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Female on Boardroom, Risk-Taking and Firm Performance: Evidence from FTSE100

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This paper aims to examine the effect of board gender diversity on firm risk taking and firm financial performance. Based on a sample of 100 UK listed companies covering a 5-year period from 2010-2014, the authors use different econometric methods and find that greater female presence on company boards has a positive effect on firm financial performance and a negative effect on firm risk-taking. Our results are consistent with the perspectives of agency theory and resource dependence theory. This paper contributes to the literature on board diversity and offers empirical evidence of the women's role on boardroom.

JEL Codes: M12, M14, O16, G31, L25

1. Introduction

Research has largely shown over the years, that companies employing a diverse workforce in terms of gender, are more likely to innovate and surpass competition. A large number of countries have currently put mandatory quotas in place, to represent men and women in public enterprises boards. In 2010, only 12.5% of the directors and 5.5% of the executive directors were women in FTSE companies. This research axis has been subject to several empirical investigations, notably in developed countries such as the Adams and Ferreira (2009) study conducted in the United States, and also that of Rose (2007) in the case of Danish companies.

Several researchers have come to the same conclusion and argue that the gender diversity has a positive effect on the company's financial performance, and a negative effect, (Minguez-Vera & Campbell 2008). However, other studies have showed a negative impact between the gender diversity in the board of directors and the financial performance (Bohren & Strøm 2007), but there are still surveys that have not detected any link between these two variables. In addition, it is also mentioned that there are specific differences between men and women in their work styles. For example, men are more aggressive, visible and noticeable in their work, while women are more cautious. Women want to succeed, and endeavor to make the working environment more satisfactory to everyone within the company (Rigg & Sparrow 1994).

The present study complements the current literature by providing additional empirical evidence on gender diversity thru the explanation of the possible gender influence on risk-taking and financial performance. For so doing, the authors stated the following problem: What is the impact of the gender diversity on risk-taking and on the financial performance of

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"FTSE100" British companies. Our main objective is to examine the impact of gender diversity, the risk-taking and the financial performance of "FTSE100" British companies.

Based on a panel of 80 British companies from FTSE 100 over a period of time ranging from 2010 to 2014, the findings of this paper show that women in the boards of directors, and women entrepreneurs are more averse, and that their presence increases the British companies' financial performance.

This article is structured as follows: the literature review is exposed in Section 2. The sample and methodology are explained in Section 3. Section 4 presents the main empirical results. The article concludes in Section 5.

2. Literature Review and Hypothesis Development

2.1. Gender Diversity and Firm Financial Performance

Several theories assert that companies employing a diverse workforce in terms of gender are more likely to innovate and surpass competition. They also show that gender diversified organizations are more likely to improve their market share and report on new markets acquisition.

A rationale of the agency's theory for these conclusions would be as follows: Women often bring a new perspective on complex issues. This can help in formulating the strategy and solving the company problems (Westphal & Milton 2000).

The followers of the resource dependency theory continue to argue that the presence of women in key positions has beneficial effects on organizational outcomes. Carter et al., (2010) and Fang et al., (2012) presented the main benefits of women's presence on the board of directors and found out that a more diversified board had a positive effect on the company and its financial performance, due to the highest talents use especially women in key positions. The upper grade theory was introduced by Hambrick and Mason (1984) with the aim to explain how the senior leaders personality traits affect the organizations performance. The basic idea of a higher grade theory was to focus on senior managers characteristics rather than on top senior executives so as to better understand the impact of senior leadership characteristics on the organization's results.

This concept is shared by Goel and Thakor (2008) who asserts that senior managers' personality traits affect their management decisions. According to Hambrick and Mason (1984), the executives demographic profile has a significant impact on the organization's performance. The group's heterogeneity is reflected in the diversity of personal histories and leadership experiences at senior levels.

In the light of these theories, increasing attention has been focused in recent years on this issue and several surveys have been carried out in this view, in order to study gender diversity influence on the company's financial performance.

Hamid et al. (2011) use a sample of 34 Tunisian companies in their study, listed on the Tunis Stock Exchange during the 2000-2007 period. They found out that improving the performance of Tunisian companies can be attributed to their boards of directors diversity. Julizaerma and Zulkarnain (2012) examine a sample of 954 companies listed on the

Malaysia Stock exchange for the years 2008 and 2009. Their study indicates that women managers can improve business performance.

Liu et al. (2013) find that out of a sample of over 2,000 companies listed in China over the 1999-2011 period, the percentage of women has a significantly positive impact on the profitability of the assets (ROA) and a significantly positive impact on the profitability of equity (ROE).

Amore et al. (2014) use a panel of family businesses from Italy over the 2000-2010 period, and they find out that female managers significantly improve the business profitability, by using a large panel of U.S. commercial banks from 2007 to 2010. However, Shrader et al. (1997) report a negative relationship between the percentage of women members of the board of directors and the financial performance of the company.

Levi et al. (2013) show that the presence of female directors in a board of directors is negatively associated with the acquisition of their businesses, women appear to be less motivated in raising an "Empire". In addition, the authors show that the representation of women managers in a council is negatively and significantly associated with the size of the offer premium. Women seem to be less likely to destroy value for shareholders. They conclude that these specific favorable effects of having women CEOs in boards of directors are compatible with women being less presumptuous than men.

Zahra and Stanton (1998) examined the relationship between gender diversity and financial performance. They surveyed 100 companies and used the return on equity (ROE), profit, earnings per share, dividend per share and profit margin on sales as performance measurement variables. Zahra and Stanton did not find a statistically significant relationship between gender diversity and financial performance.

Lam et al. (2013) base their survey over a 9-year period from 2000 to 2008, and reveal a mixed therefore inconclusive association between the CEO’s gender diversity and the company's financial performance. Hence results suggest that there is no clear link between the aforementioned variables.

Rhode and Packel (2014) also argue that the increase in diversity should be a social priority, but not for the often mentioned reasons. After exploring the strengths and limits of the various methodological approaches and the survey conclusions, they conclude that the relationship between diversity and financial performance has not been convincingly established. This research presents a theoretical and empirical basis according to which, where diversity is well managed, it can improve the decision-making and the public image of a company by transmitting commitments to equal opportunities and inclusion.

2.2. Gender Diversity and Risk Taking

The relationship between gender diversity and risk-taking is rooted in several theories which stipulate that women are more likely to be averse to risk than men. According to a biological and socio-psychological perspective, the differences between men and women in their investment behaviour can be explained by biological and social reasons.

Theories based on biological reasons assume that the Zuckerman Hormones (1991) and The Hamilton Genes (1964) are the fundamental basis for these gender differences in

financial risk taking. On the other hand, social and psychological theories that rely on social reasons, mainly identify socialization by gender as a reason for the behavior differences observed between men and women (Doyle & Paludi 1998). Risk-taking is perceived as a male attribute (Wilson & Daly 1985).

In addition, Bruce and Johnson (1994), and Johnson and Powell (1994) argue that women are more likely to be averse to risk than men, especially in probability lotteries. They are also more hostile to competition than men in wealth allocation. These results are due to three factors. Emotion: The woman is more sensitive to emotions than man. The excess of confidence: men are much more confident than women in their investment decisions. The interpretation of risky situations: women are more anxious and apprehend negative predictions of negative results more than men. Women are generally emotional, soft, intangible, helpful, demanding, less confident than men to make investments (Barber & Odean 2001).

However, Eagly and Carlie (2003) argue that men are more competitive and aggressive in their behavior. The higher the percentage of men in the board of directors, the more important is the risk-taking within the company. According to the agency theory, a diversified board of directors will play an even more important role in solving the agency problem. Indeed, as of the risk taking on the board of directors because of the variety of individual attributes specific to men and women, Arfken et al. (2004) finds that the diversity of the board of directors in terms of gender, ethnic or cultural origins may be more creative, in the sense that dissimilar individuals may ask questions or provide solutions that are not advocated by internal managers with similar backgrounds or experiences.

The followers of the resource dependency theory continue to argue that the presence of women in top management positions has beneficial effects on organizational outcomes due to the highest use of women's talents in particular. Such positions would require increased liability and inevitable risk-taking. Women are therefore called to take risks while carrying out their duties (Burke & Davidson 1994).

The systematic difference between men and women in their response to risk is an important economic issue. If women are more sensitive to risk than men, this will be reflected in all aspects of their decision-making, including the choice of the profession and also the earnings and investment decisions. Plentiful literature examining the relationship between gender diversity and risk-taking suggests different outcomes.

Berger et al. (2014). The portfolio risk improvement is the result of the presence of a young executives team, and women executives in high proportion within the board of directors. It should be noted, however, that the effect of the presence of women is lower in terms of statistical and econometric meaning, using "difference-in-difference" estimates of the entire population of senior German bank executives over a 1994 to 2010 period.

Adams and Funk (2012) use a large administrative survey of companies listed on the Swedish Stock Exchange in 2005 to show that women and men managers systematically differ in their fundamental values and attitudes towards risk. They conclude that female CEOs are actually more prone to the risk than male CEOs.

However, some authors have shown that the gender diversity in the board of directors, more specifically the increase in the proportion of women in the council, leads to a decrease in risk-taking where it is confirmed that women are averse to risk.

Wanzenried (2006) suggests that women prefer to work in smaller businesses which are less profitable, fast-growing and less risky. Using a sample of American industrial companies from 1992 to 2003, this survey brought out the idea that women executives earn 14% less than their male counterparts.

Martin et al. (2009) find changes in risk-taking after each CEO appointment. The trend towards risk-taking is significantly lower among women CEOs, supporting the idea that the market perceives CEOs women as relatively averse to risk. In addition, they suggest consistent evidence with their hypothesis that companies with relatively high risk are more likely to appoint women CEOs, so that the risk can decrease, using one at a time a sample of 70 announcements of women CEOs' appointments from 1992 to 2007, and a sample of 70 announcements of men CEOs appointments.

Gulamhussen and Fonte (2015) assess the women's role in the banks boards of directors with a sample of 461 major banks in OECD countries. They also find a negative relationship between the presence of women in the boards of directors and risk-taking measures. This relationship is valid for the supervisory board, and with some exceptions for the audit committee. For a sub-sample of 134 listed banks, the authors find that the markets have a positive perception of women's participation in the Board of directors, the supervisory board and the audit Committee. This perception was measured by Tobin's Q.

Using a panel of American companies during the 1992 to 2004 period, Khan and Vieito João (2013) suggest that when the CEO is a woman, the business risk level is lower than having a man for CEO. Truong and Wu (2014) suggest that women executives increase the bank's performance measured both by Tobin's Q and ROA, after checking the bank's specific features. In addition, they provided evidence that women executives are reducing the banks risk by increasing the Z-score and declining the rate of non-performing assets at using a sample of U.S. banks from 2002 to 2010.

However, there are surveys that have not detected any significant relationship between diversity and risk-taking. Namely, Loukil and Yousfi (2015) using a sample of Tunisian companies over 1997-2010, suggested that the more women are in the board, the more cash is held by the company. However, they do not detect any significant relationship between the gender diversity and risk-taking except for the cash held.

Vathunyoo et al. (2016) used a sample of American companies over the 1996 to 2012 period and found out a negative relationship between gender diversity in the board of directors and equity risks, namely systematic and idiosyncratic risks. However, when the authors use increasingly sophisticated identification strategies to study the variation within the company (LEAST SQUARES with fixed and dynamic effects, GMM Group), the negative relationship between gender diversity and equity risks disappears. The authors then suggest that there is no strong causality evidence between gender diversity and equity risks.

2.3. Hypothesis Development

According to theoretical underpinning and empirical studies discussed above, the authors state the following:

H1: Firm financial performance is positively related to the percentage of women on boardroom (i.e. the greater the number of women on board, the higher the firm financial performance)
H2: Firm risk is negatively related to the percentage of women on boardroom (i.e the greater the number of women on board, the lesser the firm risk taking)

3. Research Design

3.1. Data and Sample Selection

In this article, the authors suggest to look for the gender diversity impact on risk-taking and financial performance. To do so, a survey is applied on 100 largest companies in the FTSE ranking in the UK for the 2010 to 2014 period. The choice of the context as well as that of the period is based on a British law which states that ***"the search for candidates for the board of directors should be carried out," and the choice should be made on the basis of merit, based on objective criteria and taking into account the diversity benefits within the council, including gender".*** The United Kingdom has therefore set up this strict law to encourage companies to improve the recruitment and planning process, and to ensure a better channeling of women's talents. It may also be noted that the United Kingdom has been aiming to reach 25% of women's proportions in boards of administrations in 2015.

Regressions are performed using the Stata software. It should be noted that during the data collection phase some companies are eliminated from analysis because of unavailability and data discontinuity. All the variables of the study were winsorsorized at the top and the bottom of 1% level to eliminate the effect of outliers. Thus, the final sample consists of only 99 companies observed for the period between 2010 and 2014 period, providing a panel of 495 remarks.

3.2. Variables

3.2.1. Dependent Variables

RISK : It is a total risk and can be considered as a combined risk of all factors that could influence a business, and is measured by taking the standard deviation of performance from monthly business actions. It is a standard proxy for risk in the financial economy literature. This variable captures the risk level of investment decisions. Following It has Laeven and Levine (2008), Khana and Vieitob João (2013), Peltomäki et al. (2018), Loukil and Yousfi (2015) and Vathunyoo et al. (2016) the authors use natural logarithm of the ROA standard deviation to measure the level of firm's risk taking.

PERF : It is the financial performance that can be measured by the return on assets (ROA) that corresponds to the net income before extraordinary items and discontinued activities, divided by the total assets (Lam al., 2013; Levi et al., 2013; Julizaerma and Zulkarnain, 2012; & Amore et al., 2014), or the return on equity (ROE) defined as "operating profits" divided by "total equity".

3.2.2. Explanatory and Control Variables

Our key explanatory variable is gender diversity. Based on prior literature on board gender diversity, the percentage of women in boardroom (%FEMALE) as a proxy for gender diversity is employed. This proxy is computed as the ratio between the number of women in board and the total number of members in the board of directors.

The following governance and firm's characteristic are used as a set of control variables. DUAL which is a Dummy variable that takes a value of one if the chairperson is also the CEO, and zero otherwise. SBOARD is Number of members in the board of directors. The natural logarithm of board size (LN(board size)) is used in the present study. NDIRECT computed as the natural logarithm of the number of directors in board. FORENEXE is the natural logarithm of the number of foreign executors on board of directors. TENURE is the natural logarithm of the number of years of experience in the CEO office of a given company. SIZE represents the firm's size computed as the natural logarithm of total assets. AGE is the firm's age obtained as the natural logarithm of 1 plus firm age. GROWTH is sales growth calculated as the annual rate of growth of sales. MTB is Market-to-Book ratio computed as the ratio of market value of equity to book value of equity. LEV is the ratio of the company's total debt to its total assets. YEAR is a Year dummy variable for each year from 2010 to 2014. Table 1 summarizes the list of the variables and their definitions.

3.3 Econometric Models and Statistical Analysis

In order to test empirically the two main hypotheses, H1 and H2 and following empirical literature the following econometric models is used:

$$ROA_{i,t} = \beta_0 + \beta_1 \%FEMALE_{i,t} + \beta_2 RISK_{i,t} + \beta_3 DUAL_{i,t} + \beta_4 NDIRECT_{i,t} + \beta_5 FORNEXE_{i,t} + \beta_6 BSIZE_{i,t} + \beta_7 TENURE_{i,t} + \beta_8 ln(TA)_{i,t} + \beta_9 GROWTH_{i,t} + \beta_{10} AGE_{i,t} + \beta_{11} LEV_{i,t} + \beta_{12} MTB_{i,t} + Year_{dum_t} + \varepsilon_{i,t} \quad (1)$$

$$RISK_{i,t} = \alpha_0 + \alpha_1 \%FEMALE_{i,t} + \alpha_2 ROA_{i,t} + \alpha_3 DUAL_{i,t} + \alpha_4 NDIRECT_{i,t} + \alpha_5 BSIZE_{i,t} + \alpha_6 TENURE_{i,t} + \alpha_7 ln(TA)_{i,t} + \alpha_8 GROWTH_{i,t} + \alpha_9 AGE_{i,t} + \alpha_{10} LEV_{i,t} + \alpha_{11} MTB_{i,t} + Year_{dum_t} + \varepsilon_{i,t} \quad (2)$$

Where subscripts i denotes individual firm in FTSE100 and t time period (t=2010, 2011, 2012, 2013, 2014). β_j (j=0,1,….,12) et α_j (j=0,1,…,11) are the parameters to be estimated. ε is the error terms supposed independent and identical distributed (i.i.d). The definition of the variables of interest used in the regression equations (1) and (2) is as reported in section 3.2.

Table 1. Variables definitions

Variables	Definition
ROA	Return on assets, ratio of operating income to net assets
RISK	Firm risk computed as the standard deviation of daily stock returr
%FEMALE	The percentage of female on board
DUAL	Dummy variable that takes a value of one if the chairperson is a the CEO, and zero otherwise.
SBOARD	Number of members in the board of directors. The natural logarit of board size (LN(board size)) is used in the present study.
NDIRECT	The natural logarithm of the number of directors in board
FORENEXE	The natural logarithm of the number of foreign executors on boarc directors.
TENURE	The natural logarithm of the number of years of experience in t CEO office of a given company.
SIZE	Firm size computed as the natural logarithm of the book value of tc assets
AGE	Firm age obtained as the natural logarithm of 1 plus firm age
GROWTH	Sales Growth is calculated as the annual rate of growth of sales
MTB	Market-to-Book ratio computed as the ratio of market value of equ to book value of equity
LEV	The ratio of the company's total debt to its total assets.
Year	Year dummy variables for each year from 2010 to 2014.

The estimation of equations (1) and (2) are mainly based on pooled ordinary least squares regression (pooled OLS). In addition to the OLS method, alternative statistical approaches are utilized to approve the robustness of our results. The first statistical technique is the fixed/random effects panel model (FE/RE). Unlike the OLS regression, panel models allow the introduction of unobserved firm individual-effect (Wooldridge, 2002). The unobserved firm individual-effect can be fixed or random.

A Hausman test is employed to choose between Fixed-effects and Random-effects model. According to the results (not reported here), the p-value of the test is less the conventional level of 1%. Hence, the null hypothesis of the Hausman test is rejected which implies that the Fixed-effects model is privileged to the Random-effects model. Therefore a second technique is used in this study based on the Fixed-effects model. However, when error terms are serially correlated or vary across individual firm (heteroskedasticity), the FE model produce inconsistent estimators. To overcome potential problems of first-order auto-regressive disturbances and/or heteroskedasticity of error terms $\varepsilon_{i,t}$, and following Baltagi and Wu (1999) methodology, the generalized least square (GLS) random effect regression is also used. Whereas, if error terms $\varepsilon_{i,t}$ are homoskedastic and/or not serially correlated, the FE model is more efficient.

3.4 Descriptive Statistics and Correlation Analysis

Table 2 shows the descriptive statistics for key variables used in the present study: the dependent variables (ROA and RISK), independent variable (%FEMALE) and control variables (SBOARD, NDIRECTOR, FORENEXE, DUAL, TENURE, LN(TA), AGE, GROWTH, LEV and MTB). The board structure variables in Table 2 show that the mean

(median) SBOARD is 11.06 (11) with a minimum of 5 and a maximum of 21. The mean (median) of the number of directors on board is 11.13 (11) and the mean (median) number of foreign executors is 2.795 (2). The CEO tenure variable shows a mean (median) of 4.566 (4.2) years. Turning to the descriptive statistics of firm characteristics, the mean (median) of firm size is 16.72 (16.37) with a minimum of 8.409 and a maximum of 22.33. The age of firms ranges from 1 year to 126 years with a mean (median) of 32.16 (18) years. Concerning the market-to-Book and the leverage ratios, Table 2 shows a mean of 3.517 and 7.353, respectively.

The mean (median) percentage of female on board is around 0.222% (0%) with a minimum of 0% and a maximum of 18.2%. In addition, by analyzing the 1st quartile, the median and the 3rd quartile, it can be seen that the distribution of the number of female on board shows a significant dispersion among the sample of firms. Indeed, the top 25% of firm contains most of women. Furthermore, the result shows that the most companies in FTSE100 are not in line with the target percentage of 25% of women in board. However, the mean percentage of female board representation for UK companies is in line with many European countries such as Germany and France.

Regarding the key dependent variables, the mean (median) of ROA ratio is about 5.9% (5.5%) with a standard deviation of 4.3%, a minimum of -1.4% and a maximum of 27.4%. According to this result, the majority of firms introduced in the study exhibit the same level of performance. Concerning risk measure, Table 2 reports a mean (median) value of 1.676 (1.462) with a minimum of 0.113 and a maximum of 7.964.

Table 2. Descriptive statistics

Variables	Mean	SD	Min	Q1	Median	Q3	Max	Skew.	Kurt.
ROA	0.06	0.04	-0.01	0.03	0.06	0.09	0.270	0.85	4.71
RISK	1.68	0.75	0.11	1.20	1.46	1.95	7.960	2.95	2.60
%FEMALE	0.22	1.04	0.00	0.09	0.17	0.22	18.200	1.14	2.80
DUAL	0.01	0.08	0.00	0.00	0.00	0.00	1.000	1.19	1.50
FORNEXE	2.80	2.65	0.00	1.00	2.00	4.00	15.000	1.22	4.40
NDIRECT	11.13	2.57	6.00	9.00	11.00	13.00	20.00	0.67	3.38
TENURE	4.57	3.17	0.1.00	2.00	4.20	6.20	15.50	0.91	3.73
GROWTH	0.06	0.09	-0.29	0.01	0.05	0.10	0.370	0.23	4.84
BSIZE	11.06	2.63	5.00	9.00	11.00	13.00	21.00	0.52	3.84
AGE	32.16	33.01	1.00	11.00	18.00	42.00	126.00	1.63	4.55
SIZE	16.72	2.06	8.41	15.48	16.37	17.71	22.33	0.01	4.43
MTB	3.52	3.86	0.00	1.29	2.40	4.11	33.78	3.81	23.85
LEV	7.35	12.36	0.78	1.99	2.92	5.68	92.89	3.81	19.74

This table presents the descriptive statistics of variables of interest by showing mean, standard deviation (SD), minimum (Min.), first quartile (1st Quartile), median (Median), third quartile (3rd Quartile), skewness (Skew.), and kurtosis (Kurt.). See Table 1 for the definitions of variables of interest

As an elementary check for the presence of multicollinearity among independent variables Table 3 reports the Pearson's pair-wise correlation matrix among the key explanatory variables used in the regression analysis. The rule of thumb is that a correlation equal or greater than 0.8 in absolute value may indicate a multicollinearity problem. Table 3 shows that the highest significant value of correlation is 0.717 (in bold) between the board size and the number of directors in boardroom. This value may be an indicator of multicollinearity issue, however, the average variance inflation factor (AVIF) is around 1.49 and the maximum VIF is 2.45 and 2.05 (with NDIRECTOR and BSIZE) indicate multicollinearity

among these two variables should not be a concern. Regarding the rest of correlation, no value has an absolute that exceed 0.8.

4. Results

4.1. Gender Diversity and Firm Financial Performance

Table 4 presents the results of OLS, Fixed-effects (FE) and generalized least squares (GLS) random effects regression analyses to examine the relationship between gender diversity in boardroom as measured by the percentage of female on board representation and the firm performance as measured by the ROA ratio. The first multivariate regression results, using OLS technique for pooled data, are given in the first column of Table 4. The result shows that the percentage of female in boardroom (%FEMALE) is positive (0.0039) and significant at the 1% level (*p=0.000*), which provide a strong support of the first hypothesis. The coefficient of 0.0039 means that if the percentage of female presentation in board increases by one percent, the firm performance will increase on average by 0.39%, assuming all other factors remain unchanged. This finding is consistent with those reported by prior works including Robinson and Dechant (1997), M'hamid et al. (2011), Liu et al. (2013), Khan and João (2013)

As the OLS estimator cannot control for unobserved characteristics of firms and hence for omitted variable bias, equation (1) is re-estimated using the Fixed-effects panel model. The estimation results of using such technique are reported on column 2 of Table 4. As shown, the coefficient on %FEMALE variable remain positive (0.0027, *p=0.000*) and significant at 1% level even after controlling for unobserved heterogeneity. The result of the FE estimation may be inconsistent when error terms are serially correlated and/or heteroskedastics. For that, the generalized least squares (GLS) random effect (RE) model is employed to control for first-order autoregressive (AR(1)) disturbances of error termes (if any) within unbalanced-panels and cross-sectional correlation and/or heteroskedasticity across panels. The results of the GLS (RE) estimation are reported in column 3 of Table 4.

Table 3. Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12
1 :ROA	1.000											
2: RISK	-0.123**	1.000										
	(0.032)	--										
3:%FEMALE	0.052	-0.069	1.000									
	(0.369)	*(0.232)*	--									
4: DUAL	0.094	0.069	-0.008	1.000								
	(0.103)	*(0.229)*	*(0.896)*	--								
5: FORENEX	0.094	-0.121**	-0.014	0.083	1.000							
	(0.103)	*(0.035)*	*(0.814)*	*(0.148)*	--							
6: NDIRECT	-0.205***	-0.135**	-0.013	0.031	0.411***	1.000						
	(0.000)	*(0.019)*	*(0.821)*	*(0.587)*	*(0.000)*	--						
7: TENURE	0.123**	-0.135**	-0.072	0.067	0.223***	0.040	1.000					
	(0.033)	*(0.019)*	*(0.212)*	*(0.247)*	*(0.000)*	*(0.489)*	--					
8: GROWTH	0.173***	0.104*	-0.150***	-0.040	-0.076	-0.004	0.009	1.000				
	(0.003)	*(0.072)*	*(0.009)*	*(0.484)*	*(0.186)*	*(0.949)*	*(0.874)*	--				
9: SBIRD	-0.149***	-0.080	0.003	0.045	0.299***	0.717***	-0.031	-0.067	1.000			
	(0.009)	*(0.165)*	*(0.960)*	*(0.439)*	*(0.000)*	*(0.000)*	*(0.590)*	*(0.244)*	--			
10: AGE	-0.102	0.007	0.014	-0.111	-0.136**	-0.130**	-0.083	-0.056	-0.090	1.000		
	(0.075)	*(0.907)*	*(0.812)*	*(0.053)*	*(0.018)*	*(0.023)*	*(0.149)*	*(0.333)*	*(0.119)*	--		
11: SIZE	-0.448***	-0.042	-0.017	-0.119**	0.139**	0.358***	-0.014	-0.124**	0.305***	0.139**	1.000	
	(0.000)	*(0.471)*	*(0.771)*	*(0.038)*	*(0.015)*	*(0.000)*	*(0.814)*	*(0.031)*	*(0.000)*	*(0.015)*	--	
12: MTB	0.724***	-0.123**	-0.030	0.042	0.078	-0.012	0.073	0.061	-0.043	-0.139**	-0.283***	1.000
	(0.000)	*(0.032)*	*(0.599)*	*(0.471)*	*(0.176)*	*(0.836)*	*(0.207)*	*(0.288)*	*(0.456)*	*(0.016)*	*(0.000)*	--
13: LEV	-0.429***	0.110*	-0.025	-0.025	-0.079	0.172**	-0.053	0.099*	0.107*	0.070	0.343***	-0.109
	(0.000)	*(0.055)*	*(0.667)*	*(0.661)*	*(0.170)*	*(0.003)*	*(0.356)*	*(0.087)*	*(0.063)*	*(0.225)*	*(0.000)*	*(0.057)*

The table shows Pearson pairs-wise correlation matrix. ***, ** and * indicate significance at 1%, 5% and 10% levels, respectively. See Table 1 for variable definitions.

A positive and significant relation between the percentage of female in board and firm performance is found again. Indeed, the coefficient of %FEMALE variable is positive 0.0036 and significant at 5% level.

All in all, the results on the relationship between gender diversity and firm performance indicates a positive association and it is robust to the change of statistical method which gives a strong support of the first hypothesis H1.

With regard to the control variables, some interesting results are found. For example in all models in Table 4, the RISK variable is found to have a negative and significant effect (except for the FE model) on firm performance. In addition, A negative relationship is reported between firm performance and the number of directors. This result implies that the greater the number of directors in the boardroom, the lower the firm performance.

Another interesting result is that the board size has a positive and significant effect on firm performance for all models in Table 4. Regarding firm's characteristics, the LN(TA) and the leverage (LEV) are found to have a negative effect on firm performance. This result coincides with prior studies which conclude that the greater the firm size and firm leverage, the lower the firm performance. Furthermore, the authors report a positive and significant effect of the Market-to-Book ratio (MTB) and sales growth (GROWTH) on firm performance (ROA).

4.3 Gender Diversity and Firm Risk-Taking

The second main result of this study is the effect of gender diversity in board on firm risk-taking. The results using OLS, FE and GLS estimations of equation 2 are reported in Table 5. The authors find empirical evidence in support of the point of view that the female presence in board reduce risk-taking. Indeed, for all models, A negative and significant coefficient of %FEMALE variable is reported, which implies that the greater the number of women in board, the lesser the risk taking. This result is in line with prior studies including Khan and Vieito João (2013), Gulamhussen and Fonte (2015), Martin et al. (2009) and Wanzenried (2006) . In conclusion, this result supports the second hypothesis H2 which states that the presence of women in board reduces risk-taking.

Table 4: The effect of gender diversity in board on firm performance

	Dependent Variable: ROA		
	(1)	(2)	(3)
Explanatory variables	Pooled OLS	Fixed Effect	GLS random effect
Intercept	0.1332***	0.0272	0.1146***
	(7.45)	*(0.64)*	*(8.18)*
%FEMALE	**0.0039*** **	**0.0027*** **	**0.0036** **
	(13.39)	***(10.52)***	***(2.43)***
RISK	-0.0037**	-0.0030	-0.0041**
	(-2.43)	*(-0.73)*	*(-2.38)*
DUAL	0.0248	0.0119**	0.0088
	(1.76)	*(2.38)*	*(0.79)*
NDIRECT	-0.0426***	-0.0073	-0.0308***
	(-4.59)	*(-0.55)*	*(-5.00)*
INDIRECT	0.0019***	-0.0004	0.0002
	(3.56)	*(-0.61)*	*(0.49)*
BSIZE	0.0157*	0.0255***	0.0115**
	(1.88)	*(2.67)*	*(2.38)*
TENURE	0.0014	0.0023*	0.0015
	(1.00)	*(1.97)*	*(1.59)*
LN(TA)	-0.0022***	-0.0008	-0.0016***
	(-3.16)	*(-0.83)*	*(-3.01)*
GROWTH	0.0755***	0.0555***	0.0522***
	(4.95)	*(2.68)*	*(5.58)*
AGE	0.0016	-0.0027	0.0006
	(1.01)	*(-1.03)*	*(0.55)*
LEV	-0.0010***	-0.0021**	-0.0012***
	(-7.51)	*(-2.15)*	*(-12.61)*
MTB	0.0072***	0.0076***	0.0075***
	(18.59)	*(5.29)*	*(23.88)*
Year dummies	Included	Included	Included
R^2(%)	73.45	22.57	---
Fisher/Wald Chi-sq (16) test	68.66***	3.59***	1424.35***
p-value	*(0.000)*	*(0.000)*	*(0.000)*

***, ** and * indicate significance at 1%, 5% and 10% levels, respectively. See Table 1 variable definitions

Table 5: The effect of gender diversity in board on firm risk taking

	Dependent Variable: RISK		
	(1)	(2)	(4)
Explanatory variables	Pooled OLS	Fixed Effect	GLS random effect
Intercept	2.4753***	1.9338***	1.9129***
	(10.25)	*(3.99)*	*(4.49)*
%FEMALE	**-0.0148*** **	**-0.0056***	**-0.0072***
	(-3.82)	***(-1.79)***	***(-1.80)***
BSIZE	0.0640	0.0150	-0.0400
	(0.59)	*(0.20)*	*(-0.84)*
TENURE	-0.0491**	-0.0379**	-0.0402***
	(-2.39)	*(-2.11)*	*(-5.01)*
NDIRECT	-0.0337	-0.1069	-0.1143
	(-0.27)	*(-0.78)*	*(-1.57)*
DUAL	0.5528**	0.5173***	0.4717***
	(2.16)	*(12.08)*	*(6.86)*
GROWTH	0.6827***	0.2614	0.2322**
	(3.01)	*(1.54)*	*(2.11)*
ROA	0.0009	0.2255	0.1689
	(0.00)	*(0.32)*	*(0.65)*
LN(TA)	-0.0462***	-0.0056	0.0122**
	(-4.11)	*(-0.29)*	*(2.13)*
AGE	-0.0350	0.0358	0.0399***
	(-1.54)	*(0.95)*	*(3.20)*
MTB	-0.0026	0.0125***	0.0116***
	(-0.60)	*(7.32)*	*(9.34)*
LEV	0.0039***	0.0035	0.0027
	(3.46)	*(0.71)*	*(0.75)*
Year dummies	Included	Included	Included
R^2(%)	28.15	55.04	
Fisher/Wald Chi-sq test	13.81***	107.86***	12125.44***
p-value	*(0.000)*	*(0.000)*	*(0.000)*

***, ** and * indicate significance at 1%, 5% and 10% levels, respectively. See Table 1 for variable definitions.

5. Conclusion

The aim of this paper is to shed more lights on the effect of women on boards on firm's risk taking and performance. The study was based on a sample of companies listed in FTSE 100. Using different regression approaches to test the relationship between gender diversity and firm's performance and risk taking, the authors find that the percentage of women in boardroom affects positively and significantly the firm's performance. However, a negative and statistically significant impact was found of gender diversity on firm's risk taking. All in all, the results confirm the two main hypotheses H1 and H2. This contributes to the body of literature that examines the impact of women in the boardroom by providing further evidence that gender-based differences in the governance of firms have important implications regarding corporate performance, the management of risk, and the value of the firm. Nevertheless, there are some limitations that can be improved on this study for future research. First, the use of return-on-assets (ROA) and the volatility of returns as the only measures of financial performance and

firm's risk, respectively, have its own limitations. The results may not hold for other measures or indicators of profitability and risk. Second, the used sample excludes financial institutions which might lead to different result. Third, this paper focuses on UK firms and it would be interesting to examine other firms pertaining to other European countries, knowing that such countries have undertaken reforms to increase the representativeness of women in the boardroom. Fourth, the paper did not deal with the issue of the endogeneity aspect of gender diversity.

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