**Voluntary gender diversity targets and their impact**

**on firm performance and firm value**

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# ***Abstract***

Regulators in the United Kingdom (UK) recommend that 33 percent of board members of large UK firms be female by 2020. We use this setting to investigate whether greater female representation and any associated financial benefits can be achieved without establishing quotas. Using data between 2012 and 2018 for the FTSE 350 firms, we find a significant increase in female representation on boards in recent years, and that the rate of increase in gender diversity is higher in these years. Our results also indicate that board gender diversity is positively associated with both financial performance and firm value. However, this association exists only in recent years. Finally, capital market participants value non-executive female board members more than executive female board members.

# **Introduction**

Many European countries have imposed mandatory quotas for female representation on boards of directors (Bertrand, Black, Jensen, and Lleras-Muney 2019), increasing female representation in corporate leadership. In Italy, where a mandatory gender quota of 33 percent was passed in 2012, Magnanelli, Nasta, and Raoli (2020) finds a positive relation between female director presence on boards and firm performance. Other countries have followed a different path to increasing female representation on boards by setting voluntary targets for gender diversity. We focus on this alternative path to assess whether mandatory quotas are necessary to increase the representation of women on boards of directors and to observe any benefits associated with gender diversity.

Using data from the United Kingdom (UK), which established a voluntary target of 33 percent female representation on boards of directors by 2020 for its largest firms, we provide evidence on two issues: (i) whether firms reach these voluntary targets, i.e., whether quotas need not be mandatory for countries to reach gender diversity on boards, and (ii) whether the presence of women on boards of directors is associated with improved financial performance and firm value in a setting with voluntary targets.

Both mandatory quotas and voluntary targets aim to reduce the under-representation of women on boards of directors. A recent report by Deloitte (2019), covering 49 countries, finds that although the percentage of women on boards increased slightly from 2016 through 2019, the average in 2019 was only about 17 percent, and that only a few countries (specifically, Norway, France, Sweden, Finland, New Zealand, and Belgium) had values above 30 percent. There are several explanations for this lack of gender diversity on boards. As we discuss below, these include social identity theory, the existence of a glass ceiling, personality traits, and tokenism.

Given the existence of the UK’s voluntary target, public support, and campaigns launched by the three largest institutional investors in 2017 (Gormley, Gupta, Matsa, Mortal, and Yang 2021), we believe that in the UK, female under-representation should significantly decrease and we test for this decrease. In addition, this setting also allows us to document any changes in the association between gender diversity and firm performance and value over the years. As suggested by the European Commission in 2012, it is possible that an increase in females on UK boards of directors will be associated with increased economic growth because lower economic growth can be caused by underutilizing women’s skills. Moreover, new female directors can serve as role models for female workers, stimulating progress (Hafsi and Turgut 2013), and reducing income inequality.

Our sample includes 130 of the largest UK firms, and we collect data for four years: two years before the voluntary target was established (specifically, 2012 and 2014), and two years after (specifically, 2016 and 2018). Data from these four years allow us to evaluate the progress that has been made towards gender diversity to date and its association with firm performance and value.[[1]](#footnote-1) We measure financial performance using return on assets (*ROA*) and firm value using *Tobin’s Q*, which is a market-based measure.

We first describe the progress that UK firms have made towards achieving the voluntary target, and we consider any industry-based variation in the percentage of females sitting on UK boards of directors. Figure 1 shows that, overall, the percentage of female directors increases over the years, which leads us to expect that most firms will reach the voluntary target by 2020. In fact, 17 of our 21 industries show a steady and continuous increase in the percentage of female directors. Moreover, by 2018, three industries had already reached the 33 percent target.

Figure 2 shows the mean values of the percentage of females on boards over time. This percentage has been increasing steadily (with a mean in 2012 of 16.68 percent and a mean in 2018 of 29.07 percent), and the differences in the yearly means are statistically significant.

Finally, we estimate a multivariate model that controls for the presence of females in influential positions within the firm, as well as for industry fixed effects. Again, we find that throughout the years, there has been a significant increase in the percentage of females on UK boards of directors. Moreover, the increase in recent years was higher than that in the first two years. This suggests that the establishment of voluntary gender diversity targets is effective for UK firms. Moreover, these firms are likely to reach the 33 percent voluntary target by 2020. The increase in the percentage of female board directors suggests that a mandatory quota is not required and that firms recognize the benefits of having female directors on their boards.

Our second objective is to examine whether the percentage of females on boards is associated with firm financial performance and value. To assess the robustness of our findings, we test this in several ways. The results from our initial estimations show a positive and significant association between the percentage of females on boards and both financial measures (*ROA* and *Tobin’s Q*). There is also an indirect association between the percentage of females on boards and Tobin’s Q (via *ROA*), as indicated by a Sobel intermediation tests. These direct and indirect associations are present when we consider the pooled sample and when we consider only the subsample of observations from the last two years. However, they are not significant in the subsample of observations from the initial two years. This suggests that the association between females on boards and financial performance is a recent development. Our results also indicate that the percentage of executive female directors on the board is negatively associated with firm value, suggesting that, although the presence of non-executive female directors on the board is positively valued by capital market participants, a similar increase does not occur for executive female directors.

Recognizing endogeneity due to omitted variables can affect the results from valuation studies, we next consider the decision to appoint females to the board of directors as an endogenous firm decision and use a simultaneous estimation model. The results from this robustness check confirm our main findings – we find that *%Female* is positively and significantly associated with both *ROA* and *Tobin’s Q*. Additional analysis indicates that the positive association between gender diversity and financial performance extends into the future – it is also significant in the year after females join the board and in the following year. However, the association between gender diversity and valuation is immediate and does not extend into the future. These results should be of interest to a variety of firm stakeholders because they suggest that firms can benefit from increasing the representation of females on their boards. It should also interest analysts and investors who could consider board diversity in their investment decisions.

Our study contributes to two strands of literature: one on gender quotas and the other on firm performance and valuation. Our results suggest that quotas are not required to increase the percentage of females on boards of directors. Instead, voluntary targets supported by the government can increase gender diversity. Thus, although our data are exclusively from UK firms, there are cross-country implications for our findings. Moreover, using different methodologies and subsamples, we provide robust evidence of a link between board gender diversity and firm performance and value. There is mixed evidence on the relation between female directors’ board presence and firm performance in cross-country settings. However, studies focused on one country, such as ours, can help clarify this relation (Karuna 2020). It is also possible that the negative association between female executives on the board and firm value is responsible for some previous mixed findings. Female directors have the potential to be more independent of management (Adams and Ferreira 2009) and assign less value to security (Adams and Funk 2012). Given the important implications of an increase in the proportion of females on boards for corporate governance, our findings should also be of interest to board chairs, financial analysts, and investors.

# **Regulatory interventions and settings**

In 2011 and 2015, regulators in the UK established voluntary targets for gender diversity on the boards of directors of large firms. Documents establishing these targets are generally referred to as the Davies’ Reports. The first report challenged the FTSE 100 firms to reach a minimum of 25 percent female representation on boards by 2015 (Davies 2011). A second report examined data from March 2011 through September 2015 and found that FTSE 100 firms had exceeded the voluntary target and reached 26.1 percent female representation on boards (Davies 2015). Given that this initial target had served as a motivation for companies to increase female representation to more than double in less than five years, this later report introduced a more ambitious voluntary target: to increase female representation on the boards of directors of FTSE 350 firms to a minimum of 33 percent by the end of 2020. The new voluntary target has the government’s full support and if firms do not comply with the voluntary target, the government may convert it into a mandatory quota (Davies 2015).

 Scandinavian countries (specifically, Finland, Norway, and Sweden) have high female presence on the boards of directors (Ellwood and Garcia-Lacalle 2015). The most prominent example is Norway, which was the first country to impose a gender quota for boards of directors (in 2008). Norway now has 40 percent female representation in public limited companies (Norway Statistics 2018), which is exactly the value of the quota set. After the introduction of Norway’s quota, other countries such as France, the Netherlands, Belgium, and Italy introduced gender quotas to increase female representation on boards (Bertrand *et al.* 2019). In France, thanks to the “Act of 2011,” women now occupy 44 percent of board positions (Prat and Mueller 2016; European Commission 2019). The latest figures from the European Commission indicate that, on average, European boards have 26.7 percent of their board seats occupied by women (European Commission 2019).

 Despite these improvements, mandatory quotas have both positive and negative effects. A positive outcome of this type of intervention can occur because female directors are more independent (Bohren and Staubo 2014). Alternatively, blind compliance with mandatory quotas may lead firms to hire less qualified or inexperienced female directors. Another potential negative outcome of a quota is that it could induce companies to delist from the stock exchange to escape the quota obligation (Matsa and Miller 2013). Finally, there is a risk that a quota’s target may become a ceiling (Burke 2019).

In this study, we assess whether mandatory quotas are required for board gender diversity. In the United States (US), there is no quota or voluntary target but there are campaigns that raise awareness of gender equality on boards. The percentage of US corporate boards with three or more women increased from 33.8 percent in 2016 to 44.9 percent in 2018 (Haley, Haley, and Markova 2019). Moreover, new campaigns have been created, such as “2020 Women on Boards,” motivated by the fact that only five percent of US firms have achieved gender balance. Thus, it is possible that mandatory quotas are not necessary for improvements in board gender diversity. As mentioned previously, we use the UK setting and its progress towards a 33 percent voluntary target to assess this research question.

During our sample period, other events related to board gender diversity occurred. First, in 2012, the European Commission submitted a proposal for a directive aimed at increasing diversity on public boards through nonbinding measures. This proposed directive would set a quota of 40 percent for non-executive females on boards by 2020. This proposal generated a significant amount of debate and on the topic, not all member states supported the quota. To date, no directive has been issued. However, the debate and later attempts to renew it may have been viewed by UK firms as increasing pressure to improve board gender diversity. Second, institutional investors have started to pressure firms to increase board gender diversity. Marriage (2017) discusses LGIM’s decision to vote against directors when firms have no females sitting on boards and mentions that although this policy was directed at US firms, since its adoption, several UK firms have appointed female board members. Gormley *et al*. (2021) studies the gender diversity campaigns that BlackRock, State Street, and Vanguard initiated in 2017 and finds that in the US, these campaigns are associated with firms adding at least 2.5 times as many female directors in 2019 as they did in 2016. Given the international reach of these investors, it is reasonable to assume that they also had an impact on the UK’s progress towards board gender diversity.

# **Literature review and development of research questions**

## **Applicable theories**

The lack of gender diversity on boards of directors has been approached from multiple perspectives, leading to several theories. Social identity theory, first formulated by Tajfel (1982), posits that the lack of gender diversity exists because most board members are male and unconsciously create a collective sense of themselves, reinforcing group boundaries (Singh and Vinnicombe 2004). The authors of studies on social identity theory claim that unconscious actions may lead male directors to create barriers that prevent females from joining corporate boards.

 The glass ceiling theory addresses the lack of gender diversity from a different point of view, focusing on the reason for its existence. It suggests that there is a “transparent barrier” that prevents women from progressing to leadership roles (Sabharwal 2015). This barrier can take several forms, including inadequate education or insufficient experience, different communication styles (Tanen 1994), rejection from informal networks, insufficient or no support for work-life balance (Singh and Vinnicombe 2004), absence of mentorship or role models (Hafsi and Turgut 2013), or even gender stereotyping from leadership (Schein and Mueller 1992). Once women overcome the ‘glass ceiling,’ the barriers disappear. For instance, evidence that females avoid competitive environments (Niederle, Segal, and Vesterlund 2013) indicates that women who reach the boardroom may be very similar to men (Adams and Funk 2012). This may be due to their personal characteristics or because females in primarily male environments adopt male leadership traits that diminish gender differences (Adams and Funk 2012; Sabharwal 2015).

 The glass cliff theory indicates that women are more likely than men to be assigned leadership roles during periods of crisis or with a high risk of failure (Ryan and Haslam 2005; 2007; Ryan, Haslam, Hersby and Bongiorno 2011). In addition, when women attain leadership roles, these are more precarious than those attained by men (Sabharwal 2015; Ryan and Haslam 2005). Furthermore, previous studies indicate that women, in comparison to most male peers, must prove their expertise and demonstrate capabilities beyond those required to be considered potential board candidates (Singh and Vinnicombe 2004; 2006). According to Sabharwal (2015), the glass cliff theory clarifies that it is not only the number of females who reach the boardroom that is important, but also the work environment they face once they join the board of directors.

 Tokenism, which in this scenario can be defined as the practice of a board of directors including only one woman to give the appearance that it is gender diverse, is another theory that is widely used to explain the difficulties women face in gaining directorship roles (Lynn 1988; Hafsi and Turgut 2013; Gregory‐Smith, Main, and O’Reilly 2014; Sabharwal 2015). As You (2021, 356) states, “tokens have limited opportunities and low power due to their rarity and low status.” Consistent with the idea that one woman may not be enough to motivate change, Farrell and Hersch (2005) finds that the probability of a female director joining a board in a given year depends on the number of females already on the board. This may be because when there is only one female on the board, she is likely to be stereotyped and excluded by the majority. Recent research suggests that women can influence decisions only when a critical mass is present, and three females on the board seems to be the minimum necessary for them to have impact (Konrad, Kramer, and Erkut 2008; Erkut, Konrad, and Kramer 2008; Torchia, Calabro, and Huse 2011).

 Overall, these theories highlight the barriers women must overcome to gain and maintain directorship positions on corporate boards. The social identity and glass ceiling theories specify the obstacles, and the glass cliff and tokenism theories indicate that female directors face challenges even after they gain a place in the boardroom.

## **Advantages of having female directors on the board**

 Academic research suggests that there are multiple reasons for the increasing presence of females on boards (Campbell and Mínguez-Vera 2008; Davies 2011; Abdullah, Ismail, and Nachum 2016). One is that female directors contribute values that differ from those of male directors (Adams and Ferreira 2009). Adams (2016) compares boardroom gender gaps and highlights that women are generally less achievement- and stimulation-oriented than men. In addition, female directors are more benevolent and security-oriented than male directors. These values influence the way in which boards make decisions, and greater diversification in values can lead to better decision-making (Adams 2016; Ellwood and Garcia-Lacalle 2015). A second reason for increasing the number of female directors is that these directors can bring diverse perspectives to boards through more questioning and open discussion (Singh and Vinnicombe 2004). This can lead to the identification of a wider set of issues and different solutions. Different behaviors can affect firm outcomes (Kirsch 2018). Thirdly, female directors can serve as role models and mentors for other female workers, stimulating progress (Hafsi and Turgut 2013). Finally, from a social point of view, gender diversity on boards can help break down stereotypes, encourage girls to pursue careers in business, and help to reduce the wage gap between genders (Deloitte 2019).

 Firms with weak shareholder rights can also benefit from female directorships (Adams and Ferreira 2009). These benefits can be attributed to the fact that female directors are more resistant to takeovers and have higher board meeting attendance rates than male directors (Singh and Vinnicombe 2006). This can also occur because female directors are more likely than male directors to be part of monitoring-related committees, intensifying monitoring efforts. Finally, having females on the board of directors also increases community representation because directors are representative of stakeholders (Ellwood and Garcia-Lacalle 2015), which can improve the prospects of firms that seek funding (Singh and Vinnicombe 2004).

## **Gender diversity on boards**

The literature discussed above illustrates several advantages of board gender diversity and that the recognition of these advantages is relatively recent. Thus, it is reasonable to expect that recruitment (or nominating) committees in the UK are now aware of these advantages, leading to a recent increase in board gender diversity.

Given that the first Lord Davies Report challenged the FTSE 100 to reach a minimum of 25 percent female representation on boards by 2015 and this target was reached, it is now an empirical question whether the expanded focus to the FTSE 350 firms, together with a new voluntary target, is associated with a significant increase in the rate at which gender diversity has grown in UK boards. We examine whether such an increase in the rate at which gender diversity grows has occurred in recent years.

## **Gender diversity on boards and firm performance and value**

Despite the advantages of board gender diversity, there is still a lack of female representation. This underutilization of their skills may be a missed opportunity at the corporate level, which translates into a loss of potential economic growth (European Commission 2012). Both firm performance and value may be enhanced by an increase in board gender diversity. As Kirsch (2018) summarises, there are two non-exclusive causal paths that explain how board gender diversity can affect firm performance and value: (i) gender diversity affects the board as a group, which is supported by agency theory and resource dependency theory, or (ii) gender diversity is viewed as a signal of legitimacy by agents outside the firm, which is supported by signalling theory.

The idea that board gender diversity leads to financial benefits is not unanimously supported, and studies on the association between board gender diversity and firm performance and value find mixed results. Although numerous studies provide evidence that female directors positively influence firm performance and value (Campbell and Mínguez-Vera 2008; Liu, Wei, and Xie 2014; Abdullah et al. 2016), other studies document a negative relation between board gender diversity and firm performance and value or find no significant association (Caspar 2007; Simpson, Carter, and D’Souza 2010; Matsa and Miller 2013; Marinova, Plantenga, and Remery 2016). These mixed results can in part be attributed to the context in which firms operate. In fact, in a meta-analysis, Post and Byron (2015) finds evidence that the association between board gender diversity and profitability is positive and significant only for firms in countries with stronger shareholder protection. Given our focus on the UK, it is important to note that this country has a high score for this dimension.[[2]](#footnote-2)

 Isidro and Sobral (2015) also discusses the existence of mixed results and suggests that this disagreement may be due to the use of different measures of firm value and financial performance, together with the expectation that females on the board directly affect both. Accordingly, it is important to distinguish between studies in which researchers measure performance using book values and studies in which researchers use measures based on market values, especially because market values are based on investor perceptions and thus depend on their biases and stereotypes (Haslam, Ryan, Kulich, Trojanowski, Atkins 2010). Of the papers mentioned above, Campbell and Mínguez-Vera **(**2008)**,** Liu et al. (2014), and Abdullah et al. (2016) assess accounting-based performance, andCaspar (2007)**,** Marinova et al. (2016), and Adam and Ferreira (2009)assess market-based values. Analyzing the results from these two groups of studies separately, we observe that most of the accounting-based performance studies find a **positive association between female directors and firm performance,** while the results from the market-based value studies mostly point towards a negative **association between female directors and firm value.**

Three recent studies analyze the association between UK board gender diversity and firm performance. Gregory‐Smith et al. (2014) find no clear connection between the increase in female representation and company performance. In this study, the authors consider performance using both accounting and market-based variables, and the sample is FTSE350 for the period 1996 – 2010. Shehata, Salhin, and El-Helaly (2017) use data from UK small and medium-sized firms over the period 2005–2013 and find evidence consistent with a negative association between gender diversity and firm performance (which they measure using return on assets). Finally, Green and Homroy (2018) analyze the top 100 European firms (including 30 from the UK). When studying only UK data, the authors find that the proportion of female directors on the board has no statistically significant association with firm performance, although there is a positive association between female committee membership and firm performance.

Given the mixed findings in previous studies, it is an empirical question whether, in recent years, the presence of females on boards is associated with financial performance or firm value. We provide recent evidence on this association in the UK.

# **Methodology**

 Our first goal is to assess whether there has been an increase in the rate at which gender diversity has grown on UK boards of directors in recent years. To evaluate whether this change occurred, we consider four specific years – two of which are the initial years of the focus on board diversity in the UK (2012 and 2014) and two that are more recent (2016 and 2018).[[3]](#footnote-3) We begin our analyses by estimating the following ordinary least squares model:

*%Female = Y2014+Y2016+Y2018 + Female\_Chair + Female\_CEO + %Executive Females*

*+ Industry (1)*

In this model, *%Female* is calculated as the number of female directors on the board divided by the total number of directors, multiplied by 100. The main variables of interest are *Y2014*, *Y2016*, and *Y2018*. These are indicator variables coded as one when the observation corresponds to these specific years, and zero otherwise. The year 2012 is used as the reference point. Thus, if the coefficients on the year indicator variables are positive, they indicate that the percentage of females sitting on boards of directors increased from 2012 to the given year. Our focus is not only on these coefficients, but also on the differences between them, because we are interested in the changes in board diversity since 2012 and in recent years.

 *Female\_Chair* is an indicator variable coded as one when the chairperson of the board of directors is female, and zero otherwise. *Female\_CEO* is an indicator variable coded as one when the Chief Executive Officer (CEO) is female, and zero otherwise. *%Executive Female* is the percentage of executive females sitting on the board of directors. These variables are included to test whether the presence of women in leadership roles is associated with an increase in female board representation. We expect these three variables to have positive coefficients, consistent with the belief that when women hold leadership positions, they lead the way for other women to follow. We include industry fixed effects because the percentage of females sitting on boards may vary significantly across industries. All variables are measured at time t (i.e., there are no lagged variables). We estimate the model clustering standard errors by firm, following Petersen (2009).

Our second goal is to assess whether the presence of female directors is associated with firm financial performance or value. To test this, we estimate ordinary least squares models. We measure firm financial performance using *ROA* and firm value using *Tobin’s Q*. In the first analysis, we use the entire (pooled) sample. Next, we create two subsamples, separating the initial years from the more recent years. The models that we estimate are as follows:

 ROA = $β\_{0}$ + $β\_{1}$%Female + $β\_{2}$%Executive Female + $β\_{3}$Board Size + $β\_{4}$Firm Size + $β\_{5}$Leverage + Industry + Year + ε

(2)

Tobin’s Q = $α\_{0}$ + $α\_{1}$%Female + $α\_{2}$%Executive Female + $α\_{3}$Board Size + $α\_{4}$ROA + $α\_{5}$Firm Size + $α\_{6}$Leverage + Industry + Year + ε

(3)

*ROA* is calculated by dividing the company’s profit (loss) before tax by total assets. *Tobin’s Q* is calculated by dividing a proxy for market value (i.e., number of shares outstanding x market price at year-end + total liabilities) by the sum of total stockholders’ equity + total liabilities. *% Female* is as defined for equation (1). If the estimated coefficient on this variable is positive and significant, the results indicate that having female directors is associated with better financial performance (equation (2)) and higher firm value (equation (3)).

The control variables included are *%Executive Female*, *Board Size*, *Firm Size*, *Leverage*, and industry fixed effects and year fixed effects. The variable *%Executive Female* measures the proportion of female executive directors on the board, as in equation (1). *Board Size* captures the total number of directors. Shehata et al.  (2017) associates larger boards with more resources but a larger board can also be associated with lower efficiency. In fact, Hartarska and Nadolnyak (2012) finds that firm efficiency improves with board size but worsens for boards with more than 13 members. *Firm Size* is measured as the logarithm of the year’s revenue. This variable is included because women are more likely to sit on the boards of large firms (Adams 2016).[[4]](#footnote-4) Consistent with prior literature, we expect firm size to be negatively associated with performance (Adams and Ferreira 2009). We include industry indicators because different industries have different levels of profitability and/or valuation and we include year indicators to control for time effects. All variables are measured at time t and the regressions are estimated with standard errors clustered by firm.

 We also estimate a simultaneous equations model (Zellner and Theil 1962), which allows us to measure the effect of the percentage of female board members on both *ROA* and *Tobin’s Q*.This is important because these two dependent variables can be related. In this model, *%Female* is an endogenous variable. Appendix A describes all the variables used in the multivariate tests.

# **Sample and data**

 We focus on the largest firms in the UK because the voluntary target was set for the FTSE 350, which includes firms in the FTSE 100 and in the FTSE 250 index. Because our sample period starts in 2012, we start by considering all firms that were included in the FTSE100 and in the top 100 spots of the FTSE250 in each sample year. Thus, the initial potential sample includes 800 observations, comprised of 200 firms per year in each of four sample years. As expected, there were significant differences in data availability for the two subgroups. In the case of the FTSE100 firms, we find that only two firms were dissolved, whereas 15 of the firms from FTSE 250 ceased operations.

We complement data retrieved from FAME with data hand collected from firms’ annual reports. When a director’s gender is missing from the database, we consult the annual report to check for pictures of the director and we check references such as he/she, Mr./Mrs., or other titles that may indicate the director’s gender. We also identify the chairperson and which directors are executives by hand collecting data from the annual reports. If no annual reports available online, we remove the observations from the sample. After eliminating observations that do not have the necessary data, we are left with a final sample of 130 unique firms, comprising 499 observations.

 Table 1 presents descriptive statistics for the test variables. The mean value of *%Female* is almost 23 percent, and its maximum value is 57 percent. The chair of the board of directors is female only for three percent of the observations, and the CEO is female for six percent of observations. These figures indicate that having women in leadership roles is not very frequent. The size of the board varies greatly, from 5 to 20 directors. Thus, in some cases, the board has more than 13 directors, which may lead to reduced efficiency (Hartarska and Nadolnyak 2012).

 Table 2 presents Pearson correlations between test variables. Our main variable of interest, *%Female*, is positively and significantly correlated with both financial variables of interest (*ROA* and *Tobin’s Q*), as well as with the other variables representing the presence of females (*%Executive Female*, *Female\_Chair,* and *Female\_CEO*). This provides initial evidence of a positive association between *%Female* and (i) financial performance and (ii) firm value. Both *Board Size* and *Firm* *Size* are significantly and negatively correlated with our financial variables of interest (*ROA* and *Tobin’s Q*).

Figure 1 shows the percentage of female directors sitting on UK boards across industries. Seventeen (17) of 21 industries show a steady, continuous increase in the percentage of female directors. Moreover, in 2018, three industries had already reached the 33 percent target: (i) textiles & clothing manufacturing, with 45 percent; (ii) media & broadcasting, with 40 percent; and (iii) food & tobacco manufacturing, with 35 percent. Overall, the figure shows that the percentage of female directors increased over the sample period, leading us to expect most firms to reach the new target by 2020.

To provide more evidence of this progress over our sample years, we present the mean values of *%Female* across the years and we estimate univariate tests using these means. Figure 2 shows a clear increase over time and presents the results from the t-tests. The p-values are less than 0.01, indicating that, in each year, the mean proportion of female directors is statistically higher than in the previous year.

# **Multivariate results**

## **Main analysis**

 The results from our multiple regression which tests for the rate at which gender diversity increased over our sample periodare presented in Table 3. The three estimated coefficients on the year indicator variables are positive and statistically significant, indicating that there has been a significant increase in the percentage of females on boards of directors of our UK sample firms since 2012 (the base year). Moreover, the coefficient on *Y2018* is larger (11.78) than that on *Y2016* (7.35) or on *Y2014* (3.73). Next, we test the differences between these coefficients to ascertain whether they are statistically significant. We find that the coefficient on *Y2016* is statistically higher than that of *Y2014*, and the coefficient on *Y2018* is statistically higher than that on *Y2016* (the p-value is 0.000 in both cases). The increase from 2012 to 2014 was 3.73 and the increase from 2012 to 2018 was 11.78, so the difference in these coefficients (8.05) reflects a larger increase in more recent years. To compare the difference in recent years with the increase from 2012 to 2014, we divide it in half, obtaining 4.025, which is still higher than 3.73. This suggests the increase in the number of female directors is higher in recent years.

 Although the independent variables *%Executive Female* and *Female\_Chair* have positive and statistically significant coefficients, the estimated coefficient on the indicator variable *Female\_CEO* is not significant. This suggests that if a woman chairs the board of directors, she can positively influence gender diversity. However, if the woman is the CEO, she does not influence board diversity. Finally, we assess the degree of collinearity between variables: all variance inflation factors are below two, which suggests that the coefficients are not biased.[[5]](#footnote-5)

 Next, we present the results from our tests for an association between the percentage of female directors and firm profitability and value. Panel A of Table 4 presents initial results using the pooled sample. We estimate three alternative models for each financial measure (*ROA* and *Tobin’s Q*). In the first model, we consider the associations between *%Female* and the financial measures but we exclude the percentage of executive female directors. In the second model, we include *%Executive Female* instead of *%Female*. Finally, we include both variables in the final model. The results show that all estimated coefficients on *%Female* are positive and statistically significant. However, the level of significance in the first model, where *Tobin’s Q* is the dependent variable, is only marginal. This may be because *ROA*, which is significantly associated with *%Female*, is included in these models and it always has positive and statistically significant coefficients. These coefficients are expected because financial performance positively affects firm value. To assess whether *ROA* mediates the positive association between *%Female* and *Tobin’s Q*, we perform a Sobel test. The value of this statistic is 2.488 and the one-sided p-value is 0.006. This confirms that when using *ROA*, there is an indirect association between *%Female* and *Tobin’s Q*.[[6]](#footnote-6)

As for the control variables, (i) *%Executive Female* is not significantly associated with either *ROA* or *Tobin’s Q*, with the exception of in the *ROA* model that does not include *%Female* (indicating a possible substitution effect), (ii) *Board Size* is not statistically significant, (iii) *Firm Size* has negative estimated coefficients, which are statistically significant at a five percent confidence level in two of the *ROA* models, and (iv) *Leverage* has negative and statistically significant coefficients, but only in the models where *ROA* is the dependent variable.

Panel B of Table 4 presents the results from similar estimations but includes only the two initial years of our sample (2012 and 2014). The estimated coefficients for our variable of interest (*%Female*) are never statistically significant. Thus, we conclude that during this period, the presence of female directors was not associated with firm performance or value. This may be caused by several factors, such as tokenism or the allocation of riskier tasks to women, as discussed in the theory section above.

Panel C of Table 4 presents the results using the two most recent years (2016 and 2018). The coefficients on our main variable of interest (*%Female*) are all positive and statistically significant (albeit only marginally in the first model, where *Tobin’s Q* is the dependent variable, with a p-value of 0.064). Thus, we find a direct association between *%Female* and both financial performance and firm value only in recent years. As in Panel A, the coefficients on *ROA* in the models where *Tobin’s Q* is the dependent variable are positive and statistically significant. This suggests that there may be an indirect association between *%Female* and our market-based measure of performance because female directors are first associated with firm profitability through *ROA*. Therefore, we perform a Sobel test, which confirms this indirect, positive association (Sobel statistic = 2.494, one-sided p-value = 0.006).

In the models where *Tobin’s Q* is the dependent variable, two other control variables (beyond *ROA*) are statistically significant. First, *%Executive Female* is negatively associated with *Tobin’s Q* in the final model. This may indicate that capital market participants only value the presence of non-executive females on the board of directors. Second, the coefficients on *Firm Size* are negative in all the models, as expected.

Next, we present the results from estimating simultaneous equations model using all observations in Table 5.[[7]](#footnote-7) The results show that *%Female* has positive coefficients and is statistically significant in both models. This confirms that *%Female* is associated with both financial measures (i.e., performance and value). As expected, the financial performance measure *ROA* is positively associated with firm value as measured by *Tobin’s Q*. Moreover, the coefficient on *%Executive Female* is negative and significant in the *Tobin’s Q* equation, again suggesting that capital market participants value the presence of female non-executives on the board more than they value the presence of female executives. Future research could further investigate this association to understand its causes and the circumstances in which it arises. Finally, we re-estimate this model using only data from the two most recent years (2016 and 2018). Inferences from untabulated results are consistent with those using all observations. However, estimating the model using only data from 2012 and 2014 results in an insignificant association between *%Female* and *ROA,* but a positive and statistically significant association between *%Female* and *Tobin’s Q*. Thus, the positive association between *%Female* and financial performance is only present in more recent years.

The results discussed above provide evidence of a significant association between the current level of *%Female* and our dependent variables in more recent years. However,Kirsch (2018) suggests that it is not clear how much time must pass for an increase in the proportion of board seats held by females to impact firm performance and for it to be measurable. Given that capital market participants react quickly to firms’ announcements, we believe that our valuation results do not suffer from this problem. However, to assess whether we are correct, we collect data for *ROA* and *Tobin’s Q* for the years 2013, 2015, 2017, 2019, and 2020, and we generate two new sets of variables (*ROA* and *Tobin’s Q* one-year-ahead and two-years-ahead of the independent variables).

The results are present in Table 6. Panel A includes all years and Panel B includes only recent years. We find that all of the estimated coefficients on *%Female* in the *ROA* models are positive and statistically significant. Thus, this variable is associated with higher future financial performance. However, we do not find a positive association between *%Female* and future firm value. This result, taken together with results from Tables 4 and 5, suggests that capital market participants react immediately to the level of gender diversity on the board. Overall, our results provide consistent evidence of with an association between board gender diversity and both current and future performance, and an association between board gender diversity and current firm value.

## **Additional analyses**

As discussed above, several studies find that having three women on the board is the minimum necessary for them to impact the firm (Erkut et al. 2008; Konrad et al. 2008; Torchia et al. 2011). Therefore, we re-estimate our simultaneous equations model replacing *%Female* with *Female\_3*,which is an indicator variable coded as one when there are three or more female directors, and zero otherwise.[[8]](#footnote-8) The results in Table 7 indicate that our financial performance measure (*ROA*) is not associated with *Female\_3*. Given that based on our previous results, we conclude that the percentage of females on boards is associated with *ROA*, it seems that the absolute number of females (in this case, three) is not the relevant aspect of female representation. However, capital market participants seem to value the presence of at least three women on boards, as evidence by the positive and statistically significant coefficient on this variable in the *Tobin’s Q* model. Overall, we conclude that this difference in significance across different financial measures may explain some of the previous mixed results.

As mentioned in the literature review section, a positive outcome of gender quotas can occur because female directors are more independent (Bohren and Staubo 2014). In our sample, we find that there are more independent female directors than executive female directors. Moreover, in 2012, on average, there were 13.93 percent independent females on boards, whereas in 2018, independent females reached 26.37 percent. Thus, we extend the findings in Bohren and Staubo (2014) by showing that an increase in the percentage of independent female directors can also be reached using voluntary targets, at least in the UK.

# **Conclusion**

Advances in the gender diversity of boards are, in several countries, made through the establishment of quotas. However, in other countries, voluntary targets for gender diversity of boards of directors have been set. We investigate whether gender equality and any associated financial benefits (in terms of performance and value) can be achieved without establishing mandatory quotas. Given that the UK established a voluntary target of 33 percent of female directors by 2020 for large firms, the UK provides an ideal setting for our tests.

We collect data from four years after the initial UK report on board diversity (specifically, in 2012, 2014, 2016, and 2018). Our results indicate that the percentage of female directors has been increasing steadily, and that this increase is higher in recent years (2016 and 2018). This suggests that a quota system is not necessary to increase the gender diversity of the boards of directors. These findings should be of interest to governments around the globe as they consider the implementation of gender quotas.

Our analysis of the association between the percentage of female directors and firm financial performance and value indicates that female representation is positively associated with both financial measures, although these associations are only observed in recent years. Moreover, the association between gender diversity and financial performance lasts for at least three years. Combining our results, we conclude that after a voluntary target is set for gender diversity, the female representation increases and firms reap significant financial benefits, on average. Future studies could investigate whether there is a limit to this increase in performance, perhaps when the percentage of females on boards approaches 50 percent. Finally, we find that capital market participants value non-executive female directors more than executive female directors. These results should be of interest to managers and shareholders because they indicate that firms can benefit from increasing the presence of females on their boards, and to analysts and investors who should consider board diversity when making investment decisions.

As is always the case, our study has some limitations. First, because (i) the 2015 Davies Report was not the first gender diversity target set for firms in the UK, (ii) we have no exogenous shock, and (iii) we do not have data for all years, the link between the introduction of the diversity target in 2015 and the increase in gender diversity in UK boards of directors may not be causal. Instead, this increase is associated with firm performance and value. Second, given that our sample includes only large firms (which were subject to the voluntary target), our findings may not generalize to smaller firms. Third, because this study examines outcomes only in the UK, our findings might apply only to countries with similar legal and shareholder protection environments. Finally, because we do not include firm fixed effects in our models (because of the low number of observations per firm), we recognize that some relevant variables may be omitted from our models.

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# ***Appendix – Variable descriptions***

|  |  |
| --- | --- |
| **Variables** | **Description** |
| **Dependent** |  |
| ROA | Return on assets percentage, calculated as (profit/loss before tax / total assets) \* 100, winsorized at 1% extremes  |
| Tobin’s Q | Equity market value / Equity book value, winsorized at 1% extremes  |
| **Independent**  |  |
| %Female | Number of female directors divided by the total number of directors and multiplied by 100 |
| %Executive Female | Number of executive females directors, divided by the total number of directors and multiplied by 100 |
| Female\_Chair | Indicator variable for a female board chair |
| Female\_CEO | Indicator variable for a female CEO |
| Firm Size | Logarithm of turnover, winsorized at 1% extremes |
| Board Size | Total number of directors on the board |
| Leverage | Long-term liabilities / total assets, winsorized at 1% extremes |
| Industry | 21 indicator variables for industries |
| Y2014, Y2016, Y2018 | Indicator year variables |

**Figure 1:** **Percentage of female directors, by year and sector**

**Figure 2:** **Percentage of female directors and tests of differences**

Tests of differences:

* 2014 – 2012 = 4.06% (p-value = 0.0008)
* 2016 – 2014 = 3.65% (p-value = 0.0024)
* 2018 – 2016 = 4.67% (p-value = 0.0001)

**Table 1:** **Descriptive statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables | Mean | Median | Standard deviation | Minimum | Maximum |
| %Female | 22.82 | 22.22 | 10.43 | 0.00 | 57.14 |
| Female\_Chair | 0.03 | 0.00 | 0.18 | 0.00 | 1.00 |
| Female\_CEO | 0.06 | 0.00 | 0.23 | 0.00 | 1.00 |
| %Executive Female | 2.40 | 0.00 | 5.25 | 0.00 | 30.00 |
| ROA | 8.43 | 6.78 | 9.24 | -11.24 | 49.00 |
| Tobins\_Q | 1.83 | 1.35 | 1.53 | 0.74 | 12.47 |
| Board size | 9.84 | 10.00 | 2.23 | 5.00 | 20.00 |
| Firm Size | 6.42 | 6.43 | 0.80 | 4.40 | 8.36 |
| Leverage | 0.30 | 0.28 | 0.21 | 0.00 | 0.90 |

 Note: All variables are defined in the appendix.

**Table 2:** **Correlation table**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| (1) % Female | 1 |  |  |  |  |  |  |  |  |
| (2) %Executive Female | **0.343** | 1 |  |  |  |  |  |  |  |
| (3) Female\_Chair | **0.210** | 0.023 | 1 |  |  |  |  |  |  |
| (4) Female\_CEO | **0.203** | **0.447** | 0.055 | 1 |  |  |  |  |  |
| (5) ROA | **0.124** | **0.145** | 0.032 | -0.032 | 1 |  |  |  |  |
| (6) Tobin’s Q | **0.181** | **0.098** | -0.013 | -0.046 | **0.762** | 1 |  |  |  |
| (7) Board Size | -0.005 | -0.050 | **-0.120** | -0.049 | **-0.183** | **-0.147** | 1 |  |  |
| (8) Firm Size | **0.159** | -0.033 | **-0.173** | 0.011 | **-0.186** | **-0.182** | **0.501** | 1 |  |
| (9) Leverage | -0.043 | -0.033 | -0.085 | -0.023 | **-0.182** | **-0.109** | -0.050 | **0.213** | 1 |

Note: Correlations that are significant at the 5% confidence level are in bold. All variables are defined in the appendix.

**Table 3:** **Ordinary Least Squares model for %Female (H1)**

|  |  |  |
| --- | --- | --- |
|  | Coefficient | P-value |
| **Y2014**  | **3.73** | **0.000** |
| **Y2016** | **7.35** | **0.000** |
| **Y2018** | **11.78** | **0.000** |
| Female\_Chair | 10.68 | 0.000 |
| Female\_CEO | 2.83 | 0.154 |
| %Executive Female | 0.61 | 0.000 |
| Constant | Included |
| Industry FE | Included |
| Number of observations | 499 |
| Adj. R2 | 40.15% |

Note: We use two-tailed tests. All variables are defined in the appendix.

**Table 4:** **Ordinary Least Squares models for performance**

Panel A - Pooled sample (2012, 2014, 2016 and 2018)

|  |  |  |
| --- | --- | --- |
|  | ROA | Tobin’s Q |
| 1 | 2 | 3 | 1 | 2 | 3 |
| Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value |
| **%Female** | **0.188** | **0.001** |  |  | **0.159** | **0.004** | **0.008** | **0.074** |  |  | **0.012** | **0.018** |
| %Executive Female |  |  | 0.236 | 0.043 | 0.126 | 0.264 |  |  | -0.006 | 0.553 | -0.014 | 0.212 |
| Board Size | -0.156 | 0.594 | -0.214 | 0.463 | -0.168 | 0.563 | 0.027 | 0.503 | 0.026 | 0.524 | 0.029 | 0.476 |
| Firm Size | -2.516 | 0.021 | -1.980 | 0.062 | -2.384 | 0.028 | -0.180 | 0.092 | -0.160 | 0.123 | -0.193 | 0.065 |
| Leverage | -9.391 | 0.003 | -9.514 | 0.002 | -9.145 | 0.003 | 0.181 | 0.377 | 0.149 | 0.482 | 0.159 | 0.431 |
| ROA |  |  |  |  |  |  | 0.121 | 0.000 | 0.123 | 0.000 | 0.121 | 0.000 |
| Constant | Included | Included | Included | Included | Included | Included |
| Industry and year FE | Included | Included | Included | Included | Included | Included |
| Number of obs. | 499 | 499 | 499 | 499 | 499 | 499 |
| Adj. R2 | 22.96% | 21.41% | 23.21% | 62.40% | 62.21% | 62.50% |

Note: We use two-tailed tests. All variables are defined in the appendix.

Panel B – Initial years (2012 and 2014)

|  |  |  |
| --- | --- | --- |
|  | ROA | Tobin’s Q |
| 1 | 2 | 3 | 1 | 2 | 3 |
| Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value |
| **%Female** | **0.063** | **0.411** |  |  | **0.065** | **0.450** | **0.005** | **0.449** |  |  | **0.003** | **0.717** |
| %Executive Female |  |  | 0.041 | 0.755 | -0.007 | 0.960 |  |  | 0.013 | 0.190 | 0.011 | 0.292 |
| Board Size | 0.691 | 0.844 | 0.072 | 0.840 | 0.069 | 0.845 | -0.009 | 0.814 | -0.009 | 0.809 | -0.009 | 0.807 |
| Firm Size | -3.745 | 0.001 | -3.639 | 0.002 | -3.754 | 0.002 | -0.011 | 0.922 | 0.007 | 0.953 | 0.002 | 0.988 |
| Leverage | -16.206 | 0.000 | -16.145 | 0.000 | -16.220 | 0.000 | 0.377 | 0.250 | 0.404 | 0.221 | 0.398 | 0.233 |
| ROA |  |  |  |  |  |  | 0.129 | 0.000 | 0.129 | 0.000 | 0.129 | 0.000 |
| Constant | Included | Included | Included | Included | Included | Included |
| Industry and year FE | Included | Included | Included | Included | Included | Included |
| Number of obs. | 245 | 245 | 245 | 245 | 245 | 245 |
| Adj. R2 | 28.24% | 27.94% | 27.92% | 64.47% | 64.55% | 64.40% |

Note: We use two-tailed tests. All variables are defined in the appendix.

Panel C – Recent years (2016 and 2018)

|  |  |  |
| --- | --- | --- |
|  | ROA | Tobin’s Q |
| 1 | 2 | 3 | 1 | 2 | 3 |
| Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value |
| **%Female** | **0.308** | **0.000** |  |  | **0.254** | **0.002** | **0.014** | **0.064** |  |  | **0.022** | **0.017** |
| %Executive Female |  |  | 0.394 | 0.013 | 0.226 | 0.128 |  |  | -0.023 | 0.133 | -0.035 | 0.039 |
| Board Size | -0.313 | 0.375 | -0.514 | 0.132 | -0.349 | 0.302 | 0.071 | 0.176 | 0.066 | 0.200 | 0.077 | 0.131 |
| Firm Size | -1.492 | 0.259 | -0.442 | 0.727  | -1.293 | 0.324 | -0.354 | 0.012 | -0.305 | 0.025 | -0.380 | 0.008 |
| Leverage | -3.733 | 0.192 | -4.520 | 0.127 | -3.307 | 0.242 | 0.127 | 0.588 | -0.005 | 0.984 | 0.072 | 0.767 |
| ROA |  |  |  |  |  |  | 0.117 | 0.000 | 0.126 | 0.000 | 0.120 | 0.000 |
| Constant | Included | Included | Included | Included | Included | Included |
| Industry and year FE | Included | Included | Included | Included | Included | Included |
| Number of obs. | 254 | 254 | 254 | 254 | 254 | 254 |
| Adj. R2 | 17.89% | 13.67% | 19.19% | 58.82% | 58.79% | 59.97% |

Note: We use two-tailed tests. All variables are defined in the appendix.

**Table 5**: **Simultaneous equations model**

|  |  |  |
| --- | --- | --- |
|  | ROA | Tobin’s Q |
| Coeff. | P-value | Coeff. | P-value |
| **%Female** | **0.332** | **0.003** | **0.069** | **0.000** |
| %Executive Female |  |  | -0.054 | 0.000 |
| Board size |  |  | 0.040 | 0.133 |
| Firm size | -3.003 | 0.000 | -0.278 | 0.001 |
| Leverage | -8.580 | 0.000 | 0.624 | 0.014 |
| ROA |  |  | 0.141 | 0.000 |
| Constant | Included | Included |
| Industry FE | Included |  |
| Year FE | Included | Included |
| Number of obs. | 499 | 499 |
| R2 | 25.21% | 50.93% |

Note: We use two-tailed tests. All variables are defined in the appendix.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ROA**(t+1)** | ROA**(t+2)** | Tobin’s Q**(t+1)** | Tobin’s Q**(t+2)** |
| Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value |
| **%Female** | **0.215** | **0.000** | **0.139** | **0.021** | **-0.092** | **0.332** | **-0.032** | **0.521** |
| %Executive Female | 0.008 | 0.941 | 0.027 | 0.803 | 0.212 | 0.256 | 0.034 | 0.609 |
| Board Size | 0.058 | 0.845 | -0.249 | 0.420 | 0.484 | 0.402 | 0.221 | 0.191 |
| Firm Size | -2.616 | 0.012 | -2.122 | 0.069 | -2.138 | 0.209 | -0.877 | 0.042 |
| Leverage | -5.934 | 0.046 | -5.057 | 0.107 | -11.479 | 0.054 | 1.549 | 0.314 |
| ROA |  |  |  |  | 0.417 | 0.186 | 0.191 | 0.009 |
| Constant | Included | Included | Included | Included |
| Industry and year FE | Included | Included | Included | Included |
| Number of obs. | 490 | 483 | 449 | 475 |
| Adj. R2 | 18.84% | 17.44% | 6.80% | 0.43% |

**Table 6**: **Using Future ROA and Tobin’s Q**

Panel A - Pooled sample (2012, 2014, 2016 and 2018)

Note: We use two-tailed tests. All variables are defined in the appendix.

Panel B – Recent years (2016 and 2018)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ROA**(t+1)** | ROA**(t+2)** | Tobin’s Q**(t+1)** | Tobin’s Q**(t+2)** |
| Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value |
| **%Female** | **0.287** | **0.001** | **0.195** | **0.050** | **-0.084** | **0.483** | **-0.069** | **0.555** |
| %Executive Female | 0.102 | 0.473 | 0.103 | 0.483 | 0.235 | 0.344 | 0.062 | 0.660 |
| Board Size | -0.302 | 0.412 | -0.555 | 0.163 | 0.413 | 0.655 | 0.569 | 0.142 |
| Firm Size | -1.085 | 0.362 | -0.503 | 0.723 | -2.773 | 2.190 | -2.064 | 0.044 |
| Leverage | -2.712 | 0.357 | -3.420 | 0.351 | -11.538 | 0.039 | 1.621 | 0.576 |
| ROA |  |  |  |  | 0.373 | 0.323 | 0.292 | 0.046 |
| Constant | Included | Included | Included | Included |
| Industry and year FE | Included | Included | Included | Included |
| Number of obs. | 248 | 243 | 229 | 235 |
| Adj. R2 | 17.29% | 16.23% | 1.74% | 0.43% |

Note: We use two-tailed tests. All variables are defined in the appendix.

**Table 7**: **Simultaneous equations model with *Female\_3***

|  |  |  |
| --- | --- | --- |
|  | ROA | Tobin’s Q |
| Coeff. | P-value | Coeff. | P-value |
| **Female\_3** | **2.653** | **0.249** | **1.326** | **0.000** |
| %Executive Female |  |  | -0.034 | 0.002 |
| Board size |  |  | -0.068 | 0.060 |
| Firm size | -2.991 | 0.000 | -0.273 | 0.001 |
| Leverage | -9.730 | 0.000 | 0.444 | 0.070 |
| ROA |  |  | 0.138 | 0.000 |
| Constant | Included | Included |
| Industry FE | Included |  |
| Year FE | Included | Included |
| Number of obs. | 499 | 499 |
| R2 | 25.02% | 53.33% |

Note: We use two-tailed tests. All variables are defined in the appendix.

1. In 2018 the Financial Reporting Council’s UK Corporate Governance Code was updated and it now promotes diversity in appointments and succession plans. Because this change took effect in January of 2019, incorporating data from 2020 into our tests could bias our inferences. [↑](#footnote-ref-1)
2. The importance of the national context in which a firm operates is also noted in Kirsch (2018). [↑](#footnote-ref-2)
3. 2012 and 2014 are after the initial Lord Davis Report and 2016 and 2018 are after the second report. We exclude the years 2013 and 2017 for two reasons. First, changes in board composition tend to occur slowly and second, excluding these two years reduces the amount of hand collection required. [↑](#footnote-ref-3)
4. Adams (2016, 373) discusses that not controlling for firm size can affect the results, stating that “if we do not properly account for firm size, correlations between diversity and corporate outcomes will also reflect correlations with firm size. In this case, the magnitudes of the correlations suffer from “omitted variable bias” and it may be difficult to determine the magnitude of the causal effect of diversity”. [↑](#footnote-ref-4)
5. Although we have a low number of observations per firm, we also estimate the model using firm-fixed effects. The inferences are robust to this specification. In these untabulated results, the estimated coefficient on *Y2014* is 3.88 (p-value = 0.000), the estimated coefficient on *Y2016* is 7.57 (p-value = 0.000), and the estimated coefficient on *Y2018* is 12.12 (p-value = 0.000). Moreover, the independent variables *%Executive Female* and *Female\_Chair* have positive and statistically significant coefficients, as in the tabulated results. [↑](#footnote-ref-5)
6. Although we have a low number of observations per firm, we also estimate these models with firm-fixed effects. We find that our inferences are not robust to this specification. In these untabulated results, the estimated coefficients on *%Female* are not statistically different from zero, with p-values from two-tailed tests of 0.609 (in the *ROA* model) and of 0.205 (in the *Tobin’s Q* model). [↑](#footnote-ref-6)
7. In the simultaneous equations model, we remove two independent variables (*%Executive Female* and *Board Size*)from the first model and industry fixed effects from the second model. Neither *%Executive Female* nor *Board Size* have theoretical links to the dependent variable – the first variable is considered in our study because the presence of women in leadership roles may lead to an increase of females on the board and the second may lead to more resources but lower efficiency. Moreover, because the industry effects on firm profitability are included in the *ROA* model, these effects on value are controlled for. [↑](#footnote-ref-7)
8. The mean value of this indicator variable is 0.541. Thus, in our sample, more than half of the observations have at least three female directors. However, these observations are not uniformly distributed across the years. In fact, in 2012, only 36 percent of the observations had more than three female directors, whereas in 2018 this percentage had increased to 76. [↑](#footnote-ref-8)