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Female Board Directorship and Firm Performance: What Really Matters?

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Abstract

Using a sample of 394 French firms for the period of 2001 to 2010, we study the relationship between female directorship and firms' accounting (ROA and ROE) and market-based (Tobin's Q) performance. We find that female directorship significantly increases ROA and ROE, and significantly decreases Tobin's Q. We postulate that these relationships are affected by the attributes of female directors. To this end, we collect a set of nine different attributes of female directors capturing their monitoring capabilities and contribution to the board's human capital (demographic and board relational attributes). We find that the positive relationship between accounting performance and female directorship remains when we include these attributes, while the negative relationship between Tobin's Q and female directorship disappears. Interestingly, the different attributes of female directors do not uniformly affect accounting and market-based performance. We explain the different relationships between attributes and firm performance by the tradeoff between the benefits and costs of diversity on board effectiveness, particularly in a low investor protection environment.

JEL Classification: G30, M14, M41.

Keywords: Female directorship, Women directors' attributes, Firm performance.

1. Introduction

The abundant literature in recent years on the effect of gender diversity on corporate performance is not conclusive. Some studies find a positive (Campbell and Minguez-Vera, 2008; Terjesen et al., 2016, Liu et al., 2014), whereas others report a negative (Adams and Ferreira, 2009) or even non-existent (Carter et al., 2010) relationship between gender diversity and performance. In a meta-analysis of 140 articles studying the impact of gender diversity on corporate performance, Post and Byron (2015) report weaker relationship in lower shareholder protection environments. They argue that in countries with poor shareholder protection, board members have fewer incentives to monitor managers efficiently and to draw on their experience and skills in their advisory/decision-making missions. Similarly, Garcìa-Meca et al. (2015) report that gender diversity has less influence on international bank performances in environments characterized by lower investor protection.

Furthermore, the potential impact of gender diversity on performance is sensitive to the company's characteristics (Anderson et al., 2011) and different mediating variables (Miller and Triana, 2009). Johnson et al. (2013) propose the attributes of female directors as mediating variables. They argue that female directors' attributes (experience, skills, and demographic characteristics) contribute to enhancing the effectiveness of the board's monitoring, decision-making, and advisory processes.

This paper investigates the relationship between gender diversity and corporate performance using a large sample of French companies. As in some European countries, the civil law system in France offers less protection to minority shareholders (La Porta et al., 2008). Hence, we comprehensively analyze the relationship between gender diversity and corporate performance in a particular environment. Additionally, we enter the black box of the association between gender diversity and performance by analyzing how the attributes of female directors might play mediating roles. Therefore, our research questions are: (1) Does

the mere presence of female directors affect firm performance in a weak shareholder protection environment? (2) How do the attributes of female directors affect firm performance? By answering the second question, we can understand the channel through which gender diversity in the board can influence the decision-making and monitoring effectiveness of the board and consequently firm performance.

To address these questions, we collect financial and corporate governance information on 394 French firms from 2001 to 2010. During the study period, French companies had no requirements regarding the proportion of female directors. The time-frame of our study allows us to avoid potential biases stemming from discussed or rumored intention to seek legal guidance about board gender diversity. The French environment is a good laboratory for our study for two main reasons. First, because of the French weak shareholder protection environment, we expect the role played by the monitoring-related attributes of female directors to be more important compared to that in common-law system countries. Second, French firms are characterized by concentrated ownership and by a separation between ownership and control (Faccio and Lang, 2002). The conflicts of interests between minority and controlling shareholders might result in divergent perceptions of the role played by the board (Connelly et al., 2010). Whereas there may be a greater need for an active board that would monitor insiders (both controlling shareholders and managers), controlling shareholders might monitor managers, thereby reducing the importance of the board's oversight role. Consequently, we expect that the potential contribution of female directors through their attributes is even greater in this environment.

There is a substantial body of research investigating how directors' demographic, human capital and social capital attributes affect board effectiveness and firm performance. Johnson et al. (2013) provide a valuable review of this literature. Female directorship is usually associated with a significant change in the attributes of the board because the characteristics

of women directors differ from those of their male colleagues (Adams and Ferreira, 2009; Ahern and Dittmar, 2012). We argue that considering these attributes is a necessary step for understanding the channel through which female directors may affect firm performance.

We use a set of nine different observable attributes of female directors, classified into two separate categories. The first category contains monitoring-related attributes, namely the independence of female directors, their membership of relevant board committees, and their leadership position as chairperson. The second category of attributes captures the human capital of the board and is also split into two classes. The first class contains human capital related demographic attributes. We consider female directors' education level, business education, and nationality as measures of demographic attributes. The second class includes relational board capital capturing the experience (tenure), access to other boards (multiple directorships) and reputation of female board members.

We run our analysis as follows. As a benchmark, we analyze the relationship between female directorship and firms' accounting (ROA and ROE) and market-based (Tobin's Q) performance without considering the attributes of women directors. We find that female directorship is significantly positively correlated with ROA and ROE, and significantly negatively correlated with Tobin's Q. Our finding suggests that gender diversity might affect the board's decision-making, which can enhance operational performance. However, market investors do not perceive board gender diversity positively.

We then scrutinize these relationships through the lens of female directors' attributes. We find that the positive relationship between accounting performance and gender diversity remains statistically significant when we include female directors' attributes in the regression model. We argue that the female directorship variable captures certain behavioral attributes that affect corporate performances through a more effective board. However, the negative relationship between Tobin's Q and female directorship vanishes when we include attributes.

This suggests that market investors' perception of women directorship is mainly related to what they may bring to the board. For the various attributes, we find female directors who are foreigners, have business training, and with longer tenure significantly negatively correlate with all performance measures. However, female directors' reputation measured by their media coverage is positively perceived by market investors and is associated with an improvement of ROA and ROE. Additionally, we find that female directors' independence and their multiple directorships are positively perceived by markets but negatively correlated with ROA and ROE. Conversely, the education level of female directors and their chairperson position are negatively correlated with Tobin's Q, whereas they enhance accounting performance. Finally, female committee membership correlates negatively with Tobin's Q and ROE, but not significantly with ROA. All these results point to the importance of the legal system and the company features in the tradeoff between the benefits and costs of board diversity on both the monitoring and advisory role of the board.

Our paper contributes to the literature on gender diversity in various ways. First, we show that the interactions between gender diversity and firm performance are not uniform across various measures of performance. This finding is consistent with results in the literature, in particular, Adams and Ferreira (2009) for large U.S. firms. Second, we explore the black box relationship between gender diversity and firm performance by studying the mediating effect of a large set of female directors' attributes. Third, we contribute to the literature on French corporate governance mechanisms by exploring a sample that includes a large number of listed French firms between 2001 and 2010. To the best of our knowledge, studies analyzing gender diversity of French boards restrict their analysis to the largest French firms listed in the main market indices, i.e. CAC 40 (Ahmadi and Bouri, 2017; Ahmadi et al., 2017; Sabatier, 2015) and SBF 120 (Singh et al., 2015; Dang et al., 2014). Because firm size is a key factor explaining board dynamics and structures (Cashman et al., 2012), our findings

and discussion explore the importance of firm size with regard to the relationship between gender diversity and performance. Finally, we contribute to the debate on gender diversity laws by emphasizing the importance of considering the attributes of female directors for grasping the economic consequences of such legislation.

In the next section, we discuss the related literature and develop our hypotheses. Section 3 presents the sample selection, the different variables we use in our analysis and the descriptive statistics of our sample. In Section 4, we present and discuss the empirical methodology and the main results of our study. A complementary analysis is discussed in Section 5. Section 6 concludes the paper.

2. Background and hypothesis development

2.1. *Gender-diverse board and firm performance*

Boards of directors mainly monitor and advise managers. The relationship between board gender diversity and corporate performance is usually explained by agency theory (monitoring function), by the diversity brought to the board by female directors (resource dependence theory and human capital theory), or by several distinctive behavioral features of women directors compared to their male peers (behavioral based theories).[1] Female directors bring fresh viewpoints as well as professional backgrounds different from those of the "old boys' club." The new skills brought by female directors to the board deliver new perspectives and valuable advice to top managers (Anderson et al., 2011), result in better decisions related to problem-solving (Daily and Dalton, 2003; Hillman et al., 2002), enhance creativity and innovation (Robinson and Dechant, 1997), and improve access to information (Beckman and Haunschild, 2002).

[1] See Terjesen et al. (2009), Post and Byron (2015) and Terjesen et al. (2016) for reviews of the theories used in the literature to explain the relationship between gender diversity and firm performance.

However, various arguments contest the potential advantages of female directorship. The relationship between gender diversity and independence is questionable (Terjesen et al., 2016). Tougher monitoring may decrease shareholder value (Almazan and Suarez, 2003) because it may dilute managers' incentives (Dixit 1996) or negatively affect the communication channel between managers and the board (Adams and Ferreira, 2007). Further, (female) diversity may degrade interactions among board members because of potentially lower cohesiveness (DiTomaso et al., 2007; Herring, 2009). Diversity may also lead to tokenism if female board members are not sufficiently numerous (Torchia et al., 2011).

Because of these opposing arguments, studies analyzing the potential relationship between gender diversity on the board and firm performance (both financial and accounting-based) have inconsistent and ambiguous results. The relationship is reported to be positive (Campbell and Minguez-Vera, 2008; Post and Byron, 2015), negative (Adams and Ferreira, 2009; Ahern and Dittmar, 2012; Matsa and Miller, 2013; Bøhren and Staubo, 2016), and sometimes statistically non significant (Carter et al., 2010; Chapple and Humphrey, 2014).

In the first step of our analysis, we test the relationship between female board membership and French firms' performance. The potential impact of female board membership on performance is affected by the level of shareholder protection provided by the country's legal system (Post and Byron, 2015). The French civil law-based system offers less shareholder protection (La Porta et al., 2008) and features a highly concentrated ownership of firms coupled with a separation between ownership and control (Faccio and Lang, 2002). Campbell and Minguez-Vera (2008) show that female board membership is positively correlated with the performance of Spanish firms. Given the many similarities between business environments and legal systems in Spain and France, we present our first hypothesis as follows:

Hypothesis 1*: Ceteris paribus, there is a positive relationship between female board membership and firm performance*.

2.2. *Female directors' attributes and firm performance*

Beyond the mere presence of female directors, it is important to understand what women bring to the boardroom and how their skills change the monitoring and advisory missions of the board. Female directors are significantly different from their male peers in terms of demographic characteristics (Ahern and Dittmar, 2012; Ruigrok et al., 2007; Dang et al., 2014), experience and expertise (Singh et al., 2008), and personal traits such as risk aversion (Croson and Gneezy, 2009). Several studies suggest that personal attributes of board members affect firms' strategic decisions and performance (Güner et al., 2008, Johnson et al., 2013). Also, decisions on directors' appointment might be based on the attributes that will bring added value to the board (Agrawal and Knoeber, 2001). The reactions of financial markets to these appointments depend significantly on the attributes of new directors (DeFond et al., 2005; Rosenstein and Wyatt, 1990).

The importance of directors' attributes is mainly explained by the upper echelon theory (Hambrick and Mason, 1984), which argues that decision-makers' backgrounds and experience shape the way of interpreting the outcomes of strategic decisions (Nguyen et al., 2015). Empirically, it is recognized that the ambiguous relation between board gender diversity and corporate performance might be justified by the effects of the different attributes of female directors. For example, Ahern and Dittmar (2012) find that the negative relationship between female board membership and Tobin's Q becomes ambiguous when they control for board members' age and experience.

To discuss the literature linking firm performance to directors' attributes, we borrow from Hillman and Dalziel (2003) the classification of directors' characteristics and consider two categories of attributes: monitoring attributes and board capital attributes.

2.2.1. Monitoring attributes

Agency theorists argue that the board of directors is a central governance mechanism that can align the interests of principals (shareholders) and agents (the managers). The monitoring efficiency of boards is a function of the independence of directors, the members of monitoring committees, and the chairperson of the board.

Independence

Independent directors are outside directors without business links to the company, to managers and to controlling shareholders. Regulators in different countries require a minimum proportion of independent directors. The rationale is that independence is likely to guarantee better monitoring of the management team and contribute to improved performance. However, results linking independence and corporate performance are not conclusive (e.g., Adams et al., 2010), possibly because independence could be accompanied by lack of knowledge about the company's business strategies. Alternatively, managers might strategically limit directors' access to firm-specific information to lessen their monitoring capabilities, although doing so would also reduce the benefits obtained from directors' advice (Adams and Ferreira, 2007).

Several studies report that female directors are more likely to be independent (Adams and Ferreira, 2009; Dang et al., 2014; Bøhren and Staubo, 2016). Ferreira (2015) suggests that female directorship may be a better indicator of a board's independence than the usual measure of independence. Hence the monitoring effect of female directors might be augmented by their greater independence. Using Chinese data, Liu et al. (2014) compare the effects of female executive directors and independent female directors on firms' accounting performance and report a positive impact of female directors on corporate performance, though the effect is stronger for female executive directors. They argue that the monitoring effect of female independent directors is less important for Chinese corporations than the

provision of valuable advice by dependent (inside) female directors. On the other hand, Bøhren and Staubo (2016) find that the Norwegian gender quota was associated with an increase of board independence and resulted in reduced firm value in particular for smaller firms more eager for valuable advice from board members rather than monitoring. Given the tenuous relationship between (female) directors' independence and firm performance, we present our independence-related hypothesis in its null format:

Hypothesis 2*: Ceteris paribus, there is no relationship between female board independence and firm performance.*

Committee membership

Directors sitting on relevant committees significantly shape the corporate decision-making process and managers' monitoring (DeZoort et al., 2002; Bugeja et al., 2016). The relevant committees are the audit committee, compensation committee, executive committee and CEO nomination committee (Carter et al., 2010). Adams and Ferreira (2009) find that female directors in U.S. corporations are more likely to join the monitoring committee because of their greater monitoring abilities. However, the link between monitoring and performance might be biased by the adverse effects of excessive monitoring. For example, using a sample of U.S. firms, Carter et al. (2010) find no significant relationship between female presence on important board committees and corporate performance. In France, Rebérioux and Roudault (2016) report that female directors are less likely than their male peers to be appointed to the relevant monitoring committees. Hence, the possible relationship between (female) directors' membership to relevant board committees and firm performance is questionable within the French business context:

Hypothesis 3*: There is no relationship between female membership of board committees and firm performance*.

Chairperson

Because of the crucial role played by the chairperson, the leadership style and skills of the board chair are critical for board effectiveness (Gabrielsson et al. 2007). The role of the chairperson is to generate a cooperative environment between board members by adopting an efficient communication strategy leading to board cohesiveness (Machold et al., 2011). Female chairs are more likely to be democratic and interactive leaders in contrast to men, who tend to be job-oriented and authoritative leaders (Eagly and Carli, 2003). This allows female chairpersons to enhance the quality of the board's decision-making and consequently positively affect performance (Peni, 2014; Nekhili et al.; 2017). However, the relationship between female chairpersons and corporate performance is not uniform across companies. For example, Nekhili et al. (2017) find that the effect of female leadership on the performance of French companies depends on the ownership structure (family versus non-family firms). Based on these observations, our female chairperson hypothesis is as follows:

Hypothesis 4*: There is a positive relationship between female leadership and firm performance.*

2.2.2. Board capital attributes

Directors bring to the board experiences, technical skills, and social background. Resource dependence theorists argue that these characteristics enhance the functioning of the board and ultimately firm performance (Johnson et al., 2013). We categorize these attributes into two different classes: demographic attributes and relational capital attributes.[2] Some

[2] We slightly deviate from the classification used in Hillman and Dalziel (2003). There are different ways of classifying the attributes of board members (Adams et al., 2015; Ben-Amar et al., 2013; Johnson et al., 2013).

relational capital attributes contribute to the effectiveness of the board's monitoring role. However, they are usually associated with the provision of valuable advice and more efficient functioning of the board (Hillman and Dalziel, 2003).

Demographic attributes

Demographic attributes of board directors shape their cognitions, behaviors, and decision making. Heterogeneity of demographic attributes enriches debates in the board and contributes to propose creative solutions (Ben-Amar et al., 2013). According to Johnson et al. (2013), favorable dynamics in the board associated with demographic attributes diversity contributes to the effectiveness of the advisory role of the board. However, demographic diversity might also slow down the decision process because of conflicting views (Milliken and Martins, 1996), thereby impairing the effectiveness of the board.

Female directors' demographic attributes are significantly different from those of their male peers. Indeed, female directors are reported to be better educated (Nekhili and Gatfaoui, 2013; Singh et al., 2008), are more likely to have business degrees (Nekhili and Gatfaoui, 2013; Hillman et al., 2002), and bring international diversity on the board (Singh et al., 2008).

Education is a way of acquiring technical expertise and of enhancing directors' cognitive skills. More educated directors can more easily understand, analyze and propose solutions to complex issues (Johnson et al. 2013; Jiang et al., 2016). Because of the glass-ceiling effect, women are more likely to invest in education to gain recognition of their expertise and increase their credibility (Eagly and Carli, 2003; Hillman et al., 2002). Singh et al. (2015) find that female directors with higher levels of education have a greater impact during board discussions. Empirical studies report a positive relationship between firm performance and the education level of directors (Kim and Lim, 2010; Nguyen et al., 2015). The positive association between gender diversity and performance is even reported to be mainly driven by the higher education level of female directors (Nguyen et al., 2015). Nonetheless, some

studies report no relationship between the education level of directors and corporate performance (Daily and Dalton, 1994; Rose, 2007).

Apart from the educational level of directors, business expertise (through business-related degrees) is reported to facilitate the access of minorities to managerial positions (Ruigrok et al., 2007). White et al. (2014) examine the potential benefits of directors' business expertise by focusing on the appointment of academic directors. They find that the market reaction to such appointments is not driven by the advantages stemming from the business expertise of business professors but rather by their potential network and reputation effects. In France, many board directors belong to the same "education system" through the "*Grandes Ecoles*" system. The homogeneity of directors' profiles weakens the impact of business education on the effectiveness of the board (Dang et al., 2014). Hence, the relationship between directors' business expertise and performance is likely to be ambiguous.

Another important demographic attribute that is reported to affect board functioning is the nationality of board directors. Foreign directors bring to the board new skills and broader networks and knowledge of international markets (Ruigrok et al. 2007; Ben-Amar et al., 2013). These benefits of cultural diversity on the board account for the positive relationship between the proportion of foreign directors and corporate performance reported for Swedish and Norwegian firms (Oxelheim and Randøy, 2003), Korean firms (Choi et al., 2007), and U.K. firms (Estélyi and Nisar, 2016). On the contrary, the presence of foreign directors may impede the functioning of the board. Indeed, foreign directors' presence reduces the quality of communication within the board (Anderson et al., 2011) and they are less familiar with local accounting rules, legislation, governance standards and business practices (Masulis et al., 2012). Because of these disadvantages, foreign directors are reported to be negatively associated with the performance of UK (Frijns et al., 2016) and U.S. (Masulis et al., 2012) firms. Similarly, using a sample of large banks in nine countries, Garcìa-Meca et al. (2015)

find that national diversity of board directors hampers the performance of banks and that this effect depends significantly on the institutional features of banks (regulation and investor protection quality). Based on these opposing arguments and empirical results, we test the following null hypothesis:

Hypothesis 5*: There is no relationship between female directors' demographic attributes (education, foreign nationality, business education) and firm performance*.

Relational capital attributes

Board relational capital, also known as social capital (Hillman and Dalziel, 2003), refers to the potential resources that directors might hold through their experience, reputational capital, and business and social ties. As proxies for relational capital attributes, financial economists and management scholars have used political connections (Liang et al., 2013), links to external organizations (Westphal, 1999), experience (Singh et al., 2008), and membership of influential networks (Dang et al., 2014).[3] We focus here on three of these attributes, which we believe capture the essence of the board's relational capital.

First, the tenure of directors on the same board captures the knowledge of the company's strategy and functioning (Harris and Shimizu, 2004). Drawing on this argument, McDonald et al. (2008) suggest that firms have more incentive to retain directors and thereby optimize the knowledge process of the company's functioning and particularities. However, the advantages of longer directors' tenure are offset by several adverse effects. Longer tenure may be associated with greater rigidity and increased resistance to innovation (Katz, 1982), and is more likely to result in less effective monitoring, as suggested by the friendliness

[3] See Johnson et al. (2013) for a list of the different attributes used in the corporate governance literature. Also, note that some attributes classified as demographic might capture the relational capital of the board. A typical example of such attributes concerns education. Indeed, beyond degree level, education can be measured by graduation from prestigious education institutions such as the Ivy League schools in U.S. (Nguyen et al., 2015). It is reported that this gives access to powerful alumni networks of these institutions. This aspect is particularly important in France with the "Grandes Ecoles" alumni networks, which are highly represented in both top management and political circles in France (Dang et al., 2014).

hypothesis (Vafeas, 2003). These opposed effects of director tenure lead to a non-linear relationship between tenure and the efficacy of the board (Johnson et al., 2013). We, therefore, test the following null hypothesis:

Hypothesis 6*: There is no relationship between female directors' tenure and firm performance.*

Second, directors with multiple directorships may be perceived positively since they facilitate the exchange of vital information for firms (Connelly and Van Slyke, 2012), are more likely to understand the business environment of the company (Hillman et al., 2007), and are more likely to have uncommon skills and strong abilities in both monitoring and advising managers (Fallato et al., 2014). Consistent with this positive perception, Field et al. (2013) report that IPO firms' with busy directors are better valued. Likewise, Ferris et al. (2003) report a positive relationship between the number of board seats held by directors and firm performance. The same authors find that firms experience positive abnormal returns after announcing the appointment of a director with (outside) directorship position.

However, busy directors may lack the time needed to execute their monitoring and advising mission under good conditions (Johnson et al., 2013; Jiraporn et al., 2009). Related to this busyness idea, multiple directorships are associated with lower market-to-book ratio and profitability (Fich and Shivdasani, 2006), excessive CEO pay (Core et al., 1999), greater attendance problems suggesting weaker monitoring (Adams and Ferreira, 2008), a negative market reaction to the increased potential workload of these directors (Fallato et al., 2014), and more likely value-destroying acquisitions (Ahn et al., 2010). Cashman et al. (2012) reconcile the conflicting results linking directors' busyness and corporate performance by showing that both positive and negative relationships can be found in two different samples of U.S. firms. They argue that the relationship between directors' busyness and firm

performance is sensitive to the inclusion of small businesses, which place greater demand on the advisory capacity of busy directors.

Several studies report that female directors are more likely to be busier than male directors (Hillman et al., 2002, Nguyen et al., 2015; Dang et al., 2014). The Norwegian quota legislation was accompanied by the development of an elite group of women holding directorship positions on several boards. These very active women directors, known as "golden skirts", replaced the highly criticized "old boys' network" composed of male directors holding multiple directorships (Huse, 2013). As a result, the monitoring effectiveness of female directors might be compromised when they are over-boarded. Based on this argument, we posit the following null hypothesis:

Hypothesis 7*: There is no relationship between female directors' busyness and firm performance.*

The third relational capital attribute is director reputation. Different characteristics interact with the reputational capital of directors (Westphal and Stern, 2006). For example, multiple directorships, business education, celebrity, social status, prestigious titles, and public recognition might be considered as proxies for reputational capital (Singh et al., 2008). We focus here on another dimension of reputation that is more related to public recognition and visibility. We classify this attribute as a relational attribute since greater visibility is usually associated with more ties to the major players in business and political circles.

Kaplan and Reishus (1990) argue that firms retain directors based on loyalty and performance, but they appoint new directors on the strength of their reputation. Directors nurture their reputation in order to optimize their career opportunities (Diamond, 1989) by questioning takeover defenses (Coles and Hoi, 2003), firing underperforming CEOs (Farrel and Whidbee, 2000), dissenting during votes on questionable decisions (Jiang et al., 2016), and, more generally, enhancing firm performance (Yermack, 2004). On the other hand,

adverse events for companies are directly or indirectly harmful to directors' reputation and thereby to their current and future directorship opportunities (Fich and Shivdasani, 2007; Fos and Tsoutsoura, 2014).

Appointment of directors with good reputations enhances the company's value. For example, IPO firms stock prices perform better when they appoint reputed directors who legitimize (small) firms needing credibility (Certo, 2003). Also, reputed directors are reported to enhance governance quality and market transparency (Jiang et al., 2016), discipline the board and increase monitoring quality (Masulis and Mobbs, 2014; Fos and Tsoutsoura, 2014). Given these results, we argue that the reputation of female directors contributes to improving corporate performances:

Hypothesis 8*: There is a positive relationship between female directors' reputation and firm performance*.

To test the various hypotheses, we control for the endogeneity of the relationship between female directorship and firm performance, and between the attributes of female directors and firm performance. Because of the unstable statistical and economic relationship between performance and female directorship, the effect of the inclusion of the attributes in the regression model would help explain the probable relationship between gender diversity and firm performance. If the insertion of the different attributes does not affect the (significant, if any) relationship between gender diversity and performance, this would suggest that female presence nonetheless affects performance because of some omitted attributes. However, if the (significant) relationship between gender diversity and performance disappears after the inclusion of attributes, we can interpret this result as implying that what is important is the skills that women bring to the board (through attributes) rather than simply their gender.

3. Data and descriptive statistics

3.1. *Sample selection*

Our initial sample contains all companies in the CAC All-Shares index listed on Euronext Paris. This index[4] includes all firms with annual trading volume exceeding 5% of the total market capitalization. Because it includes listed companies of various sizes and business sectors in the French economy, the CAC-All-Shares index is a useful benchmark for performance comparisons. As reported by Cashman et al. (2012), the relationship between the board structure and firm performance is sensitive to the inclusion of small firms. We then consider an inclusive sample to capture the variability of board structures in French firms.

In December 2010, the CAC All-Shares index contained 511 companies. We collected information for the period between 2001 and 2010, during which time appointment of women on boards was voluntary. This period thus precedes the passing, in January 2011, of legislation by the French parliament establishing quotas for the gender balance of company boards.[5] We begin our sample in 2001 because of the lack of corporate governance data in earlier periods.[6] We follow the literature in removing financial firms, real estate companies, and foreign companies to avoid the particular features of these firms possibly biasing our results (e.g., Sila et al., 2016; Liu et al., 2014; Matsa and Miller, 2013). As pointed out by Garcìa-Meca et al. (2015), boards of banks differ from those of non-financial companies. In particular, boards of banks are larger and more independent. Also, because they are regulated differently, directors in financial and real estate companies face greater liability risks

[4] To the best of our knowledge, studies analyzing the corporate governance of French firms focus mainly on samples containing the largest firms listed in the standard French market indices (CAC 40 and SBF 120).

[5] This law states that five years after it comes into force, the proportion of female members of executive boards must exceed 40% for the largest listed and non-listed French firms (those with at least 500 employees and a turnover exceeding EUR 50 million). See Singh et al. (2015) for details about this law and its implications for the composition of French companies' boards. In particular, the legitimacy of female directors' appointment in order to comply with this law is called into question.

[6] The New Economic Regulations (NER) Act of 15 May 2001 requires more accurate communication of firms' corporate strategies and governance structure. This significantly enhanced the quality of publicly available information about boards.

compared to directors of non-financial firms (Adams and Mehran, 2012). Recognizing these structural differences between non-financial and financial companies, several studies focus on the governance of financial institutions (e.g., Garcìa-Meca et al., 2015; Pathan and Faff, 2013). Adams and Mehran (2012) explain the distinction between studies on non-financial companies and financial companies by means of the specific dynamics of the regulation of financial institutions. We also removed firms with missing or inconsistent corporate governance, ownership or financial data, which represent about 23% of the CAC All-Shares market capitalization as of December 2010. The final unbalanced sample consists of 3,403 firm-year observations covering information about a total of 394 companies over ten years. Accounting and financial data were collected from Thomson DataStream. Data on ownership were obtained from the Orbis Database (Bureau Van Dijk). All the remaining variables were hand-collected from annual reports and other sources as explained below.

3.2. *Firm performance measures*

Table 1 contains the definitions of the variables used in this study. For performance measures, we followed the literature by using a market-based measure of firm performance (Tobin's Q) and two accounting measures: Return on Assets (ROA) and Return on Equity (ROE). Tobin's Q is measured as the sum of the market value of stocks and the book value of debt divided by the book value of total assets. It proxies market expectations about the firm's future earnings. Compared to ROA and ROE, Tobin's Q is less affected by accounting conventions and by the documented strategic manipulation of earnings (Dechow et al., 1996).[7] We also use Return on Equity (ROE) as another measure of firm performance related to equity holders' accounting performance.

[7] For these accounting measures, note that French firms were required to adopt the IFRS standards in 2005. Using Norwegian data, Ahern and Dittmar (2012) argue that accounting standards may influence accounting-based performance measures because of the existence of several manipulations. In unreported results, we find qualitatively similar results when we include a dummy IFRS variable in our regression models. These results are available upon request.

3.3. *Female directors' attributes*

We measure the presence of women on the boards of French firms using the percentage of women on the board. We collected attributes for each woman sitting on the board of a French firm during our sample period. We classified attributes into two categories: monitoring attributes and board capital attributes.[8]

Monitoring attributes are those reported to be more linked to the control function of the board. We consider three monitoring attributes. First, we consider the proportion of independent female directors from the official categorization of independent directors, as stated in the annual report. Second, we collected information about the participation of female directors in one of the relevant board committees (audit, compensation, executive, and CEO appointment). At the firm level, we calculated the percentage of women directors participating in one of the relevant committees. Third, we considered a dummy variable equal to one if the chairperson is a woman.

We then consider two classes of board capital attributes: demographic and relational capital. For demographic attributes, we collected the nationality and the education level of each female director, by inspecting annual reports.[9] For each firm-year, we report the proportion of foreign female directors and the percentage of female directors with Masters or Ph.D. degrees to capture the potential academic qualification of female board members and to signal capabilities to perform monitoring and advisory roles on the board (Johnson et al., 2013). We also examine the education specialization of female directors and report the proportion of female directors with business-related diplomas.

[8] We use the classification that is most relevant to our research question. See Johnson et al. (2013) for a discussion of the different directors' attributes studied in the literature and the different ways they are measured.

[9] When director's biography is not available on the annual report, we collect information systematically from two networking websites (www.whoswho.fr and www.dirigeant.societe.com). If the information about directors on these two websites did not match, and did not appear on any official document, we systematically cross-checked information coming from other sources. The information is reported only when it is provided by at least two separate sources.

For relational capital attributes, we report the average number of years that female directors have spent on the board of the company. This tenure variable captures directors' experience and knowledge of the firm (Hillman et al., 2011). We then collected information about the number of simultaneous directorships of each female director to capture her ties with other organizations (Fallato et al., 2014). Women's board multi-directorship is measured as the percentage of women sitting on more than one board.

Finally, we measure each female director's reputation by following the reputation measures for CEOs based on their press citations (Milbourn, 2003; Rajgopal et al., 2006; Jiang et al., 2016). The intuition behind the use of media citations as a measure of reputation is that talented female directors will be the most active and more likely to be cited in the press. For each female director, we report the yearly number of the press (both French and international) citations on the Factiva (previously Dow Jones Interactive) database. The reputation variable is measured as the (natural logarithm of the) average number of citations for female board members of a firm during the corresponding year.

3.4. *Control variables*

The corporate governance literature establishes a relationship between performance and governance quality (Adams et al., 2010). The quality of governance is usually captured either by the composition of the board or by measures capturing board diligence. We use the size of the board proxied by the number of board members, the percentage of independent directors, the number of meetings of the board, and the tenure of the CEO in his/her occupation measured by the number of years as CEO in the same company (Adams and Ferreira, 2009; Terjesen et al., 2016). We also include a variable capturing the concentration of power for a CEO who serves as CEO and board chairperson simultaneously (Bhagat and Bolton, 2008).

In addition, we follow the literature and use variables that are reported to correlate with firm performance. These variables are related to company ownership structures (family

ownership and institutional ownership), firm size, leverage, sales growth, the percentage of foreign assets, and the magnitude of investment in research and development in order to capture the firm's degree of complexity (Miller and Triana, 2009; Terjesen et al., 2016). Finally, we consider the Industry Classification Benchmark (ICB) used by Euronext since 2006, because the relationship between gender diversity and firm performance may not be stable across industries (Chapple and Humphrey, 2014). We also control for year effect by including year dummies.

3.5. *Descriptive statistics*

Table 2 summarizes the descriptive statistics of the dependent and control variables available for the whole sample of 3,403 firm-years. The firms sampled have an average ROE of 5.05%. Relative to the French sample-based analysis by Nekhili and Gatfaoui (2013), ROAs in both studies are similar (2.73% versus 2.32%), yet the average Tobin's Q is significantly smaller (1.042 in our sample versus 1.696). This might be explained by the larger set of firms included in our sample and by the 2008 financial crisis, which negatively affected French stock values. Similarly, there are significant differences between our descriptive statistics and those reported by studies analyzing companies in CAC 40 index (e.g., Sabatier, 2015; Ahmadi and Bouri, 2017).

For corporate governance variables, the average percentage of female board members is 10.72%. On average, a board contains 7.7 members, 26.96% of whom are independent, and holds on average 6.37 meetings per year. The chairperson of the board is also the CEO for 62.57% of the observed firm-years, and the average CEO tenure is 7.83 years. These variables differ slightly from those reported in Nekhili and Gatfaoui (2013) and Sabatier (2015) because our sample contains small firms with smaller boards. For the same reason, ownership statistics show a higher concentration of ownership for families and lower ownership by institutional investors.

Table 3 explores the relationship between the number of female directors and performance measures. The increase in the number of women directors is positively correlated with firms' ROA and ROE. The largest marginal increases of ROA and ROE occur for an increase from two to three female directors. This is consistent with tokenism theory (Torchia et al., 2011), which suggests that the effect of female directorship on corporate performance is conditional on having a critical mass of female directors for their effect to become significant.[10] Conversely, Tobin's Q is negatively correlated with the number of women directors. The discrepancy between the correlations of performance measures and the number of women directors suggests that shareholders' perception of board gender diversity and accounting-based performance measures do not necessarily respond in the same way to board gender diversity. This underlines the importance of using both accounting and market-based measures in our analysis.

To analyze the relationship between board gender diversity and corporate performance, if any, we explore the attributes of women directors. The summary statistics of these variables are presented in Table 4. Conditional on having at least one female board member, only 8.89% of female directors are independent, a figure that is much lower than the proportion of independent directors in the whole sample. This finding is consistent with studies reporting that female board members are more likely to be firm insiders or to have affiliations with controlling shareholders (Dang et al., 2014; Nekhili and Gatfaoui, 2013).

Additionally, only 17.57% of female board members participate in relevant operational committees, and only 7.82% of firms' chairpersons are women. The percentage of female directors having a Master's or Ph.D. (or equivalent) degree is 46.79%. These figures are comparable to the sample in Dang et al. (2014) containing only the largest 120 French companies. Furthermore, female board members have an average tenure of 6.52 years, and

[10] Note that the increase in the number of female directors from three to four is associated with a decrease in ROA. This finding should be viewed with caution because of the small number of observations with four women directors, coupled with high volatility of ROA during our sample period.

their likelihood of sitting on more than one board is 61.67%. The final variable of interest in our study is the measure of female directors' reputation. On average, female directors on the same board are cited 26.30 times a year in the national and international press. The number of these citations ranges from zero to more than two thousand for female directors with the highest media coverage.

During our study period, the number of women directors increased almost everywhere in the world as a result of increasing pressure from different stakeholders, with the aim of promoting gender diversity on boards. Our sample confirms this tendency for French companies (see Table 5). In fact, the percentage and number of female directors augmented significantly over the years. Interestingly, the attributes of female directors evolved over the years. Indeed, female directors are more independent, are more likely to have a business degree, and are on average more experienced (captured by tenure). However, their demographic attributes (education, nationality), busyness, reputation, membership to relevant committees, and the likelihood of being chairperson are not statistically different (although for some attributes the average values changed considerably over the years). To assess statistically the occurrence of trends for female directorship and the attributes of women directors, we carried out a Mann-Kendall test (Table 5). The null hypothesis of no trend over time is rejected for all variables except for female board multi-directorships. For all the other variables, we find a statistically significant upward change. These findings imply a cultural shift in French companies regarding board gender diversity as well as in the dynamics of the attributes required for female directorship candidates.

To investigate the trend of female directorship, we calculate the year-to-year variation in the number of female directors as well as variation in board size. Table 6 presents these yearly variations from 2002 to 2010 for the whole sample. We first find that the year-to-year variation in the number of board directors (Column 1) and the number of women directors

(Column 5) is less than one director. The evolution of board size and the number of women directors remains steady and does not change significantly over time. Equally, no significant change is observed for the year-to-year variation in the proportion of female directors (Column 4). We carried out the Mann-Kendall non-parametric test for trend analysis. The null hypothesis is not rejected for the time series and no trends can be inferred from our data on year-to-year variation in board size and female directorship.

In addition, we report the proportion of firm-years with increasing and decreasing board size. The results are reported in Table 6, Column 2 and Column 3, respectively. The proportion of firm-year observations with an increase in the number of board directors (Column 2) is, for each year, higher than the proportion of firm-year observations with a decrease in the number of board directors (Column 3). Similarly, for each year, the proportion of firm-year observations where the number of female directors increases (Column 6) is higher than the proportion of firm-year observations where it decreases (Column 7). This finding suggests that the appointment of new female directors occurs through increasing the size of the board size rather than replacing male directors. We test this observation by carrying out mean difference tests to compare variation in board size and variation in the number of women directors. Results, reported in Table 7, confirm that the hiring (firing) of female directors is more likely when the board size increases (decreases). Our results are similar to those of Bøhren and Staubo (2016), who study the Norwegian mandatory quota context and find that the demand for women on the board of directors leads to an increase in board size.

Finally, Table 8 presents the pair-wise matrix of correlations between variables. All correlation coefficients are less than the critical threshold of 0.6. VIF values range between 1.05 and 2.87, considerably below the critical value of 10. Although several values are consistent with what is reported in other economies or other French samples, some of the reported correlations call for discussion. First, female directorship is negatively correlated

with the independence of women directors. This might be driven by the large ratio of family-owned companies in our sample, particularly for smaller businesses. Indeed, as reported by Nekhili and Gatfaoui (2013) and Dang et al. (2014), French family firms are more likely to appoint women directors with family ties.

Surprisingly, female directorship is negatively correlated with firm size, thus contradicting the results observed in other studies. This negative correlation might be related to the large positive correlation between firm size and board size, and to the broad ranges of values of these two variables (firm size ranges between €100 million and €240.56 billion and board size ranges from only 3 up to 26 directors) compared to the limited range of values of the number of female directors (between 0 and 4). Indeed, if we measure female directorship simply by the presence of women on boards (Adams and Ferreira, 2009), or the absolute number of women directors on the board (Liu et al., 2014), we get back to documented positive correlations between these variables and firm size.[11,12] Overall, the correlation matrix illustrates the importance of designing our empirical analysis carefully to deal with biases related to the structure of the sample and the endogenous relation between female directorship and corporate performance.

4. Multivariate Analysis

4.1. *Econometric specification*

Are gender-diverse boards' companies structurally different from companies with all-male boards? To answer this question, we compare the characteristics of firms with gender-diverse boards to those with all-male boards (Table 9, entire sample column). Consistently

[11] From Table 9 below, firms with at least one female director are larger than firms with only male directors. The correlation between the number of female directors and firm size is equal to 0.083 and is significant at the 1% level. Similarly, we find a positive and significant correlation (0.089) between the binary variable indicating the presence of at least one female on board and firm size.

[12] We also run our different regressions using the number of female directors as a measure of female directorship. The results are qualitatively the same although several significant results disappear because of the low variability of this measure.

with the literature, firms with women directors are (significantly) larger, have larger and more independent boards that meet more frequently and are more likely to have CEO-chairperson dual function. However, contrary to Nekhili and Gatfaoui (2013), there is no significant difference regarding family ownership. Interestingly, female directorship is associated with increased ROA and ROE, while average values of Tobin's Q in the two subsamples are not statistically different.

To properly control for these structural differences, we carried out a matched sample analysis using the propensity score matching procedure (Rosenbaum and Rubin 1983). First, we estimate a logit model in which the binary dependent variable is whether or not a firm has at least one female director. We include in the logit equation all governance, ownership and other control variables defined in Table 1 (and available for the whole sample). This first step allows us to determine for each firm a propensity score that represents a predicted probability. Each company with at least one female director is then matched with a set of control companies (those without female directors) having the closest predicted propensity score, i.e., with characteristics that are comparable to those of the firm with a gender-diverse board. To select matched firms, we use the caliper matching method that defines a maximum propensity score discrepancies.[13] The matching procedure yields a matched sample with 2,200 observations (firm-year) with 1,100 treatment observations (firms with at least one female director) and 1,100 matched observations (companies with all-male boards). Table 9 (the matched sample columns) reports the average values and pairwise differences between the variables of the new sample. Compared to the first subsamples, all the discrepancies between characteristics of subsamples vanish. This suggests that with the new matched sample, we control for heterogeneity between subsamples.

[13] More precisely, we use a caliper distance of 1% without replacement. Matching without replacement means that the same firm with one or more female directors can be matched to only one all-male director firm.

Although propensity score matching allows us to control for sample selection biases, we are left with three sources of endogeneity that may have serious consequences for inference: unobservable heterogeneity, simultaneity, and dynamic endogeneity. First, unobservable heterogeneity is a source of endogeneity if unobservable variables are correlated with performance and board gender diversity. As discussed in the literature, the decision to appoint female directors is correlated with various characteristics of the firm (Ahern and Dittmar, 2012; Terjesen et al., 2016). Some of these characteristics are unobservable. For example, CEO personality affects firm performance (Gow et al., 2016) and may affect the decision to appoint female directors. Second, simultaneity refers to the reverse causality between performance and gender diversity on the board. While female directors may affect performance, the theory suggests that firms choose the structure of the board with the aim of optimizing the efficiency of the board's advisory and control roles, which consequently affect the firm's performance over the same period. Next, a correlation between gender diversity and performance should not necessarily be interpreted as an effect of female directorship on performance but rather as a strategic board structure decision by the firm. Finally, dynamic endogeneity refers to the lagged reverse causality between performance and board gender diversity. Current board structure may indeed be a function of past performance. For example, women who have the required skills/experience to join a board may choose better performing firms. As Ferreira (2010) argues, this endogeneity effect may explain the various and contrasting relationships found in the literature between female directorship and firm performance.[14]

A simple OLS estimation of the impact of female directorship on performance results in biased estimates because of these endogeneity issues. Including past performance in the

[14] See Roberts and Whited (2013) for a detailed discussion of these endogeneity issues in corporate finance. Wintoki et al. (2012) present and discuss the theoretical and econometric issues related to these sources of endogeneity in a board structure/performance relationship setting.

explanatory variables only partially addresses the dynamic endogeneity issue, and ignores the unobservable heterogeneity and simultaneity issues.

To control for unobservable heterogeneity, linked to time-invariant heterogeneity at firm level, researchers typically include fixed effects in the regression models (Wintoki et al. 2012; Roberts and Whited, 2013). However, estimation of fixed effects will be consistent only if past performance does not correlate with current female directorship. Both theoretical and empirical arguments suggest that past performance affects the decision to appoint women directors. As suggested by Roberts and Whited (2013), this dynamic endogeneity, as well as reverse causalities, results in biased fixed effect estimates.

In order to mitigate the different endogeneity concerns, our primary estimation technique is the system GMM method proposed by Arellano and Bover (1995) and Blundell and Bond (1998). The system GMM approach allows the relationship between female directorship and performance to be estimated in levels and first differences simultaneously. The level equation presents performance as a function of its past values (lagged values), observable firm characteristics (board structure and explanatory variables), and the error term including a fixed effect component. The difference equation presents year-to-year differences in the level equation. Hence, the difference equation presents the variation in year-to-year performance as a function of the year-to-year lagged variation in performance, year-to-year variation of the explanatory variables, and the difference in error terms. Note that the fixed effect error term disappears in the difference equation, since it is by definition time invariant. By estimating these equations simultaneously, the system GMM approach controls for heterogeneous endogeneity (stemming from time-invariant variables) and includes the dynamic structure of the relationship between performance and board gender diversity. More interestingly, some of the lagged values (both for level and differences) included in the model act as internal exogenous instruments. The rationale of using past performance and differences in

explanatory variables as instruments is based on the conjecture that the strategic decision to appoint women directors is linked to the current and past performance of the firm as well as to other firm characteristics (board structure, firm size, etc.). If current performance is observed, the unanticipated component of performance (the error term in the regression) can be assumed to be uncorrelated with past observations of the endogenous variables (female directorship, board structure, firm characteristics) when observation of lags goes sufficiently far back in time.[15]

System GMM estimation has been applied in various governance research studies and other areas of finance and economics (Wintoki et al., 2012). For example, Pathan and Faff (2013) and Garcìa-Meca et al. (2015) apply this estimation to study the impact of board structure (size, independence, and gender diversity) on bank performance. Sila et al. (2016) analyze the relationship between gender board diversity and firm risk using the system GMM as the main inference method. It is important to note that the system GMM method heavily relies on the assumption of the orthogonality of internal instruments. Although we use a battery of statistical tests to examine the validity of these instruments, they do not test potential misspecifications of the model.[16] Another important issue with the system GMM method is the proliferation of instruments. Since each explanatory variable provides a number of instruments (associated with lagged values and differences), there is a potential issue of weak instruments (Roodman, 2009a) that becomes greater as the number of lags and/or explanatory variables increases. We carry out two tests to check the identification of the model. First, the Sargan test checks whether the model is overidentified. For our sample, the null hypothesis of overidentified model is rejected in all regressions. Second, the Hansen test

[15] See Roodman (2009a, 2009b) for a formal presentation of the system GMM model. Wintoki et al. (2012) provide a complete discussion of the construction of system GMM estimation method and the different theoretical arguments motivating the use of internal instruments.

[16] Naturally, the standard approach for dealing with endogeneity is to use external exogenous instruments and to apply an IV estimation. For our analysis, finding instruments that are orthogonal to female directorship and the different attributes of female directors is a hard if not an impossible task (Pathan and Faff, 2013).

of exogeneity of the instruments subset does not lead to the rejection the null hypothesis of valid (exogenous) instruments. These tests strengthen the reasons for choosing the system GMM estimation methodology.[17]

The use of the system GMM estimation method requires testing autocorrelations to detect dynamic specifications of the endogenous and dependent variables. For this purpose, we use the Wooldridge (2002) test, which strongly rejects the null hypothesis of no autocorrelation. Tables presenting the results of the system GMM estimations display the results of the Arellano-Bond (1991) auto-correlation tests for all the dependent and independent variables. The null hypothesis of no first-order (AR(1)) auto-correlation is always rejected, which confirms the Wooldridge (2002) test result. The Arellano-Bond (1991) test, however, does not reject the null hypothesis of no second-order serial correlation (AR(2)), thus supporting the rationale for using the system GMM model, which performs better with only first-order serially correlated processes (Roodman, 2009b).

4.2. Gender diversity and firm performance

We begin by testing Hypothesis 1. Tables 10, 11, and 12 report the results for ROA, ROE, and Tobin's Q, respectively. For completeness, each table includes the results of the OLS estimation, the fixed effect estimation, and the system GMM estimation. Each estimation is applied on the total sample and the matched sample. Unlike in the OLS estimation, we include in the fixed effect and the system GMM estimations the lagged values of performance as an explanatory variable.[18] For all regressions, the variable of interest is female directorship measured by the proportion of female directors on the board. We include a set of control variables putatively affecting firm performance. The first group of control variables is related to board structure (board size, board independence, number of board

[17] Wintoki et al. (2012) point out the importance of interpreting the results of the Hansen test cautiously and provide a simulation-based discussion of its validity.

[18] In untabulated results, we apply the fixed effect on a model without considering the dynamic feature of performance. The results are qualitatively similar to those presented in Tables 10, 11, and 12.

meetings, a dummy capturing whether the CEO is also the board chair, a dummy indicating whether the CEO is a woman, the CEO's tenure), and to the ownership structure of the firm (family and institutional ownership). The second group of control variables captures the riskiness and growth potential of the firm (leverage, foreign assets, and R&D investments) and its operational performance (sales growth). Finally, we include firm size, measured by the natural logarithm of its total assets, and both industry and year dummies (except for fixed effect estimation) to control for industry and time-varying effects of firm performance.

In untabulated results, we use an OLS estimation to analyze the dynamic structure of the data by explaining the year-to-year variation in performance by the year-to-year variation of the different time-variant explanatory variables. Almost all governance variables do not significantly correlate with the year-to-year variation in performance. In particular, variations in sales growth significantly and positively correlate with variations in performance, while variations in leverage negatively correlate with variations in performance (though not significantly for Tobin's Q). The results of the differences-based regressions may be driven by the small variability of the year-to-year corporate governance measures (as reported in Table 6 for female directorship) compared to variations in performances and other firm characteristics.

Overall, the signs of the coefficient of the OLS and system GMM estimations are the same. However, the significance of some coefficients slightly differs. Two differences in Tables 12 (Tobin's Q) are noteworthy. First, the female directorship coefficient is significantly negative for the GMM estimation and turns positive and non-significant in the OLS estimation. Second, ownership variables significantly and positively correlate with Tobin's Q in the GMM estimation. This result is consistent with Nekhili et al. (2017). However, ownership structure is not significant when we apply the OLS estimation. Finally, for all performance measures, the coefficients of the system GMM estimation are more

economically significant than the coefficients of the OLS estimation. This finding is consistent with the view that endogeneity results in downward biases in OLS estimations (Wintoki et al., 2012). All the differences between the results of the OLS estimations and the system GMM estimations are consistent with the ambiguous results found in the literature (Roberts and Whited, 2013) and suggest the importance of controlling for the different sources of endogeneity through the system GMM estimation.

Equally, the coefficients resulting from the fixed effect estimation are economically less significant compared to the system GMM estimation. Unlike for the system GMM estimation, governance variables correlate little with performance measures when using fixed effects estimations. Pathan and Faff (2013) report similar divergent results between the two estimation methods applied to analyze the relationship between performance and board structure variables for international banks. As suggested by Wintoki et al. (2012) and Sila et al. (2016), when the panel data is dynamically endogenous – which is the case for our sample – the fixed effect estimation results in biased estimates. The latter authors argue that the system GMM estimation is the most appropriate (and leads to the least biased estimates), in particular for panel data with short time length, as in our sample. System GMM reduces the heterogeneity effect (by including the first difference equation in the estimated system of equations), simultaneity and dynamic endogeneity by considering both the first difference equation and the lagged values of the dependent variable in the principal equation. Accordingly, our discussion focuses on the results of the system GMM estimations.

As for the variable of interest in our study, the percentage of female directors is significantly negatively correlated with Tobin's Q and significantly positively correlated with ROA and ROE. If accounting-based performance measures are more closely linked to the effectiveness of the advisory and decision-making role of the board, our results suggest that gender diversity in the board enhances the effectiveness of the board's advisory role. In

contrast, the market-based performance measure is more likely to be affected by investors' perception of the monitoring effectiveness of the board. Our result suggests that French investors do not perceive gender diversity as a way to improve the monitoring effectiveness of the board. This finding might be related to the existence of other channels that ensure effective monitoring of managers. Consistent with this board monitoring role interpretation, Tobin's Q is not significantly affected by the different board structure variables, except for board size, which is negatively correlated with Tobin's Q. However, both ownership variables are positively correlated with Tobin's Q, suggesting that investors in French markets rely more on institutional and family ownership for monitoring managers, possibly because of the distinctive ownership structure of French firms (Boubaker and Laberroge, 2008). Conversely, ownership variables are not correlated with ROA and ROE, contrary to several board structure variables that are correlated with accounting-based performance measures. For example, board size affects ROA and ROE positively and significantly. This finding contradicts the results of Adams and Ferreira (2009) and Terjesen et al. (2016), who find a negative relationship between board size and ROA. However, out result is consistent with resource dependence theory, which suggests that a large board provides access to a wider range of resources and exerts a positive effect on firms' operational performance (Coles et al., 2008). Consistently with Terjesen et al. (2016), we find that the frequency of board meetings negatively affects accounting-based performance measures, thus contradicting Liang et al. (2013), who report a positive correlation between the number of board meetings and Chinese bank performance. Additionally, CEO tenure is positively correlated with ROA, suggesting that the CEO's cumulative experience enhances the performance of the firm (Henderson et al., 2006).

Regarding the controls, ROA, ROE and Tobin's Q are negatively correlated (albeit not significantly for Tobin's Q) with debt ratio, a finding that is consistent with those of Terjesen

et al. (2016). Measures of firm complexity (foreign assets, R&D investments) and operational performance (sales growth) are positively correlated (but not always significantly) with performance measures. Finally, consistently with the literature (e.g., Adams and Ferreira, 2009), our results reveal a positive relationship between firm performance and firm size.

To summarize, the results of our analysis suggest that gender diversity affects French firms' performance even after controlling for the endogeneity of the gender diversification decision. However, these results vary in direction for different measures of performance. We turn now to our central questions. What drives the correlations between gender-diverse boards and firm performance?

4.3. *Female directors' attributes and firm performance*

To answer this question, we explore the impact of female directors' attributes on corporate performance. As with female directorship, the characteristics of women directors are endogenously determined. Ahn and Shresta (2013) and Garcìa-Meca et al. (2015) argue that directors' attributes (expertise and nationality) are endogenously determined by the need for monitoring and/or advising services by firms. We apply the system GMM estimation to gender diverse firms included in the propensity score matched sample.[19] If the significant association between gender diversity and performance vanishes after the inclusion of attributes, this would mean that the skills that women bring to the board (through their attributes) are more relevant to performance than simply their gender.

Tables 13, 14, and 15 report the results of the system GMM estimations for ROA, ROE and Tobin's Q, respectively. For each performance measure, we run the regression by including only the attributes (Model 1) and the attributes plus female directorship (Model 2).The positive correlation between accounting-based firm performance and female

[19] We restrict our attention to firm-years included in the matching procedure in order to facilitate comparisons with the results of the preceding subsection. In non-tabulated results, we estimate the system GMM model using the total subsample of firms with gender diverse boards. The results are qualitatively the same. They are available upon request from the authors.

directorship prevails when the nine attributes are included in the regression. This finding lends support to the suggestion that female directors bring advisory skills and personal features to the board that are not captured by our set of nine attributes. On the other hand, the negative correlation between female directorship and Tobin's Q vanishes and turns to be positive and non-significant. This suggests that the monitoring concerns of French investors are more related to the skills and attributes of female directors than their gender. We discuss below the results related to the different attributes by following our classification of attributes.

4.3.1. Monitoring attributes and corporate performance

Monitoring attributes are related to women's senior positions (presence on relevant board committees and chairperson) and by women directors' independence. These attributes are primarily related to the monitoring role of the board. However, they also proxy the degree of influence of female directors on the board's strategic decisions.

As illustrated by Hypothesis 2, the correlation between female directors' independence and performance depends on the tradeoff between the benefits of more effective monitoring and the cost of the less effective decision-making process. Consistently with the existing literature (Adams and Ferreira, 2009; Garcìa-Meca et al., 2015), we find a significantly positive correlation between Tobin's Q and female directors' independence. This suggests that market investors view women directors' independence positively because it is more likely to result in effective monitoring. Market investors seem to value the independence of female directors as a way of enhancing the control of French firms characterized by concentrated ownership. Interestingly, we find that the board independence becomes (statistically) unimportant when we include both female directorship and female directors' independence. Conversely, accounting-based performance measures are negatively correlated

with women directors' independence.[20] As suggested by Bøhren and Staubo (2016), this result might be driven by the presence of small firms which have a low need for monitoring compared to large firms. The independence of female directors significantly reduces the positive correlation between female directorship and accounting based performances reported in Tables 10 and 11. Our result here is similar to Liu et al. (2014), who find that the positive relationship between gender diversity and accounting based performance of Chinese firms is driven by female executive directors (insiders) rather than by independent female directors.

On the other hand, we find that female directors' leadership position in the board (chairperson) is negatively correlated with Tobin's Q and positively correlated with ROE and ROA. These results are consistent with those related to female directorship. The leadership position of women is negatively perceived by investors, although our accounting based results underline the effectiveness of female chairperson in improving the board's decision-making process. In contrast, Peni (2014) reports a positive relationship between female board leadership and both Tobin's Q and ROA for the S&P500 firms. Our sample includes more size diversity between firms, and French firms are characterized by higher ownership concentration and weak minority shareholder protection, which may explain the different results for Tobin's Q. Consistently with the contingency theory of leadership, Nekhili et al. (2017) argue that the impact of female leaders on firm performance depends on the organization and culture in which leaders operate.

Likewise, the relevant board committee membership of female directors is negatively perceived by market investors (negatively correlated with Tobin's Q), thus confirming the above results related to female directors' leadership positions, and points to the distinctive features of the French business environment. Surprisingly, female board committee membership correlates positively with ROA and negatively with ROE. This result confirms

[20] In the literature, the results on the relation between board independence and accounting based performance measures are mixed. For example, the relation is positive in Liang et al. (2013), not significant in Adams and Ferreira (2009), and negative in Pathan and Faff (2013).

the ambiguous relationship between female board committee membership and corporate performance (e.g., Carter et al., 2010).

Overall, the monitoring effectiveness of women directors is positively valued by investors only when female directors are independent. This suggests that a leadership position and membership of relevant board committees are not credible signals, sent to the market, of better monitoring. We argue that these results are driven by the ownership concentration of firms in our sample. However, contrary to female leadership, female directors' independence negatively correlates with accounting-based performance. These contrasting results denote the divergence of the effects of board composition on the effectiveness of the board and the way this is perceived by market investors.

4.3.2. Board capital attributes and corporate performance

Demographic attributes

As suggested in Hypothesis 5, there is no consensus regarding the relationship between demographic board directors' attributes and corporate performance. Although education and business education might be considered as a way to legitimize women's holding directorship positions (Singh et al., 2015), we find that these demographic attributes correlate negatively with Tobin's Q. These results contradict Kim and Lim (2010) where the relationship between education level and Tobin's Q is positive for Korean firms. Nguyen et al. (2015) also find a positive correlation between U.S. banks' returns and of the business education level of newly appointed directors. We argue that the negative relationship in our sample is associated with France's distinctive education system. We suggest that we need to go beyond the simple observation of education level since being a graduate of a "*Grande Ecole*" might be a negative indicator of diversity because female directors then have a similar educational background as their male peers. As recognized in Johnson et al. (2013), simply observing

educational background is not enough for understanding the link between educational variables and underlying social and cognitive constructs.

Nevertheless, accounting-based performances are positively related to the education level of female directors. Despite the negative perception by market participants, the education level of female directors contributes to enhancing the quality of interactions between board members and the strategic decision-making process within boards. This suggests that because of the structure of the French education system, education level and business education are perceived negatively by outsiders, even though the expertise captured by education level is valuable within boards. However, the results of Model 2 in Tables 13 and 14 show that accounting-based performance is negatively correlated with female directors' business education. This result might be related to the presence of (very) small firms, for which technical skills in the board are viewed as preferable to management related knowledge.[21]

Similarly to the findings regarding U.K. firms (Frijns et al., 2016), U.S. firms (Masulis et al., 2012), and a sample of large international banks (Garica-Meca et al., 2015), our regressions indicate that the proportion of foreign female directors is negatively correlated with performance. Then, our results indicate that an additional foreign female director on French firms' boards is associated with a decrease of market and accounting based performance. Hence, as in the studies mentioned above, the disadvantages of foreign directors – less familiarity with local accounting rules, governance and business standards, potential frictions because of different ways of thinking – seem to outweigh their potential benefits (e.g., new skills and knowledge of international markets, etc.). As for the monitoring benefits of foreign directors, our results suggest that, in an environment where managers are

[21] To confirm this intuition, we perform our system GMM regression on small and large firms separately, where small and large firms are defined according to the median firm size. The impact of business expertise of female directors on both ROA and ROE is positive and significant for large firms and negative and significant for small firms. Management expertise of female directors is then more valuable for large firms than for small firms. Nevertheless, the impact of female business expertise on Tobin's Q is similar to that found for the total sample and still negative and significant for both small and large firms. Non-tabulated results are available upon request.

monitored by different stakeholders, particularly by controlling and family shareholders (Kim et al., 2007), it seems that additional monitoring by foreign female directors is not desirable (Adams and Ferreira, 2009).

Relational capital attributes

Spending longer time on the same board might be seen as indicative of better knowledge of the firm's functioning, which would result in better monitoring and improved strategic decision making (McDonald et al., 2008). However, the friendliness hypothesis (Vafeas, 2003) suggests less effective monitoring of well-established directors. Furthermore, Bertrand and Mullainathan (2003) and more recently Matsa and Miller (2013), discuss the so-called "quiet life" argument suggesting that the scarcity of women having the required directorship skills might lead to less pressured female directors compared to their male peers. Consistent with these negative effects, we find a negative relationship between female tenure and corporate performance. Like for female directors' tenure, accounting-based performance is negatively correlated with the percentage of busy female directors. Hence, the experience and expertise benefits related to multiple directorships (Fallato et al. 2014; Fields et al., 2013) are outweighed by the lack of time given to each firm for controlling and advising managers effectively (Jiraporn et al., 2009; Fish and Shivdasani, 2006). On the other hand, busy female directors are positively perceived by market investors since the percentage of female directors with multiple positions is positively correlated with Tobin's Q. These inconsistent results between accounting-based and market-based performances are in line with Cashman et al. (2012), indicating that the relation between multiple directorship and performance is sensitive to the structure of the sample used.[22]

[22] When comparing small and large firms, we find that the relation between female board multi-directorship and accounting-based performance measures (ROA and ROE) is negative and significant for only large firms. This relation is not significant for small firms. However, the percentage of female directors with multiple positions remains unchanged and is positively and significantly correlated with Tobin's Q for both large and small firms.

Finally, the reputation variable, which captures social capital attributes, is positively correlated with all performance measures (although the correlation is not statistically significant for ROE). Media coverage of female directors thus seems to be perceived positively by market investors and to contribute positively to accounting-based (operational) performance. These results are consistent with similar studies linking CEO media coverage to Tobin's Q (Nguyen, 2015) and firm media coverage to stock market performance (Fang and Peress, 2009). Hence, consistently with Hypothesis 8, more reputed female directors seem to be positively perceived by market investors and to contribute positively to the functioning of the board. Jiang et al. (2016) report similar results for Chinese firms in studying the dissenting votes of directors during board session votes.

Overall, these results remain stable when the percentage of female directors is excluded from the regression. This suggests that the persistent effect of female directorship on performance is more likely to be related to characteristics of female directors that are not captured by the attributes we consider in this analysis. For the other variables included in the regression, coefficients are qualitatively similar to those found in the regression without taking into account female directors' attributes (Tables 10, 11, and 12).[23]

To summarize, the results in this section lend support to the idea that the relationship between female directors and firm performance is explained not only by the attributes of female directors. Female directorship still affects accounting-based performance even after including a large set of attributes, which suggests that female directors bring some features to the board that are not captured by our attributes. These characteristics can be related to their personal traits or gender-related behavioral features (Niederle, 2016). However, the negative relation between Tobin's Q and female directorship disappears once the various attributes are included, suggesting that market investors' react more to the different observable

[23] Some variables become non-significant compared to the results of Tables 10, 11, and 12. Note that these regressions are not performed on the same sample, which might explain the slight differences between the results for the control variables.

characteristics of women directors. Interestingly, the effects of several characteristics of female directors affect accounting and market-based firm performance measures in opposite ways. The implication here would be that market investors' perception of female directorship is different from the potential impact of these directors on firms' accounting performance.

5. Supplementary analysis

For some attributes of female directors, the impact depends on whether ROA or ROE are used to measure performance. The main difference between ROA and ROE measures derives from debt structure, which can be influenced by the board composition (Harford et al., 2008). To go further in our understanding of these results, we break down ROE on the basis of the widely used DuPont analysis (Jansen et al., 2012). Return on equity (ROE) can be first broken down into a profitability ratio (net income/assets) and an equity multiplier (assets/equity). Appropriately, equity multiplier measures the effect of increasing the proportion of debt in financing the firm's assets on ROE. We run the system GMM regression using the two components as dependent variables. The results are reported in Table 16, Model 1 and Model 4. The decomposition of ROE leads to two opposite results in that the proportion of female directors affects positively (0.221) and significantly (t = 26.10) the profitability ratio and strongly negatively (–2.820) and significantly (t = –12.86) the ratio of assets to equity capital (equity multiplier).[24] The first result related to the profitability ratio (net income/assets) is quite similar to the one obtained for the ROA and the ROE in Tables 13 and 14. The second result related to the equity multiplier may be explained by the high-risk aversion of women compared to men. Indeed, firms with a high leverage ratio are at greater risk of default. Firms with more gender-diverse boards are then less likely to issue debt than firms with less gender-diverse boards (Nekhili and Gatfaoui, 2013).

[24] For all regressions in Table 16, we run the same regressions, but excluding the variables sales growth and leverage because they are major components of our dependent variables. The results remain unchanged.

Taking the standard DuPont analysis further, the profitability ratio (net income/assets) can be broken down into the profit margin ratio (net income/sales) and asset turnover (sales/assets). Profit margin captures the firm's operating efficiency, which can be achieved by decreasing operating expenses or improving the use of human resources. Asset turnover measures the firm's capacity to generate revenues from its assets and reflects the productivity of the firm's assets. According to Singh and Davidson (2003), a lower asset turnover ratio indicates asset deployment for unproductive purposes and signals a situation of significant agency conflicts. Lower asset turnover ratio may also induce managers to adopt aggressive earnings management practices (Jansen et al., 2012). This situation could arise in countries with lower protection of minority shareholders, resulting in an environment conducive to less transparency of financial reporting and greater managerial discretion (Bushman et al., 2004).

Results of Model 2 and Model 3 show that the proportion of female directors is negatively (–0.492) and significantly (t = –5.12) associated with asset turnover, but not with a profit margin. The results obtained in Model 1 are then probably due to the interaction effect between profit margin and asset turnover (both measures including the value of sales) rather than to the presence of female directors or to their inherent specific attributes. Indeed, our results show that female attributes impact profit margin and asset turnover in opposite ways. With few exceptions, while some attributes, such as the independence and the business expertise of female directors, lead to better asset use efficiency (asset turnover) but fail to achieve higher profitability (profit margin), the other attributes of female directors operate in the opposite direction. Female directors who are independent or have business expertise are more concerned about finding solutions to the situation of considerable agency conflict, such as that of lower asset turnover (Singh and Davidson, 2003) than about improving incomes and/or reducing costs. Indeed, independent female directors or those with business expertise may contribute more effectively to the decision-making processes by exerting a crucial

oversight role in executive management and questioning the company's business activities in terms of assets productivity and the success of its investment policy. In contrast, some attributes such as committee membership, board leadership (chairperson), foreign nationality and experience (tenure and multi-directorship) contribute to enhancing profit margin but do not result in higher asset turnover. With regard once again to the equity multiplier, we find that the different attributes of female directors do not act in the same direction, and no homogeneity is found in female attributes, whether they be demographic or board capital attributes. Unexpectedly, we find that a higher educational level is damaging for firms in terms of both profit margin and asset turnover, but helps improve the leverage ratio (equity multiplier). Finally, female directors' reputation is the only attribute that improves the three components of ROE (i.e., profit margin, asset turnover and equity multiplier).

The absence of homogeneity among female characteristics with respect to firm performance and different performance components raises the question of the role of female directors in contributing to strategic decision making and in influencing investment and financing policies. Apart from the benefit of setting gender quotas, our study highlights the importance of attributes through which a director is more likely to be appointed.

6. Concluding remarks

This research aims to examine the relationship between board gender diversity and firm accounting and market-based performance. This relationship has been studied extensively in the literature with mixed results. We contribute to this literature by exploring the importance of female directors' attributes as a driver of the probable relationship between the presence of women on boards and firm performance. We use a sample of 394 French firms, and collect financial and board structure data from 2001 to 2010. Without controlling for female directors' attributes, we find that accounting-based performance measures (ROA and ROE)

increase with female directorship, while the market-based performance measure (Tobin's Q) decreases with female directorship.

Using these results as a benchmark, we include different attributes of female directors in our regression model. We consider two categories of female directors' attributes: monitoring attributes (Independence; membership of relevant board committees; board chair), and board capital attributes that contain demographic attributes (education; business education; foreign nationality) and board relational capital (tenure; multiple directorships; media coverage). After controlling for the attributes of female directors, the positive relationship between female directorship and the accounting-based performance measures (ROA and ROE) remains unchanged. However, the negative relationship between the percentage of women on the board and Tobin's Q vanishes. This suggests that the higher monitoring perception of female directors is related solely to their attributes. However, the effect of female directors on the functioning of the board is explained not only by our large set of attributes. We argue that some features of female directors, not captured by our attributes, contribute to the improvement of the board's decision-making process.

Interestingly, the effects of different attributes on both types of performance (accounting and market-based) are not uniform. First, we find that female directors' reputation is positively associated with all performance measures. However, women directors' business expertise and directorship tenure, as well as foreign nationality and membership of relevant committees, are negatively correlated with both the accounting and market-related measures of performance. The remaining attributes' correlations depend on the way of measuring performance. On the one hand, women's leadership position (as chairperson) and their education level are negatively correlated with Tobin's Q and positively correlated with both ROA and ROE. On the other hand, female directors' independence and multiple directorships

are both positively correlated with Tobin's Q and negatively correlated with accounting measures of performance (i.e., ROA and ROE).

These contrasting results highlight the importance of considering the way the different attributes of (female) board members contribute to the two main missions of the board (advice and control), and to the way outsiders perceive these contributions. The need to reinforce one or the other of these missions depends on the legal and regulatory systems, the business environment, and to certain characteristics of firms.

This paper contributes to the literature on the relationship between female directorship and firm performance by pointing out the importance of considering the attributes of women directors for explaining this relationship. Over and beyond accounting and market-based performances, we argue that the reported relationships between corporate strategic decisions – mergers and acquisitions, investment, divestment, strategic alliances, diversification, innovation, etc. – are sensitive to the attributes of female directors. Whether these relationships are driven by the attributes of female directors rather than by the mere presence of women on the board is a research question that needs to be explored. Furthermore, Singh et al. (2015) point out that the supply and legitimacy of female directors' appointments are open to question as from 2012, given that French firms had only three years to comply with the quota legislation. It will be interesting to explore whether the attributes of female directors are affected by this urgency and whether female directorship and these attributes affect firm performance in different ways. Several other research questions related to gender quota implementation may help to understand the interactions between board composition and board effectiveness. For example, which firms comply first with the legislation? How do the attributes of board members (both male and female) change between the legislation being passed and its coming into force? Which attributes are most required by firms when they appoint female directors? How may other attributes or characteristics of female directors act

as mediators in the relationship between female directorship and performance? At this stage, difficulties in conforming to the law have resulted in deviant behavior by some French companies.[25]

[25] Because of the gender quota, some French companies, such as Valéo in 2014, assigned new roles (e.g. censors, advisors) to some male directors in order to keep them on their board of directors. As they do not have the right to vote, they are not included in the calculation of the quota (https://www.lesechos.fr/24/03/2014/LesEchos/21653-130-ECH_conseils-d-administration---le-censeur--ce-mal-aime-des-investisseurs.htm).

References

Adams, R.B., Ferreira, D., 2007. A theory of friendly boards. Journal of Finance 62, 217–250.

Adams, R.B., Ferreira, D., 2008. Do directors perform for pay? Journal of Accounting and Economics 46 (1), 154–171.

Adams, R.B., Ferreira, D., 2009. Women in the boardroom and their impact on governance and performance. Journal of Financial Economics 94 (2), 291–309.

Adams, R.B., de Haan, J., Terjesen, S., van Ees, H., 2015. Board diversity: Moving the field forward. Corporate Governance: An International Review 23 (2), 77–82.

Adams, R.B., Hermalin, B.E., Weisbach, M.S., 2010. The role of boards of directors in corporate governance: A conceptual framework and survey. Journal of Economic Literature 48 (1), 58–107.

Adams, R.B., Mehran, H., 2012. Bank board structure and performance: Evidence for large bank holding companies. Journal of Financial Intermediation 21 (2), 243–267.

Agrawal, A., Knoeber, C.R., 2001. Do some outside directors play a political role? The Journal of Law and Economics 44 (1), 179–198.

Ahern, K.R., Dittmar, A.K., 2012. The changing of the boards: The impact on firm valuation of mandated female board representation. Quarterly Journal of Economics 127 (1), 137–197.

Ahmadi, A., Bouri, A., 2017. Board of directors' composition and performance in French CAC 40 listed firms. Accounting 3 (4), 245-256.

Ahmadi, A., Nakaa, N., Bouri, A., 2017. Chief Executive Officer attributes, board structures, gender diversity and firm performance among French CAC 40 listed firms. Research in International Business and Finance, doi: 10.1016/j.ribaf.2017.07.083

Ahn, S., Jiraporn, P., Kim, Y.S., 2010. Multiple directorships and acquirer returns. Journal of Banking and Finance 34 (9), 2011–2026.

Ahn, S., Shrestha, K., 2013. The differential effects of classified boards on firm value. Journal of Banking and Finance 37 (11), 3993–4013.

Almazan, A., Suarez, J., 2003. Managerial compensation and the market reaction to bank loans. Review of Financial Studies 16 (1), 237–261.

Anderson, R.C., Reeb, D.M., Upadhyay, A., Zhao, W., 2011. The economics of director heterogeneity. Financial Management 40 (1), 5–38.

Arellano, M., Bond, S., 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Review of Economic Studies 58 (2), 277–297.

Arellano, M., Bover, O., 1995. Another look at the instrumental variables estimation of error-components models. Journal of Econometrics 68, 29–51.

Beckman, C.M., Haunschild, P.R., 2002. Network learning: The effects of partners' heterogeneity of experience on corporate acquisitions. Administrative Science Quarterly 47 (1), 92–124.

Ben-Amar, W., Francoeur, C., Hafsi, T., Labelle, R., 2013. What makes better boards? A closer look at diversity and ownership. British Journal of Management 24 (1), 85–101.

Bertrand, M., Mullainathan, S., 2003. Enjoying the quiet life? Corporate governance and managerial preferences. Journal of Political Economy 111 (5), 1043–1075.

Bhagat, S., Bolton, B., 2008. Corporate governance and firm performance. Journal of Corporate Finance 14 (3), 257–273.

Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics 87 (1), 115–143.

Bøhren, Ø., Staubo, S., 2016. Mandatory gender balance and board independence. European Financial Management 22 (1), 3-30.

Boubaker, S., Labégorre, F., 2008. Ownership structure, corporate governance, and analyst following: A study of French listed firms. Journal of Banking and Finance 32 (6), 961–976.

Bugeja, M., Matolcsy, Z., Spiropoulos, H., 2016. The Association Between Gender-Diverse Compensation Committees and CEO Compensation. Journal of Business Ethics 139 (2), 375–390.

Bushman, R., Chen, Q., Engel, E., Smith, A., 2004. Financial accounting information, organizational complexity, and corporate governance systems. Journal of Accounting and Economics 37, 167−201.

Campbell, K., Minguez-Vera, A., 2008. Gender diversity in the boardroom and firm financial performance. Journal of Business Ethics 83 (3), 435–451.

Carter, D.A., D'Souza, F., Simkins, B.J., Simpson, W.G., 2010. The gender and ethnic diversity of US boards and board committees and firm financial performance. Corporate Governance: An International Review 18 (5), 396–414.

Cashman, G.D., Gillan, S.L., Jun, C., 2012. Going overboard? On busy directors and firm value. Journal of Banking and Finance 36 (12), 3248–3259.

Certo, S.T., 2003. Influencing initial public offering investors with prestige: Signaling with board structures. Academy of Management Review 28 (3), 432–446.

Chapple, L., Humphrey, J.E., 2014. Does board gender diversity have a financial impact? Evidence using stock portfolio performance. Journal of Business Ethics 122 (4), 709–723.

Choi, J.J., Park, S.W., Yoo, S.S., 2007. The value of outside directors: Evidence from corporate governance reform in Korea. Journal of Financial and Quantitative Analysis 42 (4), 941–962.

Coles, J.L., Daniel, N.D., Naveen, L., 2008. Boards: Does one size fit all? Journal of Financial Economics 87 (2), 329–356.

Coles, J.L., Hoi, C.K., 2003. New evidence on the market for directors: Board membership and Pennsylvania Senate Bill 1310. The Journal of Finance 58 (1), 197–230.

Connelly, B.L., Hoskisson, R.E., Tihanyi, L., Certo, S.T., 2010. Ownership as a form of corporate governance. Journal of Management Studies 47 (8), 1561–1589.

Connelly, B.L., Van Slyke, E.J., 2012. The power and peril of board interlocks. Business Horizons 55 (5), 403–408.

Core, J.E., Holthausen, R.W., Larcker, D.F., 1999. Corporate governance, chief executive officer compensation, and firm performance. Journal of Financial Economics 51 (3), 371–406.

Croson, R., Gneezy, U., 2009. Gender differences in preferences. Journal of Economic Literature 47 (2), 448–474.

Daily, C.M., Dalton, D.R., 2003. Women in the boardroom: A business imperative. Journal of Business Strategy 24 (5), 8–9.

Daily, C.M., Dalton, D.R., 1994. Bankruptcy and corporate governance: The impact of board composition and structure. Academy of Management Journal 37 (6), 1603–1617.

Dang, R., Bender, A.F., Scotto, M.J., 2014. Women On French Corporate Board Of Directors: How Do They Differ From Their Male Counterparts? Journal of Applied Business Research 30 (2), 489–507.

DeFond, M.L., Hann, R.N., Hu, X., 2005. Does the market value financial expertise on audit committees of boards of directors? Journal of Accounting Research 43 (2), 153–193.

Dechow, P.M., Sloan, R.G., Sweeney, A.P., 1996. Causes and consequences of earnings manipulations: An analysis of firms subject to enforcement actions by the SEC. Contemporary Accounting Research 13 (1), 1–36.

DeZoort, F.T., Hermanson, D.R., Archambeault, D.S., Reed, S.A., 2002. Audit committee effectiveness: A synthesis of the empirical audit committee literature. Journal of Accounting Literature 21, 38–75.

Diamond, D.W., 1989. Reputation acquisition in debt markets. Journal of Political Economy 97 (4), 828–862.

DiTomaso, N., Post, C., Parks-Yancy, R., 2007. Workforce diversity and inequality: Power, status, and numbers. Annual Review of Sociology 33, 473–501.

Dixit, A.K. (1996). The Making of Economic Policy: A Transaction-Cost Politics Perspective (MIT Press, Cambridge MA).

Eagly, A.H., Carli, L.L., 2003. The female leadership advantage: An evaluation of the evidence. The leadership quarterly 14 (6), 807–834.

Estélyi, K.S., Nisar, T.M., 2016. Diverse boards: Why do firms get foreign nationals on their boards? Journal of Corporate Finance 39, 174–192.

Faccio, M., Lang, L.H.P., 2002. The separation of ownership and control: An analysis of ultimate ownership in Western European corporations. Journal of Financial Economics 65 (3), 365–395.

Falato, A., Kadyrzhanova, D., Lel, U., 2014. Distracted directors: Does board busyness hurt shareholder value? Journal of Financial Economics 113 (3), 404–426.

Fang, L., Peress, J., 2009. Media coverage and the cross-section of stock returns. The Journal of Finance 64 (5), 2023–2052.

Farrell, K.A., Whidbee. D.A., 2000. The consequences of forced CEO succession for outside directors. Journal of Business 73, 597–627.

Ferreira, D., 2010. Board diversity, Oxford, John Wiley and Sons, 225–242

Ferreira, D., 2015. Board diversity: Should we trust research to inform policy? Corporate Governance: An International Review 23 (2), 108–111.

Ferris, S., Jagannathan, P.M., Pritchard, A.C., 2003. Too busy to mind the business? Monitoring by directors with multiple board appointments. Journal of Finance 58, 1087–1112.

Fich, E.M., Shivdasani, A., 2006. Are busy boards effective monitors? Journal of Finance, 61, 689–724.

Fich, E.M., Shivdasani, A., 2007. Financial fraud, director reputation, and shareholder wealth. Journal of Financial Economics 86 (2), 306–336.

Field, L., Lowry, M., Mkrtchyan, A., 2013. Are busy boards detrimental? Journal of Financial Economics 109 (1), 63–82.

Fos, V., Tsoutsoura, M., 2014. Shareholder democracy in play: Career consequences of proxy contests. Journal of Financial Economics 114 (2), 316–340.

Frijns, B., Dodd, O., Cimerova, H., 2016. The impact of cultural diversity in corporate boards on firm performance. Journal of Corporate Finance 41, 521–541.

Gabrielsson, J., Huse, M., Minichilli, A., 2007. Understanding the leadership role of the board Chairperson through a team production approach. International Journal of Leadership Studies 3 (1), 21–39.

García-Meca, E., García-Sánchez, I.M., Martínez-Ferrero, J., 2015. Board diversity and its effects on bank performance: An international analysis. Journal of Banking and Finance 53 (1), 202–214.

Gow, I. D., Kaplan, S. N., Larcker, D. F., Zakolyukina, A. A., 2016. CEO personality and firm policies (No. w22435). National Bureau of Economic Research.

Güner, A.B., Malmendier, U., Tate, G., 2008. Financial expertise of directors. Journal of Financial Economics 88 (2), 323–354.

Hambrick, D.C., Mason, P.A., 1984. Upper echelons: The organization as a reflection of its top managers. Academy of Management Review 9 (2), 193–206.

Harford, J., Li, K., Zhao, X., 2008. Corporate boards and the leverage and debt maturity choices. International Journal of Corporate Governance 1 (1), 3–27.

Harris, I. C., Shimizu, K., 2004. Too busy to serve? An examination of the influence of overboarded directors. Journal of Management Studies 41 (5), 775–798.

Henderson, A.D., Miller, D., Hambrick, D.C., 2006. How quickly do CEOs become obsolete? Industry dynamism, CEO tenure, and company performance. Strategic Management Journal 27 (5), 447–460.

Herring, C., 2009. Does diversity pay? Race, gender, and the business case for diversity. American Sociological Review 74 (2), 208–224.

Hillman, A.J., Cannella, A.A., Jr., Harris, I.C., 2002. Women and racial minorities in the boardroom: How do directors differ? Journal of Management 28 (6), 747–763.

Hillman, A.J., Dalziel, T., 2003. Boards of directors and firm performance: Integrating agency and resource dependence perspectives. Academy of Management Review 28 (3), 383–396.

Hillman, A.J., Shropshire, C., Cannella, A.A., 2007. Organizational predictors of women on corporate boards. Academy of Management Journal 50 (4), 941–952.

Hillman, A.J., Shropshire, C., Certo, S.T., Dalton, D.R., Dalton, C.M., 2011. What I like about you: A multilevel study of shareholder discontent with director monitoring. Organization Science 22 (3), 675–687.

Huse, M., 2013. Characteristics and background of the Norwegian women directors. In Machold, S., Huse, M., Hansen, K., Brogi, M. Eds.: *Getting women on to corporate boards: A snowball starting in Norway*. Edward Elgar Publishing, 69–77.

Jansen, I.P., Ramnath, S., Yohn, T.L., 2012. A diagnostic for earnings management using changes in asset turnover and profit margin. Contemporary Accounting Research 29 (1), 221–251.

Jiang, W., Wan, H., Zhao, S., 2016. Reputation concerns of independent directors: Evidence from individual director voting. Review of Financial Studies 29 (3), 655–696.

Jiraporn, P., Singh, M., Lee, C.I., 2009. Ineffective corporate governance: Director busyness and board committee memberships. Journal of Banking and Finance 33 (5), 819–828.

Johnson, S.G., Schnatterly, K., Hill, A.D., 2013. Board composition beyond independence social capital, human capital, and demographics. Journal of Management 39 (1), 232–262.

Kaplan, S.N., Reishus, D., 1990. Outside directorships and corporate performance. Journal of Financial Economics 27 (2), 389–410.

Katz, R., 1982. The effects of group longevity on project communication and performance. Administrative Science Quarterly 27, 81–104.

Kim, K.A., Kitsabunnarat-Chatjuthamard, P., Nofsinger, J.R., 2007. Large shareholders, board independence, and minority shareholder rights: Evidence from Europe. Journal of Corporate Finance 13 (5), 859–880.

Kim, H., Lim, C., 2010. Diversity, outside directors and firm valuation: Korean evidence. Journal of Business Research 63 (3), 284–291.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2008. The economic consequences of legal origins. Journal of Economic Literature 46 (2), 285–332.

Liang, Q., Xu, P., Jiraporn, P., 2013. Board characteristics and Chinese bank performance. Journal of Banking and Finance 37 (8), 2953–2968.

Liu, Y., Wei, Z., Xie, F., 2014. Do women directors improve firm performance in China? Journal of Corporate Finance 28, 169–184.

Machold, S., Huse, M., Minichilli, A., Nordqvist, M., 2011. Board leadership and strategy involvement in small firms: A team production approach. Corporate Governance: An International Review 19 (4), 368–383.

Masulis, R.W., Mobbs, S., 2014. Independent director incentives: Where do talented directors spend their limited time and energy? Journal of Financial Economics 111 (2), 406–429.

Masulis, R.W., Wang, C., Xie, F., 2012. Globalizing the boardroom—The effects of foreign directors on corporate governance and firm performance. Journal of Accounting and Economics 53 (3), 527–554.

Matsa, D.A., Miller, A.R., 2013. A female style in corporate leadership? Evidence from quotas. American Economic Journal: Applied Economics 5 (3), 136–69.

McDonald, M.L., Westphal, J.D., Graebner, M.E., 2008. What do they know? The effects of outside director acquisition experience on firm acquisition performance. Strategic Management Journal 29 (11), 1155–1177.

Milbourn, T., 2003. CEO reputation and stock-based compensation. Journal of Financial Economics 68 (2), 233–262.

Miller, T., Triana, M.d.C., 2009. Demographic diversity in the boardroom: Mediators of the board diversity–firm performance relationship. Journal of Management Studies 46 (5), 755–786.

Milliken, F.J., Martins, L.L., 1996. Searching for common threads: Understanding the multiple effects of diversity in organizational groups. Academy of Management Review 21 (2), 402–433.

Nekhili, M., Chakroun, H., Chtioui, T., 2017. Women's leadership and firm performance: Family versus nonfamily firms. Journal of Business Ethics, 1–26.

Nekhili, M., Gatfaoui, H., 2013. Are demographic attributes and firm characteristics drivers of gender diversity? Investigating women's positions on French boards of directors. Journal of Business Ethics 188 (2), 227–249.

Nguyen, B.D., 2015. Is more news good news? Media coverage of CEOs, firm value, and rent extraction. Quarterly Journal of Finance 5 (4), 1–38.

Nguyen, D.D.L., Hagendorff, J., Eshraghi, A., 2015. Which executive characteristics create value in banking? Evidence from appointment announcements. Corporate Governance: An International Review 23 (2), 112–128.

Niederle, M., 2016. Gender. In Handbook of Experimental Economics, second edition, Eds. John Kagel and Alvin E. Roth, Chapter 8, 481–562.

Oxelheim, L., Randøy, T., 2003. The impact of foreign board membership on firm value. Journal of Banking and Finance 27 (12), 2369–2392.

Pathan, S., Faff, R., 2013. Does board structure in banks really affect their performance? Journal of Banking and Finance 37 (5), 1573–1589.

Peni, E., 2014. CEO and Chairperson characteristics and firm performance. Journal of Management and Governance 18 (1), 185–205.

Post, C. Byron, K., 2015. Women on boards and firm financial performance: A meta-analysis. Academy of Management Journal 58 (5), 1546–1571

Rajgopal, S., Shevlin, T., Zamora, V., 2006. CEOs' outside employment opportunities and the lack of relative performance evaluation in compensation contracts. Journal of Finance 61 (4), 1813–1844.

Rebérioux, A., Roudaut, G., 2016. Gender quota inside the boardroom: Female directors as new key players? Working Paper, Ecole Polytechnique, Paris.

Roberts, M., Whited. D., 2013. Endogeneity in empirical corporate finance, in Constantinides, G., Stulz., R., Harris, M., eds.: *Handbook of the Economics of Finance*, Vol. 2A (Elsevier, Amsterdam), 495–567.

Robinson, G., Dechant, K., 1997. Building a business case for diversity. The Academy of Management Executive 11 (3), 21–31.

Roodman, D.M., 2009a. A note on the theme of too many instruments. Oxford Bulletin of Economics and Statistics 71 (1), 135–158.

Roodman, D.M., 2009b. How to do xtabond2: An introduction to difference and system GMM in Stata. The Stata Journal 9, 86–136.
Rose, C. (2007). Does female board representation influence firm performance? The Danish evidence. Corporate Governance: An International Review 15(2), 404–413.
Rosenbaum, P.R., Rubin, D.B., 1983. The central role of the propensity score in observational studies for causal effects. Biometrika 70 (1), 41–55.
Rosenstein, S., Wyatt, J.G., 1990. Outside directors, board independence, and shareholder wealth. Journal of Financial Economics 26 (2), 175–191.
Ruigrok, W., Peck, S., Tacheva, S., 2007. Nationality and gender diversity on Swiss corporate boards. Corporate Governance: An International Review 15 (4), 546–557.
Sabatier, M., 2015. A women's boom in the boardroom: effects on performance? Applied Economics 47 (26), 2717–2727.
Sila, V., Gonzalez, A., Hagendorff, J., 2016. Women on board: Does boardroom gender diversity affect firm risk? Journal of Corporate Finance 36, 26–53.
Singh, M., Davidson III, W.N., 2003. Agency costs, ownership structure, and corporate governance mechanisms. Journal of Banking and Finance 27 (5), 793–816.
Singh, V., Point, S., Moulin, Y., Davila, A., 2015. Legitimacy profiles of women directors on top French company boards. Journal of Management Development 34 (7), 803–820.
Singh, V., Terjesen, S., Vinnicombe, S., 2008. Newly appointed directors in the boardroom: How do women and men differ? European Management Journal 26 (1), 48–58.
Terjesen, S., Barbosa Couto, E. Morais Francisco, P., 2016. Does the presence of independent and female directors impact firm performance? A multi-country study of board diversity. Journal of Management and Governance 20 (3), 447–483.
Terjesen, S., Sealy, R., Singh, V., 2009. Women directors on corporate boards: A review and research agenda. Corporate Governance: An International Review 17 (3), 320–337.
Torchia, M., Calabro, A., Huse, M., 2011. Women directors on corporate boards: From tokenism to critical mass. Journal of Business Ethics 102 (2), 299–317.
Vafeas, N., 2003. Length of board tenure and outside director independence. Journal of Business Finance and Accounting 30 (7-8), 1043–1064.
Westphal, J.D., 1999. Collaboration in the boardroom: Behavioral and performance consequences of CEO-board social ties. Academy of Management Journal 42 (1), 7–24.
Westphal, J.D., Stern, I., 2006. The other pathway to the boardroom: Interpersonal influence behavior as a substitute for elite credentials and majority status in obtaining board appointments. Administrative Science Quarterly 51 (2), 169–204.
White, J.T., Woidtke, T., Black, H.A., Schweitzer, R.L., 2014. Appointments of academic directors. Journal of Corporate Finance 28, 135–151.
Wintoki, M.B., Linck, J.S., Netter, J.M., 2012. Endogeneity and the dynamics of internal corporate governance. Journal of Financial Economics 105 (3), 581–606.
Wooldridge, J.M. (2002). Econometric Analysis of Cross Section and Panel Data (MIT Press, Cambridge).
Yermack, D., 2004. Remuneration, retention, and reputation incentives for outside directors. The Journal of Finance 59 (5), 2281–2308.

Table 1
Definitions of variables

Variable	Measure[a]
Firm performance variables	
ROA	Ratio of operating income to total assets
ROE	Ratio of net income to stockholders' equity
Tobin's Q	Stock market capitalization plus book value of liabilities as a ratio of total assets
Female directorship variables	
Female directorship	Percentage of female directors on board
Independent female directors	Percentage of non-executive female directors to total female directors
Female committee membership	Percentage of female directors who are members of one of the relevant operating committees to total women directors
Woman chairperson	Dummy variable equal to 1 when the chair of the board is female; 0 otherwise
Educational level of female directors	Percentage of female directors with a Master's degree (or equivalent) or with a doctorate (Ph.D.) to total female directors
Business expertise of female directors	Percentage of female directors with formal education specializing in business to total female directors
Nationality of female directors	Percentage of foreign female directors to total female directors
Female board multi-directorship	Percentage of female directors who are members of another firm's board of directors to total female directors
Tenure of female directors	The average number of years spent by women as directors
Reputation of female directors	Natural logarithm of the average number of media citations (French and International) for female directors
Governance variables	
Board size	Number of directors on the board
Board independence	Ratio of number of non-executive independent directors to total board size
Board meetings	Number of annual board meetings
CEO duality	Dummy variable that takes the value of 1 if the CEO is also the chair of the board; 0 otherwise
Woman CEO	Dummy variable equal to 1 when the CEO is female; 0 otherwise
CEO tenure	The number of years within the company before his/her appointment as a CEO
Ownership variables	
Family ownership	Percentage of capital held by family
Institutional ownership	Percentage of capital held by institutional investors
Control variables	
Leverage	Ratio of total financial debt to total assets
Foreign assets	Ratio of foreign assets to total assets
R&D intensity	Ratio of R&D expenditures to total sales
Sales growth	Percentage growth in reported sales between year t and year t-1.
Firm size	Natural logarithm of the total assets
Industry	Binary variable that takes the value of 1 if the company belongs to the sector in question and 0 otherwise. The industry classification is based on Industry Classification Benchmark (ICB) developed in January 2005 by Dow Jones and FTSE and used by Euronext since 2006

All variables are measured at the firm-year level.
[a] Variables from Thomson DataStream are winsorized at the 1% and 99% levels.

Table 2
Descriptive statistics

	Mean	Median	Standard Deviation	Minimum	Maximum
ROA (%)	2.73	3.55	7.13	–30	18.90
ROE (%)	5.05	9.41	25.80	–120	63.70
Tobin's Q	1.04	0.80	0.83	0.20	5.38
Female directorship (%)	10.72	0	14.85	0	75
Board size (number of directors)	7.70	7	3.87	3	26
Board independence (%)	26.96	25	24.67	0	94.11
Board meetings	6.37	6	3.37	1	30
CEO duality	62.57	1	48.40	0	1
Woman CEO	3.63	0	18.70	0	1
Woman chairperson	4.62	0	20.99	0	1
CEO tenure (number of years)	7.83	6	6.19	0	42
Family ownership (%)	36.84	39	27.66	0	99.37
Institutional ownership (%)	17.94	4.44	26.47	0	98.63
Leverage (%)	23.11	21.41	16.86	0	74.45
Foreign assets (%)	18.77	3.75	25.47	0	91.87
R&D (%)	1.18	0	4.33	0	27.95
Sales growth (%)	8.95	5.47	28.52	–61	160.90
Cash flow (%)	9.88	7.18	10.02	–7.47	52.80
Beta	0.66	0.62	0.29	0.13	1.51
Firm size (Billion €)	4.92	0.22	16.99	0.01	240.56

This table reports descriptive statistics for the performance, female directorship and control variables for a sample containing the CAC All-Shares index listed on Euronext Paris. The final sample contains unbalanced panel data for 394 French firms for the period between 2001 and 2010. All variables are as defined in Table 1.

Table 3
Firm performance as a function of the number of female directors

Number of women directors on board	Number of obs.	ROA (%)	ROE (%)	Tobin's Q
0	1726	2.60	4.10	1.054
1	1157	2.70	5.33	1.047
2	387	3.02	6.34	1.032
3	92	5.06	11.89	1.026
4	41	3.39	14.12	0.976

This table presents the pattern of return on assets (ROA), return on equity (ROE) and Tobin's Q as a function of the number of female directors. All variables are defined in Table 1.

Table 4
Descriptive statistics of female directorship and their attributes for firms with a least one woman director (N = 1677)

	Mean	Standard Deviation	Minimum	Maximum
Female independent directors (%)	8.89	26.55	0	100
Female committee membership (%)	17.57	37.02	0	100
Woman chair (%)	7.82	26.85	0	1
Education level of female directors (%)	46.79	46.26	0	100
Business expertise of female directors (%)	44.36	46.83	0	100
Nationality of female directors (%)	9.38	27.47	0	100
Female board multi-directorship (%)	61.67	45.41	0	100
Tenure of female directors (number of years)	6.52	6.33	0	42
Reputation of women directors (number of press citations)	26.30	164.38	0	2664

This table presents descriptive statistics of female directors' attributes for firms with at least one female director. Data are presented at the firm-year level. The sample contains firms in the CAC All-Shares index listed on Euronext Paris. All financial, real estate and foreign firms are removed. Firms with inconsistent or missing corporate governance, ownership or financial data are removed. The final sample contains unbalanced panel data for 394 French firms for the period between 2001 and 2010. All variables are as defined in Table 1.

Table 5
Descriptive statistics by year for the percentage of female directorship, the number of female directors and female directors' attributes

Year	Female directorship (%) (N = 3403)	Number of women directors (N = 3403)	independent directors (%) (N = 1677)	committee membership (%) (N = 1677)	Woman chair (%) (N = 1677)	Education level (%) (N = 1677)	Business expertise (%) (N = 1677)	Nationality (%) (N = 1677)	board multi-directorship (%) (N = 1677)	Tenure (number of years) (N = 1677)	Reputation (number of press citations)[b] (N = 1677)
2001	8.49	0.51	5.43	10.40	6.76	42.78	33.56	7.89	57.14	5.17	7.97
2002	9.48	0.56	5.79	14.15	6.54	44.21	36.07	7.89	58.52	5.47	6.72
2003	9.95	0.60	6.09	16.40	5.94	43.32	39.18	9.22	61.58	5.89	9.34
2004	10.36	0.64	6.22	16.31	5.45	45.94	39.88	9.41	60.93	6.12	10.64
2005	10.39	0.67	7.01	17.88	6.64	46.85	42.78	9.30	59.76	6.13	35.80
2006	11.05	0.70	7.84	18.54	8.10	48.06	44.82	9.32	62.75	6.38	44.74
2007	11.31	0.73	9.28	17.21	10	47.81	45.40	9.41	62.33	6.73	35.54
2008	11.37	0.76	9.45	18.54	10.14	47.80	47.89	8.99	64.10	7.15	25.95
2009	11.69	0.79	11.79	20.37	9.69	48.86	50.04	10.10	63.91	7.50	31.99
2010	12.62	0.89	14.61	20.01	8.75	48.20	52.16	10.83	61.97	7.19	33.01
Total	10.72	0.70	8.89	17.57	7.82	46.79	44.36	9.38	61.67	6.52	26.30
F-value[a]	2.11**	5.75***	2.36**	0.88	0.94	0.34	2.70***	0.17	0.37	2.37**	1.14
(*p*-value)	(0.025)	(0.000)	(0.011)	(0.542)	(0.493)	(0.962)	(0.004)	(0.997)	(0.951)	(0.011)	(0.329)
Mann-Kendall test:											
Z-value	6.40***	7.17***	4.07***	5.20***	2.55**	1.69*	4.94***	1.67*	1.25	7.32***	9.89***
(*p*–value):	(*p* = 0.000)	(*p* = 0.000)	(*p* = 0.000)	(*p* = 0.000)	(*p* = 0.011)	(*p* = 0.091)	(*p* = 0.000)	(*p* = 0.095)	(*p* = 0.212)	(*p* = 0.000)	(*p* = 0.000)

This table presents descriptive statistics by year for the percentage of female directorship, the number of female directors, and the following female directors' attributes: the percentage of female independent directors, the percentage of female committee membership, the percentage of woman chairperson, the percentage of female directors with master diploma (or equivalent) or with doctorate (Ph.D.) degree (Education level), the percentage of female directors with formal education specializing in business (Business expertise), the percentage of foreign female directors (Nationality), the percentage of female directors who are members of another firm's board of directors (Multi-directorship), the average number of years spent by women as directors (Tenure), and the average number of media citations (French and International) observed for female directors (Reputation). The percentage of female directorship and the number of female directors are calculated for the total sample (N = 3403). Statistics on female directors' attributes are calculated for firms with a least one woman on board (N = 1677).

[a] Analysis of variance F-value for mean difference test.

[b] t-test is based on natural logarithm transformed values

, * represent significance at the 5% and 1% levels, respectively.

Table 6
Variation in board size and female directorship from 2002 to 2010 (N = 3047)

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Year	Year-to-year variation in the number of board directors	Proportion of firm-year observations where the number of board directors increases	Proportion of firm-year observations where the number of board directors decreases	Year-to-year variation in the proportion of female directors	Year-to-year variation in the number of female directors	Proportion of firm-year observations where the number of female directors increases	Proportion of firm-year observations where the number of female directors decreases
2002	0.01	15.22	13.77	1.05	0.05	5.80	1.09
2003	0.02	18.73	14.49	0.59	0.05	6.01	1.41
2004	0.03	26.78	13.22	0.83	0.07	8.47	2.03
2005	0.01	28.61	14.15	1.18	0.09	10.15	3.08
2006	0.01	21.18	18.64	1.47	0.08	8.19	2.26
2007	0.02	21.27	12.76	0.84	0.06	7.45	2.66
2008	0.03	20.58	11.08	0.05	0.03	5.28	2.64
2009	0.02	18.68	14.47	0.35	0.03	5.26	2.63
2010	0.01	15.57	14.25	0.93	0.09	10.55	1.58
Total	0.02	20.68	14.08	0.80	0.06	7.48	2.20
F-value[a]	1.55	4.02***	1.22	1.62	1.36	2.08**	0.66
(*p*-value)	(*p* = 0.136)	(*p* = 0.000)	(*p* = 0.283)	(*p* = 0.115)	(*p* = 0.211)	(*p* = 0.036)	(*p* = 0.723)
Mann-Kendall test:							
Z-value	0.34	–1.48	–0.32	–0.20	0.10	0.57	0.86
(*p*–value):	(*p* = 0.735)	(*p* = 0.140)	(*p* = 0.745)	(*p* = 0.838)	(*p* = 0.921)	(*p* = 0.568)	(*p* = 0.388)

The table presents the year-to-year variation in board size, the proportion of firm-year observations with increasing board size, the proportion of firm-year observations with decreasing board size, year-to-year variation in the proportion of female directors, year-to-year variation in the number of female directors, the proportion of firm-year observations where the number of female directors increases, and the proportion of firm-year observations where the number of female directors decreases. Statistics are calculated from 2002 to 2010 (N = 3407).

[a] Analysis of variance F-value for mean difference test

, * represent significance at the 5% and 1% levels, respectively.

Table 7
Mean difference test of the proportion of firm-year observations with the number of women on the board increasing (decreasing) against firms with increasing (decreasing) board size

	Board size increase		t-test	Board size decrease		t-test
	Yes (N = 630)	No (N = 2417)	(*p*-value)	Yes (N = 429)	No (N = 2618)	(*p*-value)
Proportion of firm-year observations where the number of women on the board increases	16.19	5.21	9.460*** (*p* = 0.000)	6.53	7.64	0.812 (*p* = 0.417)
Proportion of firm-year observations where the number of women on the board decreases	1.43	2.40	1.480 (*p* = 0.139)	3.72	1.95	2.334** (*p* = 0.019)

The table presents the mean difference test of the proportion of firm-year observations where the number of women on the board increases and the proportion of firm-year observations where the number of women on the board decreases against firms with increasing and decreasing board size.
, * represent significance at the 5% and 1% levels, respectively.

Table 8
Pairwise correlation matrix of variables and VIF values

	1	2	3	4	5	6	7	8	9	10	11	VIF
1. ROA	1.000											
2. *Lag* ROA	0.734*	1.000										1.09
3. ROE	0.709*	0.470*	1.000									
4. *Lag* ROE	0.508*	0.725*	0.521*	1.000								1.08
5. Tobin's Q	0.230*	0.147*	0.178*	0.120*	1.000							
6. *Lag* Tobin's Q	0.193*	0.193*	0.147*	0.160*	0.722*	1.000						1.15
7. Female directorship	–0.001	–0.007	–0.007	–0.020	0.025	0.034	1.000					1.96
8. *Lag* female directorship	–0.004	–0.001	–0.001	–0.022	0.019	0.029	0.909*	1.000				1.64
9. Female independent directors	0.001	–0.012	0.017	0.002	0.041	0.040	–0.155*	–0.166*	1.000			1.22
10. Female committee membership	0.062*	0.067*	0.054*	0.060*	0.006	–0.001	0.070*	0.051*	0.230*	1.000		1.25
11. Woman chair	–0.024	–0.023	0.003	0.005	–0.034	–0.017	0.208*	0.201*	0.024	0.029	1.000	1.16
12. Education level of female directors	–0.026	–0.022	–0.039	–0.033	–0.055	–0.049	–0.031	–0.039	0.106*	0.067*	–0.060	1.13
13. Business expertise of female directors	0.010	0.009	0.015	0.018	–0.052	–0.039	–0.115*	–0.136*	0.256*	0.233*	–0.076*	1.26
14. Nationality of female directors	0.053	0.049	0.011	0.007	–0.050	–0.028	–0.136*	–0.131*	0.090*	0.043	–0.085*	1.31
15. Female board multi-directorship	0.009	0.012	–0.005	–0.004	–0.048	–0.048	–0.185*	–0.159*	0.112*	0.174*	0.020	1.26
16. Tenure of female directors	–0.005	–0.009	0.000	–0.005	0.001	0.007	0.099*	0.271*	–0.087*	–0.078*	0.022	1.23
17. Female reputation	0.062	0.035	0.046	0.035	–0.000	0.008	–0.208*	–0.193*	0.223*	0.161*	0.040	1.25
18. Board size	0.118*	0.130*	0.119*	0.121*	–0.041	–0.052	–0.331*	–0.314*	0.225*	0.239*	0.019	2.52
19. Board independence	0.067*	0.045	0.058*	0.052	–0.050	–0.061*	–0.156*	–0.170*	0.200*	0.153*	0.107*	1.63
20. Board meetings	0.003	0.018	–0.012	0.023	0.006	0.003	–0.043	–0.054	0.053	0.087*	–0.052*	1.25
21. CEO duality	0.007	–0.001	0.017	0.006	0.012	0.016	–0.002	–0.005	0.076*	–0.029	–0.099*	1.22
22. CEO tenure	0.094*	0.078*	0.027	0.019	0.042	0.054	–0.009	0.018	–0.019	–0.016	0.088*	1.25
23. Woman CEO	0.015	0.018	0.030	0.036	0.015	0.016	0.212*	0.206*	0.128*	0.120*	–0.065*	1.13
24. Family ownership	0.028	0.046	0.018	0.026	0.050	0.041	0.119*	0.126*	–0.198*	–0.147*	0.001	1.97
25. Institutional ownership	–0.025	–0.025	–0.021	–0.016	–0.082*	–0.084*	–0.033	–0.045	0.048	0.037	0.001	1.99
26. Leverage	–0.049	–0.006	–0.064*	–0.019	–0.169*	–0.151*	–0.079*	–0.089*	0.004	0.079*	–0.063*	1.09
27. Foreign assets	0.113*	0.121*	0.066*	0.067*	0.022	0.010	–0.130*	–0.128*	0.154*	0.137*	–0.041	1.61
28. R&D intensity	0.051	0.064*	0.019	0.031	0.230*	0.203*	–0.036	–0.042	0.096*	0.030	–0.037	1.11
29. Sales growth	0.182*	0.016	0.195*	0.096*	0.171*	0.193*	0.020	0.039	–0.045	–0.039	–0.001	1.04
30. Firm size	0.188*	0.201*	0.141*	0.162*	0.063*	0.063*	–0.211*	–0.209*	0.216*	0.232*	0.018	2.42

Table 8 (Continued)

	12	13	14	15	16	17	18	19	20	21	22	23
12. Education level of female directors	1.000											
13. Business expertise of female directors	0.155*	1.000										
14. Nationality of female directors	0.070*	0.053	1.000									
15. Female board multi-directorship	0.137*	0.169*	0.188*	1.000								
16. Tenure of female directors	–0.092*	–0.167*	–0.113*	–0.001	1.000							
17. Reputation of women directors	0.020	0.145*	0.062	0.186*	–0.065*	1.000						
18. Board size	–0.015	0.178*	0.165*	0.206*	–0.137*	0.333*	1.000					
19. Board independence	–0.018	0.060	0.173*	0.050	–0.029	0.253*	0.381*	1.000				
20. Board meetings	0.026	0.110*	0.121*	–0.078*	–0.031	0.122*	0.092*	0.084*	1.000			
21. CEO duality	0.035	–0.027	0.024	0.078*	0.058	–0.019	–0.070*	–0.155*	0.017	1.000		
22. CEO tenure	–0.041	–0.057	–0.015	–0.060	0.079*	0.052	0.102*	0.090*	0.042	0.124*	1.000	
23. Woman CEO	–0.118*	0.049	0.055	0.036	0.252*	–0.112*	–0.101*	–0.070*	0.036	0.036	0.034	1.000
24. Family ownership	–0.099*	–0.221*	–0.109*	–0.127*	0.150*	–0.194*	–0.197*	–0.195*	–0.069*	–0.017	0.052	0.148*
25. Institutional ownership	0.122*	0.039	0.006	0.157*	–0.170*	0.137*	0.040	–0.026	–0.059*	0.128*	–0.084*	–0.078*
26. Leverage	0.009	0.053	0.030	0.122*	–0.063	0.099*	0.162*	0.030	0.061*	0.024	0.054	–0.017
27. Foreign assets	0.032	0.079*	0.312*	0.111*	–0.025	0.123*	0.361*	0.282*	0.176*	–0.036	0.166*	–0.078*
28. R&D intensity	0.031	–0.061	0.037	–0.012	0.076*	–0.073	0.118*	0.117*	0.060*	0.039	0.048	0.036
29. Sales growth	–0.045	–0.060	0.010	–0.081*	–0.010	0.006	–0.064*	–0.028	0.029	0.023	–0.069*	0.002
30 Firm size	–0.053	0.121*	0.235*	0.171*	–0.009	0.225*	0.512*	0.467*	0.193*	–0.159*	0.117*	–0.059*

	24	25	26	27	28	29	30
24. Family ownership	1.000						
25. Institutional ownership	–0.530*	1.000					
26. Leverage	–0.068*	0.065*	1.000				
27. Foreign assets	–0.222*	0.015	0.104*	1.000			
28. R&D intensity	0.005	–0.083*	–0.102*	0.116*	1.000		
29. Sales growth	0.037	–0.061*	–0.056	–0.053	–0.013	1.000	
30. Firm size	–0.084*	–0.308*	0.145*	0.442*	0.102*	0.004	1.000

This table presents correlations and VIF scores of the different variables used in our analysis.
All variables are as defined in Table 1.
* represents significance at the 1% level.

Table 9
Descriptive statistics for firms with and without female board members

	Entire sample			Matched sample		
	Firms with at least one woman director (n = 1677)	Firms without women directors (n = 1726)	t-test/Chi2[a]	Treatment group (n = 1100)	Control group (n = 1100)	t-test/Chi2[a]
ROA (%)	2.98	2.48	1.985**	3.08	2.68	1.268
ROE (%)	6.15	4.11	2.234**	5.88	4.42	1.294
Tobin's Q	1.04	1.04	0.257	1.03	1.02	0.330
Board size (number of directors)[b]	8.11	7.33	4.472***	7.80	7.67	0.179[b]
Board independence (%)	28.23	25.83	2.805***	28.79	27.23	0.975
Board meetings (number of meetings)[b]	6.46	6.27	3.383***	6.12	6.32	0.265[b]
CEO duality (%)	63.92	61.04	1.711*	61.65	62.05	0.229
Woman CEO (%)	8.22	0	12.440***	.	.	.
CEO tenure (number of years)[b]	8.63	7.10	6.458***	8.21	7.95	0.074[b]
Family ownership (%)	37.22	36.48	0.766	35.38	36.14	0.626
Institutional ownership (%)	17.12	18.70	1.703	19.34	18.69	0.539
Leverage (%)	22.97	23.24	0.455	22.32	22.83	0.838
Foreign assets (%)	17.95	19.58	1.832*	19.60	18.24	1.186
R&D (%)	1.26	1.13	0.849	1.21	1.15	0.342
Sales growth (%)	8.16	10.18	1.977**	8.77	9.31	0.452
Firm size (Billion €)[b]	7.24	2.92	4.528***	5.50	2.80	0.231[b]

This table reports descriptive statistics for the performance and control variables for a sample containing the CAC All-Shares index listed on Euronext Paris (394 French firms for the period between 2001 and 2010) and for the matched sample. The "Matched sample" columns use samples of firms with at least one female director and that were matched with firms with only male directors using the propensity score matching of Rosenbaum and Rubin (1983). Propensity score matching yields a matched sample consisting of 2200 cases: 1100 treatment cases (firms with at least one female director) and 1100 comparison cases (firms with only male directors). All variables are as defined in Table 1.
*, **, *** represent significance at the 10%, 5% and 1% levels, respectively.
[a] t-values are reported for continuous variables and Chi-square values for dummy variables.
[b] t-tests are based on natural logarithm transformed values.

Table 10
Regressions of ROA on female directorship

	OLS				Fixed effect				System GMM			
Variables	Total sample		Matched sample		Total sample		Matched sample		Total sample		Matched sample	
	Coif.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test
Lag ROA					0.266***	13.59	0.263***	12.08	0.664***	73.55	0.661***	74.52
Female directorship	0.022**	2.47	0.022**	2.17	–0.002	–0.15	0.005	0.36	0.027***	3.92	0.061***	7.40
Board size	0.009***	2.62	0.010**	2.55	–0.004	–0.76	–0.005	–0.71	0.004***	2.64	0.004*	1.73
Board independence	–0.007	–1.30	–0.016**	–2.34	–0.002	–0.17	–0.020**	–2.06	0.002	0.60	–0.003	–0.75
Board meetings	–0.009***	–3.45	–0.008**	–2.51	–0.005*	–1.95	–0.008**	–2.51	–0.005***	–4.37	–0.007***	–5.70
CEO duality	0.002	0.76	–0.001	–0.20	–0.002	–0.55	–0.004	–0.82	0.001	0.87	0.001	0.16
Woman CEO	0.006	0.94	0.008	1.19	0.030**	2.06	0.027*	1.79	–0.002	–0.82	–0.015	–1.22
CEO tenure	0.002	1.13	0.003	1.23	0.003	1.13	0.004	1.19	0.002*	1.91	0.004***	3.35
Family ownership	0.013**	2.23	0.012*	1.87	–0.023*	–1.66	–0.011	–0.71	0.001	0.21	–0.004	–1.11
Institutional ownership	0.003	0.46	0.005	0.77	–0.016	–1.53	–0.025*	–1.90	0.000	0.01	–0.001	–0.27
Leverage	–0.038***	–4.73	–0.044***	–4.63	–0.096***	–8.14	–0.109***	–7.92	–0.023***	–5.65	–0.031***	–5.73
Foreign assets	0.013**	2.39	0.012*	1.84	–0.004	–0.34	–0.015	–1.10	0.005**	2.04	0.006*	1.80
R&D intensity	–0.058**	–2.03	–0.043	–1.30	–0.404***	–6.76	–0.442***	–6.51	–0.021	–1.11	0.003	0.17
Sales growth	0.043***	9.50	0.049***	8.75	0.043***	11.76	0.047***	10.62	0.039***	13.93	0.048***	15.11
Firm size	0.003***	7.79	0.004***	7.66	0.007***	2.66	0.009***	3.01	0.001***	3.98	0.001***	4.85
Intercept	–0.054***	–3.72	–0.047***	–2.61	–0.025	–0.80	–0.016	–0.42	–0.016***	–2.98	–0.003	–0.46
Industry	Yes		Yes		No		No		Yes		Yes	
Year	Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	3403		2200		2960		1966		2960		1966	
R-squared	13.97%		14.38%		25.28%		27.94%					
Fisher (Prob > F, *p*-value)	11.81 (*p* = 0.000)		9.55 (*p* = 0.000)		31.27 (*p* = 0.000)		26.95 (*p* = 0.000)		354.46 (*p* = 0.000)		12251.83 (*p* = 0.000)	
Arellano–Bond AR(1) (z, *p*–value):									–4.92 (*p* = 0.000)		–4.49 (*p* = 0.000)	
Arellano–Bond AR(2) (z, *p*–value):									0.54 (*p* = 0.590)		0.41 (*p* = 0.683)	
Sargan test (Chi–square, *p*–value):									956.38 (*p* = 0.000)		579.16 (*p* = 0.000)	
Hansen test (Chi–square, *p*–value):									152.48 (*p* = 0.260)		154.38 (*p* = 0.387)	

The table presents results of the OLS, the fixed effect, the first difference and the system GMM regressions of ROA on female directors' proportion. The models are applied for firms with at least one female director. Matched sample analysis is carried out using the propensity score matching procedure (Rosenbaum and Rubin 1983). Propensity score matching yields a matched sample consisting of 2200 cases: 1100 treatment cases (firms with at least one female director) and 1100 comparison cases (firms with only male directors). Arellano-Bond tests check whether the data process is auto-regressive. The Sargan test checks whether the model is overidentified. The Hansen test of exogeneity of the instruments subset tests the null hypothesis of exogenous instruments. All variables are as defined in Table 1. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

Table 11
Regressions of ROE on female directorship

	OLS				Fixed effect				System GMM			
Variables	Total sample		Matched sample		Total sample		Matched sample		Total sample		Matched sample	
	Coef.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test
Lag ROE					0.160***	7.56	0.172***	7.06	0.499***	53.74	0.500***	44.95
Female directorship	0.078**	2.29	0.051	1.35	0.053	0.86	0.071	1.05	0.203***	5.75	0.301***	7.28
Board size	0.053***	4.31	0.054***	3.85	0.002	0.07	0.017	0.56	0.041***	5.63	0.035***	3.79
Board independence	0.002	0.10	–0.029	–1.19	–0.007	–0.19	–0.108**	–2.48	0.001	0.03	–0.006	–0.38
Board meetings	–0.019**	–2.04	–0.023**	–2.08	–0.003	–0.24	–0.031**	–2.11	–0.016***	–2.94	–0.036***	–5.92
CEO duality	0.002	0.22	–0.004	–0.33	–0.014	–0.66	–0.026	–1.10	0.003	0.52	0.010	1.41
Woman CEO	0.053**	2.24	0.061**	2.39	0.092	1.39	0.089	1.36	0.012	0.94	–0.025	–0.56
CEO tenure	0.001	0.01	–0.004	–0.42	–0.003	–0.19	0.002	0.11	–0.001	–0.22	0.002	0.35
Family ownership	0.047**	2.23	0.039	1.60	–0.047	–0.75	–0.020	–0.28	0.006	0.34	–0.018	–1.03
Institutional ownership	0.017	0.74	0.023	0.87	–0.049	–0.97	–0.024	–0.39	–0.001	–0.06	–0.026	–1.48
Leverage	–0.170***	–5.47	–0.163***	–4.57	–0.524***	–9.27	–0.586***	–8.98	–0.077***	–3.15	–0.144***	–5.50
Foreign assets	–0.011	–0.53	0.006	0.26	0.037	0.74	0.021	0.37	–0.005	–0.46	0.014	0.99
R&D intensity	–0.265**	–2.50	–0.233*	–1.95	–1.386***	–5.24	–1.357***	–4.56	–0.084	–1.12	0.036	0.59
Sales growth	0.168***	9.80	0.190***	9.26	0.147***	8.56	0.166***	8.29	0.150***	12.10	0.192***	16.32
Firm size	0.010***	6.05	0.011***	5.87	0.013	1.02	0.034**	2.27	0.003***	3.23	0.005***	3.51
Intercept	–0.158***	–2.91	–0.152**	–2.32	–0.011	–0.08	–0.127	–0.70	–0.122***	–4.87	–0.099***	–2.94
Industry	Yes		Yes		No		No		Yes		Yes	
Year	Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	3403		2200		2960		1966		2960		1966	
R-squared	13.13%		13%		16.96 %		19.03%					
Fisher (Prob > F, *p*-value)	10.79 (*p* = 0.000)		8.31 (*p* = 0.000)		18.44 (*p* = 0.000)		15.88 (*p* = 0.000)		182.05 (*p* = 0.000)		3830.35 (*p* = 0.000)	
Arellano–Bond AR(1) (z, *p*–value):									–6.28 (*p* = 0.000)		–4.91 (*p* = 0.000)	
Arellano–Bond AR(2) (z, *p*–value):									0.55 (*p* = 0.579)		0.50 (*p* = 0.619)	
Sargan test (Chi–square, *p*–value):									409.27(*p* = 0.000)		734.76 (*p* = 0.000)	
Hansen test (Chi–square, *p*–value):									112.38 (*p* = 0.433)		152.17 (*p* = 0.339)	

The table presents results of the OLS, the fixed effect, the first difference and the system GMM regressions of ROE on female directors' proportion. The models are applied to firms with at least one female director. Matched sample analysis is carried out using the propensity score matching procedure (Rosenbaum and Rubin 1983). Propensity score matching yields a matched sample consisting of 2200 cases: 1100 treatment cases (firms with at least one female director) and 1100 comparison cases (firms with only male directors). Arellano-Bond tests check whether the data process is auto-regressive. The Sargan test checks whether the model is overidentified. The Hansen test of exogeneity of the instruments subset tests the null hypothesis of exogenous instruments. All variables are as defined in Table 1. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

Table 12
Regressions of Tobin's q on female directorship

	OLS				Fixed effect				System GMM			
Variables	Total sample		Matched sample		Total Sample		Matched sample		Total sample		Matched sample	
	Coef.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test	Coef.	t-test
Lag Tobin's Q					0.144***	7.63	0.139***	6.47	0.654***	86.19	0.689***	73.92
Female directorship	0.019	0.19	0.025	0.22	–0.198	–1.35	–0.259	–1.58	–0.140*	–1.83	–0.161*	–1.67
Board size	–0.102***	–2.74	–0.121***	–2.78	0.003	0.05	–0.036	–0.48	–0.032*	–1.71	–0.051**	–2.47
Board independence	–0.191***	–2.90	–0.220***	–2.87	0.093	1.07	0.102	0.94	0.007	0.21	–0.006	–0.19
Board meetings	–0.042	–1.44	–0.048	–1.41	–0.039	–1.27	–0.059	–1.63	–0.003	–0.18	0.004	0.25
CEO duality	–0.004	–0.14	–0.009	–0.25	–0.092*	–1.93	–0.098*	–1.72	0.003	0.19	0.011	0.69
Woman CEO	–0.059	–0.83	–0.022	–0.29	0.122	0.80	0.113	0.69	0.023	0.78	–1.903***	–5.27
CEO tenure	0.028	1.25	0.043	1.62	0.063**	2.03	0.089**	2.25	0.005	0.44	0.016	1.24
Family ownership	0.089	1.39	0.036	0.48	0.414***	2.78	0.321*	1.83	0.077***	2.63	0.095***	2.86
Institutional ownership	0.042	0.60	0.011	0.13	0.207*	1.80	0.262*	1.78	0.090***	2.74	0.084**	2.10
Leverage	–0.600***	–6.50	–0.645***	–6.03	0.115	0.90	0.094	0.62	–0.098*	–1.94	–0.088	–1.50
Foreign assets	0.001	0.02	0.040	0.54	–0.090	–0.76	–0.119	–0.80	0.022	0.81	0.020	0.59
R&D intensity	3.182***	9.69	3.403***	9.18	1.458**	2.38	1.839**	2.51	0.396**	2.17	0.704***	2.59
Sales growth	0.445***	8.49	0.453***	7.18	0.291***	7.18	0.276***	5.47	0.193***	7.98	0.115***	4.93
Firm size	0.022***	4.35	0.020***	3.32	–0.262***	–9.17	–0.298***	–8.87	0.005**	1.98	0.006**	2.04
Intercept	1.028***	6.14	0.966***	4.74	3.401***	10.16	3.974***	9.44	0.112	1.36	–0.013	–0.14
Industry	Yes		Yes		No		No		Yes		Yes	
Year	Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	3403		2200		2960		1966		2960		1966	
R-squared	20.06%		19.34%		23.81%		24.18%					
Fisher (Prob > F, *p*-value)	17.63 (*p* = 0.000)		13.64 (*p* = 0.000)		27.93 (*p* = 0.000)		22.22 (*p* = 0.001)		688.17 (*p* = 0.000)		12969.41 (*p* = 0.000)	
Arellano–Bond AR(1) (z, *p*–value):									–4.25 (*p* = 0.000)		–3.71 (*p* = 0.001)	
Arellano–Bond AR(2) (z, *p*–value):									1.25 (*p* = 0.212)		0.62 (*p* = 0.792)	
Sargan test (Chi–square, *p*–value):									988.85 (*p* = 0.000)		695.94 (*p* = 0.000)	
Hansen test (Chi–square, *p*–value):									77.11 (*p* = 0.187)		145.81 (*p* = 0.368)	

The table presents results of the OLS, the fixed effect, the first difference and the system GMM regressions of Tobin's q on female directors' proportion. The models are applied to firms with at least one female director. Matched sample analysis is carried out using the propensity score matching procedure (Rosenbaum and Rubin 1983). Propensity score matching yields a matched sample consisting of 2200 cases: 1100 treatment cases (firms with at least one female director) and 1100 comparison cases (firms with only male directors). Arellano-Bond tests check whether the data process is auto-regressive. The Sargan test checks whether the model is overidentified. The Hansen test of exogeneity of the instruments subset tests the null hypothesis of exogenous instruments. All variables are as defined in Table 1. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

Table 13
System GMM regression of ROA on the proportion of female directorship and female directors' attributes

Variables	Model 1		Model 2	
	Coef.	z-test	Coef.	z-test
Lag ROA	0.625***	75.95	0.627***	96.38
Female directorship			0.118***	15.19
Independent female directors	–0.013***	–3.97	–0.024***	–8.17
Woman chairperson	0.002	0.53	0.004**	2.30
Female committee membership	–0.003	–1.07	0.009***	4.99
Educational level of female directors	0.022***	10.57	0.022***	11.26
Business expertise of female directors	–0.023***	–10.14	–0.019***	–12.74
Nationality of female directors	–0.007***	–3.24	–0.015***	–7.86
Tenure of female directors	–0.017***	–15.37	–0.010***	–15.92
Female board multi-directorship	–0.002	–0.93	–0.003**	–2.38
Reputation of female directors	0.001**	2.44	0.001***	3.09
Board size	0.002	1.22	0.021***	12.38
Board independence	–0.007**	–2.48	0.001	0.25
Board meetings	–0.005***	–3.31	–0.005***	–4.74
CEO duality	–0.001	–0.50	0.006***	5.70
Woman CEO	0.010***	5.73	0.010***	7.75
CEO tenure	0.008***	9.20	0.006***	8.16
Family ownership	0.001	0.19	–0.003	–1.58
Institutional ownership	–0.004	–1.52	–0.003	–1.35
Leverage	–0.042***	–13.14	–0.031***	–11.26
Foreign assets	0.008***	2.82	0.003	1.49
R&D intensity	–0.008	–0.63	–0.009	–0.95
Sales growth	0.041***	24.17	0.043***	32.19
Firm size	0.001***	8.06	0.002***	15.06
Intercept	–0.017***	–3.10	–0.109***	–17.03
Industry	Yes		Yes	
Year	Yes		Yes	
Number of observations	981		981	
Fisher (Prob > F, *p*-value)	9420.46 (p = 0.000)		26050.59 (p = 0.000)	
Arellano–Bond AR(1) (z, *p*–value):	–2.81 (p = 0.005)		–2.81 (p = 0.005)	
Arellano–Bond AR(2) (z, *p*–value):	1.25 (p = 0.213)		1.35 (p = 0.176)	
Sargan test (Chi–square, *p*–value):	837.03 (p = 0.000)		826.70 (p = 0.000)	
Hansen test (Chi–square, *p*–value):	147.78 (p = 0.513)		170.41 (p = 0.370)	

This table presents results of the system GMM regression of ROA on the proportion and the attributes of female directors. The models are applied to the matched sample of firms with at least one female director using the propensity score matching of Rosenbaum and Rubin (1983). Propensity score matching yields a matched sample consisting of 1100 treatment cases (firms with at least one female director). Arellano-Bond tests check whether data process is auto-regressive. Sargan test checks whether the model is overidentified. The Hansen test of exogeneity of the instruments subset tests the null hypothesis of exogenous instruments. All variables are as defined in Table 1.
*, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

Table 14
System GMM regression of ROE on the proportion of female directorship and female directors' attributes

Variables	Model 1		Model 2	
	Coef.	z-test	Coef.	z-test
Lag ROE	0.457***	47.53	0.452***	58.35
Female directorship			0.612***	17.01
Independent female directors	–0.048***	–3.61	–0.093***	–6.44
Woman chairperson	0.047***	4.98	0.046***	5.06
Female committee membership	–0.056***	–4.99	–0.016**	–2.01
Educational level of female directors	0.061***	5.38	0.071***	7.09
Business expertise of female directors	0.001	0.04	–0.019**	–2.16
Nationality of female directors	–0.223***	–14.20	–0.226***	–14.54
Tenure of female directors	–0.042***	–9.04	–0.030***	–7.28
Female board multi-directorship	–0.081***	–9.47	–0.079***	–13.12
Reputation of female directors	–0.001	–0.00	0.001	0.32
Board size	0.022**	2.46	0.131***	12.90
Board independence	–0.015	–1.10	0.026*	1.82
Board meetings	–0.024***	–4.46	–0.025***	–4.71
CEO duality	0.008	1.18	0.033***	5.47
Woman CEO	0.071***	8.04	0.067***	8.17
CEO tenure	0.026***	5.73	0.019***	5.53
Family ownership	0.071***	4.36	0.045***	3.44
Institutional ownership	0.079***	5.33	0.049***	4.27
Leverage	–0.149***	–9.35	–0.110***	–9.45
Foreign assets	0.076***	7.15	0.057***	5.90
R&D intensity	0.130	1.47	0.027	0.36
Sales growth	0.196***	21.51	0.201***	23.33
Firm size	0.012***	12.04	0.015***	15.96
Intercept	–0.021	–0.89	–0.455***	–13.65
Industry	Yes		Yes	
Year	Yes		Yes	
Number of observations	981		981	
Fisher (Prob > F, *p*-value)	16890.89 ($p = 0.000$)		22262.78 ($p = 0.000$)	
Arellano–Bond AR(1) (z, *p*–value):	–2.99 ($p = 0.003$)		–3.03 ($p = 0.002$)	
Arellano–Bond AR(2) (z, *p*–value):	0.44 ($p = 0.661$)		0.45 ($p = 0.656$)	
Sargan test (Chi–square, *p*–value):	1014.95 ($p = 0.000$)		992.67 ($p = 0.000$)	
Hansen test (Chi–square, *p*–value):	159.03 ($p = 0.272$)		167.22 ($p = 0.437$)	

This table presents results of the system GMM regression of ROE on the proportion and the attributes of female directors. The models are applied to the matched sample of firms with at least one female director using the propensity score matching of Rosenbaum and Rubin (1983). Propensity score matching yields a matched sample consisting of 1100 treatment cases (firms with at least one female director). Arellano–Bond tests check whether data process is auto–regressive. Sargan test checks whether the model is overidentified. The Hansen test of exogeneity of the instruments subset tests the null hypothesis of exogenous instruments. All variables are as defined in Table 1.
*, **, *** represent significance at 10%, 5%, and 1% levels, respectively.

Table 15
System GMM regression of Tobin's Q on the proportion of female directorship and female directors' attributes

Variables	Model 1		Model 2	
	Coef.	z–test	Coef.	z–test
Lag Tobin's Q	0.602***	76.87	0.603***	113.48
Female directorship			0.093	1.09
Independent female directors	0.614***	11.61	0.591***	14.71
Woman chairperson	–0.639***	–16.17	–0.614***	–23.35
Female committee membership	–0.075***	–2.57	–0.013***	–2.55
Educational level of female directors	–0.344***	–11.37	–0.274***	–15.04
Business expertise of female directors	–0.117***	–3.41	–0.112***	–5.17
Nationality of female directors	–0.683***	–17.91	–0.653***	–16.66
Tenure of female directors	–0.040**	–2.39	–0.035***	–2.74
Female board multi-directorship	0.657***	16.95	0.564***	20.30
Reputation of female directors	0.026***	5.25	0.016***	3.25
Board size	–0.103***	–4.79	–0.080***	–3.37
Board independence	0.064*	1.76	0.050	1.61
Board meetings	–0.040**	–2.27	–0.036***	–2.94
CEO duality	–0.049***	–2.54	–0.062***	–4.25
Woman CEO	0.067**	2.27	0.079	3.92
CEO tenure	–0.042***	–3.49	–0.056***	–6.38
Family ownership	–0.164***	–3.91	–0.138***	–4.02
Institutional ownership	–0.188***	–3.29	–0.150***	–3.22
Leverage	–0.334***	–6.31	–0.321***	–8.18
Foreign assets	0.236***	6.56	0.195***	5.95
R&D intensity	–0.467*	–1.97	–0.754***	–4.49
Sales growth	0.267***	9.37	0.268***	13.68
Firm size	–0.010**	–2.47	–0.005**	–1.99
Intercept	0.734***	9.89	0.512***	6.09
Industry	Yes		Yes	
Year	Yes		Yes	
Number of observations	981		981	
Fisher (Prob > F, *p*–value)	3349.09 (p = 0.000)		15049.70 (p = 0.000)	
Arellano–Bond AR(1) (z, *p*–value):	–2.20 (p = 0.028)		–2.81 (p = 0.005)	
Arellano–Bond AR(2) (z, *p*–value):	–0.07 (p = 0.942)		1.35 (p = 0.176)	
Sargan test (Chi–square, *p*–value):	743.87 (p = 0.000)		826.70 (p = 0.000)	
Hansen test (Chi–square, *p*–value):	164.38 (p = 0.184)		170.41 (p = 0.370)	

This table presents results of the system GMM regression of Tobin's Q on the proportion and the attributes of female directors. The models are applied to the matched sample of firms with at least one female director using the propensity score matching of Rosenbaum and Rubin (1983). Propensity score matching yields a matched sample consisting of 1100 treatment cases (firms with at least one female director). Arellano–Bond tests check whether data process is auto–regressive. The Sargan test checks whether the model is overidentified. The Hansen test of exogeneity of the instruments subset tests the null hypothesis of exogenous instruments. All variables are as defined in Table 1.
*, **, *** represent significance at the 10%, 5%, and 1%, respectively.

Table 16
System GMM regression of Profit margin, Asset turnover and Equity multiplier on the proportion of female directorship and female directors' attributes

Variables	Model 1 Net income/Assets		Model 2 Profit margin		Model 3 Asset turnover		Model 4 Equity multiplier	
	Coef.	z–test	Coef.	z–test	Coef.	z–test	Coef.	z–test
Lag Profit margin	0.539***	63.04						
Lag Asset turnover			0.588***	111.23				
Lag Equity multiplier					0.913***	178.63		
Lag Assets/Equity							0.411***	98.89
Female directorship	0.221***	26.10	0.009	0.47	–0.492***	–5.12	–2.820***	–12.86
Independent female directors	–0.020***	–7.36	–0.052***	–7.61	0.145***	4.00	–0.621***	–6.02
Woman chairperson	–0.013***	–6.43	0.194***	25.15	–0.366***	–9.51	2.808***	17.84
Female committee membership	0.012***	4.95	0.029***	5.05	–0.267***	–9.33	0.976***	8.95
Educational level of female directors	–0.032***	–10.79	–0.089***	–14.89	–0.098***	–2.89	1.607***	14.74
Business expertise of female directors	–0.028***	–12.53	–0.027***	–3.26	0.401***	12.55	–0.156*	–1.85
Nationality of female directors	–0.044***	–8.38	0.083***	9.37	–0.535***	–8.17	1.507***	12.88
Tenure of female directors	–0.008***	–7.16	0.004**	2.30	–0.033**	–2.46	–0.032	–0.72
Female board multi-directorship	0.032***	11.40	0.051***	7.71	–0.164***	–5.89	–1.130***	–12.80
Reputation of female directors	–0.001	–0.41	0.021***	13.24	0.036***	6.27	0.074***	3.77
Board size	0.036***	14.42	0.032***	5.16	–0.222***	–9.38	–0.303***	–3.73
Board independence	0.006*	1.92	–0.103***	–9.28	0.047	0.81	–0.596***	–6.22
Board meetings	0.001	0.80	0.018***	5.87	–0.059***	–3.68	0.116***	3.33
CEO duality	0.014***	9.09	0.011***	2.83	–0.078***	–4.63	0.126*	1.89
Woman CEO	0.006**	2.44	–0.024***	–3.62	0.096**	2.23	–0.828***	–5.34
CEO tenure	–0.004***	–3.93	0.007**	2.31	–0.047***	–4.08	0.259***	6.98
Family ownership	–0.019***	–5.67	–0.014	–1.32	0.234***	4.38	1.626***	18.05
Institutional ownership	–0.006*	–1.68	–0.003	–0.33	0.344***	8.03	0.333***	3.23
Leverage	–0.021***	–5.77	0.026**	2.38	0.350***	4.79	2.567***	18.48
Foreign assets	0.015***	5.12	0.001	0.17	0.571***	12.44	–0.712***	–5.90
R&D intensity	–0.047***	–3.14	0.084**	2.32	–0.247	–1.27	1.368	1.00
Sales growth	0.040***	18.61	0.145***	21.25	0.321***	14.33	0.164**	2.53
Firm size	0.002***	5.87	–0.007***	–8.83	–0.037***	–9.31	1.004**	2.03
Intercept	–0.157***	–18.15	0.055**	2.48	2.260***	8.16	0.037	0.12
Industry	Yes		Yes		Yes		Yes	
Year	Yes		Yes		Yes		Yes	
Number of observations	981		981		981		981	

Table 16 (Continued)

Fisher (Prob > F, *p*–value)	49751.12 (*p* = 0.000)	33961.16 (*p* = 0.000)	28268.32 (*p* = 0.000)	92977.41 (*p* = 0.000)
Arellano–Bond AR(1) (z, *p*–value):	–3.33 (*p* = 0.001)	–2.17 (*p* = 0.030)	–3.51 (*p* = 0.000)	–2.70 (*p* = 0.009)
Arellano–Bond AR(2) (z, *p*–value):	1.74 (*p* = 0.106)	1.32 (*p* = 0.188)	–1.61 (*p* = 0.107)	1.21 (*p* = 0.225)
Sargan test (Chi–square, *p*–value):	850.14 (*p* = 0.000)	790.20 (*p* = 0.000)	781.12 (*p* = 0.000)	1038.31 (*p* = 0.000)
Hansen test (Chi–square, *p*–value):	160.02 (*p* = 0.595)	177.25 (*p* = 0.244)	164.51 (*p* = 0.496)	157.12 (*p* = 0.657)

This table presents respectively results of the system GMM regressions of Net income/Assets, Profit margin, Asset turnover and Equity multiplier on the proportion and the attributes of female directors. The models are applied to the matched sample of firms with at least one female director using the propensity score matching of Rosenbaum and Rubin (1983). Propensity score matching yields a matched sample consisting of 1100 treatment cases (firms with at least one female director). Arellano–Bond tests check whether data process is auto–regressive. The Sargan test checks whether the model is overidentified. The Hansen test of exogeneity of the instruments subset tests the null hypothesis of exogenous instruments. All variables are as defined in Table 1.
*, **, *** represent significance at the 10%, 5% and 1%, respectively.