IS THERE AN OPTIMAL BOARD SIZE?

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Abstract

This research quantitatively examines the determinants of board size and the consequence it has on the performance of large companies in Australia. In line with international and the prevalent United States research the results suggest that there is no significant relationship between board size and their subsequent performance. In examining whether more complex operations require larger boards it was found that larger firms or firms with more lines of business tended to have more directors. Data analysis from the research supports the proposition that blockholders could affect management practices and that they enhances performance as measured by shareholder return.

Keywords: Board size, firm performance, determinants, corporate governance, Australia

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1. Introduction

Recent large corporate collapses including U.S. giants Enron and WorldCom have reinvigorated the debate over the role of the board of directors on the performance of a company. Agency theory has been used to theoretically underpin the majority of research in this area and suggests that the more independent the board is from management the superior company performance will be. Of particular interest is the identification of an optimal board composition that would be best positioned to control the self interested (agency) behaviour of executives and promote firm performance (Nguyen and Faff, 2007). Consequently the proportion of internal (individuals employed by the firm) or external directors serving on the board has been frequently tested in the literature (Ellstrand et al., 2002). There is inconsistency in the literature surrounding this issue and no clear correlation between board composition and performance has been established (Bhagat and Black, 2000; Wang et al., 2008).

As noted by some authors (e.g., Singh and Davidson III, 2003; Randoy and Jenssen, 2004; Choi et al., 2007; Chan and Li, 2008), one of the most frequently used control variables in these studies is board size. There is evidence in literature that board size is perceived to affect the board's ability to function effectively and therefore has a direct influence on firm performance (Coles et al., 2008). O'Reilly et al. (1989) asserted that large director groups might have difficulties in communicating and cohesiveness. Lipton and Lorsch (1992) contended that as the board increased in size, director free-riding would increase. Jensen (1993) also endorsed small boards because of the efficiency in decision making due to greater coordination and communication. Dalton et al. (1999) and Coles et al. (2008), on the other hand, argued that larger boards would bring more experience and knowledge which could result in better advice.

A review of recent research as shown in the following table indicates that the evidence on the performance outcome of board size is also mixed. Many of these studies could be challenged on their methodological premise, such as their short-term observation of firm performance (Dehaene et al., 2001; Nguyen and Faff, 2007; Chan and Li, 2008), their limited performance measures (Hossain et al., 2001; Panasian et al., 2003; Chin et al., 2004; Nguyen and Faff, 2007; Choi et al., 2007; Chan and Li, 2008), and their limited control variables used in the data analysis (Dehaene et al., 2001; Dulewicz and Herbert, 2004; Chin et al., 2004; Nguyen and Faff, 2007).

Table 1. Empirical Evidence: Contribution of Board Size on Firm Performance

Authors	Country	Performance Measures	Results
Bhagat and Black (2000)	U.S.	Tobin's *Q*, ROA, stock price return and sales to assets	Insignificant
Dehaene et al. (2001)	Belgium	ROA and ROE	Insignificant
Hossain et al. (2001)	New Zealand	Tobin's *Q*	Negative
Singh and Davidson III (2003)	U.S.	Asset turnover and expenses to sales	Negative
Panasian et al. (2003)	Canada	Tobin's *Q*	Insignificant
Bonn (2004)	Australia	ROE and market-to-book ratio	Insignificant
Dulewicz and Herbert (2004)	U.K.	Sales turnover and cash flow return on assets	Insignificant
Randoy and Jenssen (2004)	Sweden	Tobin's *Q* and ROE	Insignificant
Chin et al. (2004)	New Zealand	Tobin's *Q*	Insignificant
Chen et al. (2005)	Hong Kong	ROA, ROE and market-to-book ratio	Insignificant
Nguyen and Faff (2007)	Australia	Tobin's *Q*	Negative
Choi et al. (2007)	South Korea	Tobin's *Q*	Positive
Chan and Li (2008)	U.S.	Tobin's *Q*	Negative

This paper intends to present robust evidence on the impact of board size on firm performance, using data from Australian listed companies. The paper also explores the potential determinants of board size, for which the literature gives some guidelines. According to Fama and Jensen (1983), the way a firm is organized depends on the scope and complexity of its production process; since the board has to ratify and monitor managers' decisions. The information requirements of more complex operations may require a larger board. Similarly, Lehn et al. (2004) and Coles et al. (2008) argued that a firm growing into new product lines or a new territory would seek more directors to oversee managers' performance. Boards of larger or more diverse firms may increase their demands for new members, since such tasks as succession planning, compensation and auditing would be assigned to committees rather than handled by the board as a whole (Bhagat and Black, 1999; Agrawal and Knoeber, 2001).

The empirical research, primarily from the U.S., confirms that board size is positively related to firm size (e.g., Denis and Sarin, 1999; Baker and Gompers, 2003; Lehn et al., 2004; Boone et al., 2007; Coles et al., 2008; Linck et al., 2008) and diversification (Boone et al., 2007; Coles et al., 2008; Linck et al., 2008). The Australian work surrounding this topic however has been scant. As suggested by Guest (2007), the determinants of board structure may depend on the specific function of boards within a particular country, which should be analysed in the national legal and institutional background. To compliment and extend international research in the area it is important to ascertain whether the scope and complexity of operations explain the variance of board size in the Australian corporate sector.

2. Empirical Tests

The dataset used in this research comprises the top 500 companies listed on the ASX, ranked by market capitalization. Each year the ASX collects information on these companies to calculate its All Ordinaries Index, the primary indicator of the Australian equity market. On December 31, 2003, the top 500 companies represent 95% of the total market capitalization of the ASX-listed companies (Standard & Poor's, 2004). Thus this dataset sufficiently covers the Australian corporate sector.

There are two broad groups of performance measures. The first are accounting measures drawn from accounting systems used by firms to track internal affairs. Financial market measures are also used including share price and dividend stream observations (Devinney et al., 2005). A limitation of accounting measures is their internal focus which is a consequence of the historical rudiments of the information and the major function they are designed to fulfil. Developed as a reporting mechanism, they represent the impact of many factors, including the past success of advice passed from the board to the management team. They are the traditional mainstay of corporate performance factors (Kiel and Nicholson, 2003). Accounting measures are "distortable" however and the distortion can arise because of human error or deception, government policies relating to various activities, or accounting policies or procedures (Devinney et al., 2005). Muth and Donaldson (1998) confirmed that both Return on Assets (ROA) and Return on Equity (ROE) have been extensively used in research on board composition and structure; they are therefore included in this study.

Market-based measures are future looking indicators that reflect current plans and strategies, in theory representing the discounted present value of future cash flows (Fisher and McGowan, 1983). Related to the value placed on the firm by the

market, market measures are not susceptible to the impact of accounting policy changes or mere timing effects; they are objective in the sense that they exist outside of the influence of individuals (Devinney et al., 2005). One of the market measures frequently endorsed by the scholars is shareholder return, which is used in this research.

Shrader et al. (1984), in examining the literature on the empirical relationship between strategic planning and organizational performance, noted that most studies had chosen 3 or 5-year periods as their time frames, which were deemed to be appropriate for a given strategic planning intervention to take effect. To avoid short-term fluctuations, the performance figures tested in this study are the three-year averages over 2000-2003 or 2003-2006. Adopting the approach supported by most prior studies in the area of board composition and structure, board size of sample firms are assessed at one point in time being 2003.

Bathala and Rao (1995), Coles et al. (2001) and Elsayed (2007) suggested that the conflicting evidence on the existence or non-existence of an impact of the board of directors on financial performance might be attributed to the omission of other variables that affect performance. Therefore a number of covariates are introduced into the data analysis to control for any potential confounding influence. Bathala and Rao (1995) noted that while the agency literature recognizes the importance of the board of directors in the monitoring of management decisions it is only one of the mechanisms used to control agency conflicts. The literature identifies other devices which ensure that managers' interests are aligned with those of shareholders, including managerial ownership, dividend payout and leverage.

Jensen and Meckling (1976) asserted that increasing managerial ownership could mitigate agency conflicts; the higher the proportion of equity owned by managers, the greater the alignment between managers and shareholder interests. Evidence supporting their view includes Morck et al. (1988), Kim et al. (1988), McConell and Servaes (1990) and Hudson et al. (1992). Regarding dividend payout and leverage, Jensen (1986) argued that the payment of dividends and the contractual obligations associated with debt reduced the amount of discretionary funds available to management, thereby reducing their incentive to engage in non-optimal activities. Grossman and Hart (1980) suggested that increased debt would cause managers to become more efficient in order to lessen the probability of bankruptcy, loss of control and reputation. The regular payment of dividends would force firms to go to the capital markets for investment funding, the consequential scrutiny of firms accessing the market would act as a deterrent to opportunistic behaviours by managers (Easterbrook, 1984). Harris and Raviv (1991) claimed that the empirical evidence was broadly consistent with the proposition that debt could mitigate agency conflicts.

Drawing on the empirical models identified in the literature this research includes several other controls, which may capture the firm characteristics likely to be associated with performance or board size. These include blockholder ownership, number of board committees, diversification, firm age and firm size. Consistent with the performance figures, dividend payout, firm size and leverage are calculated as the three-year averages for 2000-2003 or 2003-2006. In line with the measures of board size, data on firm age, blockholder and executive director shareholdings, board committees and diversification are collected for the 2003 financial year.

Table 2. Description of Research Variables

Measure	Abbreviation	Definition
Board Size		
Board size	SIZE	Number of directors on the board
Firm Performance		
ROA	ROA	Ratio of EBIT to book value of total assets
ROE	ROE	Ratio of profit after interest and tax to book value of equity
Shareholder return	SHRET1, 2[1]	Realized rate of return incorporating capital gains and dividend payments
Control		
Firm age	AGE	Number of years listed on the ASX and its antecedents
Blockholder ownership	BLOCK	The percentage of common stocks held by the top 20 shareholders
Dividend payout	DIVR1, 2	Ratio of dividend payments to profit after interest and tax
Board committees	COMM	Number of committees on the board
Managerial ownership	EQED	Percentage of equity including options held by executive directors
Leverage	GEAR1, 2	Ratio of short-term and long-term debt to book value of equity
Firm size	LogMCAP1, 2	Natural logarithms of market value of common stocks (in $million)
Diversification	SEGMT	Number of industrial and geographical segments

[1] SHRET, DIVR, GEAR and LogMCAP are coded 1 for 2000-2003, and 2 for 2003-2006.

Due to lack of comparable performance data, financial institutions including property trusts and investment funds are removed from the 2003 list of top 500 companies as provided by *Huntleys' Shareholder* (2003); a sample of 384 companies is retained. Data on firm performance, dividend payout, firm size and financial leverage is collected from *Fin Analysis* database. The data on board size and committees, and blockholder and managerial ownership is developed from the 2003 corporate reports provided by *Connect 4* database. The information on diversification and firm age is obtained from *Huntleys' Shareholder* (2003). The sample is further reduced to 243 firms due to missing data from the above sources.

Ordinary least squares and logit regressions are constructed for the research variables. Firm performance serves as the dependent variable in the model which is used to test the influence of board size on performance. The independent variables include blockholder and managerial shareholdings, board committees, diversification, dividend payout, leverage, firm age and size. An algebraic statement of the models is as follows:

$$_{i} = + _{1} SIZE _{i}) + _{2} AGE _{i}) + _{3} BLOCK _{i}) + _{4} DIVR2 _{i}) + _{5} COMM _{i})$$
$$\beta_{6} EQED _{i}) \beta_{7} GEAR2 _{i}) \beta_{8} LogMCAP2 _{i}) \beta_{9} SEGMT _{i}) \mu_{i}$$

Where, for the i^{th} *company*

Y = *ROA, ROE or SHRET2*

α = *Constant of the equation*

β = *Coefficient of the variable*

μ = *Error term*

In the regression analysis used to investigate the explanatory factors of board size, the independent variables include blockholder and managerial shareholdings, number of board committees or reportable segments, dividend payout, leverage, firm age and size, and prior performance. Additional regression analysis excluding firm size control is conducted to address any concern over multicollinearity[2].

$$_{i} = + _{1} AGE _{i}) + _{2} BLOCK _{i}) + _{3} DIVR1 _{i}) + _{4} EQED _{i}) + _{5} COMM _{i})$$
$$\beta_{6} GEAR1 _{i}) \beta_{7} LogMCAP1 _{i}) \beta_{8} SEGMT _{i}) \beta_{9} SHRET1 _{i}) \mu_{i}$$

Where, for the i^{th} *company*

Y = *SIZE*

α = *Constant of the equation*

β = *Coefficient of the variable*

μ = *Error term*

3. Results

Table 3 presents a description of firm characteristics for the sample in 2003. The Table reveals that the sample contains a wide range of firms. The number of directors on the board ranges from a low of 3 to a high of 15, with an average of just over 6. The percentage of equity held by blockholders or executive directors varies between 0% and 99.86%, with a mean of 65.10% or 11.84% respectively. The number of business segments ranges from 1 to 11 and the number of years the company has been listed on the stock exchange ranges from 3 to 132, with an average close to 4 and 17 respectively.

[2] The correlation analysis for the research variables, which are available from the authors, indicates that board size and firm size are strongly correlated.

Table 3. Descriptive Statistics

Sample Period: 2003
Included Observations: 243

Variable	Mean	Median	Maximum	Minimum	Std. Dev	Skewness	Kurtosis
AGE	16.90	11.00	132.00	3.00	17.81	2.90	15.39
BLOCK	65.10%	67.09%	99.86%	13.60%	0.18	-0.42	2.74
COMM	2.37	2.00	6.00	0	1.15	0.60	3.91
EQED	11.84%	2.21%	80.99%	0	0.18	1.70	4.89
SEGMT	4.46	4.00	11.00	1.00	2.23	0.84	3.19
SIZE	6.33	6.00	15.00	3.00	2.05	1.02	4.53

The contribution of board size and other variables to firm performance is reported in Table 4; according to the table, there is no statistically significant relationship between the number of directors on the board, and ROA, ROE and shareholder return.

Table 4. OLS Regressions: Board Size and Subsequent Performance

Sample Period: 2003-2006
Included Observations: 243

Coefficient t-Statistic	ROA	ROE	SHERT2
Intercept	-0.300	0.067	-0.078
	-1.589	0.130	-0.234
SIZE	0.007	-0.058	-0.038
	0.274	-0.889	-0.884
AGE	0.0008	-0.003	0.002
	0.347	-0.504	0.472
BLOCK	-0.046	-0.887	1.065
	-0.223	-1.552	2.879**
COMM	-0.086	-0.118	-0.009
	-2.431*	-1.208	-0.144
DIVR2	0.198	0.498	-0.247
	2.465*	2.260*	-1.730
EQED	-0.333	0.047	-0.972
	-1.533	0.079	-2.517*
GEAR2	-0.018	-0.699	0.002
	-1.003	-14.403**	0.077
LogMCAP2	0.067	0.144	0.050
	2.206*	1.727	0.930
SEGMT	0.005	0.108	-0.029
	0.245	2.008*	-0.820
R^2	0.115	0.492	0.073
Std Error (Regression)	0.556	1.526	0.988
F-Statistic	3.375	25.094	2.036
Probability (F-Statistic)	0.0007	0	0.036
Durbin-Watson	2.019	2.044	2.012

* Significance at the 5% level ** Significance at the 1% level

Table 5 displays the regression results without the firm size control, in which no significant influence of board size on performance measures could be identified. Regarding the control variables used in the analysis, it is found in Table 4 and 5 that higher blockholder ownership enhances performance as measured by shareholder return.

Table 5. Sensitivity Tests: Board Size and Subsequent Performance

Sample Period: 2003-2006
Included Observations: 243

Coefficient t-Statistic	ROA	ROE	SHERT2
Intercept	-0.176	0.333	0.014
	-0.970	0.670	0.044
SIZE	0.031	-0.006	-0.019
	1.453	-0.098	-0.511
AGE	0.002	-0.001	0.002
	0.767	-0.183	0.657
BLOCK	-0.018	-0.824	1.086
	-0.084	-1.440	2.945**
COMM	-0.072	-0.087	0.002
	-2.050*	-0.907	0.024
DIVR2	0.232	0.571	-0.222
	2.919**	2.629**	-1.582
EQED	-0.462	-0.229	-1.068
	-2.188*	-0.397	-2.873**
GEAR2	-0.013	-0.688	0.006
	-0.727	-14.239**	0.195
SEGMT	0.014	0.129	-0.021
	0.751	2.446*	-0.628
R^2	0.097	0.486	0.069
Std Error (Regression)	0.560	1.533	0.988
F-Statistic	3.137	27.625	2.183
Probability (F-Statistic)	0.002	0	0.030
Durbin-Watson	1.984	2.014	2.011

* Significance at the 5% level ** Significance at the 1% level

Coles et al. (2001) argued that blockholders had the capacity to monitor their investments and by virtue of the magnitude of their investments, could affect managerial behaviour. The threat that blockholders might sell large blocks of shares if the firm fails to provide an acceptable return is a significant issue for managers. The empirical studies that support the proposition include Barclay and Holderness (1991), Van Nuys (1993), Brickley et al. (1994), Shome and Singh (1995), Bethel et al. (1998) and Allen and Phillips (2000).

It is not surprising that the tables reveal dividend payments of sample firms reflect the accounting measures of ROA and ROE, given that dividend payout is normally based on the historic performance of a company. Table 4 and 5 reveals that in the period of 2003-2006 lower leverage leads to a better ROE. This finding coincides with Alaganar (2004) in which the author documented an inverse relationship between leverage and ROE for the top ASX 100 companies from 1994 to 2003, which over time was becoming more dramatic. It is unclear however why the number of business segments gives a positive impact on ROE; it is noted that diversification has been shown to be value destroying by some authors (Berger and Ofek, 1996; Servaes, 1996; Denis et al., 1997). This issue is raised for future investigation.

Table 6 provides regression estimates in relation to the explanatory factors for board size, with or without firm size control. It appears that larger companies or companies with more reportable segments tend to have more board members. The results are consistent with those reported in the U.S. studies of Denis and Sarin (1999), Baker and Gompers (2003), Lehn et al. (2004), Boone et al. (2007), Coles et al. (2008) and Linck et al. (2008).

Table 6. OLS Regressions: Determinants of Board Size

Sample Period:	2000-2003	
Included Observations:	243	
Coefficient t-Statistic	SIZE	
Intercept	0.901	2.675
	1.779	5.081**
AGE	-0.003	0.003
	-0.477	0.461
BLOCK	0.891	1.458
	1.615	2.332*
DIVR1	0.139	0.488
	0.634	1.988*
COMM	0.170	0.450
	1.764	4.343**
EQED	-0.270	-1.175
	-0.477	-1.850*
GEAR1	0.049	0.172
	0.724	2.301*
LogMCAP1	0.710	
	8.493**	
SEGMT	0.120	0.318
	2.235*	5.779**
SHERT1	-0.002	-0.020
	-0.030	-0.264
R^2	0.490	0.333
Std Error (Regression)	1.489	1.700
F-Statistic	24.904	14.570
Probability (F-Statistic)	0	0
Durbin-Watson	2.002	1.926

* Significance at the 5% level ** Significance at the 1% level

4. Conclusions

Using a sample of Australian firms from 2000 to 2006, this research investigates the performance impact and explanatory factors for board size. In line with Bhagat and Black (2000), Dehaene et al. (2001), Panasian et al. (2003), Bonn (2004), Dulewicz and Herbert (2004), Randoy and Jenssen (2004), Chin et al. (2004) and Chen et al. (2005), no significant relationship between board size and subsequent firm performance is identified.

The data analysis suggests that blockholder ownership enhances performance as measured by shareholder return; this evidence supports the proposition that blockholders could affect management practices. Over the sample period 2003-2006 higher leverage leads to poor ROE. One possible explanation for this is that newly acquired debt may be deployed on projects that have a negative impact on profitability. The earnings generated by investments funded by new debt are not adequate to offset the additional interest expense. As noted by Alaganar (2004), this may have been fuelled by the prevailing environment where interest rates were low and firms were inclined to undertake such projects.

The analysis shows that, similar to the patterns which have emerged in the U.S. research, larger companies or companies with more industrial and geographical segments tend to have more board members. It could be concluded that the board structure determinants for Australian firms may not differ from those for U.S. firms. The results are consistent with the expectation that more complex operations require larger boards (Fama and Jensen, 1983; Bhagat and Black, 1999; Agrawal and Knoeber, 2001; Lehn et al., 2004; Coles et al., 2008). However, as shown in Section 2, lack of comparable data precludes the inclusion of financial institutions in this study; there may be scope for further research investigating the impact and determinants of board size in several major industries to take into account the specificity of their business.

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