

## IMPACT OF BOARD SIZE AND BOARD DIVERSITY ON FIRM VALUE: AUSTRALIAN EVIDENCE

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### **Abstract**

The aim of this paper is to provide a preliminary analysis of the relationship between firm market value and the size and gender diversity of a board of directors for a sample of publicly listed Australian firms. Our results show that smaller boards appear to be more effective in representing the shareholders as smaller boards are associated with higher firm value. As board size increases firm value declines, however at a decreasing rate suggesting that the relationship between board size and firm value is not strictly linear. Our findings further indicate that gender diversity promotes shareholders' value as the presence of women directors is associated with higher firm value.

**Keywords:** corporate governance, board of directors, shareholders, Australia

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### **1. Introduction**

Corporate governance structure and the role of board of directors have recently re-emerged as a topical research topic following the collapse of US giants Enron and WorldCom. The main thrust of research in this area is to identify the optimal board composition and to investigate the effectiveness of corporate governance structure in controlling agency behaviors of executive officers and promoting firm value. Existing empirical evidence from various US studies, while mixed, suggests that board characteristics indeed have an impact on firm performance. Baysinger and Butler (1985), for example, show that the number of outside directors impacts positively on firm performance. Additionally, investors view the appointment of a new outsider on the board of director is good news (Rosenstein and Wyatt 1990). The compensation literature, on the other hand, postulates that firm performance is a function of how directors and executive officers are being compensated. Ownership compensation is expected to align directors and managers' interest to that of shareholders, hence reduces agency costs. Empirical evidence on the effectiveness of corporate governance structure in Australia is however rather limited. In one of the rare studies that look at the role

of board composition of Australian publicly listed companies Lawrence and Stapledon (1999) have no success in documenting a significant relationship between the number of independent directors and firm value. The potential impact of board size and board diversity on firm value, on the other hand, has not been investigated in Australia.

In this paper we focus on the relationship between board size and firm value using data from the Australian corporate sector. We also address the question of whether board gender diversity, as presented by the number of woman directors, adds value as claimed by many commentators. Yermack (1996) shows that larger board in general destroys value, mostly due to the costs involved in coordinating the decision making process of a large number of people. Carter, Simkins and Simpson (2003), on the other hand, suggest that a more diverse board is associated with value increment. We aim to test the generalizability of these results using a sample of Australian companies. The choice of the Australian sample is justified on two grounds. First, Australian board of directors appear to be structurally different from US boards. Australian companies tend to have smaller boards which are mostly attributable to the smaller market capitalization of Australian firms. It is therefore unclear if larger boards are associated with a reduction in firm market value as a critical mass in

the number of directors needs to be achieved for a diverse range of skills and expertise. Second, Australia has less developed financial markets and a less active market for corporate control. These institutional differences are expected to have implications for the relationship between board characteristics and firm value.

Using a sample of 832 observations over the 2-year period from 2000 to 2001 we find that larger boards are in general associated with lower firm value. Our results also suggest that the relationship between board size and firm value is non-linear in nature. More specifically, firm value is V-shaped as board size increases. Nevertheless, the cut-off point appears to be sufficiently large that all of our sample firms belong to the left hand side of the V and thus do not benefit from an increase in board size. In general, our results support the empirical evidence documented by Yermack (1996) that larger boards hurt firm value and firms should consider a simple strategy to enhance value by reducing the number of directors. The underlying argument for a smaller board is when board size increases the marginal benefits from a wide range of expertise and skills do not seem to outweigh the marginal costs arising from conflicts of opinions in the decision making process. Furthermore, we show that an increase in board size of Australian firms is associated with a reduction in firm market value at a *decreasing rate*. This means that a super-sized board can potentially add value. Nevertheless, according to our rough estimation, a board needs to be comprised of at least 26 members for this value addition to take place as an additional director is appointed. Given that the maximum number of directors for our sample firm is 17, it is unrealistic to expect that a larger board is associated with enhanced shareholders' value.

We also find that a board of director comprising of female members is more effective in promoting firm value. Employing both a dummy variable and a continuous variable to measure the presence of women directors on the board, we find encouraging results that woman director variables are both significantly and economically related to a higher firm market value. Our findings are supportive of the view that board diversity should be promoted as a common corporate governance practice. The US National Association of Corporate Directors Blue Ribbon Commission, for example, recommended that gender, racial, age, and nationality diversity should be considered in the selection of directors.<sup>1</sup> In an empirical study, Carter et al (2003) also document significant relationships between the proportion of women (and racial minorities) on the board and firm value.

The paper proceeds as follows. Section 2 describes the data and methodology. Empirical

results are presented in Section 3 and Section 4 concludes.

## 2. Data and Methodology

The role of the board of directors in monitoring agency behaviors of executive officers is most critical in publicly traded firms. As a result, we choose to focus on the 500 largest listed companies in the Australian Stock Exchange that have their financial reports registered with the Connect4 database. We study the financial reports of these firms individually for financial years 2000 and 2001 to obtain data on the board of directors. Specifically, we hand collect the data regarding the number of directors, the composition of the board in terms of gender balance and insider/outsider director make-up. We also determine the average age of the directors where possible and whether the Chairman of the board is also an executive officer. Balance sheet and profit and loss statement data are also obtained from Connect4. In addition, we examine the Directors' reports and the Notes to the financial statement to gather data on directors' option and equity ownership. The number of industry segment is also obtained from Connect 4 while market value of equity and capital expenditure data is downloaded from Datastream. Following this data collection procedure, we end up with a sample of 832 firm-year observations, of which data on woman directors are available for 793 observations.

First, to determine the potential relationship between firm value and board size we run the following regression:<sup>2</sup>

$$TobinQ = \alpha_0 + \alpha_1 BoardSize_t + \sum_{i=1}^n \alpha_i X + \varepsilon \quad [1]$$

where *TobinQ* is measured as the sum of market value of equity and book value of total liabilities divided by the book value of total assets. *BOARDSIZE* is the natural log of the number of directors at the reporting date. *X* is a vector of control variables. The control variables are: *WOMANDUM* (a dummy variable equaling to unity if a company has a woman director), *OUTDIRPER* (percentage of outside directors on the board), *DUALITY* (a dummy variable equaling to unity if the Chairman of the board also holds an executive position with the firm), *CAPEX* (the expenditure spent on fixed assets in a particular financial year scaled by total assets), *INDSEG* (the number of industry segments that the firm operates in), *ROA* (the return on assets calculated as profit after interest and tax divided by total assets), *LNTA* (the natural log of total assets), *EXEOP* (the number of options held by directors scaled by the total number of shares outstanding) and *EXESH* (the number of company

<sup>1</sup> See Carter, Simkins and Simpson (2003)

<sup>2</sup> Equation [1] is estimated using OLS. Yermack (1996), however, argues that fixed effects estimators are more appropriate as unobservable firm characteristics are likely to affect firm market value. Our results using fixed effects estimators are forthcoming.

shares held by directors scaled by the total number of shares outstanding).  $\varepsilon$  is the error term.

We choose to use Tobin's Q ratio as a measure of firm market value. In the spirit of Lemmon and Lins (2003) we calculate Tobin's Q ratio as the ratio of total liabilities plus the market value of equity divided by the book value of total assets. A simple Tobin's Q is used in our paper as opposed to a more complex Tobin's Q (for example, as measured in a fashion described by Lewellen and Badrinath, 1997, and/or Perfect and Wiles, 1994) because simple Tobin's Q has been shown to be highly correlated with more complex Tobin's Q proxies, the measurement of which requires an estimation of the replacement costs of assets. Allayannis and Weston (2001), for example, report that the correlation coefficient between simple Tobin's Q and complex Tobin's Q is 0.93, while Daines (2001) suggests that similar results are obtained using a simple Tobin's Q and one constructed using the Perfect and Wiles (1994) approach. A simple Tobin's Q also does not require a lot of data input and has been used widely in both Australia and elsewhere as a popular proxy for firm value (Farrer and Ramsey 1998, Daines 2001).

The control variables are employed to account for variations in firm market value which are not explained by our two main explanatory variables – board size and gender diversity. Firm value has been shown to be positively related to the percentage of insiders on the board (Baysinger and Butler 1985, Prevost, Rao and Hossain 2002), future growth opportunities as measured by capital expenditure (Yermack 1996, Smith and Watts 1992), profitability as measured by the return on asset ratio (Yermack 1996, Carter et al 2003) and executive option and share ownership (Morck, Shleifer and Vishny 1988). Joint chairmanship and executive role and industrial diversification, on the other hand, are expected to have a negative impact on firm market value.<sup>3</sup> Existing findings on the relationship between firm size and market value however is mixed and thus is a question of 'empirical evidence'. These predicted theoretical relationships are depicted in Column 2 of Table 4.

Theoretically, the impact of board size on firm value appears to be determined by two interacting factors: the marginal benefits of a director's expertise, skills, experience and fresh perspectives and the marginal costs of the potential conflict of ideas and a slower decision making process when an additional director is appointed. For a particular period, if marginal benefits outweigh marginal costs, a positive relationship between board size and firm value will prevail. On the contrary, a negative relationship results when marginal costs outweigh

marginal benefits. Therefore it is reasonable to expect that the relationship between board size and firm value is non-monotonic. We test for the possibility of a non-linear relationship by employing a quadratic term. Specifically, we run the following regression:

$$TobinQ = \beta_1 + \beta_2 BoardSize_i + \beta_3 BoardSize_i^2 + \sum_{j=1}^n \beta_j X_j + \delta \quad [2]$$

Second, the relationship between firm value and board gender diversity is tested by running the following equations:

$$TobinQ = \lambda_0 + \lambda_1 WOMDIR_i + \sum_{j=1}^n \lambda_j Y_j + \theta \quad [3]$$

$$WOMDIR = \gamma_0 + \gamma_1 TobinQ_i + \sum_{j=1}^n \gamma_j Z_j + \sigma \quad [4]$$

*WOMDIR* is measured as a dummy variable equaling to unity if a company has a woman director and a continuous variable indicating the percentage of woman directors on the board. *Y* is a vector of explanatory variables which include *BOARDSIZE*, *OUTDIRPER*, *DUALITY*, *CAPEX*, *INDSEG*, *ROA*, *LNTA*, *EXEOP* and *EXESH*. *Z* is also a vector of explanatory variables which include *BOARDSIZE*, *OUTDIRPER*, *DUALITY*, *ROA* and *LNTA*. The definitions of these variables are the same as above.

Carter *et al* (2003) and Prevost, *et al* (2002) argue that corporate governance research that attempt to establish a relationship between firm value and board composition may suffer from endogeneity problem where one or more variables on the right hand side are correlated with the disturbance term. This situation may arise if there are endogenously determined variables on the right hand side of the equation. To correct for this biasness and inconsistency of the OLS estimators, two-stage least squared (2SLS) can be used. Our OLS estimators, however, do not appear to be affected by endogeneity as our OLS results are highly similar to 2SLS results although the coefficients of the *WOMDIR* variables are more economically significant in 2SLS results. We therefore choose to report OLS results.

### 3. Empirical Findings

#### a. Descriptive Statistics

In Table 1, we report the descriptive statistics of the board of directors for our sample firm. On average, an Australian listed corporation has a board of director that comprises of 6.3 directors, of which 0.31 (4.52%) is woman and 1.71 (28.34%) are directors who concurrently hold a full time executive position with the company. The median value of board size (median = 6) suggests that the distribution of the number of directors is fairly normal. The largest board has 17 members while the smallest one has a mere 3 directors. The highest number of women directors on the board is 3 while a majority of firms have a board of directors that are made up of entirely males. The mean value of the

<sup>3</sup> See Yermack (1996) for a discussion of the chairman and CEO duality and Lang and Stuz (1994) for empirical evidence on industrial diversification

chairman/executive duality variable is 0.1617 which means that 16.17% of the firms have a non-independent chairman. Directors are approximately 55 years old and on average they hold 2.33% of options and 18.22% of shares relative to the total number of shares outstanding. Our descriptive statistics highlight the institutional difference between US and Australian corporation. Yermack (1996) reports that the mean board size of his *Forbes* magazine sample is 12.25 while *Fortune* 1000 firms have a mean board size of 10.98 (Carter *et al* 2003). Our statistics are however similar to that obtained from New Zealand. According to Prevost *et al* (2002), the mean number of directors for a sample of firms listed on the New Zealand Stock Exchange is 6.6 with a min of 2 and a max of 14. While differing in size, board composition of US and Australian firms appear to be fairly similar: 36% of inside directors reported by Yermack (1996) and 26.2% by Carter *et al* (2003).

A comparison of board characteristics and firm characteristics of boards with no women directors and boards with women directors is presented in Table 2. Boards with women directors, in general, are larger which makes intuitive sense as a larger board is more likely to have a woman director on it. Boards without women directors, however, are characterized by a higher incidence of chairman and executive duality, a higher percentage of directors' option and equity ownership and a larger proportion of inside directors compared to boards with female directors. The existing literature suggests that boards of directors where the chairman is also the CEO and the number of inside directors is significant tend to be less effective in controlling agency behaviors of executive officers. Boards with and without woman directors, however, are not distinguishable from each other with respect to the average age of directors.

In terms of financial characteristics, firms with women directors have a statistically higher ROA ratio suggesting that profitable firms are more likely to appoint a female director. Female directors are also more likely to be appointed in larger firms that are more industrially diversified (operate in more industry segments). Nevertheless, these univariate analyses do not reveal any differences between boards with and without woman directors with respect to firm value as measured by the Tobin's Q ratio and future growth opportunities as proxied by capital expenditure.

In Table 3, we report the board size and gender diversity statistics according to industry sector as classified by the Australian Stock Exchange (ASX). We observe that on average utilities firms have largest boards (mean = 7.75) while firms in the Information Technology industry sector have smallest boards (mean = 5.67). In terms of gender balance, the Health Care industry sector has the highest number of women directors (mean = 0.52). In relative terms, the Health Care industry also has the

highest score for women directors with approximately 8% of the board being female members. On the other hand, women are least likely to be appointed as directors in the Materials industry (mean percentage = 2.96%).

## b. Board size and firm market value

Regression results of Equation [1] are presented in Column (1) of Table 4. According to the results, there is no significant relationship between firm market value and board size. We argue above that the residual relationship between firm value and board size depends on the interactive strength of two opposing factors: the marginal benefits of an extra director's skills, experience and expertise and the marginal cost arising from potential conflicts and slower decision making. The strengths of these two forces may vary as the number of directors changes. Therefore, the initial insignificant relationship between board size and firm value does not necessarily mean that board size has no impact on firm value. The lack of a significant relationship is more likely to be attributable to non-linearity. Consistent with our expectation, the results of Equation [2], which are presented in Column (2) of Table 4, indicate that the relationship between firm value and the number of directors on the board is non linear. As the coefficient of the main variable *BOARDSIZE* is negative and the coefficient on the quadratic term is positive, it appears that firm value takes on a V shape as board size increases. While both the linear and quadratic coefficients are statistically significant at the 1% level, economically, the coefficient on the linear term far overpowers the coefficient on the quadratic term. As a result, the cutoff number of directors (the benchmark number of directors above which an increase in board size will result in an increase in firm value) appears to be so large that it is unrealistic in practice to pursue a value enhancing strategy by increasing board size. For instance, other things being equal, our estimation shows that the board needs to comprise of at least 26 members for any subsequent member appointment to add value. Given the largest board in our sample only consists of 17 directors, we conclude that for our sample firms an increase in board size hurts firm value. The marginal cost of adding one extra director appears to be greatest when board size increase from 4 to 5, after that the decline in firm value takes place at a decreasing rate as board size increases. Our findings indicate that despite differences in board size between the US and Australia, in both countries larger boards are associated with a lower firm value. Contrary to the common belief that an additional director appointment to a small board will add value, our results show that in all instances the cost of communication and coordinating the decision making process of a large number of directors outweigh the benefit that additional directors bring.

Our regression results also show that the presence of woman directors is associated with higher firm value. We will endeavor to examine this relationship in more detail in the next section. Consistent with Lawrence and Stapledon (1999) we fail to find a significant correlation between the percentage of outside directors and firm value. Australian firms are neither valued more highly when they have more outside directors on the board nor when the chairman of the board is separate from a full time executive officer. Contrary to our prediction that growth opportunities are related to higher firm value, we find no such significant relationship. Industrial diversification, on the other hand, hurts firm value as theorized by Lang and Stulz (1994). In particular, as a company operates in one more industry segment, Tobin's Q declines by 0.0936 which is equivalent to a 4.93% reduction in firm value based on the mean Tobin's Q of 1.8999. The results also support the notion that more profitable firms have higher market value while, other things being equal, the market values smaller firms more highly than larger firms. Despite the belief that option and stock compensation should align directors' interest with that of shareholders and result in a higher firm value, we find no evidence that directors' option and equity holdings have a positive impact on firm value.

### c. Board gender diversity and firm value

The case for a positive relationship between board diversity and firm value has recently emerged and thus the body of empirical knowledge in this field is relatively limited. Board diversity, however, is believed to benefit corporations for the following reasons.<sup>4</sup> First, diversity allows a better understanding of the marketplace; the more diverse the market place, the more diversity is expected to add value in a corporate context. Second, diversity is associated with creativity and innovation. Third, diversity produces more effective problem-solving. Fourth, diversity enhances the effectiveness of corporate leadership and finally diversity promotes more effective global relationships. In this paper, we only examine the value enhancing property of one diversity aspect – gender diversity. In particular, we test the hypothesis that firms with women directors on the board (dummy variable) and firms with more women directors on the board (continuous variable) are associated with higher firm value. The results of our regression on the inter-relationship between firm value and gender diversity are reported in Table 5. First, it is observed that firms with women directors are associated with higher market value. The coefficient is both statistically and economically

significant. On average, if two firms are similar in every aspect, the firm with woman directors has a Tobin's Q which is 0.7149 higher than that of a firm with all male directors. Hence, it appears that a market value premium exists for the appointment of female directors. Using a continuous variable to proxy for the presence of women on board of directors, we also find that not only the incidence of woman directors is associated with higher market value but the proportion of women directors relative to men directors also adds value. In particular, as the number of women directors increases by 1, Tobin's Q increases by 0.0360, an increase of 1.89% in firm value. Our findings suggest that women play an essential role in maintaining the effectiveness of a board of directors.

In the 2<sup>nd</sup> and 4<sup>th</sup> columns of Table 5 we report the results of regressions where the dependent variable are a dummy variable and the percentage of women directors on the board respectively. We find that Tobin's Q is positively related to both the incidence of woman director appointment and the proportion of them on the board. This result further supports the view that board gender diversity and firm value are positively related to each other. We are also able to draw conclusions about the factors that determine the appointment of women directors and the number of them on the board. It appears that a firm is more likely to have a female director if it is larger and has a bigger board. The findings are consistent with our expectation that larger firms are more likely to have larger boards and hence more likely to have a woman director. Not only are firm size and board size important in determining the appointment of women directors, they also play a crucial role in determining the number of women directors on the board. Generally, a firm is more likely to have a larger percentage of woman director representation if it is larger and has a bigger board of directors. Our overall results suggest that board diversity leads to an increase in firm value and the appointment of female directors is a practice that should be encouraged in the corporate world.

### 4. Conclusion

In this paper we address the issue of whether characteristics of a board of directors are instrumental in promoting shareholders' wealth in a sample of Australian publicly listed companies. Specifically, we examine the impact of board size and board gender diversity on firm value. Using a simple Tobin's Q as a measure of firm market value, we find that larger boards are generally value destructive as the costs of resolving conflicts and coordinating communication flows and decision making significantly outweigh the benefit of having an additional director. Gender balance in the board of directors, on the other hand, is associated with higher market value. Firms with woman directors are

<sup>4</sup> These propositions are provided by Cox and Blake (1991) and Robinson and Dechant (1997) and recited by Carter, Simkins and Simpson (2003). The propositions provided by Cox and Blake (1991) and Robinson and Dechant (1997) are in the context of corporate diversity but they have implications for board diversity.

rewarded with a value premium and the higher the proportion of women directors, the higher the firm value. The implication of our findings is shareholders' value is best preserved when board size are small and partly represented by female directors.

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## Appendices

**Table 1.** Descriptive Statistics of Board of Directors

This table details the statistics of the boards of director for our sample firm. The number of directors and number of woman directors are gathered from the individual firms' financial reports as of reporting date. Chairman and executive duality is a dummy variable equaling unity if the chairman holds an executive position in the firm. Executive options (shares) are measured as the numbers of options (shares) held by directors scaled by the total number of shares outstanding. An insider director is defined as a director who holds a full time executive position with the firm. The remaining directors are classified as outside directors. Average age is the mean age of all directors.						
	Mean	Median	Maximum	Minimum	SD	Observations
Number of directors	6.2993	6.0000	17.0000	3.0000	2.1380	832
Number of woman directors	0.3153	0.0000	3.0000	0.0000	0.5518	793
% of woman directors	4.5234	0.0000	50.000	0.0000	8.5109	793
Chairman and executive duality	0.1617	0.0000	1.0000	0.0000	0.3684	810
Executive options	2.2329	0.3719	66.5369	0.0000	8.6876	830
Executive shares	18.1191	7.0039	94.7946	0.0000	22.9613	830
Number of insider directors	1.7086	1.0000	7.0000	0.0000	1.1443	810
% of insider directors	28.3382	25.0000	100.0000	0.0000	18.4182	810
Number of outsider directors	4.6086	4.0000	14.0000	0.0000	2.0779	810
% of outsider directors	71.6619	75.0000	100.0000	0.0000	18.4182	810
Average age	55.0831	56.0000	82.0000	39.0000	4.8578	373

**Table 2.** Comparison of boards with no woman directors and board with woman directors

This table details the statistics of the boards of director with woman directors and boards with no woman directors. The number of directors and number of woman directors are gathered from the individual firms' financial reports as of reporting date. Chairman and executive duality is a dummy variable equaling unity if the chairman holds an executive position in the firm. Executive options (shares) are measured as the numbers of options (shares) held by directors scaled by the total number of shares outstanding. An insider director is defined as a director who holds a full time executive position with the firm. The remaining directors are classified as outside directors. Average age is the mean age of all directors. Tobin Q is measured as the sum of market value of equity and book value of total liabilities divided by book value of total assets. ROA is the return on assets calculated as profit after interest and tax divided by total assets. Ln(Total Assets) is the natural log of total assets. Capital expenditure is the expenditure spent on fixed assets in a particular financial year. Number of industry segment indicates the number of industry segments that the firm operates in

	Board with woman directors N=256		Board with no woman directors N=575		p-value
	Mean	SD	Mean	SD	
Board characteristics					
Number of directors	7.2891	1.9610	5.8594	2.0665	0.0000
Chairman and executive duality	0.1205	0.3262	0.1800	0.3846	0.0337
Executive options	1.4205	5.6587	2.7400	9.7083	0.0430
Executive shares	14.5018	21.7380	19.8701	23.3124	0.0018
Number of insider directors	1.7390	1.1289	1.6952	1.1518	0.6157
% of insider directors	24.3663	15.0807	30.1010	19.4736	0.0000
Number of outsider directors	5.5542	1.9505	4.1889	1.9946	0.0000
% of outsider directors	75.6337	15.0807	69.8990	19.4736	0.0000
Average age	55.6639	4.3382	54.8008	5.0754	0.1075
Firm characteristics					
Tobin Q	1.9929	2.1294	1.8587	2.3395	0.4330
ROA	0.0276	2.0027	-0.7117	4.7292	0.0163
Ln(Total Assets)	19.9873	1.9187	18.7349	1.6473	0.0000
CapEx/Total Revenue	0.4109	4.0840	1.1570	7.5320	0.1462
Number of industry segment	1.9063	1.2676	1.5625	0.9831	0.0000

**Table 3.** Board Size and Woman Directors by Industry Classification

This table reports the board size and woman directors of firms according to industry classification. The industry sectors are classified according to the Global Industry Classification Standard (GICS) adopted by the Australian Stock Exchange (ASX) from March 31, 2002

Industry sector	Observation	Board size	Observation	Average number of woman director	Average percentage of woman directors
Energy	35	6.1429	33	0.2424	3.9960
Materials	158	5.8797	152	0.1974	2.9613
Industrials	121	6.5372	117	0.2735	4.0612
Consumer Discretionary	141	6.9220	132	0.4091	5.4567
Consumer Staples	55	6.7091	54	0.3704	5.5511
Health care	83	6.2048	82	0.5244	8.0213
Financials	151	6.0795	137	0.2774	3.5732
Information Technology	58	5.6724	56	0.2500	4.1490
Telecommunication Services	18	5.8889	18	0.3333	3.7037
Utilities	12	7.7500	12	0.4167	5.2976
Total	832	6.2993	793	0.3153	4.5234

**Table 4. Board Size and Firm Value**

This table presents the results of the following regressions

$$TobinQ = \alpha_0 + \alpha_1 BoardSize_i + \sum_{i=1}^n \alpha_i X + \varepsilon \quad [1]$$

$$TobinQ = \beta_1 + \beta_2 BoardSize_i + \beta_3 BoardSize_i^2 + \sum_{j=1}^n \beta_j X + \delta \quad [2]$$

where TobinQ is measured as the sum of market value of equity and book value of total liabilities divided by book value of total assets. Board Size is the natural log of the number of directors at the reporting date.. X is a vector of control variables. The control variables are: WOMANDUM (a dummy variable equalling to unity if a company has a woman director), OUTDIRPER (percentage of outside directors on the board), DUALITY (a dummy variable equaling to unity if the Chairman of the board also holds an executive position with the firm), CAPEX (the expenditure spent on fixed assets in a particular financial year scaled by total assets), INDSEG (the number of industry segments that the firm operates in), ROA (the return on assets calculated as profit after interest and tax divided by total assets), LNTA (the natural log of total assets), EXEOP (number of options held by directors scaled by the total number of shares outstanding) and EXESH (number of company shares held by directors scaled by the total number of shares outstanding).  $\varepsilon$  and  $\delta$  are error terms.

	Predicted Sign	(1)	(2)
Constant		10.9594 <sup>a</sup>	16.0484 <sup>a</sup>
		(8.8579)	(6.9582)
Ln(BoardSize)	?	0.3827	-4.8775 <sup>a</sup>
		(1.5794)	(-2.6081)
Ln(BoardSize) Squared	?		1.4833 <sup>a</sup>
			(2.9645)
Woman Director Dummy	+	0.7149 <sup>a</sup>	0.7410 <sup>a</sup>
		(4.1125)	(4.2668)
Percentage of Outside Directors	+	0.0003	0.0007
		(0.0571)	(0.1403)
Duality	-	0.3825	0.2927
		(1.0826)	(0.8061)
Capital Expenditure	+	0.0133	0.0121
		(1.0713)	(1.0194)
Industry Segment	-	-0.0824 <sup>c</sup>	-0.0936 <sup>c</sup>
		(-1.6805)	(-1.8919)
ROA	+	0.0441 <sup>b</sup>	0.0499 <sup>b</sup>
		(2.2567)	(2.4980)
Ln(Total Assets)	?	-0.5122 <sup>a</sup>	-0.5431 <sup>a</sup>
		(-7.0478)	(-7.3954)
Executive Options	+	0.0071	0.0074
		(1.4126)	(1.5380)
Executive Shares	+	-0.0060	-0.0056
		(-1.5880)	(-1.4794)
R-squared		0.1341	0.1415

<sup>a</sup> Significant at 1%<sup>b</sup> Significant at 5%<sup>c</sup> Significant at 10%



**Table 5.** Woman Directors and Firm Value

This table presents the results of the following regressions

$$TobinQ = \lambda_0 + \lambda_1 WOMDIR + \sum_{i=1}^n \lambda_i Y + \theta \quad [3]$$

$$WOMDIR = \gamma_0 + \gamma_1 TobinQ + \sum_{j=1}^n \gamma_j Z + \omega \quad [4]$$

where TobinQ is measured as the sum of market value of equity and book value of total liabilities divided by book value of total assets. WOMDIR is measured as a dummy variable equaling to unity if a company has a woman director and a continuous variable indicating the percentage of woman directors on the board. Y is a vector of explanatory variables which include BOARDSIZE (natural log of the number of directors), OUTDIRPER (percentage of outside directors on the board), DUALITY (a dummy variable equaling to unity if the Chairman of the board also holds an executive position with the firm), CAPEX (the expenditure spent on fixed assets in a particular financial year scaled by total assets), INDSEG (the number of industry segments that the firm operates in), ROA (the return on assets calculated as profit after interest and tax divided by total assets), LNATA (the natural log of total assets), EXEOP (number of options held by directors scaled by the total number of shares outstanding) and EXESH (number of company shares held by directors scaled by the total number of shares outstanding). Z is also a vector of explanatory variables which include BOARDSIZE, OUTDIRPER, DUALITY, ROA and LNATA.  $\theta$  and  $\omega$  are error terms.

	Predicted Sign	DepVar = TobinQ	DepVar = WomanDum	DepVar = TobinQ	DepVar = % Woman Director
Constant		10.9594 <sup>a</sup> (8.8579)	-1.4649 <sup>a</sup> (-7.6631)	10.8811 <sup>a</sup> (8.8222)	-17.6778 <sup>a</sup> (-4.9352)
Woman Director Dummy	+	0.7149 <sup>a</sup> (4.1125)			
% of Woman Directors	+			0.0360 <sup>a</sup> (3.4123)	
TobinQ	+		0.0262 <sup>a</sup> (3.1071)		0.4335 <sup>a</sup> (2.7821)
Board Size	?	0.3827 (1.5794)	0.2763 <sup>a</sup> (4.9111)	0.5098 <sup>b</sup> (2.0662)	2.1874 <sup>b</sup> (2.2009)
% of Outside Directors	+	0.0003 (0.0571)	0.0014 (1.5666)	0.0007 (0.1277)	0.0248 (1.5309)
Duality	-	0.3825 (1.0826)	-0.0100 (-0.2216)	0.4154 (1.1427)	-0.3235 (-0.3554)
Capital Expenditure	+	0.0133 (1.0713)		0.0122 (0.9786)	
Industry Segment	-	-0.0824 <sup>c</sup> (-1.6805)		-0.0625 (-1.2155)	
ROA	+	0.0441 <sup>b</sup> (2.2567)	-0.0006 (-0.2579)	0.0461 <sup>b</sup> (2.3389)	-0.0049 (-0.1206)
Ln(Total Assets)	?	-0.5122 <sup>a</sup> (-7.0478)	0.0592 <sup>a</sup> (5.3525)	-0.5196 <sup>a</sup> (-7.0744)	0.8256 <sup>a</sup> (3.8977)
Executive Options	+	0.0071 (1.4126)		0.0066 (1.2821)	
Executive Shares	+	-0.0060 (-1.5880)		-0.0067 <sup>c</sup> (-1.7413)	
R-squared		0.1341	0.1500	0.1357	0.0718

<sup>a</sup> Significant at 1%

<sup>b</sup> Significant at 5%

<sup>c</sup> Significant at 10%

Null Hypothesis: Board gender diversity has no causal relationship with firm performance in India. 2.1 Gender Diversity in the Boardroom and Firm Value. With changing social norms, women will constitute a larger proportion of the workforce. As a result, gender diversity in the boardroom has also attracted attention from scholars, corporations as well as governments in recent years (Erhardt et al, 2003). Evidence of the Resource Dependence Theory include a survey by McKinsey which highlights that gender diversity helps in sustaining good relationships with female clients and gaining female insight into consumer buying patterns (Sussmuth-Dyckerho et. al, 2012). Gender representation on corporate boards of directors refers to the proportion of men and women who occupy board member positions. To measure gender diversity on corporate boards, studies often use the percentage of women holding corporate board seats and the percentage of companies with at least one woman on their board. Globally, men occupy more board seats than women. As of 2018, women held 20.8% of the board seats on Russell 1000 companies (up from 17.9% in 2015). The inconsistent findings of past board diversity research demand a test of competing linear and curvilinear diversity-performance predictions. This research focuses on board age and gender... Impact of board size and board diversity on firm value: Australian evidence. *Corporate Ownership & Control*, 4, 24-32. Google Scholar. Nielsen, S., & Huse, M. (2010).