Women on the Board and Environmental Sustainability Reporting: Evidence from France

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According to the perception that women pay more attention to the environment and stakeholder concerns than men and may possibly affect the decisions about environmental issues. This study investigates whether a gender diverse board is associated with environmental sustainability reporting. Using a sample of 833 French firms-year observations over the period 2010-2019, we show that the presence and percentage of women on the board of directors are positively associated with environmental disclosures. These results are robust to using alternative estimation methods, and GMM approach that control for endogeneity issues. We further examine the ESG, social and governance disclosures and provide evidence that women on the board are more likely to enhance corporate, social and governance sustainability reporting. Overall, our findings offer valuable understandings for the regulators and practices and significantly adds to understand the importance of corporate voluntary disclosure in a specific European setting, i.e., France.

Introduction

Giannarakis, Andronikidis and Sariannidis (2019) report that environmental problems have many effects on the economic systems as well as on people's lives. Prior research offers evidence that society is highly asking firms to pay greater attention on environmental and social

issues instead of focusing only on financial self-interest (Oppenheim, Bonini, Bielak, Kehm & Lacy 2007; Parnell, 2008). Further, Eccles, Serafeim and Krzus (2011) show that stakeholders are demanding more transparency about environmental, social and governance disclosure. To sustain their competitive advantages and acceptability in society, the firms recognize that addressing environmental concerns is an important key. To this end, environmental sustainability is a significant issue for firms that need to be addressed at the board level (Aguilera, Williams, Conley & Rupp, 2006, Jamali, Safieddine & Rabbath, 2008). Consequently, studies on environmental sustainability reporting received great importance in recent times. Thus, the firms' environment issues should be explored and investigated.

The board of directors undertake a very significant role within firms and they are responsible for decision-making. They draw the main policies of firms, including environmental policies. Therefore, identifying the appropriate composition of board of directors is of great importance. After the last corporate scandals and financial crises, it has led many to question whether the situation would have been different if there were more female directors in US firms and worldwide (Adams & Funk, 2012). A lack of female representation on boards of directors is turning out to be much discussed issue lately that needs to be addressed because of the benefits obtained from gender diversity in the boardrooms. In fact, gender diversity on corporate boards has been recognized as a tool that can enhance the value and performance of firms since they add new skills, new capabilities and new views (Carter, Simkins & Simpson, 2003). In addition, women presence on boards increases board attendance (Ammer & Ahmad-Zaluki, 2017). Thus and for the challenge of sustainability, Galbreath (2011) indicates that the new visions and perceptions at the board level are expected to be essential.

Shareholders of firms expect that higher level of female representation on board will lead to better implementation of ethical conduct (Flynn & Adams, 2004). Triana, Miller AND Trzebiatowski (2014) report that more gender-diverse boards will show its awareness for the business environment. Further, women on boards are expected to enhance board effectiveness concerning environmental policies (Nielsen & Huse, 2010). Recently, Baalouch, Damak & Hussainey (2019) propose that gender diversity in the board room has important roles in clarifying the differences in environmental disclosure quality. It is suggested by Biggins (1999) that women response to the needs of stakeholders are better than men which might help in drawing the policies and decision making regarding sustainability.

Based on the above, our study addresses the issue of women on boards and environmental sustainability reporting. We conduct this study in French context, that has an applied regulated framework concerning the environmental disclosure. France is one of the countries that have regulations for obligatory disclosure of environmental information information (Baalouch, Damak & Hussainey, 2019). Despite mandatory disclosure of environmental information in France, Lassaad and Khamoussi (2012) indicate that French firms disclose very little information. In the same vein, Kühn, Stiglbauer and Heel (2014) show that the disclosure of

French environmental reporting still lacks in obedience with the Global Reporting Initiative (GRI). Thus, France provides an admirable area for studying environmental sustainability reporting.

We test the effect of women on boards on environmental sustainability reporting based on a sample of 85 firms with 833 firm-year observations from the SBF 120 index (French stock exchange companies) between the periods 2010-2019. We use two alternative measurements for board gender diversity which are women presence on board and percentage of women on board. We find evidence that the presence and percentage of women on board have a significant positive relationship with environmental sustainability reporting. The results suggest that women directors bring a different and greater variety of skills and social resources to the board to improve environmental reporting and performance. We check the robustness of our finding and we find that our result is unaffected by the use of alternative different estimation techniques. As an additional analysis, we find the women presence and percentage on board increase ESG, social and governance disclosures. To consider the endogeneity problem between women diversity on boards and environmental reporting, we utilize the dynamic GMM estimator. Interestingly, we find similar results. These results are in line with resource-dependence theory and critical mass theory. Furthermore, the results propose that efforts of policy makers to encourage the appointment of women on boards are valuable for French firms by enhancing the environmental reporting practices.

This study contributes to the existing literature in several ways: Firstly, previous evidence on the existence of women the board has been widely examined in various contexts, nevertheless, limited studies have explored the associations between women on boards and sustainability reporting including environment disclosure. Secondly, the findings of prior studies are inconclusive and have reported mixed results (Harjoto, Laksmana & Lee, 2015, Baalouch Baalouch, Damak & Hussainey, 2019). Accordingly, our study extends the current literature on women diversity and environment reporting and fills the existing gap. Thirdly, there is a lack in previous studies regarding examining each of environmental, social and governance disclosure independently as they are different concepts (Lu & Herremans, 2019). Thus, we fill this gap by focusing on environmental reporting. Third, most of prior studies on women diversity and environment employ US data. Thus, we fill the gap in the literature by utilizing a sample of firms listed in France where there is a scarcity of studies on the impact of women on environmental reporting. In addition, to the best of our knowledge, we are the first paper that examines the influence of board gender diversity on ESG performance in the French context. Finally, our study offers practical evidence that environmental disclosure is valued and significant for market participants.

The rest of this study is organized as follows. In Section 2, we discuss the institutional settings in France. In Section 3, the theoretical framework, empirical evidence and construction of hypotheses development are presented. Section 4 presents the design of the research. Section 5

presents the empirical analysis and results along with the robustness analyses. Lastly, Section 6 introduces the conclusion of the study.

Institutional settings

In France, the reporting of environmental information has started in 1992 (Cormier & Magnan, 2003). Since then, French government still carry on its governing method concerning environmental reporting (Kühn, Stiglbauer & Heel, 2014). In 2001, France released the New Economic Regulations law (NER law) that restrains the public firms from publishing an annual report concerning the corporate social responsibility including environment information. The law identifies the obligatory information disclosure by mentioning to 40 qualitative and quantitative indicators that categorized in three groups: 1) social information to employees, 2) information on firms influence on stakeholders and 3) information on the firms impact on the environment (Kühn, Stiglbauer & Heel, 2014). In order to improve the NER law, the Grenelle Act II of 2012 was released.

In many countries, the involvement of women on boards have been addressed by regulations initiatives. In the context of French, the law of Zimmerman/cope has been enacted in 2011. By January 2014, the law requires firms to make a quota of female on boards at least 20% and by January 2017 should be full compliance. Indeed, France is undertaking a "comply or explain" regulation since 2010 to stimulate firms to improve the presence of women on boards. This regulation is involved in French code of corporate governance. To this end, it is mandatory for French firms to disclose whether they comply with code or else they need to provide a reasonable explanation (Lakhal, Lakhal & Malek, 2015).

Further, the European Commission dedicated distinctive consideration to gender diversity (European Commission, 2012, 2014). Specifically, it has introduced targets for the presence of women on boards of directors. Further, it indicates that the percentage of women on boards has an impact on the quality of ethical conduct.

Literature review
Theoretical framework

Women diversity of directors has been explained by several theories, such as resource-dependence theory and critical mass theory. The resource-dependence theory states that the main responsibility of the directors is to aid management of the firm to make high-quality strategic decisions. In addition, the directors assist in securing critical resources needed by the firms since they have connections or links to the external environment (Pfeffer & Salancik, 1978, Bédard, Coulombe & Courteau, 2008). Further, Hillman, Cannella and Paetzold (2000) indicate that since boards provide associating tasks between a firm and the external

environment, the more diverse the board (including a greater proportion of female directors), the more choices of network and linkage opportunities for a firm.

With reference to the critical mass theory of Kramer, Konrad and Erkut (2006), the effect of female directors' presentation on the board comes to be more noticeable when the number of women increases to a specific threshold. This is in line with Granovetter (1978) who claims that a small modification in the heterogeneity of a group could lead to a greater modification in the whole behavior of the group. Konrad, Kramer and Erkut (2008) debate that the existence of a minimum of three women sitting on boards is expected to provide actual adjustment into the board. Lückerath-Rovers (2013) reveals that having at least three women on boards can result in good decision-making. For women to do their work effectively, Adams and Ferreira (2009) indicate that the appropriate measure of women diversity on boards should be having a minimum of three women directors instead of their presence only. In accordance with the critical mass theory, the presence of at least three women board members is expected to improve the efficiency of women diversity tool and lead to better environment reporting.

Empirical evidence

Previous studies have examined women on boards from various perspectives with diverse findings. In terms of environmental reporting, Lu and Herremans (2019) find a positive association between board gender diversity and the environmental performance of firms. In addition, they report that the impact of women is strong in industry groups with higher environmental effects. Manita, Bruna, Dang and Houanti (2018) provide support to the critical mass theory. They find that boards with a number of women directors less than three has an insignificant impact on environmental, social and governance disclosure. Moreover, Kassinis, Panayiotou, Dimou and Katsifaraki (2016) document a positive association between women diversity on the board and environmental performance. Post, Rahman and Rubow (2011) report a positive influence of board gender diversity on the strength of environmental disclosure in chemical and electronics industries. In contrast, Baalouch, Damak and Hussainey (2019) point out that the existence of women directors offers opposing impact on the quality level of environmental disclosure.

For the studies about gender and environment issues, Ciocirlan and Pettersson (2012) find a strong and positive impact of the existence of women on boards on the commitment toward climate change. Similarly, Liao, Luo and Tang (2015) show that the disclosure of greenhouse gas emissions is positively related to the proportion of women members on boards. In their study on oil and gas companies, Post, Rahman and McQuillen (2015) present that the link between environmental performance and gender diversity is mediated by renewable energy alliances.

Besides the above, the impact of gender diversity on corporate social responsibility (CSR) is documented in prior studies. The evidence found by Beji, Yousfi and Loukil (2020) reveal a positive association between gender diversity and firm CSR performance. They claim that women have the ability to bring new visions and perceptions, especially on the topics related to human rights**.** Likewise, Bear, Rahman and Post (2010) and Fernandez-Feijoo, Romero and Ruiz-Blanco (2013) show that the level of CSR reporting is higher in countries with a greater percentage of boards of directors with at least three women. Finally, Hafsi and Turgut (2013) claim that gender diversity might improve the activities of CSR.

Hypotheses development
The presence of women on the board and environmental sustainability reporting

The existence of women directors on the board is expected to lead to more independent and diligent boards (Gul, Srinidhi & Tsui, 2008). From the perspective of the resource-dependence theory, companies have the capability to attract, employ and preserve a stream of resources from their outside environment. Gender diversity is considered as one of these resources. Ruigrok, Peck and Keller (2006) indicate that firms with female members on its board are expected to enhance the variety of perceptions for the problem-solving and strategic planning processes. To this end, female members compared to men will be more involved in social activities as well as environmental issues as they have diverse skills and knowledge.

Nielsen and Huse (2010) indicate that women can be sensitive to some firm practices like environmental policies. Based on psychological attributes of women members, they are more expected to take part in strategic issues that have an impact on the stakeholders of firms and its CSR (Manita, Bruna, Dang & Houanti, 2018). Consequently, women directors on boards are expected to offer diverse counsel and guidance than male directors concerning environmental reporting. Moreover, women directors are characterized with great averse to risk of losing the reputation (Srinidhi, Gul & Tsui, 2011). Kim and Starks (2016) point out that women on boards are found to have the sustainability skills. They also add that having female directors with expertise concerning the environment will offer access to new and various resources not formerly under the control of firm.

Based on the above discussion and owing to the differences between women and men, a board with women directors might influence the environmental sustainability reporting. Thus, in line with resource-dependence theory and previous empirical evidences the hypothesis is identified as follows:

H1: The presence of women on the board increases environmental sustainability reporting

The percentage of women on board and environmental sustainability reporting

It is important to not only take into account the women existence on the board but also their number. Kapotas (2010) shows that the existence of women directors on boards will not indicate whether they have an equal proportion of power as men. In their study, Singh and Vinnicombe (2004) report that firms with higher proportion of women whether in management positions or on boards are associated with greater scores in working based on corporate governance codes than other firms directed by a lot of men. This result is further supported by the study Terjesen, Sealy and Singh (2009). Additionally, Bear, Rahman and Post (2010) document a positive association between the number of women on the board of directors and the strength of CSR ratings. Konrad, Kramer and Erkut (2008) contend that women will not feel comfortable expressing her views when there is only one woman among a lot of men, nevertheless, they tend to work better in boards with a minimum of three women, the critical mass.

Therefore, it is expected that, if the board of directors include greater percentage of women directors, females are more likely to impact the decision making of the board including environmental concerns. According to critical mass theory and prior studies, the second hypothesis is stated as follows:

H2: A higher percentage of women on board improve environmental sustainability reporting.

Methods
Sample construction

First, the sample of this study contains all the firms that made up the SBF 120 index (French stock exchange companies) over the 2011-2019 period. Data concerning board diversity, environmental disclosures and financial data are collected from Bloomberg. Following standard practice, utility (SIC codes 4900-4999) and financial (SIC codes 6000-6999) firms are excluded, owing to their particular accounting regulations and disclosure requirements. We further eliminate firms with missing data or outliers. The final sample comprises 85 firms and 833 firm-year observations. Practically, about 80% of French market capitalization is encompassed by our sample.

Measurement of variables
Dependent variable

New Economic Regulation (NRE) Act mandates that all listed French companies provide non-financial reports regarding environmental and social policies and/or practices. These data are defined and compiled by Bloomberg from publicly available sources. The variable chosen to measure environmental sustainably reporting is environmental disclosure score (ENV). This

score comes directly from Bloomberg and defined as follows: "proprietary Bloomberg score based on the extent of a company's environmental score as a part of environmental, Social and Governance (ESG) data"

The scoring system ranges from 0 (for firms that do not disclose Environmental data) to 100 percent (for firms that disclose all Environmental data recognized by Bloomberg). The scores are based on a company's Environmental disclosure index computed using a set of data points collected by the analysts at Bloomberg. Each data point is weighted in terms of importance and relevance for the particular industry sector. Therefore, it may be considered as a measure of breadth of Environmental reporting.

Previous literature (Nollet, Filis & Mitrokostas, 2016, Manita, Bruna, Dang & Houanti, 2018) commonly use Bloomberg ESG disclosure scores. Further, we concentrate on environmental disclosure score to relieve the concern that governance factors drive ESG effects (Duuren, Plantinga & Scholtens, 2015).

Independent variable

We use two proxies to measure board gender diversity. The first one is a dummy variable "WOCB" equals 1 when a board has at least one female director and 0 otherwise (Liu, Wei, & Xie, 2014). The second measure is the percentage of women on a corporate board "PWOCB", Campbell and Mínguez-Vera, 2008, Adams and Ferreira, 2009.

Control variables

We introduce in our empirical models three firm-specific variables including firm profitability, firm risk and firm size as the control variables.

- Firm profitability (*ROA*) is measured by return on assets. According to Fakhari and Pitenoei (2017) and Giannarakis, Andronikidis and Sariannidis (2019), highly profitable firms disclose more information since they are more visible to the public and more followed by analysts.
- Firm size (*SIZE*) is calculated as the log of market capitalization. Some previous studies demonstrated that firm size is a good predictor of firms' environmental and social disclosure practices ((Shahab & Ye, 2018, Welbeck, Yaw Owusu, Bekoe & Kusi, 2017).
- Firm risk (*DEBT*) is measured by firm's debts (Waddock & Graves, 1997, Campbell & Mínguez-Vera, 2008).

Moreover, previous research (Alazzani, Hassanein & Aljanadi, 2016, Rebeiz, 2015, Boulouta, 2013, Esa & Ghazali, 2012, Amran & Devi, 2008) emphasize the need to take into account:

- Auditor type (*AUDITOR*) is a dummy variable which takes the value of 1 if the firm is audited by one of the Big Four audit firms and 0 otherwise.
- Board size (*BOARDSIZE*) is measured as the number of directors on the board.
- Book to market value (*BTM*), calculated as the book value of firm equity deflated by its market value).

Research model

In this paper, we aim to identify possible associations between the board gender diversity and the level of environmental disclosure for French stock exchange firms appertaining to the SBF 120 index. Accordingly, the following two models have been identified:

$$ENV_{i,t} = \beta_0 + \beta_1 \, WOCB_{i,t} + \beta_2 \, SIZEe_{i,t-1} + \beta_3 \, BOARDSIZE_{i,t} + \beta_4 \, AUDITOR_{i,t} + \beta_5 \, DEBT_{i,t} + \beta_6 \, ROA_{i,t} + \beta_7 \, MTB_{i,t} + Industry \; dummies + year \; dummies + \varepsilon_{i,t} \qquad (1)$$

$$ENV_{i,t} = \beta_0 + \beta_1 \, PWOCB_{i,t} + \beta_2 \, SIZE_{i,t-1} + \beta_3 \, BOARDSIZE_{i,t} + \beta_4 \, AUDITOR_{i,t} + \beta_5 \, DEBT_{i,t} + \beta_6 \, ROA_{i,t} + \beta_7 \, MTB_{i,t} + Industry \; dummies + Year \; dummies + \varepsilon_{i,t} \qquad (2)$$

Where i denotes firms in the sample and t refers to time period. The expressions *Industry dummies*, *Year dummies* and $\varepsilon_{i,t}$ refer to unobserved industry fixed effect, time-specific effects that are time-variant and common to all firms, and the classical error term, that is supposed to be identically distributed and independent, respectively.

To control for the issue of independence of observations for each company, we first use ordinary least squares (OLS) e equations (1) and (2). Then, we control for time-invariant firm-particular effects by estimating equations (1) and (2) using Fixed Effect in order to better analyze the specific effect of board gender diversity on environmental sustainability reporting.

Our coefficient of primary interest β_1, which measures the association between the women presence on board and environmental disclosure. Whereas, the estimate coefficient β_2 measures the association between the women's percentage on the board and environmental disclosures and in equations (1) and (2), respectively. In accordance with our hypotheses H_1 and H_2, the coefficients estimate of the interaction term β_1 and β_3 should be significantly positive.

Results
Summary statistics and correlation analysis

Table 1 documents the summary statistics for the variables used in our baseline models. As shown in this table, the mean percentage of women on board (PWOCB) is 30.7 percent. This is higher than the number given in, for instance, Lakhal, Lakhal and Malek (2015), who reported

a value of 12.6 percent. This could be explained by our more recent sample, 2010-2019, compared to 2008-2011 for Lakhal, Lakhal and Malek (2015).

Regarding the ENV disclosures, Khaireddine, Salhi, Aljabr and Jarboui (2020) collect environmental information manually from annual reports for each French firm over the period 2012-2017 and calculate a score for environmental disclosures. They find a mean score of 41.6. That is slightly higher than the mean of ENV scores of our firms is (37.7). This is due to the difference in manner of scores' calculations.

Table 1: Summary statistics

Variables	N	Mean	STD	5th percentile	25th percentile	Median	75th percentile	95th percentile
ENV	833	37.6925	13.7662	13.1783	28.6822	38.3929	47.2868	59.6899
ESG	833	47.8182	7.5295	29.3388	41.7355	49.1736	54.9587	61.1570
SOC	751	52.2806	12.3426	28.0702	43.8596	54.3860	60	70.1754
GOV	751	61.7866	7.0421	51.7857	57.1429	62.5	66.0714	71.4286
WOCB	833	0.9701	0.1703	1	1	1	1	1
PWOCB	833	30.7283	13.0206	8.33	21.4286	31.25	40	50
SIZE	833	9.8931	0.4979	9.0791	9.5513	9.8780	10.2143	10.7689
BOARDSIZE	833	13.0156	3.2032	8	11	13	15	19
AUDITOR	833	0.1947	0.3962	0	0	0	0	1
DEBT	833	25.9066	15.3719	1.4926	15.1565	24.1425	35.972	54.9695
ROA	833	3.9487	4.4160	-1.7483	1.4781	3.6218	5.7581	11.2005
MTB	833	0.4096	0.2771	0.0517	0.2398	0.3900	0.5309	0.9190

Notes: This table shows descriptive statistics for all variables employed in our models. The study sample contains 833 observations that cover 85 unique French firms throughout the period from 2010 to 2019.

Table 2 reports the Pearson's correlation to reveal problems of multicollinearity between all the variables used in our baseline model. The correlation coefficients between ENV and both proxies of board gender diversity (*WOCB* and *PWOB*) are positive. ENV is further significantly correlated to control variables with having the projected associations. No correlation coefficient exceeds 0.23 between control variables, which alleviates the concern that multicollinearity might impact the results of regression. In addition, we compute the variance inflation factors (VIF) and for each variable it does not surpass the critical value of 10, guaranteeing that multicollinearity is not a problem.

Table 2: Pearson correlation

Variables	ENV	WOCB	PWOCB	SIZE	BOARDSIZE	AUDITOR	DEBT	ROA	MTB
ENV	1								
WOCB	0.0921**	1							
PWOCB	0.2231***	0.2366***	1						
SIZE	0.3913***	0.0792**	0.1552***	1					
BOARDSIZE	0.2307***	0.0748*	-0.0487	0.3187***	1				
AUDITOR	0.1067***	0.0858*	0.0593	-0.0570	-0.0074	1			
DEBT	-0.1148**	0.1421***	0.0634	0.1509***	0.0568	0.1672***	1		
ROA	0.1020**	0.0025	0.0077	0.0480	-0.2592***	-0.1969***	-0.2861***	1	
MTB	0.0183	-0.0337	0.0511	-0.1295**	-0.0690*	0.0822*	-0.0967*	-0.0528	1

Notes: This table displays the coefficients of Pearson correlation of all variables of the study. The study sample contains 833 observations that cover 85 unique French firms throughout the period from 2010 to 2019.
Significance levels: *10%, **5% and ***1%.

Empirical results

Table 3 outlines the findings of regressing environmental disclosure score (*ENV*) on the presence of women on board (*WOCB*) using OLS and fixed effects regressions.

In model (1), the results support first hypothesis H_1 indicating a positive association between board diversity and environmental disclosures. The coefficient associated with *WOCB is positive and* statistically significant at 1% level, showing that a presence of at least one female director on board induces a higher level of firm environmental disclosures.

We obtain similar results in Model 2, which regress equation (1) using Fixed Effects. *WOCB is* still positively and significantly associated with *ENV*. Concerning the control variables, our findings reveal a high level of ENV for profitable firms (*ROA*), large firms (*Size*) and large boards (*BOARDSIEZ*) (Fakher & Pitenoei, 2017, Giannarakis, Andronikidis & Sariannidis, 2019, Shahab & Ye, 2018, Welbeck, Yaw Owusu, Bekoe & Kusi, 2017). Moreover, firms with

less debt (*DEBT*) have higher environmental disclosure scores (Baraibar-Diez & Odriozola, 2019). These results suggest that firm environmental disclosures are linked to its characteristics and its corporate governance mechanisms which is consistent with other findings in the literature.

Table 3: The impact of Women presentation on board on firm environmental disclosures

Variables	Expected sign	OLS	Fixed effect
WOCB	+	0.4170**	0.3345**
		(3.12)	(2.81)
SIZE	+	9.9089***	17.5038***
		(11.94)	(11.69)
BOARDSIZE	+	0.4294**	0.0292
		(2.94)	(0.16)
AUDITOR	+	2.8119**	0.6823
		(-2.61)	(0.63)
DEBT	-/+	-0.0966**	0.2175***
		(-3.16)	(5.52)
ROA	+	0.4846***	0.4100***
		(-4.47)	(-4.47)
MTB	+	2.6226*	1.3084
		(1.66)	(1.17)
Intercept	-/+	-1.5526***	-4.6861***
		(-8.67)	(-9.90)
Year_FE		Yes	Yes
Industry_FE		Yes	Yes
F statistic		22.44***	30.18***
R^2/Adj_R^2		0.2793	0.2249
Sample size		833	833

Notes: This table shows the findings of regressing firm environmental disclosures on the women presence on board and the control variables. The study sample contains 833 observations that cover 85 unique French firms throughout the period beginning from 2010 and ending in 2019.Models 1 and 2 regress ENV score on WOCB (dummy variables that takes 1 if there is at least one women director on board and 0 otherwise) using OLS and Fixed effect, respectively. The utilized control variables are firm size (SIZE), board size (BOARDSIZE), firm auditing (AUDITOR), firm risk (DEBT), firm profitability (ROA) and Market to book ratio (MTB). Significance levels: *10%, ** 5% and ***1%.

OLS and Fixed effect models in Table 4 show that the coefficient linked to *PWOCB* is statistically significant, which indicates that there is evidence of a significant influence of percentage of women on board on ENV disclosure and (t=6.74 for OLS and t=12.89 for FE).

Consequently, the results support H$_2$, indicating that a higher percentage of women on corporate board increases the level of environmental disclosures. Concerning control variables, all the estimated coefficients are statistically significant except that of *MTB*. These results are generally consistent with the prior literature.

Table 4: The impact of Women percentage on board on firm environmental disclosures

Variables	Expected sign	OLS	Fixed effect
PWOCB	+	0.2250*** (6.74)	0.2843*** (12.89)
SIZE	+	8.8891*** (10.77)	8.4983*** (5.53)
BOARDSIZE	+	0.5348*** (3.67)	0.1730 (1.01)
AUDITOR	+	-3.0502** (-2.91)	0.3139 (0.32)
DEBT	-/+	-0.1091*** (-3.71)	-0.1128** (3.08)
ROA	+	0.4770*** (-4.60)	0.3173*** (-3.80)
MTB	+	1.8379 (1.19)	0.3055 (0.30)
Intercept	-/+	-1.7156*** (-7.76)	-5.1286*** (-3.96)
Year_FE		Yes	Yes
Industry_FE		Yes	Yes
F statistic		28.31***	59.02***
R^2/Pseudo R^2/Adj_R^2		0.3129	0.3620
Sample size		833	833

Notes This table shows the findings of regressing firm environmental disclosures on the women presence on board and the control variables. The study sample contains 833 observations that cover 85 unique French firms throughout the period beginning from 2010 and ending in 2019. Models 1 and 2 regress ENV score on PWOCB (Percentage of women on board) using OLS and Fixed effect, respectively. The utilized control variables are firm size (SIZE), board size (BOARDSIZE), firm auditing (AUDITOR), firm risk (DEBT), firm profitability (ROA) and Market to book ratio (MTB). Significance levels: *10%, **5% and ***1%.

Additional analysis

Manita, Bruna, Dang and Houanti (2018) is the first study that investigates the association between gender diversity and environmental, social and governance (ESG) disclosure score provided by Bloomberg for US firms. Going a step forward, we test such association in the French context as an additional analysis. We further follow previous literature (Beji, Yousfi & Loukil, 2020, Khaireddine, Salhi, Aljabr & Jarboui, 2020, Yaseen, Iskandrani, Ajina & Hamad,

2019) and examine the relationship between gender diversity and social and governance disclosures. Table 5 documents the results of regression of ESG, SOC and GOV disclosures using OLS and fixed effects regressions. Using OLS regressions (Fixed effects regressions) in models (1), (2), (5), (6), (9) and (10) ((3), (4), (7), (8), (11) and (12)) the estimated coefficients on ESG, SOC and GOV are positive and statistically significant at 1% level, showing that the women presence on board and higher percentage of women on board lead to a higher level of firm environmental, social and governance disclosures. Thus, a higher board gender diversity results in a higher level of corporate sustainability. This finding is the first one illustrated in the French context. WOCB and PWOCB have a positive and significant influence on SOC. This indicates that higher gender diversity enhances the quality of corporate social responsibility disclosures which is similar to the findings of (Beji, Yousfi & Loukil, 2020, Yaseen, Iskandrani, Ajina & Hamad, 2019). At least, the coefficients associated with GOV are statistically significant at the level of 1% and positive, indicating women on board positively impact governance disclosures. These findings are similar to prevailing research in the French context (Khaireddine, Salhi, Aljabr & Jarboui, 2020)

Table 5: The impact of board gender diversity on ESG, Social and Governance disclosures

Variables	ESG				SOC				GOV			
	OLS		FE		OLS		FE		OLS		FE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
WOCB	0.9842***		0.3040***		0.0498***		0.5192***		0.9343***		0.1393***	
	(2.84)		(3.33)		(4.75)		(4.02)		(2.57)		(2.98)	
PWOCB		0.1903***		0.1939***		0.2688***		0.1860***		0.1957***		0.1676***
		(6.82)		(11.98)		(6.76)		(6.51)		(8.93)		(9.29)
SIZE	6.2048***	5.3505***	11.5120***	5.6237***	2.5038	1.3370	10.2165***	5.2956*	4.2880***	3.4259***	9.9488***	4.9289***
	(9.79)	(8.62)	(11.16)	(5.24)	(2.57)	(1.43)	(6.03)	(2.80)	(8.18)	(6.89)	(8.98)	(4.12)
BOARDSIZE	0.2928	0.3808**	-0.0393	0.0689	0.3076	0.4364*	0.0147	0.1184	0.1179	0.2103	-0.0047	0.0888
	(2.53)	(3.34)	(-0.32)	(0.61)	(1.89)	(2.72)	(0.07)	(0.59)	(1.31)	(2.37)	(-0.04)	(0.70)
AUDITOR	-0.8990	-0.9706	-0.2332	0.0846	0.1418	0.0647	-1.2171	-0.9218	0.1477	0.0840	-1.2891	-1.0153
	(-1.06)	(-1.16)	(-0.31)	(0.12)	(0.12)	(0.06)	(-0.99)	(-0.77)	(0.22)	(0.13)	(-1.61)	(-1.34)
DEBT	-0.0875***	-0.1006***	0.1914***	0.1298***	-0.1195***	-0.1364***	0.2348***	0.1828***	0.0012	-0.0115	0.1166***	0.0640
	(-3.69)	(-4.34)	(6.91)	(5.02)	(-3.50)	(-4.12)	(5.16)	(4.01)	(0.07)	(-0.66)	(3.91)	(2.22)
ROA	-0.3822***	-0.3988***	-0.1375	-0.1267	-0.3836**	-0.4074***	-0.0378	-0.0378	-0.1156	-0.1328	0.0312	0.0395
	(-4.53)	(-5.10)	(-2.03)	(-2.05)	(-3.34)	(-3.91)	(-0.34)	(-0.35)	(-1.77)	(-2.11)	(0.43)	(0.57)
MTB	2.2283	1.4468	-0.1139	-0.7467	3.6098	2.4820	-0.4971	-1.1617	4.1268***	3.3135***	1.6513	1.0989
	(1.92)	(1.27)	(-0.15)	(-1.10)	(2.15)	(1.50)	(-0.41)	(-0.97)	(4.62)	(3.79)	(2.07)	(1.45)
Intercept	-23.7813**	-13.6147	-74.0557	-17.4952	11.9115	27.5319**	-62.7987***	-11.5455	7.9149	18.8839***	-44.1758***	4.4234
	(-3.41)	(-2.20)	(-7.42)	(-1.69)	(1.25)	(3.09)	(-3.83)	(-0.63)	(1.24)	(3.72)	(-4.12)	(0.38)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F statistic	16.94***	22.44***	32.44***	57.59***	6.67***	8.95***	15.00***	19.25***	10.73***	14.58***	20.69***	34.06***
Adjusted R²	0.2520	0.2946	0.0788	0.3850	0.1292	0.1772	0.1402	0.1730	0.1921	0.2687	0.1836	0.2702
Sample Size	729	729	747	96	729	729	747	747	729	729	747	747

Notes: This table reports the results from regressing ESG, Social and Governance disclosures on WOCB, PWOCB and other control variables over the period 2010-2019 for the 833 firm-year observations of the sample. Models 1 (2,5,6,9,10) and 3 (4,7,8,11,12) use OLS and Fixed effect, respectively. The utilized control variables are firm size (SIZE), board size (BOARDSIZE), firm auditing (AUDITOR), firm risk (DEBT), firm profitability (ROA) and Market to book ratio (MTB). Significance levels: *10%, **5% and ***1%..

Robustness Checks
Alternative estimation methods

Similar to Gow, Ormazabal and Taylor (2010), and Petersen (2009), we change the estimation method to account for serial dependence and cross-sectional. Results of other estimation methods are reported in table 5. For instance, we use the White (1980) procedure in Model 1 and in Model 2, we use a generalized linear model estimation. For Model 3, we employ the Fama-MacBeth procedure and in Model 4, the quantile regression procedure is utilized. Finally, while the Newey-West (1987) procedure is used in Model 5, we conduct the two-way clustering by firm and year in Model 6.

The coefficients associated with *WOCB* and *PWOCB* still remain positive and significant in all these regressions. This show strong evidence of a positive relationship between board diversity and environmental sustainability reporting, which remains unchanged with the use of various estimation methods.

Table 6. The effect of board gender diversity on firm environmental disclosures using alternative estimation methods

Variables	White		GLM		Fama Macbeth		Quantile		Newey-West		Clustering by firm and year	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
WOCB	0.6772*		0.7793*		-0.2728		0.7670		0.5159*		0.9420*	
	(2.56)		(2.49)		(-0.62)		(1.95)		(2.47)		(2.47)	
PWOCB		0.2216***		0.2790***		0.0844*		0.1932***		0.2624***		0.2812***
		(6.50)		(6.59)		(3.04)		(4.00)		(5.80)		(6.29)
SIZE	10.4460***	9.3744***	16.0110***	9.2585***	9.6465***	9.5953***	11.1973***	9.7292***	12.8888***	11.5281***	15.7938***	9.0739***
	(12.52)	(11.43)	(6.77)	(3.99)	(8.09)	(8.73)	(8.76)	(7.11)	(9.96)	(8.76)	(6.39)	(3.77)
BOARDSIZE	0.2886*	0.3996**	0.0633	0.2397	0.4449*	0.4285*	0.3103	0.1838	-0.3380	-0.1899	0.1050	0.2671
	(2.03)	(2.83)	(0.31)	(1.30)	(2.74)	(2.51)	(1.57)	(0.88)	(-1.39)	(-0.80)	(0.50)	(1.42)
AUDITOR	3.1147**	3.3227**	0.1156	-0.2191	3.4741***	3.6682***	3.7486*	4.3602**	1.0615	-1.0311	0.1934	-0.1671
	(-3.00)	(-3.30)	(0.12)	(-0.23)	(-6.24)	(-6.11)	(-2.48)	(-2.74)	(-0.61)	(-0.62)	(0.20)	(-0.17)
DEBT	-0.0980**	-0.1095***	0.1573	0.0740	-0.1240***	-0.1181***	-0.0232	-0.0523	-0.1807***	-0.2133***	0.1624	0.0716
	(-3.29)	(-3.84)	(1.82)	(0.96)	(-6.85)	(-6.62)	(-0.56)	(-1.21)	(-3.55)	(-4.51)	(1.75)	(0.85)
ROA	0.5654***	0.5659***	0.3840***	0.3307***	0.5919**	0.5929**	0.5295***	0.5489***	0.6416***	0.6408***	0.3833***	-0.3323***
	(-5.29)	(-5.55)	(-4.40)	(-3.80)	(-3.80)	(-3.88)	(-3.69)	(-3.64)	(-4.55)	(-4.65)	(-4.42)	(-3.84)
MTB	2.3884	1.5000	1.5394	0.4597	1.4169	1.3537	2.7918	1.1648	3.9938*	2.8612	1.2669	0.2200
	(1.47)	(0.94)	(1.28)	(0.37)	(0.99)	(1.09)	(1.23)	(0.49)	(2.42)	(1.72)	(1.05)	(0.18)
Intercept	-1.3977***	-1.8572***	-12.8571***	-7.1325**	-5.7691**	-9.7629***	-8.5780***	-2.1550***	-7.9591***	-6.6781***	-3.0408***	-6.7596**
	(-8.81)	(-7.99)	(-5.36)	(-2.95)	(-4.33)	(-5.81)	(-6.41)	(-4.74)	(-6.70)	(-6.00)	(-4.98)	(-2.81)
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F statistic	41.00***	49.36***	83.68***	150.47***	63.10***	74.12***	148.12***	175.56***	200.15***	306.29***	10.14***	12.39***
Adj R^2/R^2	0.2218	0.2570	0.2229	0.3603	0.2677	0.2687	0.1158	0.1298	0.2247	0.2024	0.2183	0.3551
Sample size	833	833	833	833	833	833	833	833	833	833	833	833

Notes: This table notifies the panel regressions results for firms listed in SBF 120 Index through the period 2010-2019. We show the heteroskedasticity-consistent standard errors using the White (1980) procedure in Model 1 and in Model 2 we use a generalized linear model estimation. For Model 3, we employ the Fama-MacBeth procedure and in Model 4, the quantile regression procedure is utilized. Finally, while the Newey-West (1987) procedure is used in Model 5, we conduct the two-way clustering by firm and year in Model 6. All models include industry and year fixed effects. Unreported industry controls are in line with Global Industry Classification Standard. Significance levels: *10%, **5% and ***1%.

Endogeneity

Hermalin and Weisbach (1998) highlight a theoretical reasoning and empirical proof indicating that the structure of a board is more probably to be endogenous. However, there is a general agreement in the literature on the exogeneity of board structure (Adams, Hermalin & Weisbach, 2010). Thus, we should take in consideration of such endogeneity issue as it is a concern in our analysis and may create estimation problems. To do this, we take into account appointment of female directors as a deliberate choice made by the firm when estimating Equation (1) and Equation (2). Yet, Boulouta (2013) outlines two main alternative explanations. First, omitted unobservable firm characteristics both variable and fixed via time could impact both the women presentation on board and environmental disclosures. For example, some firm-particular unobservable variables, including culture (Luo & Tang, 2016) and religion (Dongchuhl Oh & Shin, 2020), are ignored in our analysis as they are quite hard to observe and measure.

Second, a reverse causality might also be present (Adams & Ferreira, 2009). Accordingly, female directors significantly increase the level of environmental disclosure, but it is also possible that greener corporations may significantly influence the number of female directors. In this situation, OLS and FE models could not be appropriate.

Moreover, Wintoki, Linck and Netter (2012) claim that a past action could itself be a proxy for unnoticeable but important firm features which locate current action. Indeed, any corporate financial decisions tend to be dynamic and it is referred to as 'dynamic endogeneity'. Therefore, the two traditional static models used in our specification could ignore dynamic endogeneity and thus, stimulate biased inferences.

Based on the up reasoning, we pursue Arellano and Bond (1995) and include a lagged dependent variable, $(ENV)_{i,t-1}$, in Equation (1) and Equation (2). We further adapt the Blundell and Bond (1998) and Arellano and Bover (1995) dynamic generalized method of moments (GMM) estimator to mitigate the concerns about endogeneity and dynamic panel bias.

The results of the dynamic panel GMM approach are presented in table 6. The model (1) ((2)) incorporates the dynamic relation between WOCB and ENV (PWOCB and ENV). We continue to find significantly positive coefficients on *WOCB and PWOCB*, suggesting that the positive association between gender diverse board and environmental sustainability reporting holds after taking into account for endogeneity based on the dynamic GMM estimator.

As can be seen from Table 6, the estimated coefficient on the lag of the dependent variable is significantly at 1% level and positively related to firm environmental disclosures for both

models (1) and (2). This result signals that the association between board gender diversity and ENV is robust to dynamic endogeneity.

Table 6 also documents the results of the Hansen test for over-identification, indicating that past values of ENV, women on board and firm characteristics are exogenous. Additionally, the AR (1) and AR (2) tests, show the non-presence of second-order serial correlations. Overall, the specification tests show the non-endogeneity of t the instruments used in Eq. (1) and Eq. (2).

Table 7: Addressing endogeneity: GMM approach

Variables	GMM	
	(1)	**(2)**
Lag ENV	0.6310***	0.5739***
	(34.52)	(27.91)
WOCB	0.3072**	
	(3.12)	
PWOCB		0.0986***
		(5.26)
SIZE	8.2046***	1.3255
	(6.74)	(0.97)
BOARDSIZE	-0.0745	-0.1028
	(-0.76)	(-1.15)
AUDITOR	1.2899	1.6617*
	(1.67)	(2.50)
DEBT	-0.0111	-0.0452
	(-0.34)	(-1.41)
ROA	0.0741	0.0835
	(0.75)	(0.98)
MTB	-0.4123	-0.3802
	(-0.34)	(-0.36)
Intercept	-107.281	24.2852
	(-1.54)	(1.00)
Year_FE	Yes	Yes
Industry_FE	Yes	Yes
Sample size	716	716
F statistic	3724.15***	4058.47***
AR(1) test (p-value)	-3.55***	-3.55***
AR(2) test (p-value)	-1.43	-1.04
Hansen-J test of over-identification (p-value)	51.30	53.53

Notes: This table shows the findings of regressing ENV on board gender diversity using GMM approach over the period 2010-2019 for the 833 firm-year observations of the sample. Models 1 and 2 regress ENV score on WOCB (dummy variables, which takes the value of 1, if there is at least one women director on board and 0 otherwise) and on PWOCB (Percentage of women on board), respectively. The control variables are firm size (SIZE), board size (BOARDSIZE), firm auditing (AUDITOR), firm risk (DEBT), firm profitability (ROA) and Market to book ratio (MTB). The *z*-statistics of the system GMM model are reported in parentheses and based on Windmeijer-corrected standard errors. Significance levels: *10%, **5%, and ***1%.

Conclusion

This study extends the previous literature by investigating the association between gender diverse boards of directors and environmental sustainability reporting. The results of our study reveal that the presence and percentage of women on board of the listed French firms are positively and significantly related with environmental sustainability reporting. The results propose that women members provide a diverse and superior range of skills, experience and resources to the board that result in advancing the environmental reporting. These results are in line with both of resource-dependence theory and critical mass theory. Female presentation on boards further increase ESG, social and governance disclosures. Additionally, the results indicate that French firms are gaining the benefits of the regulations related to the presence of women on boards. When employing the dynamic GMM in order to consider the endogeneity problem, we find similar results.

The results of this study have some imperative implications for market participants. It inspires firms to assign a significant percentage of women directors to enhance environmental performance. Further, it gives good signs to policy makers to maintain their efforts about gender diversity and environmental disclosure by firms. A limitation of this study is that it is difficult to generalize the results to other countries that might have diverse regulations concerning women on boards and environmental disclosure. Thus, future studies could examine the same topic in different regulation settings. Another direction for future study is to explore the impact of women diversity on the committees like audit committee on the environment disclosure.

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