment effects estimates of the quota (post_quota_treated) on the probability of having a woman chair the committee and the percentage of women members in the committee. The dependent variable in columns 1 to 4 is a dummy equal to one if the committee chairperson is a woman. The dependent variable in columns 5 and 6 is the percentage of women on the committee. The sample includes French firms and, alternately, one of our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. The results are reported for the Vigeo sample over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period begins in 2011, and the year 2010 is excluded. All models include year and firm fixed effects and our usual controls: Size, Market.to.Book, Leverage, ROA, Independent, Tenure, Network, Age. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	Committee chairwoman				%women members	
	probit	*OLS*	*probit*	*OLS*	*OLS*	
Panel A: E&S committee						
Post_quota_treated	11.28***	0.24	5.91***	0.37*	0.20***	0.30***
	(0.91)	(0.21)	(0.70)	(0.20)	(0.05)	(0.07)
Treated	−11.70***	−0.49	−5.15***	−0.92*	−0.38**	0.48*
	(1.26)	(0.36)	(0.59)	(0.47)	(0.16)	(0.27)
Observations	386	386	278	278	386	278
Adjusted R^2		0.59		0.62	0.67	0.72
Log Likelihood	−223.50		−124.09			
Akaike Inf. Crit.	485.01		286.18			
Panel B: Audit committee						
Post_quota_treated	0.73*	0.08	0.94**	0.12**	0.18***	0.15***
	(0.39)	(0.05)	(0.43)	(0.06)	(0.03)	(0.05)
Treated	−0.81*	−0.95***	−0.82*	−0.21	0.01	0.19
	(0.44)	(0.17)	(0.43)	(0.18)	(0.07)	(0.13)
Observations	1,030	1,030	838	838	1,030	838
Adjusted R^2		0.62		0.64	0.64	0.64
Log Likelihood	−389.99		−345.95			
Akaike Inf. Crit.	817.99		729.90			
Panel C: Compensation committee						
Post_quota_treated	0.53	0.01	0.76	0.04	0.12***	0.09**
	(0.41)	(0.07)	(0.48)	(0.07)	(0.03)	(0.04)
Treated	−0.53	−0.21*	−0.09	−0.11	−0.17*	0.07
	(0.51)	(0.12)	(0.56)	(0.23)	(0.09)	(0.12)
Observations	1,010	1,010	784	784	1,010	784
Adjusted R^2		0.57		0.61	0.58	0.58
Log Likelihood	−420.64		−271.00			
Akaike Inf. Crit.	879.27		580.01			
Panel D: Nomination committee						
Post_quota_treated	0.53	0.01	1.15***	0.14	0.08**	0.06
	(0.36)	(0.08)	(0.41)	(0.09)	(0.04)	(0.05)
Treated	−0.16	0.03	−0.24	−0.76***	−0.34***	−0.13
	(0.46)	(0.14)	(0.46)	(0.26)	(0.10)	(0.14)
Observations	845	845	680	680	845	680
Adjusted R^2		0.56		0.58	0.53	0.58
Log Likelihood	−387.45		−277.85			
Akaike Inf. Crit.	812.90		593.69			
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	Yes	Yes
Control Group	US	US	Hq.Abr	Hq.Abr	US	Hq.Abr
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table IA7: Effect of the quota law on the E&S scores: sample of firms without E&S committee over 2007−2016.

This table reports the OLS estimates of the treatment effects of the quota (post_quota_treated) on the E&S score, environmental score, and social score. The sample includes French firms and, alternately, one of our control groups composed of matched US firms and firms listed in Paris and headquartered abroad. Only firms with no E&S committee during the entire period of interest are included. The results are reported for both the Asset 4 and Vigeo samples over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period begins in 2011, and the year 2010 is excluded. All models include year and firm fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	E&S.Score$_{t+1}$				Env.Score$_{t+1}$				Social.Score$_{t+1}$			
Post_quota_treated	9.42***	4.59***	9.96***	3.59**	7.80**	3.84*	11.05***	4.32**	11.04***	5.34***	8.87***	2.86*
	(2.80)	(1.47)	(2.53)	(1.63)	(3.45)	(1.97)	(3.01)	(2.15)	(3.06)	(1.45)	(3.28)	(1.58)
Size	7.25**	1.71	6.48**	2.23	7.21**	2.16	6.71***	2.18	7.30*	1.26	6.24*	2.29
	(3.09)	(1.15)	(2.63)	(1.91)	(3.20)	(1.54)	(2.56)	(2.43)	(3.96)	(1.28)	(3.79)	(1.94)
Market.to.Book	−0.20**	−0.07*	−0.08	−0.08***	−0.20*	−0.09*	−0.15*	−0.13***	−0.20*	−0.05	−0.004	−0.03
	(0.09)	(0.04)	(0.06)	(0.03)	(0.11)	(0.05)	(0.08)	(0.04)	(0.10)	(0.05)	(0.06)	(0.03)
Leverage	−3.84	−2.32	0.97	−1.85	−6.69	0.28	3.72	−1.47	−0.99	−4.92	−1.78	−2.22
	(7.78)	(3.16)	(8.42)	(4.80)	(8.35)	(3.96)	(9.20)	(5.44)	(9.51)	(3.29)	(9.82)	(5.00)
ROA	−9.76	−4.70	−18.51	−10.42	−1.46	−7.59	−20.88	−12.91	−18.07	−1.82	−16.15	−7.93
	(12.66)	(4.68)	(13.04)	(6.43)	(16.94)	(6.27)	(16.00)	(8.41)	(12.06)	(4.48)	(15.60)	(5.78)
Independent	1.04	3.30	−2.18	3.54	1.22	2.88	2.33	5.93**	0.86	3.72	−6.69	1.16
	(5.74)	(2.36)	(4.86)	(2.25)	(7.28)	(2.81)	(5.37)	(2.74)	(7.82)	(3.09)	(6.69)	(2.82)
Tenure	0.04	0.24	0.21	0.42	−0.15	0.12	0.18	0.45	0.23	0.35	0.24	0.38
	(0.50)	(0.21)	(0.55)	(0.27)	(0.58)	(0.26)	(0.61)	(0.32)	(0.58)	(0.26)	(0.64)	(0.31)
Network	−0.35	0.40	−0.22	0.41	0.19	0.68**	0.25	0.61*	−0.90*	0.13	−0.69	0.22
	(0.54)	(0.25)	(0.54)	(0.28)	(0.65)	(0.32)	(0.65)	(0.35)	(0.54)	(0.26)	(0.57)	(0.26)
Age	0.11	−0.19	0.17	−0.31*	−0.12	−0.23	−0.10	−0.43**	0.34	−0.15	0.45	−0.19
	(0.34)	(0.19)	(0.31)	(0.17)	(0.40)	(0.20)	(0.35)	(0.21)	(0.38)	(0.22)	(0.37)	(0.21)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Group	US	US	Hq.Abr	Hq.Abr	US	US	Hq.Abr	Hq.Abr	US	US	Hq.Abr	Hq.Abr
E&S scores	A4	Vigeo	A4	Vigeo	A4	Vigeo	A4	Vigeo	A4	Vigeo	A4	Vigeo
Observations	678	667	600	655	678	667	600	655	678	667	600	655
Adjusted R^2	0.89	0.91	0.91	0.90	0.88	0.86	0.89	0.86	0.84	0.91	0.86	0.89

Table IA8: Effect of the law on the percentage of directors with E&S experience in France.

This table reports the OLS estimates of the treatment effects of the quota (post_quota) on the percentage of directors with E&S experience. The sample includes French firms. The results are reported for both the Asset 4 and Vigeo samples over the period 2007−2016. We delete observations with missing information, and the financial variables are trimmed at 1%. The post-quota period begins in 2011, and the year 2010 is excluded. All models include year and industry or company fixed effects. The appendix provides the definitions of the variables. Standard errors clustered by firms are reported in parentheses. Stars indicate significance levels *** 1%, ** 5%, and *10%.

	Pc.Prev.ES.EXP$_{t+1}$				Pc.Prev.ES.EXP.HJ$_{t+1}$			
Post_quota	0.03***	0.03**	0.03***	0.02**	0.06***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Size	0.02**	0.02	0.02***	0.02	0.02	0.01	0.02***	0.02
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.03)	(0.01)	(0.03)
Market.to.Book	0.0002	0.01*	0.001	0.01**	0.002	0.01*	0.003	0.01**
	(0.004)	(0.005)	(0.003)	(0.003)	(0.01)	(0.005)	(0.005)	(0.004)
Leverage	0.10	0.003	0.12*	0.02	0.14*	0.06	0.16**	0.03
	(0.06)	(0.05)	(0.07)	(0.07)	(0.08)	(0.06)	(0.08)	(0.10)
ROA	−0.08	0.22*	0.09	0.21***	−0.14	0.09	0.11	0.21**
	(0.17)	(0.13)	(0.07)	(0.07)	(0.20)	(0.15)	(0.09)	(0.08)
Independent	−0.08*	−0.03	−0.06*	−0.003	−0.12*	−0.05	−0.10**	0.005
	(0.04)	(0.05)	(0.03)	(0.04)	(0.07)	(0.07)	(0.05)	(0.06)
Tenure	−0.005*	0.001	−0.01**	−0.002	−0.01*	−0.0001	−0.01*	−0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.004)	(0.005)
Network	−0.001	−0.003	0.004	0.001	0.005	−0.001	0.01*	0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.01)	(0.01)	(0.005)	(0.005)
Age	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)
Industry FE	Yes	No	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes
E&S scores	A4	A4	Vigeo	Vigeo	A4	A4	Vigeo	Vigeo
Observations	646	646	747	747	646	646	747	747
Adjusted R^2	0.32	0.69	0.33	0.70	0.26	0.66	0.27	0.65

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