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Board Gender Diversity and Firm Risk

Zyed Achour

Abstract

In this chapter, we address the following question: Does board gender diversity affect global risk? Drawing on agency theory, upper echelon theory, and human capital theory, we hypothesize that gender diversity on the board of directors will decrease the volatility of firm risk. Applying fixed effect estimation on a panel data of listed French companies (SBF120) for the years 2011–2018, the results show a negative link between the percentage of female directors on the board and the standard deviation of monthly stock return as firm risk proxy suggesting that the inclusion of more women on corporate boards could improve financial stability. Our findings contribute to the literature by providing empirical evidence from France occupying the first place at the European level with the most female presence on the boards of directors.¹

Keywords: board gender diversity, board of directors, corporate governance, firm risk, SBF 120

1. Introduction

Recent years have been marked by an abundance of research, both theoretical and empirical, dealing with the impact of board gender diversity on firm performance. Results have often remained mixed and the mechanisms by which gender diversity could impact global performance remain ambiguous and not fully understood. Furthermore, little attention has been devoted to gender diversity on the board of directors as an instrument moderating firm risk.

The board of directors plays a crucial role in strategies adoption and the firm's future direction design. In addition, it is an essential corporate governance mechanism. In literature, it is well accepted that the board of directors is a scarce, valuable, and inimitable resource favoring the creation of sustainable competitive advantage. However, its effectiveness remains largely dependent on its size and member's composition. For instance, its decisions would be influenced by its size, member's background, level of education, ages, as well as by its "degree of feminization." Indeed, gender diversity is seen as one of the mechanisms of corporate governance and a key element in policymaking.

¹ BoardEx Global Gender Balance Report 2021. <https://www.boardex.com/2020-global-gender-diversity-analysis-women-on-boards/>

The majority of European countries, (among them France, Italy, and Norway),² have adopted during the last decade legislation imposing greater representation of the female gender on the board of directors. The main objective of these policies was to combat gender inequality, which largely dominates board composition. Since then, the question on the implications of board gender diversity on a company's outputs has aroused much interest among researchers and academics. However, although several studies have found that women, compared to men, are psychologically more risk averse [1–3], it is not clear that the presence of women on boards of directors leads to better performance even less and reduces overall firm risk.

Indeed, many empirical studies have attempted to study the impact of gender diversity on firm financial performance in general and on firm global risk in particular [4–8], the results did not allow ruling on a stable relationship between gender diversity on board of directors and firm risk. Indeed, while some research does not show any effect, asserting that women directors do not necessarily mitigate firm risk [7, 9] but their presence can increase the supervisory function of the board of directors, some other research has shown that the proportion of board members female is associated with an increased risk [10–12]. In contrast, other studies essentially mobilizing the resource dependency theory [13], feminist theory [14], and social identity theory [15] have shown a negative impact of the female gender on risk taking and firm financial stability. For instance, a low variability in stock market returns has been observed in companies with mixed membership on boards of directors [16]. Similarly, Hutchinson et al. [17] have shown that the feminization of the board of directors moderates the excessive risk-taking of the company. Finally, other research has established that the proportion of women on boards needs to reach a “critical mass” to have an impact on the risk [18].

The present study aims to contribute to the literature dealing with gender diversity on firm global performance by examining, in particular, the impact of gender diversity on firm risk in two ways. First, on a theoretical level, it seeks to strengthen the hypothesis of a negative link between diversity in the composition of boards of directors and corporate risk. Second, on an empirical level, this study, conducted in the French context, seeks to enrich the debate on the consequences of gender diversity on firm global performance, especially since the conclusions drawn by previous research remain mixed. The choice of the French case and the analysis period (2011–2018) are certainly not arbitrary. Indeed, it coincides with the adoption of the Copé-Zimmermann law (2011), which imposes quotas for women on boards of directors and supervisory boards. Besides, according to the Global Gender Balance Report (2021), France took the top spot with 44% of board positions held by women.

The remainder of this chapter is organized as follows: In Section 2 discusses the theoretical foundations of the impact of board gender diversity on the firm risk and justify the hypothesis of a negative impact. Section 3 presents the proposed methodology of empirical validation. Finally, Section 4 discusses the results and conclusions as well as the managerial implications of this research.

2. Literature review and hypothesis development

The link between board gender diversity and firm risk may be apprehended from many theoretical lenses.

Agency theory highlights the divergence of interests between managers and shareholders. It argues that managers, because of their opportunism, can be driven

² Copé-Zimmermann law (2011) which imposes quotas for women on boards of directors and supervisory boards.

into practices of self-interest's maximizing to the detriment of those of shareholders [19]. This situation is often facilitated by weak internal control exercised by homogeneous boards of directors. Thus, due to overconfidence and weak control, male managers, are likely to be engaged in risky investments, discretionary spending, and excessive indebtedness. Moreover, several studies have shown that women's presence on boards of directors reinforces the monitoring mechanisms, makes it possible to resolve agency conflicts, and moderates risky decision-making. For example, Mirza et al. [20] have shown that, by playing their supervisory role in the board, women improve resource allocation and limit the problem of overinvestment problems. Jizi and Nehme [21] noted that female presence on boards makes it possible to mitigate firm risk by reducing stock return volatility. In recent research, Zhou [22] was able to demonstrate on a sample of 2825 Chinese companies and 21,420 firm-yearly observations that women managers will reduce firm risk distress by a quarter by going through better cash management. The author also emphasizes that the presence of women directors enjoys better access to bank loans with greater frequency to reduce insolvency risk.

According to gender socialization theory [23], women have distinct traits, values, and interests because of the personalities they develop during childhood. Women show more altruism and compassion and care more about others. Female managers are also more attached to ethical codes [24] and less tempted by corruption [25].

Regarding risk preferences, women would be more hostile to risk than men, especially in financial decisions. This could be explained by the fact that men are overconfident and rely on their personal experiences and their own risk assessments, leading them to make riskier decisions than women who are less self-confident and tend to dodge risky decisions [26].

Upper echelon theory [27] suggests that strategic choices are determined and influenced by the values and cognitive bases of the dominant actors in the organization. Thus, preferences and decisions are likely to be predicted by managerial background characteristics. According to [28], decisions made by directors are impacted by their psychological traits. Women on boards, known for their sensitivity to risk, would favor less risky policies. Under this perspective, Jeong and Harrison [29] argue that differences in business performance can be explained by the reduction in strategic risk-taking adopted by women. Li and Zeng [30] were able to highlight the importance of the female gender in the financial decision-making process and the stock return crash risk prevention. Likewise, Perryman et al. [31] found that companies with greater gender diversity in top management teams have lower market risk and offer better performance.

According to the social identity theory [15] a person's idea of their own identity is based on their membership in a group. Any behavior will change depending on the identity of the group to which a person belongs. The presence of women on boards of directors, who are less willing to take risks, may have an impact on decision-making processes.

Human capital theory [32] postulates that board diversity may produce benefits in terms of efficiency and control. Board members with heterogeneous skills, preferences, and backgrounds constitute a valuable, unique, inimitable, and hardly transferable resource. Human capital theory joins resource dependence theory [33] suggesting that directors bring benefits to the organization (information, networks, preferential resources, and legitimacy). According to Ferreira [34], gender diverse board has access to a larger pool of resources. It is, therefore, expected that board women presence would influence firm financial performance and firm risk levels. Mobilizing these theoretical approaches, Farag and Mallin [35] concluded that the vulnerability of banks to crises is likely to be reduced by a critical mass of female representation. De Cabo et al. [36] observed that low-risk European banks have

a higher proportion of women on boards of directors. Saeed et al. [37] found that board gender diversity is inversely related to business risk in emerging and developed countries. In contrast, Talavera et al. [38] could not find a significant association between found no significant association between women directors and firm risk. Yang et al. [39] found a negative effect of mandated female representation on firm performance and firm risk.

Based on the above theoretical and empirical literature, we assume the existence of significant negative impact women presence on board on the corporate Global risk. Hence, we formulate our main hypothesis as follows:

H: gender diversity on the board of directors has a negative effect on firm global risk.

3. Research methodology

3.1 Sample and data

For the purposes of this study, we used a sample of French companies belonging to the SBF 120 index over the period 2011–2018. The SBF 120 index includes the 120 most important companies in terms of market capitalization and trading volumes on the Euronext Paris market. This 10-year period analysis allowed us to constitute a large panel of observations enriching the results and the validity of the econometric tests. Financial institutions were excluded from the sample due to differences in their specific governance and accounting systems. The final panel consisted of 64 companies. Thus, the study covers 576 firm-year observations. Data about women’s presence on board were hand-collected from the reference documents and annual reports available on the firms’ websites. Financial and accounting data were obtained from the ThomsonOne database.

Table 1 presents the firm distribution by industry within the sample.

3.2 Variables description

In financial theory, two components are used to measure the risk of the company. On the one hand, market risk generally resulting from factors exogenous to the company such as fluctuations in supply and demand, interest rates, and input

Sector	Number	%
1. Oil and gas	5	7.8
2. Basic materials	3	4.6
3. Industrial	16	25
4. consumer goods	12	18.8
5. Health	7	10.9
6. Consumer services	12	18.8
7. Telecommunications	1	1.5
8. Utilities	3	4.7
9. Technology	5	7.8
Total	64	100

Table 1.
Distribution of companies by industry.

costs. On the other hand, the idiosyncratic risk is inherent in the company’s operations and its management expertise. The overall risk of an investment is commonly measured by the standard deviation of its return [40–42]. In accordance with previous research [43–45], we use the standard deviation of monthly stock returns over a one-year period as global risk proxy (RISK) formulated as follows.

$$\sigma R_{it} = \sqrt{\frac{\sum_{i=1}^n (R_{it} - \bar{R})^2}{n - 1}} \tag{1}$$

σR_{it} = standard deviation of company’s monthly stock return,
 R_{it} = company’s monthly stock return, \bar{R} = company’s average monthly stock return, n = Number of observation.

Thus, a higher standard deviation value reflects a higher risk.

The gender variable (GEND) was measured by the percentage of women on the board of directors (number of women on the board of directors/total number of directors). This measure, more and more used by similar researchers [5, 46, 47], makes it possible to go beyond the limits of binary measurements of women’s presence and their representativeness in the boards and to take into account board size.

In addition, we have deemed it useful to introduce control variables that are likely to have an effect on the relationship between women’s presence on boards of directors and firm risk.

First, the size of the board of directors (B-SIZE) was included as a control variable as a large board has more chance to contain female members. In addition, previous literature suggests that the size of boards of directors is a major determinant of its effectiveness and governance mechanism to protect company assets, to secure better allocation of resources, to limit managerial opportunism, and to prevent the risks of insolvency risk or dangers of risky investments. B-SIZE is measured by the number of directors on the board. Larger boards tend to be also associated with lower return volatility [48].

Second, R&D spending and innovation effort are considered as an indicator of risk-taking insofar as their impact often remains uncertain [7]. R&D intensity (RID), measured by the “R&D expenditures divided by total annual sales” ratio, was introduced into the model as a control variable. Third, we control the model by the

Variable	Abbreviation	Measurement
Firm global risk	RISK	Standard deviation of monthly stock return
Gender diversity	GEND	Percentage of women on board of directors
Board size	B-SIZ	Number of directors on the board.
Firm financial performance	FFP	Return On Assets ratio
Firm size	F-SIZ	Natural logarithm of total assets (in millions of Euros)
Leverage	LEV	Total debt to total assets ratio
R&D expenditure intensity	RDI	R&D expenditures divided by total annual sales
Gender diversity	GEND	Percentage of women on board of directors
Board size	B-SIZ	Number of directors on the board

Table 2.
Variables description.

leverage (LEV). Leverage is considered to be an indicator of solvency often associated directly with firm financial risk. According to Bodie et al. [49], leverage level allows welling assess the risk of financial distress and bankruptcy and provides information on the ability of the company to honor its financial commitments. Among others, Abobakr and Elgiziry [50] found that percentage of females to the total board to be significantly negatively correlated to ratio leverage. We define leverage as the “total debt to total assets” ratio. Forth, firm size (F-SIZ), measured by the natural logarithm of total assets (in millions of Euros), was introduced into our model as a control variable. In this regard, Bruna et al. [9], for example, have shown that risk aversion was negatively associated with firm size. Finally, since profitability level could imply greater risk-taking [51], we opted for controlling for profitability (FFP) calculated as the Return on Assets. For a detailed description of variables see **Table 2**.

3.3 Model

To test our hypotheses, we use panel data regression running the following model.

$$RISK_{it} = f(GEND_i^t, B-SIZ_i^t, FFP_i^t, F-SIZ_i^t, LEV_i^t, RID_i^t) \tag{2}$$

Model 1

$$RISK_{it} = \beta_0 + \beta_1 GEND_{it} + \beta_2 B-SIZ_{it} + \beta_3 FFP_{it} + \beta_4 F-SIZ_{it} + \beta_5 LEV_{it} + \beta_6 RID_{it} + \mu_i + e_{it} \tag{3}$$

In equation 3, the index t presents the year of the observation, while the index i refers to the company. The variable RISK is our dependent variable. GEND is the proportion of women on the board of directors. B-SIZ, FFP, F-SIZ, LEV, and RID are our controls as defined above. The β_j with $j \in \{0...6\}$ are the model parameters. μ is the time fixed effect and e is our idiosyncratic error term.

4. Results and discussion

4.1 Descriptive statistics

Table 3 reports the descriptive statistics for all variables. The data show that the average 10-year stock return volatility is 34.6%, with a minimum and a maximum of 1.3 and 90%, respectively. Nevertheless, RISK presents a significant dispersion with a high standard deviation, which is understandable given the diversity of the firms being studied. Regarding gender diversity, the proportion of women is 23.8% of the total number of directors. It should be noted that this average has increased considerably over time after the Copé-Zimmermann enacted the law in 2011. The average size of boards of directors is around 14, and the average return on assets of the companies in our sample is around 4%.

4.2 Multivariate analyzes

The correlations between all test variables are reported in **Table 4**. At this point, and without claiming to draw a definitive conclusion, we notice that GEND has a high negative correlation with the risk metric. This is consistent with our hypothesis

Variable	Obs.	Mean	Std. deviation	Max	Min
RISK	576	0.346	0.205	1.441	0.013
GEND	576	0.238	0.1152	0.609	0
B-SIZ	576	13.93	3.696	25	5
FFP	576	0.039	0.049	0.7751	-0.3374
F-SIZ	576	9379	1438	12,284	6463
LEV	576	0.372	0.2081	0.886	0.082
RDI	576	0.0451	0.1055	0.1815	0.001

Table 3.
Descriptive statistics.

	1	2	3	4	5	6	7	VIF
1. RISK	1							
2. GEND	-0.1315***	1						1.19
3. B-SIZ	-0.0542**	0.1654***	1					1.05
4. FFP	0.1101**	0.2211***	0.059	1				1.90
5. F-SIZ	-0.1151*	0.2650	0.4520***	0.0568	1			1.20
6. LEV	0.0412*	-0.0115	0.0684	0.2315***	-0.0050	1		1.05
7. RDI	0.0954**	0.1154**	-0.0019	0.1345**	-0.0642	-0.0290	1	1.85
							Mean VIF	1.37

*This table presents the correlations between all variables and the variance inflation factor (VIF). It shows that correlation between the explanatory variables as each of the variables used range from 1.05 to 1.90 along with mean VIF value below 10. *Significance at the 5% levels.
**Significance at the 1% levels.
***Significance at the 0.01% levels.*

Table 4.
Correlation matrix.

and is in line with the result of the current literature. GEND also has a strong correlation (p-value <0.0001) with both board size (0.1654) and financial performance (0.2211). This is reasonable as large boards are more likely to include the female gender. There is a significant correlation between risk and board size in our sample, which is consistent with previous researches [52]. Besides, we note a positive correlation at the 1% level of confidence between risk and ROA and a significantly positive association between risk and leverage ratio. Finally, there is a significant relationship between risk and R&D expenditures.

To test our hypothesis, we ran least squares regressions and then we had selected the appropriate estimation based on the different usage tests. Our estimation satisfies the assumptions of normality. Furthermore, we had ensured the independence between the error terms by the Durbin-Watson autocorrelation test and the absence of heteroscedasticity problems by the Breusch-Pagan test. Finally, the F-test allowed us to opt for the fixed-effect estimation, which allows overcoming unobserved heterogeneity issue over time.

According to **Table 5** results, the model's explanatory power is acceptable (R^2 within equal to 24.12%). The statistic of the Wald test (Wald Chi), presents a statistically significant p-value (Prob > Chi) at 1% level. The coefficient of the dependant variable (gender) is negative and significant (Coeff. = -0.903; t-stat = - 2.82)

Variable	Coefficient	t-statisc
Intercept	1.370***	23.6
GEND	−0.0903***	−2.82
B-SIZ	−0.0281**	2.29
FFP	0.0365	0.45
F-SIZ	−0.2017**	2.47
LEV	0.091 ^ˆ	2.46
RDI	0.0009***	5.49
observations	576	
R ²	24.12%	
R ² ajusted	18.55%	
Wald Chi2	20.33	
Prob>chi2	0.0034	

This table presents results from fixed effects regression of the risk measure on board gender diversity, over the period 2011–2018. A firm’s total risk (RISK) is the annualized standard deviation from the monthly stock returns over the past year. GEND is the percentage of women on the board of directors.

^ˆSignificance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

Table 5.
Multifactor regression results RISK as a dependant variable.

indicating that women board presence mitigates firm risk. This result supports our assumption; that is, to say that an increase in women representation on board decreases firm risk. It is also in line with the main arguments presented in our theoretical background. Women are less “adventurous” than men and are likely to have an innate aversion to risk. Then, this result joins those obtained in previous empirical research [5, 53]. However, these findings do not support those found by [9] who have found no evidence to support the assumption of a significant relationship between women on corporate boards and firm risk-taking on a sample of SBF 120 index listed companies. This can be explained by the fact that the authors carried out their investigation over the period 2006–2010 before the adoption of the Copé-Zimmermann law in 2011 or by the measurement of the risk retained.

Other than the GEND effect, we find a negative association between board size and firm global risk (under the 5% risk error). This is in line with the risk aversion hypothesis, which suggests that large boards tend to control leverage, as this will increase the volatility of equity returns [54]. Likewise, this can be explained by the fact that large boards can lead to slower decision-making processes and search for compromises inducing less risky behaviors. This result is in accordance with Nakano and Nguyen [52] who observed lower performance volatility and lower risk bankruptcy in companies with larger boards of directors. Another explanation could be found in the arguments put forward by Cheng [53] and Wang [54] suggesting that a high number of administrators would prevent boards from functioning properly, thus limiting performance variability. Bureaucracy and vulnerability to agency issues that characterize large boards may cause less performance volatility and higher risk.

The positive coefficient of the variable FFP confirms that risk has a positive effect on return on assets. However, this influence is not statistically significant. The proportion of women on the board of directors, therefore, has no impact on economic performance. This observation is inconsistent with the risk-based rationale

presented by Akbas et al. [55] according to which a greater risk is not associated with better expected profitability, nor with the results of Nartea et al. [56] who determined that risk has a positive effect on return.

In addition, we found a negative link between firm size and risk. This may be because large companies, which enjoy better governance and less information asymmetry, tend to control the volatility of stock returns [57]. This negative relationship was also found by Damanpour [58] who argues that large companies better control fluctuations in stock prices.

Also, **Table 5** indicates a coefficient on leverage variable of 0.091, significant at 5% level of confidence (t-statistics of 2.46). These results confirm the close link between stock return volatility the leverage suggesting that the volatility of returns represents a risk hindering the company's ability to go for debt financing [59].

Finally, R&D intensity has a coefficient of 0.0009 (t-statistic 5.49) significant at 1% level. This relationship most likely exists. One of the plausible explanations has been given by Mazzucato and Tancioni [60] suggesting that the volatility of stock returns is indeed linked to innovation since financial markets react to signals provided by companies about their future growth prospects through their R&D spending and innovation behavior.

5. Conclusion

The aim of this research was to examine the impact of gender diversity on firm risk. More specifically, we studied the relationship between board women presence and firm global risk measured by stock return volatility. To this end, we used a sample of French companies listed SBF 120 over the period 2011–2018. Using a panel data regression method, we were able to highlight a negative and statistically significant link between the percentage of women on boards of directors and firm risk. Our results suggest that better women representativeness on boards could lead to better financial performance through risk mitigation. This is in line with gender socialization theory suggesting that women would be more risk-averse as well as with the agency theory, which states that women would exercise better control and participate actively in conflict resolution. The potential explanations for this negative effect would lie not only in the crucial role played by women in boards in ensuring better risk oversight [7, 13], in the reduction of agency costs [61], but also in the risk aversion generally observed among women [62]. Our results help to enrich the debate on this issue. They are consistent with a current of the literature [26, 31, 63] but remain in contradiction with the results of other empirical research [9]. Thus, this should lead us to consider the role of contingent variables that may moderate/mediate this relationship, such as cultural differences, organizational visibility, or intersectorial differences. On the other hand, we should also recognize that reverse causation is likely to exist and deserves to be examined, which means that companies with lower risk might intentionally choose more female directors [36]. Thus, it is important to address the issue of endogeneity when studying the relationship between gender diversity on the board of directors and business risk.

Moreover, although our results suggest that women inclusion on boards is likely to strengthen corporate governance mechanisms, mitigate risks, and maximize value, it is important to note that such appointments should not be a reaction to normative pressures just to legitimize governance modes or to comply with rules deemed socially acceptable. Our results should therefore not be analyzed from an instrumentalist perspective, that is to say, from purely economic and financial angles, but rather based on notions of gender equity and justice as well as on fundamental legal principles. Hence, it is also strongly recommended that nomination

and governance committees in the boards of directors take steps to achieve men-women parity within boards. The laws of the various European countries appear to be evolving in this direction.

Our study has also several limitations. First, by focusing our investigation only on large companies, the results cannot be generalized. The extension of the sample to cover small- and medium-sized enterprises would make it possible to give more robustness to observed results. The second limit is related to the risk measurement: the variability of stock return may not capture all risks incurred by the company. Finally, an impact of the female presence may not be immediate: Considering a delay effect (by introducing lagged variables in the econometric model) would probably be interesting since the appointment of women may take time to observe its risk impact.

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