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Variety is the Spice of Life – and Boardrooms

Abstract
We examine the impact of board diversity on both the corporate value and equity risk of British companies since the financial crisis. We find that the inclusion of overseas directors on boards improves market value and reduces equity risk. When the number of female directors included on the board reaches a critical mass this also increases corporate value but has no effect on risk. These findings do not change when we allow for the presence of board members who are qualified accountants or who hold MBAs. Diversity in and of itself has a significant effect on corporate performance.

Keywords
corporate value, risk, board diversity, gender, nationality

JEL Classifications
G34, J15, J16

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Introduction

Corporate governance regulation in the UK (Financial Reporting Council, 2012) stresses the need for boards to be balanced in terms of independence, skills, experience and knowledge. Much empirical research in corporate governance has focussed on the relationship between board independence and corporate performance, but in some cases the hypothesised positive relationship has not been observed (see for example Agrawal and Knoeber, 1996 and Vafeas and Theodorou, 1998). Over the years researchers have started to explore other areas of board diversity, and have found that corporate performance, measured in a variety of ways, is better when boards are diverse in terms of the gender (Carter *et al.*, 2010, Erhardt *et al.*, 2003 and Campbell and Minguez-Vera, 2007), ethnicity (Miller and Triana, 2009) and nationality (Masulis *et al.*, 2012, Oxelheim and Randøy, 2003 and Rose *et al.*, 2013) of directors. These findings may be related to balance in terms of educational and professional background and experience. Ruigrok *et al.* (2007) find that there are significant differences in the educational background of the women and men, and in the experience of foreign and domestic directors on Swiss boards.

In the UK there is a lot of interest in gender diversity on boards and increasing regulatory pressure to appoint more female directors. In 2009 the 30% Club was formed with the aim of achieving female board representation of 30% by 2015. 30% was chosen because it represents a critical mass at which "minority" groups are able to function without being seen simply as representatives of their minority. In 2011 the EU Justice Commissioner announced the same goal for companies in the EU, with a further increase to 40% by 2020. The Norwegian government had already gone further than this. In 2003 it passed a law introducing a 40% quota which became mandatory in 2008. In the UK the latest version of the UK Corporate Governance Code (Financial Reporting Council, 2012) includes recommendations on diversity, and the updated Davies Report (Davies, 2013) suggests a target of 25% female representation on the boards of FTSE 100 companies by 2015 and urges the chairs of FTSE 350 companies to lay down their own aspirational goals.

There are two distinct arguments in favour of diversity. The first rests on the logic of fairness in the representation of particular groups in decision-making bodies. As Lord Davies puts it (Davies, 2013), it does not make sense for a group that makes up more than half of the general population and nearly half of the working population, to play a relatively small role in decision-making in the highest echelons of the business world. The second argument is based on the idea that companies are missing out on a large talent pool that could contribute to improved performance. This argument could be extended to foreign directors who may have expertise in

relation to overseas markets, regulation and institutions, which could be valuable to companies operating in those markets.

While there is an extensive literature on the relationship between board composition and corporate performance measured in both accounting and market terms, there is relatively little evidence on the effects of board composition on corporate risk-taking. We do know however that in general terms women are more risk-averse than men (Charness and Gneezy, 2012) and that women make fewer trades in experimental markets (Fellner and Maciejovsky, 2007). Some authors (Huang and Kisgen, 2013, and Levi *et al.*, 2013) have found that boards with more female members make fewer takeover bids, which could indicate greater risk aversion, although Ahern and Dittmar (2012) find the opposite in the case of Norway, where as we have already seen, a quota system ensures that 40% of board members are women.

The novelty of this paper is that we examine the relationships between both corporate value and risk and gender and national diversity in British boards since the financial crisis that started in 2007/8. In our balanced panel of FTSE350 firms we see that female board representation has increased significantly since 2007 while the proportion of overseas directors has been stable but remains higher than the proportion of women on boards. We find that no matter how we measure national diversity, it has a positive impact on value and a negative effect on risk. These findings are robust to the addition of variables that account for the educational and professional background of board members. Our findings on gender indicate that the inclusion of women on boards has an impact on value only when at least three women are present. This is in line with the idea that minority groups can only have an impact when they reach a critical mass. Again the inclusion of additional variables does not change this result. The critical mass of women on boards has no effect on risk.

The paper continues as follows, the next section reviews relevant literature and introduces the hypotheses that are tested later. We then describe the model and the data used in estimation, before presenting our empirical results and offering conclusions.

Literature review and hypothesis development

Gender and corporate performance

Previous research on the boards of British companies has shown that female representation depends not just on the size of the company but on the characteristics of its board and industry. For example Brammer *et al.* (2007) note that women tend to be found on larger boards and on

those which have more non-executive members. Retailers, banks, media and utility companies have more diverse boards. This may reflect a greater stakeholder- or more specifically consumer-orientation in these businesses. Female board members can provide valuable insights in markets where women make purchasing decisions.

This observation implies that, at least in some industries, the presence of women on boards could influence corporate performance. This is borne out by studies of American companies that find a positive relationship between profitability and the proportion of women on the board (Carter *et al.* 2010, and Erhardt *et al.*, 2003). While Carter *et al.* (2010) do not find a similar relationship between gender diversity and market value, Miller and Triana (2009) find that such a relationship is mediated through innovativeness which is positively associated with diversity. Campbell and Minguez-Vera (2007) use a variety of measures of board diversity on their Spanish dataset. They find that, for most measures the relationship between market value and female board representation is positive. The exception to this comes when they use a simple dummy variable indicating the presence of one or more women on the board. This suggests that simply having a lone woman on the board is not enough; women can only make a difference when they reach a critical mass.

Kanter (1977) argues that when only one member of a group is female (or comes from any other "minority") the rest of the group and indeed the woman herself become fixated on the fact that she is a woman and therefore representative of women in general, rather than seeing her as an individual. This inhibits normal working relationships. It is only when a critical mass of women is present in the group that they cease to be seen as women and become simply group members. Recent research suggests that the critical mass is 30% which in most countries translates to three directors. Torchia *et al.* (2011) find that innovation in Norwegian companies is improved by the presence of three women and Joecks *et al.* (2013) report that German companies experience an increase in return on equity when the board includes at least three women.

Ahern and Dittmar (2012) provide an exception to the generally rosy picture of board diversity. They look at Norway in the wake of legislation mandating that 40% of the board be female. It is interesting to note that this quota exceeds the critical mass identified in the literature. Following implementation of the law Tobin's Q fell significantly. A closer look at the data reveals that the new female directors appointed were significantly younger than their male counterparts and had less experience as CEOs. It is likely that these other characteristics drive the results. This finding indicates the danger of imposing quotas rather than allowing companies to appoint female directors on the basis of talent and experience alone.

Given that the UK has only recently introduced targets we believe that those women who sit on corporate boards are there on merit rather than is response to regulatory pressure, and that thanks to their different experience, background or attitude they bring additional value to their companies. This leads to:

> Hypothesis 1(a): there is a positive relationship between corporate value and female board representation.

In addition to their work on value creation, Ahern and Dittmar (2012) also look at other aspects of corporate behaviour to see if the quota system has had an effect. They find that companies became more levered and undertook more mergers. This finding is interesting given that researchers who have examined risk-taking by men and women find that women are more risk-averse (Charness and Gneezy, 2012) and make fewer trades in experimental markets (Fellner and Maciejovsky, 2007). The Norwegian findings also contradict those of Huang and Kisgen (2013) and Levi *et al.* (2013) who observe that boards with more female members make fewer takeover bids, potentially because women are less over-confident than men. However, Sila *et al.* (2014) find that the relationship between risk and gender depends on the functional form of the model being tested.

The balance of existing evidence on various aspects of risk-taking by women leads to:

> Hypothesis 2 (a): there is a negative relationship between corporate risk and female board representation.

Nationality and corporate performance

Given that existing evidence from a variety of markets shows that gender diversity has positive impacts on corporate performance it makes sense that other forms of diversity should also be beneficial. Overseas directors may have very different educational and cultural backgrounds, giving them different attitudes to problem-solving as well as valuable knowledge of other markets. Masulis *et al.* (2012) find that overseas directors create value in terms of higher CARs around acquisition announcements in companies that make acquisitions in the home regions of their foreign directors. Oxelheim and Randøy (2003) find that the market value of Norwegian and Swedish companies increases when they have British or American directors on their boards. They suggest that this is because these directors bring with them Anglo-Saxon governance norms. In a similar vein, Rose *et al.* (2013) examine the influence of overseas directors on the performance of Nordic and German companies. They find that directors from common law countries have a positive impact on performance. Anderson *et al.* (2011) do not look specifically

at nationality, but find that board diversity measured by an index that includes age, gender, ethnicity, education, profession and board experience, is valuable in relatively complex organisations.

This leads us to hypothesise that overseas directors will have the same impact on performance and risk as women directors.

> Hypothesis 1(b): there is a positive relationship between corporate value and overseas board representation.
>
> Hypothesis 2(b): there is a negative relationship between corporate risk and overseas board representation.

The model and data

In order to investigate whether or not corporate performance and risk are affected by board diversity we estimate a variety of models taking the general form:

$$\text{performance}_{i,t} = \sum \beta_1 \, \text{control}_{i,t} + \sum \beta_2 \, \text{governance}_{i,t-1} + \beta_3 \text{gender diversity}_{i,t-1} + \beta_4 \text{national diversity}_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

$$\text{risk}_{i,t} = \sum \beta_1 \, \text{control}_{i,t} + \sum \beta_2 \, \text{governance}_{i,t-1} + \beta_3 \text{gender diversity}_{i,t-1} + \beta_4 \text{national diversity}_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

where β_1 and β_2 are vectors of coefficients, control is a vector of accounting and financial data, governance is a vector of board characteristics other than gender or nationality, the subscript i refers to a company i and t to time. The control variables are measured contemporaneously with performance but the governance and diversity variables are measured with a lag. We do this because these two sets of variables are concerned with board characteristics. Given the strategic nature of the decisions made by the board, changes in its composition are unlikely to have an immediate effect on decision-making and therefore on value or risk. In addition the used of lagged variables means that board composition cannot be endogenous to the model. Appendix 1 provides a detailed description of the data sources used for each variable. Briefly, the board characteristics were hand collected from annual reports and, where necessary, were checked using Amadeus or Osiris. The accounting data are from Fame and the market data from Bloomberg.

Our value measure is the Chung and Pruitt (1994) approximation of Tobin's Q, measured at the end of each company's financial year. Return on capital employed (ROCE) is the ratio of pre-tax

profit to total assets minus current liabilities. Size is measured as the natural logarithm of total assets (LOGTA) as in Carter *et al.* (2010), gearing (LOGGEAR) is defined as the sum of short-term overdrafts and loans, long-term loans and liabilities divided by shareholders' funds and again is measured in logs, innovation (INNOV) is defined as research and development spending divided by turnover as in Miller and Triana (2009). We anticipate a positive relationship between ROCE and Q because we expect the market to react positively to improvements in accounting performance. We expect size to be negatively related to performance on the grounds that smaller companies usually offer a premium to investors and during a period of uncertainty like the one examined here, surviving small firms are able to adapt rather quicker to changing circumstances that their larger competitors. This would be consistent with results obtained by Carter *et al.* (2010). Innovation should have a positive impact on performance, as in Miller and Triana (2009). The relationship between gearing and value could be positive or negative depending on whether the companies in the sample are moving towards an optimum capital structure and creating valuable tax shields, or have exceeded the optimum and are starting to incur financial distress costs.

Board size (LOGBOARD) is the natural log of the total number of directors, board age (LOGAGE) is the natural log of the average age of the board and the proportion of non-executives (PROPNED) is simply the number of non-executives divided by board size. We hypothesise that better governance leads to improved performance. This translates into the expectation that the coefficient on board size will be negative (Guest, 2009) and on the percentage of non-executives will be positive (Choi *et al.*, 2007). Assuming that age and experience are positively correlated, age should have a positive effect on performance.

We include four different measures of diversity for both gender and nationality. The simplest is the proportion of female (PROPF) and overseas (PROPOSEAS) board members; this includes both executives and non-executives. As an alternative to the simple proportion we also use the Blau index. The Blau index (Blau, 1977) is calculated as:$1 - \sum_{i=1}^{n} P_i^2$ where P_i is the percentage of board members in each category. The index (BLAUN for nationality and BLAUG for gender) varies between 0 indicating no diversity to 0.5 when there are equal numbers of both categories. These two measures are used by Miller and Triana (2009). We also use dummy variables taking the value 1 when a woman or overseas directors is present (FAL1 and OAL1 respectively) or zero otherwise. Finally in the spirit of the critical mass literature we include a dummy variable that takes the value 1 if there are at least three women or overseas directors (FAL3 and OAL3 respectively) serving on the board, as in Torchia *et al.* (2011). Given the results described in the previous section we expect the diversity variables to have a positive effect on value.

When estimating (2) risk is measured as the standard deviation of weekly stock returns. In addition to the variables already described, we add the average annual weekly return on the company's stock. Our expectation, based on portfolio theory is that risk and return will be positively related. We also expect that risk will increase with higher gearing and, more innovation and risk will be negatively affected by size. It is harder to reach clear cut expectations about the relationship between risk and good governance. If we take the view that self-seeking boards are more risk-averse than the shareholders they serve, we would expect to see a positive coefficient on the proportion of non-executives. On the other hand, if we take the view that shareholder protection is about reducing risk, which is especially pertinent during the time period under consideration here, we would expect to see the reverse. Large boards are associated with slower decision-making and with less extreme decisions leading to lower risk (Nakano and Nguyen, 2012) so we expect a negative relationship between risk and board size. Bertrand and Schoar (2003) find that older CEOs are less aggressive than their younger counterparts, so we assume that older boards will have the same characteristic, leading us to expect a negative relationship between RISK and LOGAGE. Given the discussion of the literature on the relative risk aversion of women, we expect the female diversity variables to have a negative impact of risk. Overseas directors may be more relatively cautious when working with foreign firms, and keen to establish a good reputation, making them also relatively risk-averse. For this reason we also expect the overseas diversity variables to have a negative effect on risk.

The primary aim of the paper is to understand how, if at all, board diversity contributes to corporate success. A secondary objective is to see how diversity has changed since the onset of the recent financial crisis. In order to achieve these aims we decided to work with a balanced panel of companies that were in the FTSE350 index in July 2012, collecting data from their most recent annual report and the four previous reports. We fully acknowledge that this introduces survivorship bias, but it allows us to get a better perspective of how boards change over time. We exclude banks, investment companies and utilities as well as companies for which there was missing data in any of the five years. This leaves us a total of 158 companies giving us 790 firm-year observations.

Table 1 shows how the characteristics of our sample boards have changed over time. Panel A includes general board characteristics, panel B focuses on diversity and panel C looks at business education which is introduced as a robustness test later in the paper. Panel A shows that average board size has fluctuated around nine members. One possible response to the financial crisis would have been to change board size, either increasing it so as to gain access to more expertise or reducing it to allow decisions to be made more quickly. Given that neither of these things

happened we can infer that nine is the optimal board size. The average board age increased slowly each year. These annual changes are not sufficiently large to suggest that companies sought out more experienced directors to help them through the crisis period. The increase in the proportion of non-executives over the time period appears more striking, but with an average board size of nine, it does not indicate a major change in board composition. In short, the size, age and independence of boards did not change much during this period.

Panel B of table 1 shows that boards are becoming more diverse over time but that national diversity is more noticeable than gender diversity. The proportion of overseas directors increases slowly each year from 19.87 in 2007 to 21.32 in 2011. Overseas directors play equally important roles as both executives and non-executives as both percentages vary over time between 19.50 and 21.87 for executives and between 19.60 and 21.49 for non-executives. The percentage of boards with a critical mass of at least three overseas directors varies over time but is always greater than 25%. The picture with respect to female directors is rather different. The proportion of female board members also climbs over the period, but it starts from a much lower base of 7.20 in 2007, reaching 10.60 in 2011. Turning to the split between executives and non-executives we see women playing a much more important role as non-executives than as executives. The percentage of female executives ranges from a low of 2.85 in 2009 to a high of 4.15 in 2010, while the percentage of non-executives increases steadily from 9.44 in 2007 to 13.66 in 2011. These figures suggest that the executive pipeline challenge discussed by Davies (2013) continues to be an issue.

[Insert table 1 around here]

While diversity is the main issue addressed here, later in the paper we use data on directors' business education as a robustness check on our findings regarding diversity. The two measures used are the proportion of directors with an MBA and the proportion with a professional accounting qualification. Panel C shows that accountants are often found on corporate boards. Between 2007 and 2011 they made up more than 25% of board members. This is not surprising given that most boards include the finance director who is usually a qualified accountant, and that companies are encouraged to appoint people with a finance or accounting background to their audit committees. A rather smaller proportion of directors hold MBAs, but this rises steadily over the period from 5% to 6.43%.

Table 2 shows the descriptive statistics for the sample. We can see that there is considerable variation in the observations on most variables. The presence of some huge and some very successful companies is shown by the fact that the mean is larger than the median for measures

such as Q and total assets. Gearing is also skewed thanks to the presence of some very highly leveraged companies, although others do not borrow at all. The board data confirms what we have already seen on an annual basis in table 1, but also shows that there is far greater variability in the representation of overseas directors than female directors. While there are companies with neither overseas nor female directors the highest overseas representation is nearly 90%, while the corresponding figure for women is 50%.

[Insert table 2 around here]

Table 3 shows the correlations between the explanatory variables in (1) and (2). This gives us further insights into board composition. We can see that larger firms are associated with bigger, older and more diverse boards, consistent with Brammer *et al.* (2007). The proportion of non-executives is positively correlated with measures of diversity, but this is significant only for national diversity, not for gender diversity. In contrast to Miller and Triana (2009) we find a negative association between innovativeness and female board representation. We do see a positive association between gearing and the proportion of women on boards as in Ahern and Dittmar (2012), but here the relationship is insignificant.

[Insert table 3 around here]

Empirical results

The results of estimating (1) using the four different diversity measures are shown in table 4. In 1(a) diversity is measured very simply as the proportion of overseas or female directors which could vary between 0 and 1; in 1(b) we use the Blau index which varies between 0 for a company whose board is entirely British or single-sex and 0.5 for a board which is evenly split between British and overseas or male and female directors. 1(a) uses a simply dummy variable taking the value 1 if an overseas or female board member is present and 1(d) uses a dummy variable taking the value 1 if there are at least three overseas or female members. We include industry and year fixed effects in each specification.

As table 4 indicates, the only control variables that have a significant impact on Q are ROCE and LOGTA. Q increases with increasing return on capital employed and falls as company size increases. Q increases with board size and the proportion of non-executives on the board, and decreases with board age, although none of these effects is significant. The national diversity of board members has a significantly positive effect on performance, no matter how diversity is measured. Although the setting is rather different because our companies are British and we do

not examine specific director nationalities, our findings are similar to those of Oxelheim and Randøy (2003). Turning to gender diversity we find that female directors have a positive impact on Q, but the effect is significant only when the number of women reaches a critical mass as measured by FAL3 in 1(d) which is statistically significant at the 5% level. Joecks *et al.* (2013) report similar findings for their sample of German companies, but they use a measure of accounting, rather than market performance. To summarise, our results indicate that greater board diversity leads to higher market value in British companies.

[Insert table 4 around here]

Table 5 shows the results of estimating (2) using our four measures of diversity. We see that market risk and return are positively related, although the relationship is not statistically significant. The relationships between RISK and ROCE and INNOVATION are significantly negative, indicating that more profitable and more innovative companies are less risky. There are indications that older boards make their companies less risky, but the board age variable is statistically significant in just two of the specifications. The proportion of non-executives has a positive effect on risk, and is statistically significant in three specifications. Both national and gender diversity have a negative effect on risk, but none of the gender diversity measures has a statistically significant impact. The effect of national diversity is stronger, but it is clear that simply having an overseas director on the board is not enough, because the coefficient on OAL1 is not significantly different from zero, but the other measures are, showing that you need a group of overseas directors to make a real difference. In interpreting the effect of board composition on risk it is necessary to take a view on the risk attitudes of managers and shareholders. It is usual to assume that all economic agents are risk averse but some are more risk averse than others. Shareholders with diversified portfolios are likely to be less risk averse than the managers of individual companies whose portfolios are less well-diversified. This implies that good governance, which protects shareholders' interests, should increase risk. According to this interpretation the nonexecutives are doing a good job while the overseas directors are harming shareholders. However, during the financial crisis period under investigation here it is plausible to believe that shareholders sought safer investments, in which case they were supported by overseas directors but not by the nonexecutives.

[Insert table 5 around here]

Our results so far show that the presence of overseas directors improves corporate performance and reduces market risk. This may be because they have knowledge of specific foreign markets into which their companies export, or because they are more cautious when making decisions in

markets with which they are not familiar. Alternatively, they may come from a different educational background than their British counterparts. There is certainly evidence that overseas directors have more business education than female directors (Ruigrok *et al.*, 2007). The impact of female directors on performance is weaker than that of their overseas counterparts. This is not surprising given that as table 1 shows, there are far fewer female directors than overseas board members. Women have a significant impact only when they reach a critical mass on the board. Their impact on market risk is negligible, despite what we know about their general risk attitudes and their impact on specific business decisions. As we saw in table 1, women are better represented among non-executives than among executive directors. The suggests that either female executives are busy in the sense that they sit as non-executives on multiple boards, or that non-executives are not also executives, in other words they hold less senior roles in the corporate sector, or come from outside the sector, possibly from the professions. In order to test the robustness of our results we now go on to consider the effect of educational and professional background on performance and risk. We include two additional explanatory variables, one is the proportion of board members with an MBA (PROPMBA), the other is the proportion of directors who are members of a professional accounting body (PROPAC). Existing research indicates that MBA holders make different decisions to those with other educational backgrounds. Betrand and Schoar (2003) find that CEOs with MBAs are more "aggressive" that others in that they investment and borrow more and pay lower dividends. This leads to better accounting performance for their companies. Chevalier and Ellison (1999) find that fund managers with MBAs hold portfolios with higher systematic risk than their peers' finds. We therefore hypothesise that the PROPMBA will be positively related to both market value and risk. Given that regulation requires companies to appoint non-executives with financial or accounting experience to sit on the audit committee; this suggests that they should be able to protect shareholders from too much risk-taking. For this reason we expect the presence of accountants to reduce risk. While the inclusion of accountants on the board should improve financial control this may not be reflected in market performance, so we do not anticipate a significant relationship with Q.

Table 6 shows the results of adding the two additional variables to equation (1). PROPMBA has a negative effect on Q, contrary to our expectations, while PROPAC has a positive impact; however neither has a coefficient that is statistically different from zero, indicating that educational and professional backgrounds have no impact on market value. The significance of the national diversity measures is reduced, but each measure with the exception of OAL3 retains some significance. FAL3 remains statistically significant but again the significance level reduces. This suggests that even if overseas and female directors have different educational or professional

backgrounds from their British male colleagues, this difference does not explain their impact on performance. Corporate value is still positively affected by national diversity and by the presence of a critical mass of women on the board.

[Insert table 6 around here]

Turning to the impact of educational and professional background on risk, a rather different picture emerges in table 7. Here we exclude gender diversity since its effects were statistically insignificant in previous models. We see that the control and board variables have the same impact they did in the previous specifications but that PROPNED no longer exerts a significant impact on risk. As hypothesised, PROPMBA has a positive and significant impact on risk in all specifications. Unexpectedly, PROPAC also has a positive effect, but it is statistically insignificant. National diversity still exerts a negative effect on risk; the only difference between these results and those in table 5 is that in table 7 OAL1 loses its significance. Allowing for educational background, the presence of a single overseas director is not enough to affect risk, but as more overseas directors are added to the board, risk falls.

[Insert table 7 around here]

Conclusions

Our aim here is to discover what impact, if any, board diversity has had on the performance of British companies in the wake of the recent financial crisis. While most existing literature focuses on the impact of governance on value, we also consider its impact on risk. Our findings show that both national and gender diversity on boards lead to higher market valuation of companies. The key difference between the reactions of value to the two forms of diversity is that overseas directors have an impact no matter how their presence is measured. Women have an impact only when they form a critical mass, defined here as the presence of three women on the board. Female directors do not affect corporate risk, but overseas directors lead to a reduction in risk. These findings do not change when we incorporate additional variables allowing for the educational and professional characteristics of the directors. In other words, overseas and female directors bring something special to the boardroom.

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Appendix 1: Data sources

Variable	Measurement	Data source
Q	$\frac{\text{market capitalisation+book value of preferred stock and debt}}{\text{book value of total assets}}$	Fame
ROCE	$\frac{\text{profit before tax}}{\text{total assets – current liabilities}}$	Fame
RISK	Standard deviation of daily stock returns over the financial year	Bloomberg
LOGTA	Natural logarithm of total assets	Fame
INNOV	$\frac{\text{research and development spending}}{\text{turnover}}$	Fame
LOGGEAR	Natural logarithm of $\frac{\text{short-term overdrafts and loans+long-term loans and liabilities}}{\text{shareholders' funds}}$	Fame
RET	Average daily stock returns over the financial year	Bloomberg
LOGBOARD	Natural logarithm of the number of board members	Annual reports
PROPNED	$\frac{\text{number of non-executive directors}}{\text{board size}}$	Annual reports
PROPOSEAS	$\frac{\text{number of directors from outside the UK}}{\text{board size}}$	Annual reports supplemented by Amadeus or Osiris
PROPF	Percentage of board members who are female	Annual reports
BLAUN	1 minus the product of the proportions of British and overseas directors	Annual reports supplemented by Amadeus or Osiris
BLAUG	1 minus the product of the proportions of men and women on the board	Annual reports
OAL1	A dummy variable taking the value 1 if there is at least one overseas director on the board, zero otherwise	Annual reports supplemented by Amadeus or Osiris
OAL3	A dummy variable taking the value 1 if there are at least three overseas directors on the board and zero otherwise	Annual reports supplemented by Amadeus or Osiris
FAL1	A dummy variable taking the value 1 if there is at least one woman on the board and zero otherwise	Annual reports
FAL3	A dummy variable taking the value 1 if there are at least 3 women on the board, zero otherwise	Annual reports
PROPMBA	$\frac{\text{number of directors with an MBA}}{\text{board size}}$	Annual reports supplemented by Amadeus or OSIRIS
PROPAC	$\frac{\text{number of directors holding a professional accounting qualification}}{\text{board size}}$	Annual reports supplemented by Amadeus or OSIRIS

Tables

Table 1: Board characteristics

Panel A: general characteristics

	2007	2008	2009	2010	2011
Board size	9.29	9.23	9.09	8.96	9.11
Board age	55.65	56.00	56.42	56.64	56.74
Percentage of non-executives	61.98	63.32	64.77	64.89	66.73

The figures reported here are the means of the relevant figures for the 158 companies in the sample. Board age is itself an average of the ages of all board members.

Panel B: diversity

	2007	2008	2009	2010	2011
Overseas directors					
Percentage of board members	19.87	20.56	20.57	20.59	21.32
Percentage of executives	21.87	19.73	19.38	19.50	21.55
Percentage of non-executives	19.60	20.85	20.98	21.08	21.49
Percentage of boards with critical mass	30.40	29.75	25.32	28.48	31.01
Female directors					
Percentage of board members	7.20	7.66	8.31	9.05	10.60
Percentage of executives	3.15	3.50	2.85	4.15	4.03
Percentage of non-executives	9.44	9.78	11.14	11.86	13.66
Percentage of boards with critical mass	3.80	5.70	7.60	8.23	8.23

Percentage of board members is the mean of the percentage of board members in each company who are from overseas or who are female. The percentage of executives is the mean of the percentage of executive directors in each company who come from overseas or are women. The percentage of non-executives is the mean of the percentage of non-executive directors who come from overseas or are women. Percentage of boards with critical mass is measured by the percentage of companies which have at least 3 overseas or female directors on their boards.

Panel C: business education

	2007	2008	2009	2010	2011
Percentage of directors with an MBA	5.00	5.70	5.95	6.34	6.43
Percentage of directors who are accountants	26.90	27.27	28.57	28.57	26.14

Percentage of directors with an MBA is the mean of the percentage of board members in each company who hold an MBA. Percentage of directors who are accountants is the average of the parentage of board members in each company who hold an accounting qualification from any professional association.

Table 2: Descriptive Statistics

	Mean	Median	Maximum	Minimum	Standard Deviation
Q	1.3889	1.0811	16.0515	0.0346	1.2023
RISK	5.3174	4.6340	23.2573	0.1037	2.6428
ROCE	0.1481	0.1295	1.3583	–1.2936	0.1598
RET	0.2523	0.2422	3.9518	–4.4480	0.8701
INNOV	0.0116	0	0.4525	0	0.0407
Total assets	12457.49	1493.00	37,000,000	27.252	41846.025
Gearing	113.3696	73.8850	949.2600	0	133.4521
Board size	9.1367	9	20	3	2.5347
Board age	56.29	56.5	65.33	46	3.11
PROPNED	0.6434	0.6667	0.9286	0.2857	0.1196
PROPOSEAS	0.2058	0.1429	0.9167	0	0.2204
BLAUO	0.2299	0.2188	0.5	0	0.1854
PROPF	0.0855	0.0833	0.5	0	0.0939
BLAUF	0.1391	0.1528	.5	0	0.1405
PROPMBA	0.0588	0	0.8333	0	0.0942
PROPAC	0.2713	0.2727	0.8571	0	0.1524

In this table total assets are shown in £m, board size is the number of directors and board age is shown in years. Gearing is the ratio of short-term overdrafts and loans together with long-term loans and liabilities to shareholders' funds. All other variables are measured as described in appendix 1.

Table 3: Correlations between explanatory variables

	ROCE	RET	Innov	Logta	Loggear	Logboard	Logage	Propned	Proposeas	Blauo	Propf	Blauf	Propmba	Propac
ROCE	1.0000	.1039	–.0488	–.1698*	–.1149	–.0002	–.0600	.0163	.0653	.0182	–.0016	.0044	.0528	–.1061
RET	.1039	1.0000	–.0123	–.0673	–.0619	–.0466	.0522	.0102	.0284	.0064	–.0605	–.0656	.0178	0.0128
INNOV	–.0488	–.0123	1.0000	–.1043	–.0988	–.0229	.0700	–.0235	.0423	.0801	–.0325	–.0250	.0435	.0195
LOGTA	–.1698*	–.0673	–.1043	1.0000	.2468**	.5785***	.2445	.4081***	.4655***	.4018***	.3030***	.3171***	.1282	–.2403**
LOGGEAR	–.1149	–.0619	–.0988	.2468**	1.0000	.0675	.0644	.0781	.1333	.1194	.0547	.0537	.0317	–.0478
LOGBOARD	–.0002	–.0466	–.0229	.5784***	.0675	1.0000	.0676	–1383	.3524***	.3896***	.2768***	.3095***	.0589	–.3127***
LOGAGE	–.0600	.0522	.0700	.245**	.0644	.0676	1.0000	.1927*	.3981***	.2718***	–.1865*	–.1795*	.0309	–.1101
PROPNED	.0163	.0102	–.0235	.4081***	.0781	.1383	.1927*	1.0000	.4292***	.3816***	.1564	.1537	.1877*	–.1282
PROPOSEAS	.0653	.0284	.0423	.4655***	.1333	.3524***	.3981***	.4292***	1.0000	.7873***	.0717	.0689	.1946*	–.3919***
BLAUO	.0182	.0064	.0801	.4018***	.1194	.3896***	.2718***	.3816***	.7873***	1.0000	.1020	.1012	..1582	–.2905***
PROPF	–.0016	–.0605	–.0325	.3030***	.0547	.2768***	–.1865*	.1564	.0717	.1020	1.0000	.9835***	.0420	–.1517
BLAUF	.0004	–.0656	–.0250	.3171***	.0537	.3095***	–.1795*	.1596	.0689	.1013	.9836***	1.0000	.0526	–.1469
PROPMBA	.0528	.0178	.0435	.1282	.0317	.0589	.0309	.1877*	.1946*	.1582	.0420	.0526	1.0000	.0441
PROPAC	–.1061	.0128	.0195	–.2403**	–.0478	–.3127***	–.1101	–.1282	–.3919***	–.2905***	–.1517	–.1469	.0441	1.0000

All variables are as described in appendix 1. *,** and *** indicate significance at the 1%, 5% and 10% levels respectively.

Table 4: The relationship between Q and diversity

	1(a)	1(b)	1(c)	1(d)
ROCE	2.1698*** (4.5765)	2.2338*** (4.7805)	2.2395*** (4.7465)	2.2652*** (4.8604)
INNOV	–1.1183 (–0.7102)	–0.3187 (–.8417)	–1.1754 (–0.7804)	–0.9597 (–0.6003)
LOGTA	–0.3522*** (–4.0129)	–0.3397*** (–4.1025)	–0.3180*** (–3.9478)	–0.3549*** (–4.0472)
LOGGEAR	–0.0071 (–0.1691	–0.0113 (–0.2782)	–0.0125 (–0.3148)	–0.0002 (–0.0055
LOGBOARD	0.3253 (1.0742)	0.2292 (0.7260)	0.1921 (0.5767)	0.3679 (1.2357)
LOGAGE	–0.7107 (–0.4793)	–0.4401 (–0.3183)	–0.1603 (–0.1173)	–0.5942 (–0.4022)
PROPNED	0.4629 (0.7366)	0.3229 (0.5187)	0.4193 (0.6757)	0.7205 (1.0981)
PROPF	1.0342 (1.6323)			
PROPOSEAS	0.8483** (2.3972)			
BLAUG		0.6290 (1.4236)		
BLAUN		1.0897*** (3.0342)		
FAL1			0.1766 (1.3719)	
OAL1			0.3175** (2.0679)	
FAL3				0.4182** (1.9719)
OAL3				0.2647* (1.7255)
Industry effects Year effects	Yes yes	Yes yes	Yes yes	Yes yes
N	632	632	632	632
Adjusted R^2	.2793	.2848	.2774	.2746

All variables are as defined in appendix 1. The model is estimated using OLS with White standard errors; t-statistics are shown in brackets. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels respectively.

Table 5: The relationship between risk and diversity

	2(a)	2(b)	2(c)	2(d)
RET	0.2506 (1.1021)	0.2443 (1.0827)	0.2425 (1.0752)	0.2439 (1.0481)
ROCE	–4.9605*** (–4.3899)	–5.0764*** (–4.4421)	–5.0801*** (–4.3977)	–5.0669*** (–4.3676)
INNOV	–6.8412*** (–2.9607)	–6.5098*** (–2.9000)	–6.7491*** (–3.1288)	–7.1895*** (–2.9497)
LOGTA	–0.0344 (–0.3549)	–0.0556 (–0.5793)	–0.0905 (–0.9644)	–0.0333 (–0.3447)
LOGGEAR	–0.0512 (–0.7479)	–0.0441 (–0.6391)	–0.0419 (–0.6074)	–0.0667 (–0.9850)
LOGBOARD	–0.1181 (–0.2498)	0.0854 (0.1797)	0.1185 (0.2427)	–0.0855 (–0.1727)
LOGAGE	–2.9924 (–1.3089)	–3.6616* (–1.7195)	–4.2110** (–2.0303)	–2.4582 (–1.0898)
PROPNED	1.8290* (1.7790)	2.0337** (1.9923)	1.8485* (1.7934)	1.4000 (1.4283)
PROPF	–1.5051 (–1.1436)			
PROPOSEAS	–1.5446** (–2.0193)			
BLAUG		–1.0941 (–1.1966)		
BLAUN		–1.8315** (–2.3189)		
FAL1			–0.3504 (–1.3963)	
OAL1			–0.5109 (–1.6435)	
FAL3				–0.0092 (–0.0237)
OAL3				–0.7975** (–2.4845)
Industry effects	yes	yes	yes	yes
Year effects	yes	yes	yes	yes
N	632	632	632	632
Adjusted R^2	.3681	.3708	.3669	.3678

All variables are as defined in appendix 1. The model is estimated using OLS with White standard errors; t-statistics are shown in brackets. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels respectively.

Table 6: Robustness tests of the relationship between value and diversity

	1(a)	1(b)	1(c)	1(d)
ROCE	2.1962*** (4.6832)	2.2603*** (4.8255)	2.2543*** (4.8062)	2.2688*** (4.9047)
INNOV	–1.0721 (–0.6827)	–1.2640 (–0.8077)	–1.1071 (–0.7360)	–0.9214 (–0.5764)
LOGTA	–0.3523*** (–4.0521)	–0.3392*** (–4.2110)	–0.3176*** (–4.0901)	–0.3548*** (–4.1047)
LOGGEAR	–0.0063 (–.1434)	–0.0109 (–0.2558)	–0.0127 (–0.3038)	0.0001 (0.0023)
LOGBOARD	0.3396 (1.0809)	0.2389 (0.7410)	0.1928 (0.5757)	0.3679 (1.1850)
LOGAGE	–0.7696 (–0.5065)	–0.4813 (–0.3490)	–0.2048 (–0.1516)	–0.6258 (–0.4210)
PROPNED	0.4905 (0.7708)	0.3576 (0.5664)	0.4600 (0.7311)	0.7448 (1.1110)
PROPF	1.0466 (1.5988)			
PROPOSEAS	0.8969* (1.9565)			
BLAUG		0.6358 (1.4001)		
BLAUN		1.1247*** (2.6842)		
LFAL1			0.1791 (1.3494)	
LOAL1			0.3270* (1.9238)	
LFAL3				0.4126* (1.9557)
LOAL3				0.2668 (1.5209)
PROPMBA	–0.3780 (–0.5810)	–0.3991 (–0.6564)	–0.3839 (–0.6093)	–0.1758 (–0.2796)
PROPAC	0.1455 (0.2055)	0.1020 (0.1547)	0.0207 (0.0319)	0.0168 (–0.0249)
Industry effects Year effects	Yes yes	Yes yes	Yes yes	Yes yes
N	632	632	632	632
Adjusted R^2	.2777	.2833	.2757	.2724

All variables are as defined in appendix 1. The model is estimated using OLS with White standard errors; t-statistics are shown in brackets. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels respectively.

Table 7: Robustness tests of the relationship between risk and diversity

	2(a)	2(b)	2(c)	2(d)
RET	0.2431 (1.0546)	0.2391 (1.0427)	0.2417 (1.0554)	0.2310 (0.9981)
ROCE	–4.9308*** (–4.3805)	–5.0450*** (–4.4645)	–5.0498*** (–4.4721)	–4.9686*** (–4.3565)
INNOV	–7.6771*** (–3.1677)	–7.4504*** (–3.0982)	–7.6565*** (–3.3070)	–7.9679*** (–3.1724)
LOGTA	–0.0479 (–0.5310)	–0.0684 (–0.7222)	–0.0959 (–1.0388)	–0.0265 (–0.2754)
LOGGEAR	–0.0451 (–0.6402)	–0.0371 (–0.5217)	–0.0370 (–0.5221)	–0.0561 (–0.7982)
LOGBOARD	–0.0979 (–0.1986)	0.0491 (0.0979)	0.03412 (0.0686)	0.0169 (0.0332)
LOGAGE	–1.8865 (–0.8218)	–2.4649 (–1.1326)	–2.9902 (–1.1400)	–1.8607 (–0.8177)
PROPNED	1.3232 (1.2841)	1.5395 (1.5398)	1.3862 (1.3511)	0.9462 (0.9502)
PROPOSEAS	–1.4887** (–2.0062)			
BLAUN		–1.8240** (–2.2713)		
LOAL1			–0.5170 (–1.6307)	
LOAL3				–0.7780*** (–2.4550)
PROPMBA	2.9262* (1.9500)	2.9416** (1.9678)	2.8801* (1.9014)	2.8066* (1.9442)
PROPAC	1.2075 (1.2218)	1.2700 (1.2840)	1.3977 (1.3929)	1.3754 (1.3960)
Industry effects	yes	yes	yes	yes
Year effects	yes	yes	yes	yes
N	632	632	632	632
Adjusted R^2	.3774	.3803	.3763	.3794