

THE EFFECT OF GENDER BOARD DIVERSITY ACROSS MARKET QUOTATION ON FIRM PERFORMANCE: EVIDENCE FROM THE UK

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Abstract

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This paper examines the impact of gender board diversity on firm performance for companies registered on the London Stock Exchange (LSE). The data has been collected from a unique set of 644 financial companies in the Main (MAIN) market and Alternative Investment Market (AIM) for the period 1999–2016. The firm performance has been measured using return on equity (ROE) and Tobin's Q. The main independent variable is the female board diversity, which was distinguished into executive and non-executive females. In the MAIN market, the executive female directors negatively affect the firm's financial performance; however, the non-executive female directors positively impact the firm's financial performance. Furthermore, the positive effect of non-executive female directors in the bad market is higher than in the good market. Whereas the negative effect of the executive female directors in the bad market is lower than in the good market. To the best of our knowledge, this paper contributes to the corporate governance literature in two folds. First, this paper explores the effect of executive and non-executive female directors on the board on the firm performance. Second, the paper also scrutinizes such associations in two different regimes of the financial market.

Keywords: Gender Board Diversity, Corporate Governance, Firm Performance, Executive and Non-Executive Female Directors

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1. INTRODUCTION

Recently, female representation on board has grasped more attention than before (Adams & Ferreira, 2009; Post & Byron, 2015). The reason for

this could be the increasing force of legislation and regulations that compel organizations to increase female board representation (Chapple & Humphrey, 2014; Duppatti et al., 2020). Furthermore, some countries adopted the gender quota law on board

such as Norway, Spain, Italy, Germany, France, and Belgium; while some other countries have applied a soft-law principle such as the UK, Australia, and Canada (Kumar & Zattoni, 2016; Li & Chen, 2018). Moreover, in the UK, Lord Davies Review Annual Report in 2015 supported the representation of females on board, which reached 26.1% in 2015 which is double compared to the situation in 2011 (Davies, 2015).

Many factors contribute to the necessity for enhancing the number of females on board. First, females are more risk averse, which increases the possibility that females may lead in a different way than males do (Jizi & Nehme, 2017; Papangkorn et al., 2019; Srinidhi et al., 2011). Secondly, the cognitive differences between females and men lead to disparities in females' life experiences, networks, management styles, and knowledge (Hillman et al., 2002; Post & Byron, 2015). Thirdly, females on board are more likely to be creative, social justice oriented, and cooperative, which affects the decision-making process resulting in more fair and reasonable decisions (Hillman, 2015; Kumar & Zattoni, 2016).

The debate on whether the females on board affect the firm financial performance is still ambiguous, with which empirical findings are contradicting. Some scholars provide evidence of a positive relationship between gender diversity and firm performance (Kim & Starks, 2016), while others may argue that there is a negative impact (Adams & Ferreira, 2009); or even no association (Carter et al., 2010; Dobbin & Jung, 2011; Wang & Clift, 2009).

In this study, the data has been collected from the London Stock Exchange (LSE) that incorporates both residential and global companies that are recorded among two diversely direct markets; the Main (MAIN) market and the Alternative Investment Market (AIM) (Neal, 2006). The data has been collected from 644 companies in the MAIN market and 1,528 companies in the AIM covering the period from 1999 to 2016. The total sample of the non-financial companies is 39,150 firm-year observations.

To the best of our knowledge, this paper contributes to the corporate governance literature in various ways. First, this paper explores the effect of the board executive and non-executive female directors on firm performance in both MAIN market and AIM in the UK. Second, the firm performance has been measured using book value and market value performance for the two markets: MAIN and AIM. Third, the paper also examines the state of the market on stocks using unexpected returns. Furthermore, we estimated the model parameters when the stock market closes with high market returns or vice versa. This has been fulfilled by exploring the effect of executive and non-executive female directors on firm performance using the two states of the market: bad and good. Fourth, this study addresses the research gap on whether the executive or non-executive females on board could enhance the firm performance or not, which might help the policymakers to take further actions. Therefore, the research question can be summarized as below:

RQ: What are the effects of executive and nonexecutive females on board on the firm performance in the MAIN market and AIM on the UK stock exchange?

The rest of this paper is organized as follows: Section 2 describes the literature review and hypotheses development. Section 3 presents the research design and methodology. Section 4 presents the empirical results and the discussion. Finally, the conclusions and implications are provided in Section 5.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Theoretical background

The link between board diversity and firm performance was elucidated in diverse theories and arguments across academic fields. Resource dependency theoreticians have precisely debated that the combination of various shareholders on the board develops the firm's aptitude by having critical resources (Davis & Cobb, 2010). Available resources contain experience, knowledge, and independent suggestions from both males and females (Haniffa & Cooke, 2002; Hillman et al., 2002). Members of the board are elected based on their qualified knowledge and experience, which in turn are used to improve the firm performance (Hsu et al., 2019). Furthermore, some scholars show that the firm performance is boosted by the board diversity that is sustained by the resource dependency theory (Hafsi & Turgut, 2013; Hsu et al., 2019; Lu et al., 2015). On the contrary, social identity theory advocated studies that confirm the negative association between females on board and the company's performance (Adams & Ferreira, 2009; Shehata et al., 2017).

According to the critical mass theory, gender quota requires companies to increase the number of females on board which consequently allows females to take high positions in their companies (Wang & Kelan, 2013). In accordance with the agency theory, more non-executive members on the board would lead to superior financial performance (Davidson & Rowe, 2004). Agency theory also suggests that the board size is negatively associated with the firm performance (Augusto et al., 2020; O'Connell & Cramer, 2010). However, some studies show that the board size has a positive effect (Adams & Mehran, 2012; Mahadeo et al., 2012). As a result, large board size leads to agency problems, and high communication and management problems (Jensen, 1993). Consequently, it will lead to low encouragement and incentives (Lipton & Lorsch, 1992).

2.2. Hypotheses development

Varying results regarding the association between females on board and firm performance have been conveyed in multiple studies. It has been revealed that gender diversity has a positive effect that enhances the firm performance (Al-Shaer & Zaman, 2016; Byron & Post, 2016; Post & Byron, 2015); improves the firm value (Kim & Starks, 2016) by adopting restrained earnings management (Lonkani, 2019), leads to a better board monitoring (Adams & Ferreira, 2009), develops the sustainability of the reporting quality (Al-Shaer & Zaman, 2016), upturns firm profitability (Green & Homroy, 2018). In contrast, other scholars have identified a negative link between gender diversity and firm performance

(Adams & Ferreira, 2009; Gull et al., 2018; Shehata et al., 2017). Whereas some studies have found no relationship (Carter et al., 2010; Sun et al., 2011).

2.2.1. Executive female on board and firm performance

Some studies have found that executive females on board have a more positive effect on firm performance than non-executive female directors; showing that the executive effect outweighs the monitoring effect (Kemper et al., 2019; Liu et al., 2014). However, other studies reported that the non-executive female directors monitoring effect outweighs the executive effect (Usman et al., 2018). Moreover, executive female directors have higher financial performance under low competition, but they tend to underperform when competition increases (Amorea & Garofalo, 2016).

H1: There is a significant positive relationship between executive females on the board and firm performance.

2.2.2. Non-executive female on board and firm performance

Several studies confirmed the positive relationship between non-executive directors and firm performance (Duru et al., 2016; Kim & Lim, 2010; Uribe-Bohorquez et al., 2018). This will lead to a larger number of non-executive directors on the board that implies higher board independence in making decisions (John & Senbet, 1998), solving the agency problem (Ameer et al., 2010), enhancing the monitoring role of the board (Duru et al., 2016; Fama & Jensen, 1983), and providing appreciated service to the shareholders (Nguyen & Nielsen, 2010). Furthermore, the non-executive female directors upturn the venturing risk with the expectation of improving future performance (Poletti-Hughes & Briano-Turrent, 2019), and developing the board governance (Srinidhi et al., 2020).

On the other hand, other scholars report a negative relationship between non-executive directors and firm performance (Bird et al., 2018; Naciti, 2019). Additionally, it has been revealed that the non-executive directors may deteriorate the firm performance as they can be affected by reputational risk (Naciti, 2019). Thus, the information received by the non-executive directors can be manipulative and confusing (Martín & Herrero, 2018). While, some studies found that there is no significant relationship between non-executive board members and financial performance (Ahmed et al., 2006).

H2: There is a significant positive relationship between non-executive females on the board and firm performance.

3. RESEARCH DESIGN AND METHODOLOGY

3.1. Sample selection

Our basic sample comprises 644 companies in the MAIN market (30% of the sample) and 1,531 companies in the AIM (70% of the sample). The final sample is 2,175 non-financial listed

companies in the UK, with a total of 39,150 observations. The analysis is conducted during the period of 1999–2016.

3.2. Data collection

The data has been collected from a unique set of financial and corporate governance data. The source of the financial data has been derived from the Datastream database. These variables are ROE, Tobin's Q, leverage, firm size, net sales, and research and development to sales ratio (R&D/sales). BoardEx database is the source of data for the corporate governance variables which are: board size, board independence, and executive and non-executive females on the board. This data has been collected from MAIN market and AIM in LSE. The MAIN market is known as the Official List (OL); it includes 1400 companies, and it is the most controlled and managed market under the LSE, as it contains companies that should exchange at minimum 25 percent of their shares with the public. Additionally, they should be traded for at least 3 years and they ought to pursue the UK Listing Authority (UKLA) rules or any European Union authority.

Thus, it is hard to enter, and admission takes several months. Moreover, companies listed in the MAIN market ought to have at least (£700K) market capitalization. Additionally, these companies must provide a progressive level of disclosure and transparency, alongside with regular financial reports and semi-annual management statements. Furthermore, shareholders must approve any decision related to dividend declaration, takeovers, mergers and acquisitions.

On the other hand, the AIM was established in 1995 mainly to help small developing companies to obtain the needed fund or capital through the public market (Espenlaub et al., 2012; Vismara et al., 2012). Since then, it includes various companies across more than 100 countries with a combined market capitalization exceeding £70 billion (Gerakos et al., 2013). Companies get cheaper, easier and quicker access to this capital market compared to the MAIN market, as companies are not required to have minimum shares in the public hand. Additionally, there is no trading record required or minimum market capitalization. Companies in the AIM are accepted upon the reference of a nominated advisor (NOMAD) who approves their qualifications for entering the AIM, which made the listing process much easier and can be achieved within two weeks (Mendoza, 2008).

3.3. Measurement of variables

The explanation and measurement of variables are included in Table 1. Panel A consists of two dependent variables of firm performance where, ROE is the book value of firm performance and Tobin's Q is the market value of firm performance. Panel B is comprised of board and firm-specific characteristics that represent the independent variables.

Table 1. Measurement of variables

Variable name	Code	Measurement	Source of data
Panel A: Dependent variables (firm performance)			
Return on equity	ROE	(Net income - Bottom line - Preferred dividend requirement) / Average of last year's and current year's common equity	Datastream
Tobin's Q	Tobin's Q	(M.V of equity + total asset-B.V of equity) / total asset	Datastream
Panel B: Independent variables			
Board characteristics			
Board size	BSize	Number of directors on the board	BoardEx
Board independent	BIndep	Ratio of number of independent directors to total number of board directors	BoardEx
Executive female	EDF	Number of executive female directors on the board	BoardEx
Non-executive female	NEDF	Number of non-executive female directors on the board	BoardEx
Firm-specific characteristics			
Leverage	Lev	Total debt / Total assets * 100	Datastream
Firm size	FSize	Natural log of total assets	Datastream
Net sales	NS	Log (gross sales and other operating revenue less discounts, returns, and allowances)	Datastream
R&D/Sales	R&D/S	Research and development expense / Net sales or revenues	Datastream

3.4. Model development

An important consideration we want to address is whether the conditional mean dynamics of

performance measure (ROE or Tobin's Q) respond differently to the covariates in bad and good states of the financial market. For this reason, we adopt the following panel regression equation:

$$y_{it} = \beta_0 + D_{t-1} \sum_{j=1}^J \beta_j^{bad} \chi_{j,it} + (1 - D_{t-1}) \sum_{j=1}^J \beta_j^{good} \chi_{j,it} + \mu_i + \varepsilon_{it} \quad (1)$$

where, y_{it} is the dependent variable (ROE or Tobin's Q) for individual (firm) i at time t , the $\chi_{j,it}$ is the explanatory variable number j for individual i at time t , β_0 is the global constant of the model, μ_i is the cross-section random effect, ε_{it} is the individual specific unexpected return (the error term), β_j^{bad} and β_j^{good} capture the response of the dependent y to the explanatory variable χ_j in the bad and good regimes respectively and D_{t-1} is a dummy variable that captures the state of the financial market in the previous period (previous day). That is if the market was in a bad state in the previous period $D_{t-1} = 1$ and zero otherwise.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1. Descriptive statistics

Table 2 shows the descriptive statistics for the dependent, independent, and control variables. With regard to governance characteristics, we found that the mean percentage of independent directors is 55.65%, which indicates that half of the board consists of independent directors. The mean of board size is 6.5498. Additionally, the descriptive statistics showed that the maximum numbers of executive and non-executive directors are 6 and 7 females, respectively. It is also shown that the average Tobin's Q and ROE values are 1.77 and 2.17, respectively.

Table 2. Descriptive statistics

Variables	Minimum	Maximum	Mean	Std. Dev.	Median	Skewness	kurtosis
ROE	-209.910	193.380	2.170	34.699	8.850	-1.714	10.402
Tobin's Q	-0.034	7.5	1.78	1.213	1.387	1.977	7.372
Lev	0	0.90	0.164	0.185	0.106	1.266	4.247
BIndep	0	1	0.557	0.175	0.571	-0.147	3.346
BSize	1	27	6.550	2.469	6	1.257	6.817
FSize	0	24.023	10.763	2.604	10.583	0.246	3.448
R&D/S	0	0.872	0.087	0.145	0.027	2.805	11.709
EDF	0	6	0.136	0.385	0	2.434	10.511
NEDF	0	7	0.332	0.668	0	3.355	19.986
NS	0	21.102	10.563	2.947	10.589	-0.241	3.257

Note: The table presents the descriptive statistics for the sample of 39,150 observations from 2,175 firms for the period from 1990 to 2016, which were drawn from Datastream and BoardEx.

Figure 1 shows the mean of executive and non-executive females in the MAIN market from 1999 to 2016. As displayed in Panel (A), the MAIN market has recently done a tremendous increase in the number of female non-executive directors from 2009 to 2016. Panel (B) describes the percentage number of companies that have female directors. The study has shown a significant increase in the percentage of companies that have non-executive female directors. It can be observed that the number

of companies that have executive female directors increased from 0.5% to 1.5% before 2007, but it decreases during the financial crisis, and then it turned to increase again to 1.5% by the end of 2016. Similarly, the percentage of companies that have non-executive female directors progressed from about 1.5% in 1999 to about 7% in 2007; however, it seems to be stable during the financial crisis and turns to increase until it arrives at 7% by the end of 2015.

Figure 1. Females in the MAIN market

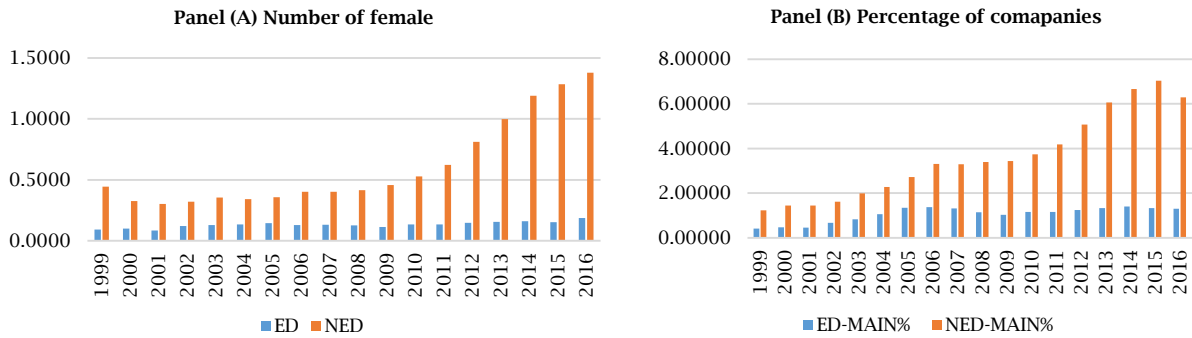


Figure 2 shows the mean of executive and non-executive female directors in the AIM market from 1999 to 2016. Panel (A) shows that there has been an increase in the number of executive and non-executive female directors. It can be analyzed that the average number of executive female directors gradually increased until 2005, and then it fluctuated within the same range at the end of 2016. However, the average number of non-executive female directors decreased gradually within the period before the financial crisis. It became stable during the financial crisis, and then it

increased substantially until the end of 2016. Panel (B) shows that the percentage of companies having executive female directors increased gradually from 0.16% in 1999 to 2.24% in 2007, then the percentage decreased to 1.5% during the financial crisis, and it turns to increase again till the end of 2016. On the other hand, the percentage of companies that have non-executive female directors increased gradually from 0.39% in 1999 to 1.99% in 2007, and then it increased to 2.27% by the end of 2016.

Figure 2. Females in the AIM

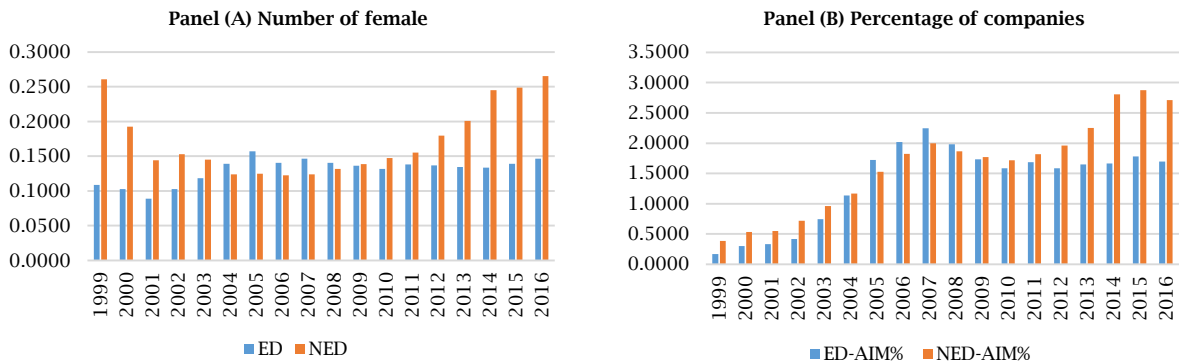
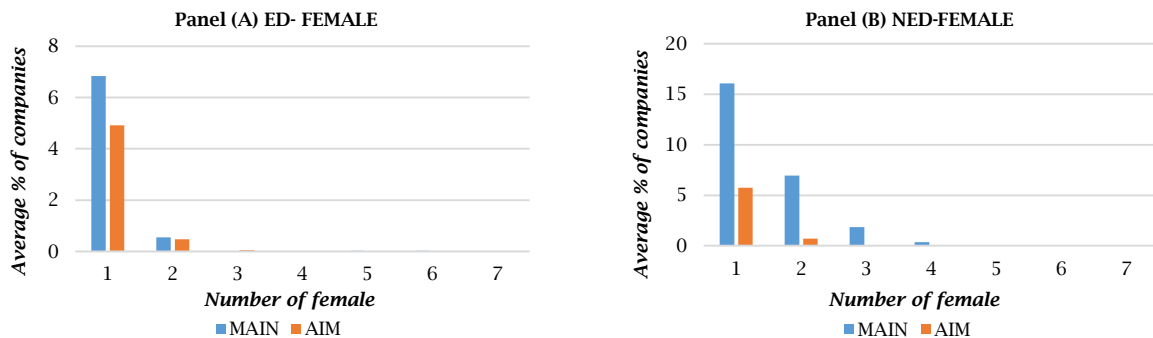


Figure 3 shows executive and non-executive Females in the MAIN and AIM markets, Panel (A) shows that the average percentage of companies that have one executive female director is 6.63% in the MAIN market, and 4.91% in the AIM. However, this percentage diminishes for more than one executive female director, as 0.55% of the companies in the MAIN market have two female directors and 0.47% of the companies in the AIM have two female

directors. The result in Panel (B) reveals that 16.08% of the companies in the MAIN market and 5.74% of the companies in the AIM have one non-executive female director. On the other hand, 6.95% of the companies in the MAIN market and 0.7% in the AIM have two non-executive female directors. While 1.85% of the companies in the MAIN market and 0.08% in the AIM have three non-executive female directors.

Figure 3. Executive and non-executive females



4.2. Bivariate analysis

Table 3 describes the differences between the executive and non-executive female directors in the MAIN, AIM, and the whole market. For the MAIN market, Panel A shows that the average number of non-executive females is higher than the number of executive females. There is a significant difference between the executive and non-executive females in

the MAIN market. For the AIM, Panel B displays that the average number of non-executive female directors is higher than the number of executive female directors, which reveals a significant difference between the executive and non-executive female directors in the AIM. Finally, Panel C presents the test results for the whole market, where, $t = -4.605$ is highly significant.

Table 3. T-independent test

Variables	Mean	Std. Dev.	S.E	t-value	Sig.
Panel A: MAIN market					
EDF	0.13	0.025	0.006	-5.571	0.000
NEDF	0.61	0.361	0.085		
Panel B : AIM					
EDF	0.13	0.018	0.004	-3.322	0.003
NEDF	0.17	0.051	0.012		
Panel C : All markets					
EDF	0.1310	0.02153	0.00359	-4.605	0.000
NEDF	0.3898	0.33649	0.05608		

4.3. Regression analysis

Table 4 reveals the results of the test of the reported hypotheses for the UK market (MAIN market and AIM) using the random effect model. All the explanatory variable coefficients are standardized to permit a direct comparison of each variable's relative effect on firm performance. The result demonstrates that the board size is positively related to Tobin's Q at a 1% significance level. The result is consistent with (Adams & Mehran, 2012).

Additionally, board independence is positively associated with firm performance using Tobin's Q at a 1% significance level in the whole UK market. Similarly, the table reports a positive effect in the MAIN market; however, it reveals that board independence is not significant to the firm performance in the AIM. This means that the higher the percentage of non-executive directors, the higher the firm performance in the MAIN market, which supports the descriptive statistics, and is consistent with (Fama & Jensen, 1983; Kim & Lim, 2010).

Table 4. Random effect analysis

Variables	All markets		MAIN market		AIM	
	ROE	Tobin's Q	ROE	Tobin's Q	ROE	Tobin's Q
Intercept	-61.573*** (-13.416)	3.365*** (23.132)	-15.418** (-2.247)	2.798*** (11.803)	-81.344*** (-11.679)	4.075*** (18.960)
Lev	-63.273*** (-14.733)	-0.553*** (-4.910)	-32.601*** (-6.110)	-1.081*** (-7.001)	-78.820*** (-12.560)	-0.341** (-2.161)
Blndep	-9.920** (-2.340)	0.328*** (2.661)	9.311* (1.626)	0.434*** (2.487)	-15.384*** (-2.614)	0.195 (1.148)
BSize	-0.953*** (-2.983)	0.0654*** (6.946)	0.377 (1.083)	0.029*** (2.720)	-2.331*** (-4.365)	0.103*** (6.628)
FSize	2.304*** (2.771)	-0.300*** (-11.966)	-8.239*** (-6.036)	-0.260*** (-5.970)	6.508*** (5.943)	-0.361*** (-10.995)
R&D/S	-132.528*** (-11.345)	2.145*** (6.129)	-100.212*** (-5.157)	1.370** (2.197)	-132.593*** (-8.933)	2.283*** (5.191)
R&D/S^2	94.174*** (5.859)	-1.867*** (-3.893)	89.994*** (3.150)	-1.646* (-1.840)	92.023*** (4.549)	-2.005*** (-3.350)
NEDF	-0.904 (-1.147)	0.099*** (4.341)	-0.441 (-0.588)	0.100*** (4.490)	-0.449 (-0.252)	-0.012 (-0.226)
EDF	-3.489** (-2.090)	-0.132*** (-2.715)	-4.188** (-2.043)	-0.261*** (-4.244)	-1.209 (-0.495)	-0.074 (-1.046)
NS	5.605*** (7.380)	0.115*** (5.028)	10.645*** (7.836)	0.160*** (3.695)	4.314*** (4.529)	0.081*** (2.842)
Adjusted	0.147	0.063	0.071	0.058	0.169	0.083
F-statistics	103.045	42.256	20.738	17.428	68.213	32.860
Prob (F-statistics)	0.000	0.000	0.000	0.000	0.000	0.000

Note: *, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively.

The results in the MAIN market show that the executive female directors have a negative significant effect on the firm's financial performance using Tobin's Q at a 1% significance level. The result is consistent with (Faccio et al., 2016) and inconsistent with (Liu et al., 2014). Moreover, the non-executive female directors are positively significant on the firm's financial performance using Tobin's Q at a 1% significance level. Nevertheless, the result in the AIM reports that the executive and non-executive female directors are insignificant to the firm performance.

4.4. The effect of the state of the financial market

Table 5 shows the results related to the change in regime for the whole UK market, MAIN market and AIM. In Panel A, for the whole UK market, the results reveal that executive female directors are negatively significantly with the firm financial performance at a 5% significance level both in the bad and good market. In the bad market, the coefficient is -0.146 which means that the addition of one executive female decreases the financial performance by

14.6%. In the good market, the coefficient is -0.107, which means that the addition of one executive female director decreases the financial performance by 10.7%. Moreover, the result reports that non-executive female directors have a significant positive on the firm financial performance at a 1% significance level in the bad market and a 5% significance level in the good market. In the bad market, the coefficient is 0.150, which means that the addition of one non-executive female director increases the financial performance by 15%. In the good market, the coefficient is 0.066, which means that the addition of one non-executive female director increases the financial performance by 6.6%. We can report that the influence of both the executive and non-executive female directors in the bad market is higher than in the good market.

Panel B shows the results for the MAIN market, the result is quietly the same as the result in Panel A, as it demonstrates that executive female directors negatively affect the firm financial performance both in the bad and good markets. Moreover, the result highlights that non-executive

females have a significant positive relationship with the firm financial performance both in the bad and good markets. It can be said that the effect of non-executive female directors in the bad market is higher than in the good market, which means that the non-executive female directors improve the firm's financial performance in the bad market. The result is in line with other studies that found that the presence of female directors on the board during the recession period improves the firm performance (Papangkorn et al., 2019). However, the effect of the executive female directors in the bad market is lower than in the good market, which means that the executive female directors decrease the firm performance in the good market more than in the bad market.

Panel C shows the results for the AIM, it reports that both the executive and non-executive female directors do not document a significant effect on the financial performance. The result on the AIM is in line with (Carter et al., 2010; Wang & Clift, 2009).

Table 5. Random effect analysis using two regimes (Part 1)

	ROE		Tobin's Q	
	BAD	GOOD	BAD	GOOD
Panel A: All UK markets				
Intercept	-62.187*** (-13.543)	-62.187*** (-13.543)	3.312*** (22.779)	3.312*** (22.779)
Lev	-70.087*** (-12.005)	-58.440*** (-11.847)	-0.727*** (-4.673)	-0.451*** (-3.572)
BIndep	-12.213** (-2.124)	-9.445** (-1.979)	0.140 (0.850)	0.411*** (2.985)
BSize	-1.407*** (-3.268)	-0.653* (-1.749)	0.048*** (3.858)	0.075*** (6.971)
FSize	3.679*** (3.271)	1.785** (1.945)	-0.239*** (-7.279)	-0.319*** (-11.658)
R&D/S	-143.579*** (-9.073)	-126.852*** (-9.854)	1.736*** (3.715)	2.408*** (6.374)
R&D/S^2	119.573*** (5.065)	81.946*** (4.540)	-1.933*** (-2.748)	-1.909*** (-3.622)
NEDF	-0.697 (-0.676)	-0.942 (-1.009)	0.150*** (5.131)	0.066** (2.429)
EDF	-4.346** (-1.933)	-2.985 (-1.556)	-0.146** (-2.231)	-0.107** (-1.949)
NS	4.629*** (4.414)	5.977*** (7.110)	0.074*** (2.436)	0.129*** (5.151)
Adjusted	0.149		0.069	
F-statistics	52.742		23.774	
Prob (F-statistics)	0.000		0.000	
Panel B: MAIN market				
Intercept	-15.740** (-2.304)	-15.74** (-2.304)	2.7897*** (11.748)	2.7897*** (11.748)
Lev	-44.419*** (-6.278)	-22.875*** (-3.720)	-1.169*** (-5.777)	-1.004*** (-5.779)
BIndep	8.723 (1.180)	8.103 (1.247)	0.461** (2.112)	0.402** (2.031)
BSize	0.160 (0.352)	0.569 (1.382)	0.028** (2.068)	0.031*** (2.526)
FSize	-6.758*** (-3.911)	-8.980*** (-5.886)	-0.216*** (-4.089)	-0.283*** (-5.866)
R&D/S	-93.797*** (-3.872)	-100.661*** (-4.741)	1.576** (2.071)	1.072 (1.605)
R&D/S^2	86.440** (2.236)	90.970*** (2.789)	-3.190*** (-2.658)	-0.644 (-0.646)
NEDF	-0.418 (-0.419)	-0.300 (-0.334)	0.143*** (4.958)	0.071*** (2.682)
EDF	-5.430* (-1.917)	-3.546 (-1.496)	-0.224*** (-2.693)	-0.275*** (-3.903)
NS	9.389*** (5.443)	11.271*** (7.527)	0.111** (2.104)	0.1869*** (3.929)
Adjusted	0.074		0.062	
F-statistics	11.443		9.836	
Prob (F-statistics)	0.000		0.000	

Table 5. Random effect analysis using two regimes (Part 2)

	ROE		Tobin's Q	
	BAD	GOOD	BAD	GOOD
Panel C: AIM				
Intercept	-83.101*** (-11.886)	-83.101*** (-11.886)	4.100*** (18.548)	4.100*** (18.548)
Lev	-80.038*** (-9.046)	-78.271*** (-10.788)	-0.564*** (-2.484)	-0.235 (-1.321)
Blndep	-18.478** (-2.198)	-14.331** (-2.156)	-0.091 (-0.383)	0.317* (1.672)
BSize	-3.439*** (-4.571)	-1.738*** (-2.799)	0.074*** (3.382)	0.114*** (6.459)
FSize	8.796*** (5.750)	5.746*** (4.780)	-0.294*** (-6.626)	-0.375*** (-10.541)
R&D/S	-149.347*** (-7.071)	-124.490*** (-7.508)	1.769*** (2.870)	2.624*** (5.456)
R&D/S^2	128.665*** (4.140)	75.061*** (3.284)	-1.790** (-1.949)	-2.195*** (-3.311)
NEDF	0.302 (0.127)	-0.753 (-0.363)	0.027 (0.3930)	-0.018 (-0.288)
EDF	-1.403 (-0.428)	-0.809 (-0.288)	-0.114 (-1.191)	-0.025 (-0.313)
NS	2.830** (2.074)	4.923*** (4.636)	0.050 (1.279)	0.089*** (2.837)
Adjusted	0.171		0.089	
F-statistics	34.958		18.123	
Prob (F-statistics)	0.000		0.000	

Note: *, **, *** represent significance at 0.1, 0.05, and 0.01 levels, respectively.

5. CONCLUSION

This paper delivers new insights into the relationship between the females on the board and firm performance. This study represents one of the earliest attempts to account for gender diversity in the MAIN market and AIM. This study contributes to current research, as it employs 644 companies in the MAIN market and 1,531 companies in the AIM with a total of 39,150 firm-year observations. Furthermore, we adopt panel regression and regime change techniques to reveal the effect of the executive and non-executive female directors in the MAIN market and AIM as the state of the market change using unexpected returns as an indicator.

By using the panel regression, the overarching results reveal that in the MAIN market, the executive female directors negatively affect the firm's financial performance. However, the non-executive female directors affect positively the firm's financial performance. Furthermore, using the regime change, the results indicate that in the MAIN market, the positive effect of non-executive female directors in the bad market is higher than in the good market. However, the negative effect of the executive female directors in the bad market is lower than in the good market. Using panel regression and regime change technique, it has been found that in the AIM,

the executive and non-executive female directors have no significant effect on the firm performance

The findings of this paper have some significant implications. The findings suggest that the presence of females on the board is not by gender quota or increasing the number of females, but by increasing the non-executive female directors on the board, which applies only to the MAIN market that could be seen as an argument in favor of agency theory. For the UK government and policymakers, our findings deliver some insights which could help the policymakers to articulate suitable initiatives and strategies not to achieve a critical mass of females on the board, but to hire qualities of females, and add more non-executive female directors for companies working in the MAIN market. The reason for supporting non-executive female directors is that they have more impact on firm performance which might be due to their different experience, knowledge, age, nationality, and education. These factors have not been investigated in this paper, which opens room for future research.

The limitations of this paper are that it focuses exclusively on the effect of the gender board diversity, both executive and non-executive, on firm performance; disregarding the other board diversity, which could have a significant effect on firm performance.

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