



# Institutional investors, non-mandatory regulations, and board gender diversity

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## ABSTRACT

This study investigates the interaction between institutional investors and non-mandatory regulations, specifically, their impact on board gender diversity. Using a sample of UK FTSE All-Share firms from 2000 to 2017, we find that higher institutional ownership leads to higher female director representation on boards. We also find that this effect is more pronounced after the Davies intervention, a campaign promoting gender balance on British corporate boards. The findings highlight the complementary role of institutional investors and the Davies intervention in shaping board gender diversity, thereby offering insightful implications for shareholder perspectives and demand for board diversity.

## 1. Introduction

“Shareholders just aren’t interested in the make-up of the board, so why should we be?”

This is one of the top ten excuses made for not appointing women to boards, as suggested by the Hampton-Alexander Review (2018, p.23). This study tackles this excuse and asks: Do shareholders care about board gender composition? We focus on institutional investors because these shareholders have vital ownership of equity capital and voting rights (Dyck et al., 2019).

The extant literature suggests that institutional investors can monitor and intervene in corporate governance, but the free-rider problem discourages them from doing so (Ferreira and Matos, 2008; Aggarwal et al., 2011; Lel, 2019; McCahery et al., 2016; Shleifer and Vishny, 1986). Despite these challenges, there is a growing advocacy for gender-diverse boards among institutional investors and proxy advisory firms (Goodman and O’Kelly, 2017; Douglas et al., 2022). While gender-diverse boards may face integration challenges, they can also increase monitoring, foster innovation, and enhance the informativeness of stock prices, especially in firms with weak corporate governance (Baysinger and Butler, 1985; O’Reilly et al., 1999; Adams and Ferreira, 2009; Gul et al., 2011; Griffin et al., 2021). Therefore, this study hypothesizes a positive association between institutional ownership and board gender diversity.

The UK’s voluntary approach to gender diversity on corporate boards provides an ideal setting to examine the interplay between institutional investors and non-mandatory regulations (i.e., soft law), such as the Davies intervention. In specific, this study explores whether institutional investors and the Davies intervention complement or substitute each other in promoting board gender diversity. On the one hand, institutional investors may comply with soft law norms to enhance their legitimacy and prepare for potential legal

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changes. On the other hand, they may take on a substitutionary role, promoting improved governance in the absence of soft law, resulting in companies with strong institutional investors feeling less need to comply with the Davies intervention. Thus, this study hypothesizes that the association between institutional ownership and board gender diversity strengthens after the implementation of the Davies intervention.

This study contributes to the literature in several ways. First, this study extends the literature on the impact of institutional investors on corporate governance (e.g., Dyck et al., 2019) by showing that they can influence corporate board composition. Second, we add to the general literature on board gender diversity by highlighting the pivotal role as determinants of this diversity. While previous research has yielded mixed results on the influence of gender diversity on shareholder wealth, our findings indicate that institutional investors drive gender diversity, implying that shareholders perceive such diversity as beneficial. Finally, our study sheds light on the complementary role of institutional investors and soft law in promoting board gender diversity, thereby providing a new understanding of the dynamics of enhancing board diversity and improving corporate governance.

## 2. Background and hypotheses development

There are two contrasting perspectives on the relation between institutional investors and board gender diversity. On the one hand, existing research underlines the benefits of female directors, who are more likely to be engaged in monitoring activities such as holding CEOs accountable (Adams and Ferreira, 2009). Gender-diverse boards also foster innovation (Griffin et al., 2021) and enhance stock informativeness, particularly in firms with weak governance (Gul et al., 2011). These attributes are generally favorable to investors. One effective approach, chosen increasingly by investors to improve corporate governance, is to advocate for greater board gender diversity. From the standpoint of institutional investors—sophisticated stakeholders with both resources and motivation to oversee and influence managerial decisions—these proactive steps align well with their objectives of enhancing corporate governance (Ferreira and Matos, 2008; Aggarwal et al., 2011; Lel, 2019). This is supported by surveys indicating that institutional investors are particularly active when faced with issues concerning corporate governance or strategy (McCahery et al., 2016). Additionally, anecdotal evidence suggests a rising trend among both institutional investors and proxy advisory firms in advocating for boards with greater gender diversity (Goodman and O’Kelly, 2017; Douglas et al., 2022).

On the other hand, the incorporation of diverse boards may pose challenges. Female directors may encounter isolation within male-dominated boards due to the human tendency to trust and build relationships with similar individuals. Board heterogeneity may also result in diminished information sharing, increased disagreements, and a lack of consensus on shared objectives (O’Reilly et al., 1999). Additionally, some firms may appoint female directors on their boards merely as tokens, undermining the potential benefits of diversity (Baysinger and Butler, 1985; Bourez, 2005; Branson, 2006). Given these conflicting viewpoints, the relation between institutional investors and board gender diversity is unclear *ex-ante*. Thus, our first hypothesis is as follows:

**H1.** There is a positive association between institutional ownership and board gender diversity.

The UK provides an ideal context for this study. Unlike certain European countries, such as Norway and Spain, which mandate quotas for female representation on boards, the UK employs a voluntary approach, allowing companies to select from various board gender structures. Lord Davies’ “Women on Boards” report in 2011 advocated for FTSE 100 companies to aim for a minimum of 25% female board member representation by 2015, a target that was achieved. Consequently, the target was revised to 33% by 2020 for FTSE 350 companies’ boards (Davies, 2011). This non-mandatory setting presents an ideal opportunity to observe both the potential impact of institutional investors on board composition and the interplay between institutional investors and soft law: Are they substitutionary or complementary?

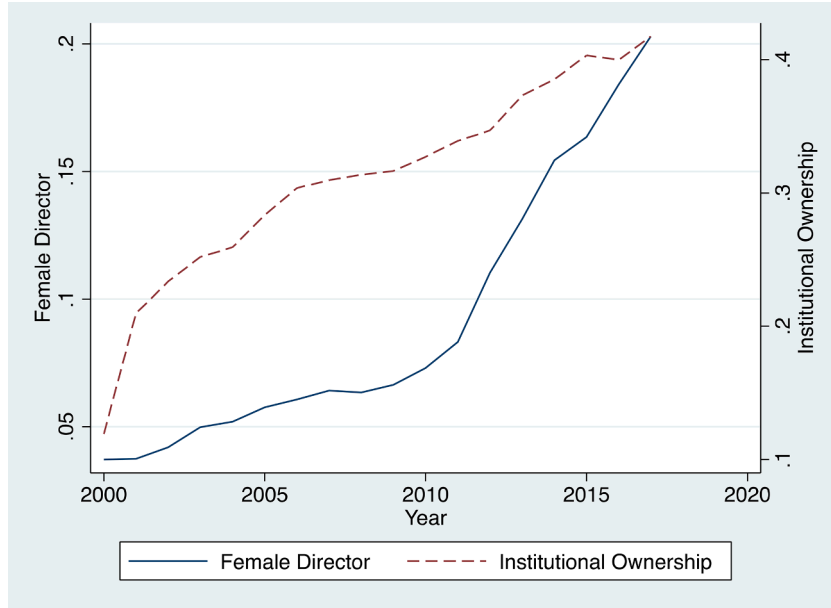
Influences shaping corporate governance may view institutional investors and soft law as both complementary and substitutionary. On the one hand, legitimacy theory posits that organizations strive to conform to societal and stakeholder norms and expectations to maintain their legitimacy (Suchman, 1995). Thus, institutional investors may be more responsive to soft laws. Although non-binding, soft law offers norms and recommendations to guide institutional investors’ engagement with firms (Aguilera and Cuervo-Cazurra, 2004). By adhering to soft laws, i.e., the Davies intervention, institutional investors can demonstrate their commitment to sound corporate governance, thereby gaining legitimacy and enhancing their reputations. Furthermore, soft laws often precede hard laws. Thus, compliance with soft law provides institutional investors with the opportunity to anticipate and prepare for potential legislative changes, thereby gaining a potential competitive advantage (Terjesen et al., 2015).

On the other hand, soft law and institutional investors may serve substitutionary roles that influence corporate behavior. Good governance codes aim to enhance overall corporate governance, particularly when other mechanisms fall short (Aguilera and Cuervo-Cazurra, 2004). The active role of institutional investors in promoting improved governance could substitute for the role of soft law. In the absence of the Davies intervention, institutional investors can serve as an alternative force, advocating for increased board gender diversity in their investment firms, and thereby encouraging greater accountability and oversight. Consequently, companies with strong institutional investors might feel less need to respond to interventions like Davies review. Hence, our second hypothesis is as follows:

**H2.** The positive association between institutional ownership and board gender diversity is stronger after Davies intervention.

**Table 1**  
Descriptive statistics.

Variable	Number	Mean	Std Dev	P25	Median	P75
<i>Female_Director</i>	6859	0.083	0.100	0.000	0.000	0.143
<i>IO</i>	6859	0.307	0.146	0.196	0.309	0.413
$\log(\text{Total\_Assets})$	6859	20.089	2.021	18.694	19.863	21.258
<i>Tobin's_Q</i>	6859	1.798	1.222	1.080	1.420	2.040
<i>Leverage</i>	6859	0.322	0.293	0.07	0.287	0.474
<i>ROA</i>	6859	0.049	0.114	0.017	0.059	0.100
$\log(\text{Board\_Size})$	6859	2.176	0.266	1.946	2.197	2.303
<i>Independent_Director</i>	6859	0.494	0.153	0.400	0.500	0.600
<i>Average(Director_Age)</i>	6859	55.018	3.626	52.667	55.182	57.444



**Fig. 1.** Time series trend of institutional ownership and board gender diversity.

**3. Data and methodology**

**3.1. Methodology**

We estimate the following regression model to test H1:

$$Female\_Director_{i,t+1} = \alpha + \beta^{IO} \times IO_{i,t} + \sum_{j=1}^N \gamma^j \times CONTROL_{i,t}^j + Firm\ Fixed\ Effect + Year\ Fixed\ Effect + \epsilon_{i,t} \tag{1}$$

where *i* and *t* refer to firm and year, respectively; *Female\_Director* is the percentage of female directors on a board; *IO* is the percentage of institutional ownership; and *CONTROL* refers to a set of firm characteristics: firm size ( $\log(\text{Total\_Assets})$ ), firm value (*Tobin's\_Q*), firm's financial risk (*Leverage*), firm performance (*ROA*), and corporate governance characteristics, namely, the size of the board ( $\log(\text{Board\_Size})$ ), the percentage of independent directors (*Independent\_Director*), and the average age of directors (*Average(Director\_Age)*). We apply lead-lag regressions to mitigate reverse causality issues and employ firm-fixed effects to mitigate issues relating to unobservable time-invariant omitted variables.

Then, we further test H2 by estimating the following regression model:

$$Female\_Director_{i,t+1} = \alpha + \beta^{IO} \times IO_{i,t} + \beta^{IO \times POST} \times IO_{i,t} \times Post_{i,t} + \beta^{POST\_Davies} \times Post\_Davies_{i,t} + \sum_{j=1}^N \gamma^j \times CONTROL_{i,t}^j + Firm\ Fixed\ Effect + Year\ Fixed\ Effect + \epsilon_{i,t} \tag{2}$$

Where *Post* is a dummy variable equal to one for FTSE350 firms after the Davies intervention in 2010. *Post\_Davies* is a dummy variable

**Table 2**  
The effect of institutional ownership on board gender diversity.

	<i>Female_Director</i> <sub>t+1</sub>	
	(1)	(2)
<i>IO</i> <sub>t</sub>	0.056*** (5.18)	0.033*** (2.79)
<i>Post</i> <sub>t</sub>		0.019*** (2.65)
<i>IO</i> <sub>t</sub> * <i>Post</i> <sub>t</sub>		0.040** (2.47)
<i>Post</i> <sub>t</sub> * <i>Davis</i> <sub>t</sub>		0.123*** (18.14)
$\log(\text{Total\_Assets})_t$	0.008*** (4.08)	0.006*** (3.33)
<i>Tobin's-Q</i> <sub>t</sub>	0.001 (1.01)	0.001 (0.71)
<i>Leverage</i> <sub>t</sub>	0.001 (0.19)	0.003 (0.56)
<i>ROA</i> <sub>t</sub>	0.006 (0.64)	0.010 (1.07)
$\log(\text{Board\_Size})_t$	0.009 (1.50)	0.012* (1.86)
<i>Independent_Director</i> <sub>t</sub>	0.068*** (7.75)	0.058*** (6.63)
<i>Average(Director_Age)</i> <sub>t</sub>	-0.003*** (-8.04)	-0.003*** (-7.71)
Intercept	-0.016 (-0.41)	0.007 (0.18)
No. of Observations	6859	6859
Adj. R-sq	0.31	0.32
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes

Notes: All continuous variables are winsorized at the 1st and 99th percentiles. T-statistics reported in parentheses are based on robust standard errors. \*, \*\* and \*\*\* stand for significance at the 10%, 5% and 1% levels, respectively.

equal to one for the years after the Davies intervention.

### 3.2. Data

The data are obtained from different sources: board and corporate governance characteristics from Boardex, institutional holdings data from Factset/LionShares, and firm-level characteristics from Worldscope.

The sample consists of all firms in the UK FTSE All-Share Index. After excluding firms with missing data, the final sample consists of 6859 firm-year observations from 2000 to 2017. Table 1 presents the descriptive statistics.

## 4. Results

Fig. 1 shows the time series evolution of board gender diversity and institutional ownership from 2000 to 2017. We find that the average percentage of female directors on boards increases from 3.7% in 2000 to 20.3% in 2017. The steepest increase occurred around 2011, probably because of the Davies intervention. We also observe a dramatic increase in institutional ownership, from 11.9% in 2000 to 41.7% in 2017. The figure shows an initial correlation between board gender diversity and institutional ownership.

Table 2 presents the results of the main regression analyses. Column (1) shows a significant and positive relationship between institutional ownership and female directors on boards (a positive coefficient on *IO*), suggesting that institutional investors seek higher gender diversity on boards, consistent with H1. One standard deviation change in institutional ownership is associated with an increase in the number of female directors on boards of approximately 10% of the mean level shown in Table 1.

We then investigated the role of the Davies intervention in this relationship. The results in Column (2) provide two indications. First, the Davies intervention can indeed increase the percentage of female directors on boards, reflected by a positive coefficient on *Post*. More importantly, the effect of institutional ownership is stronger after the Davies intervention (a positive coefficient on *IO* \* *Post*), consistent with H2. Specifically, we find that one standard deviation change in institutional ownership is associated with an increase in the number of female directors on boards of around 13% of the mean level after the Davies intervention. The results suggest that although the Davies intervention was not a mandatory regulatory move, it effectively stimulated institutional investors' attention and, therefore, their demand for more female directors on boards. In short, the Davies intervention and institutional ownership are complements in the effort to increase board gender diversity.

**Table 3**  
Endogeneity tests.

	<u>Female_Director<sub>t+1</sub></u>	<u>IO<sub>t+1</sub></u>	<u>Female_Director<sub>t+1</sub></u>	<u>Female_Director<sub>t+1</sub></u>
	(1)	(2)	(3)	(4)
$IO_t$	0.036*** (4.16)	0.612*** (58.90)	0.044*** (3.04)	
$Female\_Director_t$	0.644*** (61.92)	-0.015 (-1.19)		
$Predicted\_IO_t$				0.047** (1.99)
$\log(Total\_Assets)_t$	0.004** (2.34)	0.004** (2.25)	0.006** (2.25)	0.008*** (4.08)
$Tobin's\_Q_t$	0.002* (1.81)	0.000 (0.26)	0.001 (0.73)	0.001 (1.03)
$Leverage_t$	0.002 (0.56)	-0.002 (-0.54)	-0.001 (-0.18)	0.001 (0.13)
$ROA_t$	0.004 (0.59)	0.042*** (4.65)	-0.005 (-0.36)	0.006 (0.68)
$\log(Board\_Size)_t$	-0.006 (-1.20)	-0.004 (-0.74)	0.013 (1.58)	0.009 (1.51)
$Independent\_Director_t$	0.018*** (2.66)	0.023*** (2.70)	0.076*** (6.14)	0.069*** (7.68)
$Average(Director\_Age)_t$	-0.000 (-0.45)	-0.001** (-1.99)	-0.002*** (-4.43)	-0.003*** (-8.05)
Intercept	-0.052 (-1.64)	0.092** (2.41)	-0.030 (-0.50)	-0.020 (-0.49)
F-statistic				10.700
No. of Observations	6859	6859	3944	6859
Adj. R-sq	0.57	0.56	0.13	0.37
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes

Notes: All continuous variables are winsorized at the 1st and 99th percentiles. T-statistics reported in parentheses are based on robust standard errors. \*, \*\* and \*\*\* stand for significance at the 10%, 5% and 1% levels, respectively.

## 5. Additional analysis

### 5.1. Endogeneity tests

While our main model specification applies lead-lag regression with firm fixed effects, one may still concern about the endogeneity. For example, instead of asking for more female directors on the boards of firms that they already own, institutional investors might be attracted to acquiring shares in firms with *ex-ante* good board gender diversity. To help rule out such concerns, we applied three econometric approaches. First, we adopt the Granger causality test. Specifically, we estimate two symmetric sets of regressions: first, similar to our baseline results, we regress  $Female\_Director_{t+1}$  on  $IO_t$ ,  $Female\_Director_t$ , and control variables; second, to test for reverse causality, we regress  $IO_{t+1}$  on  $IO_t$ ,  $Female\_Director_t$ , and control variables. The results in Column (1) of Table 3 confirm our baseline results that institutional investors influence board gender diversity. However, we do not find a reverse causal relationship to be true. Column (2) of Table 3 shows that institutional ownership is not affected by the level of gender diversity on boards. These results indicate that institutional investors' engagement in corporate decisions is more likely to be the primary driver of board gender diversity than their self-selection into firms with diverse boards.

Second, we rely on the propensity score matching (PSM) to control for self-selection bias. We apply PSM to assemble a matched sample using nearest-neighbor matching without replacement and with a caliper width of 0.001. The propensity score is calculated as the predicted probabilities from a logit model in which the dependent variable is  $IO\_Dummy$ , a dummy variable set to one if a firm's  $IO$  exceeds the 50th percentile in a given year and zero otherwise. Column (3) of Table 3 presents the regression analysis for the matched sample. Consistent with previous empirical findings, the estimated coefficient on  $IO$  is positive and significant.

Our third identification method is the two-stage least squares (2SLS) estimation. We specify the median of institutional ownership of firms in the same two-digit SIC industry classification and size quartiles as our instruments for the corresponding institutional ownership variables. Column (4) of Table 3 reports the results of the second-stage regressions estimating Eq. (1), with the independent variables of interest replaced by their fitted values from the first-stage regressions. The coefficient estimates on instrumented  $IO$  remain positive and statistically significant.<sup>1</sup>

<sup>1</sup> The F-statistic is statistically significant (10.700 as shown in Table 3), lending support for the joint relevance of our instruments in the first-stage regressions.

**Table 4**  
Additional tests.

	<i>Female_Director</i> <sub>t+1</sub>		
	(1)	(2)	(3)
<i>IO</i> <sub>t</sub>	0.056*** (5.18)	0.030** (2.33)	0.053** (2.31)
<i>Post</i> <sub>t</sub>		0.018** (2.43)	
<i>IO</i> <sub>t</sub> × <i>Post</i> <sub>t</sub>		0.043** (2.50)	
<i>Crisis</i> <sub>t</sub>	0.025*** (4.53)	0.028*** (4.05)	
<i>IO</i> <sub>t</sub> × <i>Crisis</i> <sub>t</sub>		0.009 (0.57)	
<i>ASV</i> <sub>t</sub>			0.134*** (8.81)
<i>IO</i> <sub>t</sub> × <i>ASV</i> <sub>t</sub>			0.160*** (4.61)
<i>Post_Davis</i> <sub>t</sub>		0.123*** (18.05)	
<i>Tobin's-Q</i> <sub>t</sub>	0.001 (1.01)	0.001 (0.71)	0.001 (0.51)
<i>Leverage</i> <sub>t</sub>	0.001 (0.19)	0.003 (0.56)	0.011 (1.13)
<i>ROA</i> <sub>t</sub>	0.006 (0.64)	0.010 (1.06)	0.035* (1.75)
$\log(\text{Board\_Size})_t$	0.009 (1.50)	0.012* (1.86)	0.016 (1.25)
<i>Independent_Director</i> <sub>t</sub>	0.068*** (7.75)	0.058*** (6.61)	0.069*** (3.73)
<i>Average(Director_Age)</i> <sub>t</sub>	-0.003*** (-8.04)	-0.003*** (-7.71)	-0.006*** (-6.81)
Intercept	-0.016 (-0.41)	0.008 (0.19)	0.192 (1.59)
No. of Observations	6859	6859	2664
Adj. R-sq	0.31	0.32	0.14
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Notes: All continuous variables are winsorized at the 1st and 99th percentiles. T-statistics reported in parentheses are based on robust standard errors. \*, \*\* and \*\*\* stand for significance at the 10%, 5% and 1% levels, respectively.

## 5.2. Robustness tests

Next, we explore whether the impact of *IO* on board gender diversity depends on the specific settings. The financial crisis might impact the necessity for monitoring, and consequently, the demand for a more gender-diverse board. Considering the timeline overlap, it is a valid concern that the financial crisis rather than the Davies intervention may drive board gender diversity. Thus, we incorporated the financial crisis period from 2007 to 2009, following Chen et al. (2019), in our regression models (our results remain robust if we adjust the crisis period to 2007–2008 or 2007–2010). As reported in Columns (1) and (2) of Table 4, we find that the crisis does influence board gender diversity. However, firms with higher institutional ownership do not necessarily increase their board gender diversity during the crisis period. Most importantly, our main results remain even when considering the effect of the crisis.

We then examine public attention on the Davies intervention as an alternative measure for *POST* capturing direct public pressure on board gender diversity. We calculate the abnormal Google search volume following Bijl et al. (2016) and Kim et al. (2019). We first obtain the weekly search volume (*WSV*) for all keywords: board gender diversity, boardroom diversity, female directors, gender diversity, Lord Davies report, women on boards, and women on the board. Then, we obtain the weekly abnormal search volume using  $WASV_t = \frac{WSV_t - \frac{1}{n} \sum_{i=1}^n WASV_i}{\sigma_{WSV}}$  where *n* is the number of weeks of *WSV* observations and  $\sigma_{WSV}$  is the full-sample standard deviation of *WSV*. Finally, we calculate the average of *WASV* for each year to obtain the annual *ASV*. We re-estimate Eq. (2) by replacing *Post* with *ASV* and only consider the post-Davies intervention period (after 2010). As reported in Column (3) of Table 4, our main inferences remain.

## 6. Conclusion

Using a comprehensive sample of UK listed firms from 2000 to 2017, we find strong evidence that institutional investors push for more gender-diverse boards. We also find that a gender campaign stimulated institutional investors' demand for female directors, despite its voluntary nature. Taken together, our results suggest that institutional investors care about gender diversity on boards and ask firms to step up in this aspect.

## CRedit authorship contribution statement

**Xi Fu:** Data curation, Writing – original draft, Writing – review & editing. **Yiwei Li:** Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Zhifang Zhang:** Conceptualization, Data curation, Writing – original draft, Writing – review & editing.

## Declaration of Competing Interest

None.

## Data availability

Data will be made available on request.

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