RESEARCH

includes research articles that focus on the analysis and resolution of managerial and academic issues based on analytical and empirical or case research

Influence of Board Size and Independence on Firm Performance: A Study of Indian Companies

Ajay Kumar Garg

Executive Summary

Corporate governance issues have attracted a good deal of public interest because of their apparent importance for the economic health of corporations and society in general, especially after the plethora of corporate scams and debacles in recent times.

Corporate governance issues flow from the concept of accountability and governance and assume greater significance and magnitude in the case of corporate form of organization where the ownership and management of organizations are distanced. And, it is in this context that the pivotal role played by the board of directors in maintaining an effective organization assumes much importance. A major part of the debate on corporate governance centres around board composition especially board size and independence. Various committees have mandated a minimum number of independent directors and have given guidelines on board composition. However, the relationship of board characteristics such as composition, size, and independence with performance has not yet been established.

This paper addresses this question: Does the board size and independence really matter in terms of influencing firm's performance?

The findings suggest that:

- There is an inverse association between board size and firm performance.
- Different proportions of board independence have dissimilar impact on firm performance.
- The impact of board independence on firm performance is more when the board independence is between 50 and 60 per cent.
- Smaller boards are more efficient than the larger ones, the board size limit of six suggested as the ideal.
- Independent directors have so far failed to perform their monitoring role effectively and improve the performance of the firm.
- The guidelines on corporate governance should take into account the 'cross-board' phenomenon while defining the criteria for eligibility for appointment as an independent director.
- Lack of training to function as independent directors and ignorance of the procedures, tasks, and responsibilities expected of them could be reasons for the independent directors' non-performance.
- A bad performance leads to an increase in board size, which in turn, hampers performance.

Guidelines are provided for future studies to include different variables to see which board composition is suitable for different companies at different stages of life cycle.

KEY WORDS

Corporate Governance

Board Independence

Board Size

Firm Performance

Agency Theory

The corporate governance issues have succeeded in attracting a good deal of public interest because of their apparent importance for the economic health of corporations and society in general, especially after the plethora of corporate scams and debacles in the recent times. The US, Canada, the UK, other European countries, the East Asian countries, and even India for that matter have witnessed the collapse of or severe pressure on their economies and have faced grave problems including the demise of several leading companies in the last two decades or so. This has resulted in a greater emphasis and attention on the corporate governance issues (Dalton and Dalton, 2005).

The corporate governance issues flow from the concept of accountability for the safety and performance of assets and resources entrusted to the operating team; these issues of accountability and governance assume greater significance and magnitude in the case of corporate form of organization where ownership and management of the organizations are distanced. A variety of governance mechanisms have been suggested to overcome the agency problem arising from the separation of ownership and control. One of them is the inclusion of independent directors in the board of directors.

The board of directors is viewed as an important internal corporate governance mechanism. In the corporate form of business organization, the board of directors occupies a unique position. It governs all organizations big or small. To have a board of directors is a legal requirement mandated by a statute for all the incorporated entities. The Cadbury Report (1992) placed the corporate board at the centre stage of the governance system, and described it as one by which companies are directed and governed. Elected by the equity shareholders of the company, the board presides over the functioning and performance of the company, operates through the executive management, and is accountable to the shareholders and, in a broader sense, to the other stakeholders of the company also. The board can therefore be viewed as juxtaposed between the shareholders (owners) and the executive management (Cadbury, 1992).

The corporate governance literature in the US and the UK focuses on the role of the board as a bridge between the owners and the management (Cadbury, 1992). In an environment where ownership and management are widely separated, the owners are unable to exercise effective control over the management or the board. The management becomes self-perpetuating and the likes and dislikes of the Chief Executive Officer (CEO) largely influence the composition of the board itself. The corporate governance reforms in the US and the UK have focused on making the board independent of the CEO.

Given the fiduciary relationships that the corporate directors are subject to, there is always an overwhelming need to ensure that they discharge their responsibilities properly to protect and promote the interests of all shareholders as well as other stakeholders. It is in this context that measures to have independent directors on the board — who have no pecuniary relationships that may impair their judgments on matters relating to the company and its shareholders — are being stressed upon. The Cadbury Committee (1992), the Greenbury Committee (1995), the Hampel Committee (1998), the Higgs Committee (2003), etc., have mandated independent directors on the board.

In India, guidelines on the composition of the board of directors have been issued along the similar lines as abroad, mandating the appointment of a certain percentage of independent directors. The guidelines on independent directors pose a series of questions concerning their independence and the relationship of the board composition and independence with the firm's performance. The justification of inferring a relationship between board composition and performance is implied by the impact of the decision-making authority of the board on firm performance. The question how the board characteristics such as composition or size or duality are related to profitability has remained unresolved based on the studies done abroad.

REVIEW OF LITERATURE AND RESEARCH GAP

A number of empirical studies have been conducted in the US on whether there is any link between independent directors and corporate performance. Some researchers have looked for a direct evidence of a link between board composition in terms of independence and corporate performance. They have studied the correlation between the independent directors and the firms' performance as reflected by the accounting numbers. Baysinger and Butler (1985) and Hambrick and Jackson (2000) found evidence for the proportion of independent non-executive directors to be positively correlated with the accounting measure of performance. On the other hand, studies by Klein (1998), Bhagat and Black (1997), and

Hermalin and Weisbach (1991) have found that a high proportion of independent directors does not predict a better future accounting performance. Using accounting measures Agrawal and Knoeber (1999) found a negative relationship between board independence and firm's performance.

Hermalin and Weisbach (1991) and Bhagat and Black (2000) used the approach of Tobin's *q* as a performance measure, on the ground that it reflects the 'value added' of intangible factors such as governance (Yermark, 1996) and found that there is no noticeable relation between the proportion of outside directors and *q*. The study by Lawerence and Stapledon (1999) produced no consistent evidence that the independent directors either add or destroy value where corporate performance was assessed using accounting and share-price measures.

Hermalin and Weisbach (1988) found that the proportion of independent directors tended to increase when a company performed poorly. Therefore, any cross-sectional regression of performance on board composition will be biased because of changes in board composition resulting merely from past performance. Both Hermalin and Weisbach (1991) and Bhagat and Black (2000) have attempted to correct for this effect using panel data, which allowed them to control for biases due to joint endogeneity of the variables and simultaneous equation methods. In particular, these papers used lagged performance as an instrument for current performance. Even after correcting in this manner, there did not appear to be an empirical relation between board composition and firm performance.

The firm value depends on the quality of monitoring and decision-making by the board of directors, and the board size represents an important determinant of its performance. Jensen (1993) opines that large boards can be less effective than small boards. He says that when boards get beyond seven or eight people, they are less likely to function effectively and are easier for the CEO to control. A similar view is advocated by Lipton and Lorsch (1992) who state that the norms of behaviour in most boardrooms are dysfunctional because directors rarely criticize the policies of the top managers or hold candid discussions about corporate performance. Believing that these problems increase with the number of directors, they recommended limiting the membership of boards to ten, with a preferred size of eight or nine. They, in a way, suggest that even if board capacities for monitoring increase with the board size, the benefits are outweighed by such costs as slower decision-making, less candid discussions of managerial performance, and biases against risk taking. The idea is that when boards get to be too big, agency problems increase and the board becomes more symbolic and less a part of the management process. The inverse relationship between board size and performance has been reported by Yermack (1996), Eisenberg, Sundgren and Wells (1998), Mak and Kusnadi (2003), Alshimmiri (2004), and Andres, Azofra and Lopez (2005). However, Dalton *et al.* (1999), came up with contrary results.

Weirner and Pape (1999) have shown that the system of corporate governance in a particular country is context-specific and is a framework of legal, institutional, and cultural factors shaping the patterns of influence that stakeholders exert on managerial decision-making.

Further, the board leadership structure outside of the US might be more varied and, hence, may have a different relationship with firm performance. This phenomenon is particularly true for transition economies experimenting with the Western forms of governance and market mechanisms. Nonetheless, firms outside of the US are composed of different individuals and have different institutional expectations than the American boards, and this institutional context may lead to a different relationship with firm performance. For example, in their study of the 50 largest firms in the US, the UK, and Japan, Dalton and Kesner (1987) found that the proportion of insiders of boards varied significantly between these three countries (30%, 34%, and 49%, respectively). The institutional context and the make-up of corporate boards vary considerably around the world. Also, each country has through time developed a wide variety of governance mechanisms to overcome the agency problem that arises from the separation of ownership and control (Maher and Andersonn, 2001). Further, Verma (1997) opines that there is no reason to expect the Anglo-American models of corporate governance to work in the Indian context. In fact, India had a unique system of Managing Agency in force for a long period of time before it was finally abolished. Balasubramanian (2005) documents that our own ancient texts have laid down sound principles of governance, which are very relevant to the modern day corporate requirements. But, in India, the policy-makers are aping the Western models and forming policies and regulations based on them without checking their ap-

plicability in the Indian context. To add to this, there is a mixed evidence abroad on the value addition as a result of moving towards majority-independent boards. Within a country, different studies have produced conflicting results.

The question how are board characteristics such as composition or size or duality related to profitability, still remains unresolved. Yet, the recommendations of the Securities and Exchange Board of India Committee on Corporate Governance under the chairmanship of Kumar Mangalam Birla (1999), the Confederation of Indian Industry Code on Corporate Governance (1999), the Naresh Chandra Committee (2002) and the Securities and Exchange Board of India Committee on Corporate Governance under the chairmanship of N R Narayana Murthy (2003) are in favour of majority-independent boards while the J J Irani Committee has recommended 33 per cent independence which can also vary with the size and the type of company. There is a need for stronger tests to discern whether board composition has any effect on a firm's performance. Hence this study examines the question whether or not board composition has an impact on the firm's performance.

RESEARCH DESIGN

Data

The guidelines on corporate governance issued by SEBI (1999) made it mandatory for all the listed companies to adopt them in a phased manner. The BSE 100, NSE 50 companies, and the Category A companies had to adhere to the guidelines by March 31, 2001. This classification virtually covers all BSE 200 companies. So, all the companies in BSE 200 were taken, as it provided data for at least three financial years after the adoption of the guidelines on corporate governance. In all, data for six financial years from FY 1997-1998 to FY 2002-2003 were included in the analysis. The data sources were the Annual Reports of the companies, databases like Prowess and Capitaline, and the reports filed by the companies with the NSE and the BSE as part of the listing requirements. From the 200 companies selected above, all the banking companies were excluded as being governed by the Banking Companies Regulation Act; hence these companies were different from those governed by the Companies Act. Also, those companies, which were not listed for all the six years under consideration were excluded. The exclusion of these as well as the banking companies left us with a sample of 164 companies.

Methodology

To study the relationship between board independence, board size, and firm performance, the following variables were used, which were endogenous or exogenous depending upon the hypothesis being tested:

Firm Performance

Data on four measures of firm performance — each with support in the finance and accounting literature as a respectable measure of firm performance were collected as there is no single ideal measure of long-term firm performance (Healey,1985**)**. The approach is akin to the approach adopted by Bhagat and Black (2002) with suitable modifications.

The measures are:

Tobin's q. Computed as [(MV of common stock + BV of preference stock + BV of borrowings + BV of CL)/ BV of total assets as denoted by FA + INV + CA] with all values computed at the year end. This is a slightly modified version of the computation [(MV of common stock + BV of pref stock + BV of LTD)/ BV of total assets], given by Chung and Pruitt (1994) who report that this computation approximates the actual q to the extent of 96 per cent. The modification was being done to make it compatible with the manner of reporting in the Indian context. Tobin's q is an unambiguous measure of value-added by the management and can also capture the value of future investment opportunities.

Ratio of operating income (EBIT) to assets. Also known in literature as return on assets.

Ratio of sales to assets.

The accounting variables chosen were independent of the firm's capital structure and its tax structure. Other measures are also there in literature but they tend to be highly correlated (Jacobson, 1987), so the choice was limited to the above three.

Market-adjusted stock price returns (MASR). Computed by cumulating over the measurement period, monthly stock returns minus returns on market index (NSE 50) without adjustment for beta. For the multi-year periods over which returns are cumulated, MASR is better specified than abnormal return measures that include a beta adjustment (Kothari and Warner, 1997).

Director Independence

The directors of the companies were classified into four categories namely executive (inside) directors, outside (independent) directors, directors who are non-executive but non-independent, and nominee directors (directors who are nominees of financial institutions). The measure for board independence was taken as the number of independent directors as a percentage or proportion of total directors. Also, to see the differences between boards that have 30 per cent independent directors or boards that have 60 per cent independent directors, the board independence was categorized as follows:

Category 1: where the proportion of independent directors with respect to the total board size was less than one-third i.e., 33.33 per cent.

Category 2: where the proportion of independent directors with respect to the total board size was greater than 33 per cent and up to 50 per cent.

Category 3: where the proportion of independent directors with respect to the total board size was greater than 50 per cent and up to 60 per cent.

Category 4: where the proportion of independent directors with respect to the total board size was greater than 60 per cent and up to 74 per cent

Category 5: where the proportion of independent directors with respect to the total board size was greater than 74 per cent.

Board Size

The measure for board size was the total number of directors on the board. Also, there was a need to see the differences between different board sizes. Large boards as suggested in literature, may become dysfunctional. To check for this, the board was categorized as follows:

Category 1: if board size was of 3 to 6 members.

Category 2: if board size was of 7 to 9 members.

Category 3: if board size was of 10 to 12 members.

Category 4: if board size was more than 12 members.

Dummy variables were used for board size categories at the time of analysis.

Control Variables

The regression results between firm performance and board composition were subject to control for a number of factors that could affect firm performance, board composition or both. These control variables are:

Outside director ownership by using dummy variable which equals 1 if it exceeds one per cent. Directors' and shareholders' interests get aligned when directors have significant holdings.

Firm size as measured by log of sales. Log transformation of this variable is used to correct for the high degree of skewness in the firm size, thus ensuring that the data is properly distributed. Log sales takes care of heteroskedasticity.

Leverage measured as long-term debt/ (debt + equity), to control for variations in capital structure and as proxy for default risk.

Industry control for manufacturing/services/financial services with dummy variables for different categories.

Risk as measured by beta.

Type of company whether government-owned/Indian private sector/foreign-owned (MNC) by using dummy variables for different categories.

Age measured as the number of years for which the company has been in existence since incorporation.

Number of outsiders who own at least 5 per cent stock.

Diversification measured as the number of business segments for which the company reports. Yermack (1996) reports that the diversified firms were valued less highly in the capital market than the stand-alone businesses. He also states that the diversified companies are likely to have larger boards, because many boards grow in size when companies make acquisitions and because boards of conglomerates may seek outside expertise for a greater number of industries.

Ratio of capital expenditure over sales as proxy for investment opportunities. Smith and Watts (1992) state that the firm value depends upon the future investment opportunities.

Use of Panel Data

Unobservable characteristics are likely to affect each company's market value. Therefore, both OLS and Random Effects models were estimated. The Random Effects model was estimated to verify the main results obtained from the OLS models. Green (1997) maintains that the panel data sets allow researchers to capture both time series and cross-sectional relations. There are both fixed-effects and random-effects panel models. Hsiao (1986) states, "when inferences will be made about a population of effects from which those in the data are considered to be a random sample, then the effects should be considered random," That is what has been proposed to be done through this study and hence the Random Effects model has been used.

Testing for Endogenity

Endogeneity implies that causality runs both ways between corporate performance and board composition. If causality ran in only one direction, then one would conclude that the relation is not endogenous. To test for intertemporal causality, a simple cross-lagged regression model was used as in Bateman and Strasser (1983), and Davidson, Rangan and Rosenstein (1997):

Performance t = $\delta 0 + \delta 1$ performance t-1 + $\delta 2$ board composition t-1..(1a)

Board composition t = $\delta 0 + \delta 1$ performance t-1 + $\delta 2$ board composition t-1..(1b)

If there is endogeneity, one would expect both $\delta 2$ in equation 1a and $\delta 1$ in equation 1b to be significant; that is, there would be reciprocal intertemporal causality.

The tests for endogeneity were done separately in respect of two aspects of board composition, i.e., board size and board independence as measured by the proportion of independence.

Robustness Checks

Suitable robustness checks are deployed using both changes in variables from one year to another as well as different specifications like log board size and log independent directors.

RESULTS AND ANALYSIS

Board Size and Firm Performance

To analyse the impact of board size on the firm performance, regressions were run with different performance variables as dependent variables and board size as explanatory variable. These regressions were controlled for all the control variables as specified earlier.

OLS Estimates

The OLS estimates are reported in Table 1A. The board size had significant negative coefficients in all the regressions except in the case market-adjusted stock price returns (henceforth referred to as MASR) was the dependent variable. This is consistent with the literature that board size negatively affects firm performance. The R square values ranged from 0.13 to 0.27 and all of them were significant. Regressions with the lead (next year's) values of the dependent variables were estimated to check whether the board size of that year had any relation with the next year's firm performance. For this, figures for the performance variables for the year 2003-04 were incorporated in the analysis. The results are reported in Table 1B.

The results were identical to the one obtained pre-

Table 1A: OLS Regression Estimates: Board Size and Performance

Dependent Variables →	Tobin's *Q*	MASR	Sales/Assets	EBIT/Assets
Constant	-1.063		0.362	0.182
Board size coefficient	-0.088		-0.043	-0.002
Standard error	0.052	Not Significant	0.006	0.001
t-statistic	-1.694		-7.673	-2.101
Significant (at % level of significance)	10		1	5
R^2	0.13		0.273	0.108
(Sig)	(0.00)		(0.00)	(0.00)

Note: Regression controlled for outside director ownership, firm size, leverage, industry (manufacturing, services, financial services), risk (beta), type of company (government, private, foreign-owned), age, diversification, no. of outsiders owning 5 % stock and investment opportunities and year dummies.

Table 1B: OLS Regression Estimates: Board Size and Next Year's Performance

Dependent Variables →	Tobin's *Q* *T*+ 1	MASR *T*+1	Sales/Assets *T*+1	EBIT/Assets *T*+1
Constant	-0.038		0.449	0.203
Board size coefficient	-0.093		-0.04	-0.002
Standard error	0.052	Not Significant	0.006	0.001
t-statistic	-1.793		-7.05	-2.521
Significant (at % level of significance)	10		1	5
R^2	0.127		0.25	0.156
(Sig)	(0.00)		(0.00)	(0.00)

Note: As in Table 1A.

viously. Board size continued to have negative coefficients, which were significant although the level of significance differed in the case of different firm performance variables. The results with MASR as the dependent variable still continued to be insignificant though with a negative sign. The *R* square values were significant in the range of 0.127 to 0.25.

Random Effects Estimates

Thereafter the random effects coefficients were estimated which are reported in Table 2A.

The results reinforced the ones obtained from OLS estimates. Board size continued to have significant negative coefficients. The results for Tobin's *Q* were now significant at 5 per cent level of significance as compared to the 10 per cent significance level in the case of OLS estimates. The *R* square values too were significant in the range of 0.098 to 0.255. The random effects results with the lead values of the performance variable are shown in Table 2B. The significant negative coefficients of board size show that increase in board size impairs the firms' next year's performance, which was consistent with the previous results.

Robustness Checks

To check for the robustness of the results, the OLS coefficients were estimated using logarithmic specification of board size as explanatory variable with two performance measures, namely Tobin's *Q* and EBIT/Assets as dependent variables. The coefficients with MASR as dependent variable were not estimated, as previous regressions had not yielded significant results with this measure. The results are shown in Table 3A.

The coefficient of log board size in both the regressions was significant and negative although the level of significance differed across the two regressions but it was consistent with the earlier results. In one particular year, two companies may have the same board size but different values of Tobin's *Q* and other performance measures due to firm-specific reasons and hence give spurious results in regressions. To take care of such cases and strongly establish causality between board size and performance, OLS coefficients were estimated with ΔTQ (change in Tobin's *Q* this year from the previous year figure), Δ Sales/Assets (change in sales/assets ratio this year from that of the previous year) and Δ EBIT/Assets (change in EBIT/Assets ratio this year from that of the previous year) as dependent variables and Δ Board size (change in board size from the previous year) as explanatory variable. The results are reported in Table 3B.

The results reinforced the results obtained earlier. These regressions too yielded negative and significant coefficients with respect to the Δ Board Size.

Inference

The finding of an inverse association between board size and firm performance seemed to be insensitive to the

Table 2A: Random Effects Regression Estimates: Board Size and Performance

Dependent Variables →	Tobin's *Q*	MASR	Sales/Assets	EBIT/Assets
Constant	0.746		0.255	0.135
Board size coefficient	-0.084		-0.019	-0.001
Standard error	0.034	Not Significant	0.004	0.0005
z-statistic	-2.47		-4.08	-2.01
Significant (at % level of significance)	5		1	5
R^2	0.1		0.255	0.098
(Sig)	(0.00)		(0.00)	(0.00)

Note: As in Table 1A.

Table 2B: Random Effects Regression Estimates: Board Size and Next Year's Performance

Dependent Variables →	Tobin's *Q* *T*+1	MASR *T*+1	Sales/Assets *T*+1	EBIT/Assets *T*+1
Constant	2.11		0.494	0.181
Board size coefficient	-0.1006		-0.014	-0.003
Standard error	0.052	Not Significant	0.004	0.001
z-statistic	-1.935		-3.11	-2.6
Significant (at % level of significance)	10		1	1
R^2	0.093		0.217	0.152
(Sig)	(0.00)		(0.00)	(0.00)

Note: As in Table 1A.

Table 3A: Robustness Checks: OLS Regression Estimates: Log Board Size and Performance

Dependent Variables →	Tobin's *Q*	EBIT/Assets
Constant	-0.132	0.2
Log board size coefficient	-0.759	-0.016
Standard error	0.425	0.006
t-statistic	-1.785	-2.667
Significant (at % level of significance)	10	1
R^2	0.129	0.093
(Sig)	(0.00)	(0.00)

Note: As in Table 1A.

Table 3B: Robustness Checks: OLS Regression Estimates: Change in Board Size and Change in Performance

Dependent Variables →	Δ Tobin's *Q*	Δ Sales/Assets	Δ EBIT/Assets
Constant	-0.034	0.017	0.043
Δ Board size coefficient	-0.188	-0.006	-0.001
Standard error	0.101	0.002	0.001
t-statistic	-1.861	-3.245	-2.051
Significant (at % level of significance)	10	1	5
R^2	0.041	0.192	0.031
(Sig)	(0.00)	(0.00)	(0.00)

Note: As in Table 1A.

method of estimation as reflected by the significant negative coefficients across all estimations. This was consistent with the results obtained by Yermack (1996), Eisenberg, Sundgren and Wells (1998), and Mak and Kusnadi (2003).

Board Size Categories and Firm Performance

After establishing the inverse relationship between board size and performance, the relationship between different board sizes and firm performance was investigated, as it is likely that different board sizes may not have an identical impact on the firm performance.

OLS Estimates

The board size was classified into four categories: below 6, 7 to 9, 10 to 12, and more than 12. The OLS coefficients were estimated using dummies for different categories as explanatory variables and performance measures as dependent variables. The number of dummy variables was one less than the number of categories. First, the coefficients were estimated by including dummies for board size categories 7 to 9, 10 to 12, and more than 12 in the regression. The results are shown in Table 4A.

The coefficients were significant and negative; and larger negative coefficients were obtained as the board

Table 4A: OLS Regression Estimates: Board Size Categories and Performance

Dependent Variables →	Tobin's *Q*	MASR	Sales/Assets	EBIT/Assets
Constant	-0.859	0.449	0.295	0.189
Board size > 12	-1.063	-0.188	-0.515	-0.037
Standard error	0.628	0.081	0.068	0.013
t-statistic	-1.693	-2.323	-7.559	-2.827
Significant (at % level of significance)	10	5	1	1
Board Size 10 to 12	Not	-0.187	-0.385	-0.033
Standard error	significant	0.076	0.064	0.012
t-statistic		-2.46	-6.039	-2.674
Significant (at % level of significance)		5	1	1
Board Size 7 to 9	Not	-0.159	-0.286	-0.028
Standard error	significant	0.075	0.063	0.012
t-statistic		2.128	-4.458	-2.324
Significant (at % level of significance)		5	1	5
R^2	0.133	0.075	0.276	0.111
(Sig)	(0.00)	(0.00)	(0.00)	(0.00)

Note: As in Table 1A.

Table 4B: OLS Regression Estimates: Board Size Categories and Next Year Performance

Dependent Variables →	Tobin's Q *T*+1	MASR *T*+1	Sales/Assets *T*+1	EBIT/Assets *T*+1
Constant	0.462	0.677	0.378	0.218
Board Size > 12	-1.206	-0.283	-0.476	-0.037
Standard error	0.625	0.073	0.069	0.012
t-statistic	-1.929	-3.858	-6.916	-3.12
Significant at (% level of significance)	10	1	1	1
Board Size 10 to 12		-0.231	-0.351	-0.035
Standard error	Not Significant	0.074	0.064	0.011
t-statistic		-3.113	-5.449	-3.175
Significant (at % level of significance)		1	1	1
Board Size 7 to 9	-1.059	-0.224	-0.258	-0.034
Standard error	0.577	0.079	0.064	0.011
t-statistic	-1.834	2.829	-4.057	-3.047
Significant (at % level of significance)	10	1	1	1
R^2	0.13	0.076	0.252	0.16
(Sig)	(0.00)	(0.00)	(0.00)	(0.00)

Note: As in Table 1A.

size increased. In the case of Tobin's *Q*, only the coefficient with respect to board size category of greater than 12 was significant. This board size category of more than 12 members had significant results in all regressions. With MASR, the coefficient was 0.159 when the board size was between 7 to 9, which became –0.187 when the board size was between 10 to 12, and –0.188 when the board size went beyond 12. Similar progressive coefficients were obtained with sales/assets and EBIT/assets. The *R* square too was significant for all the specifications. Thereafter, OLS coefficients were estimated with the lead (next year's) values of the dependent variables. The results are reported in Table 4B.

The coefficients were negative but larger and, in some cases, significant at lower levels of significance. This seems to suggest that the inverse relationship between board size and performance is more pronounced with a lead-time of one year. When the OLS coefficients were estimated by replacing the board size category of 7 to 9 with the board size category of 3 to 6, the regression yielded significant positive coefficients in respect of board size category of 3 to 6 members. Similar results were obtained when the coefficients were estimated with the next year's values of the performance variables. The results for the board size category of 3 to 6 are shown in Table 4C.

One Way ANOVA

To establish the robustness of the results that different categories of board size impact the performance differently, one-way ANOVA was used to test for the comparison of means across different categories. The results of descriptive statistics with mean values of performance variables across different board size categories and the results of one-way ANOVA test for the comparison of means are shown in Table 5A.

A look at the results with Tobin's *Q* revealed that the mean Tobin *Q* was 3.361 when the board size was

Table 4C: OLS Regression Estimates: Board Size Categories of 3 to 6 and Performance

Dependent Variables →	TQ T+1	MASR	MASR T+1	S/A	S/A T+1	EBIT/A	EBIT/A T+1
Constant	-0.597	0.29	0.394	0.009	0.121	0.161	0.183
Board size 3 to 6	1.059	0.159	0.283	0.286	0.258	0.028	0.035
Standard error	0.577	0.075	0.073	0.063	0.064	0.012	0.011
t-statistic	1.834	2.128	3.858	4.548	4.057	2.324	3.175
Significant (at % level of significance)	10	5	1	1	1	5	1
R^2	0.13	0.075	0.076	0.276	0.252	0.111	0.16
(Sig)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note: Regression controlled for outside director ownership, firm size, leverage, industry (manufacturing, services, financial services), risk (beta), type of company (government, private, foreign-owned), age, diversification, no. of outsiders owning 5% stock and investment opportunities, dummies for board size categories 10 to 12 and >12 and year dummies.

Table 5A: Descriptives and Results of One Way ANOVA for comparison of means

	Board Size Category	N	Mean of Performance Variable		Sum of Squares	*df*	Mean Square	*F*	Sig.
T	3-6	72	3.361	Between groups	205.96	3.00	68.65	3.23	0.02
O	7-9	343	2.376	Within groups	20831.21	980.00	21.26		
B									
I	10-12	358	2.257	**Total**	**21037.18**	**983.00**			
N	>12	211	1.521						
Q									
	Total	**984**	**2.223**						
M	3-6	72	0.254	Between groups	4.12	3.00	1.37	4.16	0.01
A	7-9	343	0.066	Within groups	323.80	980.00	0.33		
S	10-12	358	0.011	**Total**	**327.92**	**983.00**			
R	>12	211	0.000						
	Total	**984**	**0.046**						
S/A	3-6	72	1.147	Between groups	6.74	3.00	2.25	7.62	0.00
	7-9	343	1.001	Within groups	289.15	980.00	0.30		
	10-12	358	0.920	**Total**	**295.89**	**983.00**			
	>12	211	0.836						
	Total	**984**	**0.947**						
EBIT/A	3-6	72	0.169	Between groups	0.10	3.00	0.03	3.78	0.01
	7-9	343	0.148	Within groups	8.75	980.00	0.01		
	10-12	358	0.137	**Total**	**8.85**	**983.00**			
	>12	211	0.131						
	Total	**984**	**0.142**						

between 3 and 6; the mean value dropped as one moved to categories with larger board size, and it was 1.521 when the board size exceeded 12. This difference in means across categories was significant. Similar results were obtained with other performance measures also. One-way ANOVA was repeated with performance variables specified in terms of lead (next years') values and it was observed that the difference of means between the categories was more pronounced and significant. In the case of Tobin's *Q*, now the mean dropped from 3.640 to 1.492 as one moved from a board size of 3-6 to a board size greater than 12. The results are reported in Table 5B.

Inference

The results were consistent with the theory that when boards get to be too big, agency problems increase and the board becomes more symbolic and less a part of the management process. Lipton and Lorsch (1992) and Jensen (1993) say that this is akin to productivity losses that arise when work groups grow large, an insight they borrow from the organizational behaviour research. According to Jensen (1993), "…as groups increase in size they become less effective because the coordination and process problems overwhelm the advantages from having more people to draw on." Jensen (1993) has recommended boards up to seven or eight and Lipton and Lorsch (1992) prefer a size of eight or nine. But, the results here suggest limiting the board to six members.

Proportion of Board Independence and Firm Performance

To analyse whether the presence of independent directors on the board has any influence on the performance of the firm, regressions with different performance variables as dependent variables and proportion of independent directors (independent directors as a percentage of the total board size, henceforth called board independence) as explanatory variable were estimated.

OLS Estimates

The OLS estimates are shown in Table 6A. The coefficients of board independence with Tobin's *Q* and MASR were not significant. Both these measures incorporate market valuation. With sales/assets and EBIT/assets, the coefficients were positive and significant, but very low.

To check for the lag effect of board independence, the OLS coefficients were estimated with the next years' performance as dependent variable. For this, the figures for performance variables for the year 2003-04 were incorporated in the analysis. The results are shown in Table 6B.

Table 5B: Descriptives and Results of One Way ANOVA for Comparison of Means with Next Years' Values of Performance Variable

	Board Size Category	N	Mean of Performance Variable		Sum of Squares	*df*	Mean Square	*F*	Sig.
T	3-6	72	3.640	Between groups	205.96	3.00	68.65	3.23	0.02
O	7-9	343	2.339	Within groups	20831.21	980.00	21.26		
B	10-12	358	2.212	**Total**	**21037.18**	**983.00**			
I	>12	211	1.492						
N									
Q									
T+1	**Total**	**984**	**2.209**						
M	3-6	72	0.359	Between groups	4.12	3.00	1.37	4.16	0.01
A	7-9	343	0.061	Within groups	323.80	980.00	0.33		
S	10-12	358	0.057	**Total**	**327.92**	**983.00**			
R	>12	211	0.043						
T+1	**Total**	**984**	**0.075**						
S/A	3-6	72	1.116	Between groups	6.74	3.00	2.25	7.62	0.00
T+1	7-9	343	1.004	Within groups	289.15	980.00	0.30		
	10-12	358	0.934	**Total**	**295.89**	**983.00**			
	>12	211	0.858						
	Total	**984**	**0.956**						
EBIT/A	3-6	72	0.174	Between groups	0.10	3.00	0.03	3.78	0.01
T+1	7-9	343	0.150	Within groups	8.75	980.00	0.01		
	10-12	358	0.139	**Total**	**8.85**	**983.00**			
	>12	211	0.132						
	Total	**984**	**0.144**						

Table 6A: OLS Regression Estimates: Board Independence and Performance (All Years)

Dependent Variables →	Tobin's *Q*	MASR	Sales/Assets	EBIT/Assets
Constant			0.035	0.139
Board ind coefficient	Not Significant	Not Significant	0.003	0.001
Standard error			0.001	0.001
t-statistic			2.907	3.211
Significant (at % level of significance)			1	1
R^2			0.236	0.113
(Sig)			(0.00)	(0.00)

Note: As in Table 1A.

Table 6B: OLS Regression Estimates: Board Independence and Next Year Performance (All Years)

Dependent Variables →	Tobin's *Q T*+1	MASR *T*+1	Sales/Assets *T*+1	EBIT/Assets *T*+1
Constant			0.165	0.139
Board ind coefficient			0.002	0.000
Standard error	Not Significant	Not Significant	0.001	0.000
t-statistic			2.334	2.187
Significant (at % level of significance)			5	5
R^2			0.216	0.155
(Sig)			(0.00)	(0.00)

Note: As in Table 1A.

The results were similar to the ones obtained previously. The coefficients for board independence with the next years' values of Tobin *Q* and MASR as dependent variables were not significant. The coefficients were positive and significant with the next years' figures of sales/assets and EBIT/assets but were very small. In case of EBIT/assets, it was 0 till the third decimal place. Further, the coefficients were significant at only 5 per cent level of significance as compared to 1 per cent obtained earlier.

These results were obtained when the entire data from 1997-98 to 2002-03 was considered. The guidelines with the first definition of 'independence' and also the requirement of a specific percentage of independent

directors on the board came into force in 2001. Prior to that, neither was a minimum proportion of independent directors on the board mandatory, nor was it clarified as to what 'independence' meant. To check whether the insignificant results or the significant results with low coefficients obtained previously were due to 'independence' not being followed in true spirit prior to 2001, the OLS coefficients were estimated by taking data from 2000-01 to 2002-03. The reason for this is that the significant results here would lead to the conclusion that board independence has started impacting performance after the enforcement of the guidelines when the board has independent directors who are actually 'independent' in the true spirit of the word.

The OLS results with the data from 2000-01 to 2002-03 are shown in Table 6C. Significant positive results were now obtained with Tobin's *Q*, sales/assets, and EBIT/assets giving evidence that post-issuance of the guidelines, board independence had started affecting the firm performance more as compared to the period before 2001. The coefficients with respect to sales/assets and EBIT/assets were very small. The *R* square values ranged from 0.16 to 0.22 and were significant.

For the data post-2001, it was also checked whether the board independence affected the performance with a lag. For this, the OLS coefficients were estimated with the next years' values of performance as dependent variables. Table 6D contains the results.

The coefficient of board independence was significant and positive when the next years' figures of Tobin's *Q*, sales/assets and EBIT/assets were dependent variables. The results were similar to the ones obtained with the performance variables figures of the same year. Thus, it can be said that there is no difference between the immediate and the lag effect of board independence on firm performance.

Random Effects Estimates

After this, the random effects coefficients were estimated to determine the impact of board independence on the firm performance for the entire period of study (1997-98 to 2002-03) with both the same year's as well as the next year's values of the performance measures as dependent variables. The results are shown in Table 7.

The coefficient was significant when the same year's sales/assets and EBIT/assets ratios and the next year's sales/assets ratio were the dependent variables. With other performance measures, the results were not significant. Even where the results were significant, the coefficients on the board independence were very low. To check whether the results are different for the period post-issuance of guidelines, the random-effect coefficients were again estimated for the period 2000-01 to 2002-03 with both the same years' as well as the next years' values of performance variables as dependent variables. No significant results were obtained across all

Table 6C: OLS Regression Estimates: Board Independence and Performance (2000-01 to 2002-03)

Dependent Variables →	Tobin's *Q*	MASR	Sales/Assets	EBIT/Assets
Constant	0.011		-0.01	0.135
Board ind coefficient	0.011		0.004	0.001
Standard error	0.005	Not Significant	0.001	0.000
t-statistic	2.358		2.733	2.388
Significant (at % level of significance)	5		1	5
R^2	0.194		0.224	0.16
(Sig)	(0.00)		(0.00)	(0.00)

Note: As in Table 1A.

Table 6D: OLS Regression Estimates: Board Independence and Next Year's Performance (2000-01 to 2002-03)

Dependent Variables →	Tobin's Q *T*+1	MASR *T*+1	Sales/Assets *T*+1	EBIT/Assets *T*+1
Constant	0.011		0.085	0.156
Board ind coefficient	0.008		0.003	0.001
Standard error	0.004	Not Significant	0.001	0.000
t-statistic	2.156		2.293	2.407
Significant (at % level of significance)	5		5	5
R^2	0.222		0.202	0.201
(Sig)	(0.00)		(0.00)	(0.00)

Note: As in Table 1A.

Table 7: Random Effects Estimates: Board Independence and Performance (All Years)

Dependent Variables →	TQ	MASR	S/A	EBIT/A	TQ T+1	MASR T+1	S/A T+1	EBIT/A T+1
Constant			0.256	0.11			0.5	
Board Ind expendence			0.003	0.0005			0.002	
Standard error	NS*	NS*	0.0006	0.0002	NS*	NS*	0.0006	NS*
z-statistic			4.42	2.6			3.61	
Significant (at %level of significance)			1	1			1	
R^2			0.187	0.106			0.177	
(Sig)			(0.00)	(0.00)			(0.00)	

*NS: Coefficient not significant at even 10 per cent level of significance.

Note: As in Table 1A.

regressions. Hence the values are not reported.

Robustness Checks

The insignificant results or the significant results with very low coefficients for impact of board independence on firm performance might be due to the fact that in one particular year, two companies might have had the same board independence but different values of Tobin's *Q* and other performance measures due to firm-specific reasons and hence have given spurious results in regressions. To take care of such cases, OLS coefficients were estimated with Δ TQ (change in Tobin's *Q* this year from the previous year), Δ sales/assets (change in sales/assets ratio this year from the previous year) and Δ EBIT/assets (change in EBIT/assets ratio this year from the previous year) as the dependent variables and Δ board independence (change in board independence from the previous year) as the explanatory variable. The results are reported in Table 8A.

The results were mostly insignificant. Finally, the OLS coefficients were estimated with board independence expressed in logarithmic terms. Here too, the results were insignificant except in one case where EBIT/assets ratio was the dependent variable. The results are shown in Table 8B.

Inference

The OLS results for the influence of board independence on firm performance were mixed with significant positive coefficients with accounting-based measures of performance (sales/assets and EBIT/assets) as dependent variables and insignificant with market-based performance measures (Tobin's *Q* and MASR). But, the coefficients were very low. An OLS analysis with data post-2001 gave significant results but again with low coefficients with Tobin's *Q* also along with the accounting-based measures of performance. But, all the random effects estimates were insignificant for this period. The OLS results with board independence specified in logarithmic terms and in terms of change from the previous period too are mostly insignificant. No consistent significant results with a particular dependent variable across all specifications were obtained.

So, the argument that board independence positively influences firm performance cannot be accepted. The mixed results are different with the ones obtained by Klein (1998), Bhagat and Black (1997), Hermalin and Weisbach (1991), and Lawerence and Stapledon (1999) who did not get any evidence that independent directors add value and improve the performance of the firm and from Baysinger and Butler (1985) and Hambrick and Jackson (2000) who got results that independent directors improve performance.

Board Independence Categories and Firm Performance

Different proportions of independent directors may impact firm performance in dissimilar fashion. To test

Table 8A: Robustness Checks: OLS Regression Estimates: Change in Board Independence and Change in Performance

Dependent Variables →	Δ Tobin's Q	Δ Sales/Assets	Δ EBIT/Assets
Constant		0.019	
Δ Board ind coefficient		0.002	
Standard error	Not Significant	0.001	Not Significant
t-statistic		-2.62	
Significant (at % level of significance)		1	
R^2		0.191	
(Sig)		(0.00)	

Note: As in Table 1A.

Table 8B: Robustness Checks: OLS Regression Estimates: Log Board Independence and Performance

Dependent Variables →	Tobin's *Q*	MASR	Sales/Assets	EBIT/Assets
Constant				0.119
Log Board Ind Coefficient	Not significant	Not significant	Not significant	0.013
Standard error				0.003
t-statistic				4.088
Significant (at % level of significance)				1
R^2				0.119
(Sig)				(0.00)

Note: As in Table 1A.

this, the board independence was classified into five categories with category 1 having board independence of less than 33 per cent, category 2 having board independence greater than 33 per cent and up to 50 per cent, category 3 having board independence greater than 50 per cent and up to 60 per cent, category 4 representing cases where board independence was greater than 60 per cent and up to 74 per cent, and category 5 including cases where board independence was greater than 74 per cent.

OLS Coefficients

The OLS coefficients were estimated by using dummies for different categories of board independence and firm performance measures (same year as well as next year's) as dependent variables. The number of dummies used was one less than the number of categories of board independence and hence the coefficients were estimated first by leaving out the dummy for category 1 and using dummies for categories 2, 3, 4, and 5. The results are shown in Table 9A.

No significant coefficients were obtained for the board independence category 5 (greater than 74%) in any of the regressions. The coefficients with respect to board independence category 4 (greater than 64% and up to 74%) were significant in only one situation where EBIT/assets is the dependent variable. Significant positive coefficients were obtained in respect of category 3 (greater than 50% and up to 60%) and category 2 (greater than 33% and up to 50%). The *t*-statistics were higher and significant at lower level of significance in case of category 2 but the coefficients were higher with lower *t* statistics for category 3.

The regressions were again estimated by excluding the dummy for category 2 and including the dummy for category 1 (board independence less than 33%) and no significant coefficients were obtained for category 1 with any of the dependent variables.

To check whether the results are any different post-2001 after the implementation of guidelines, the OLS

Table 9A: OLS Regression Estimates: Board Independence Categories and Performance (All Years)

Dependent Variables →	Tobin's *Q*	Sales/A	EBIT/A	Sales/Assets *T*+1	EBIT/Assets *T*+1
Constant	-1.594	0.074	0.15	0.197	0.18
Ind > 33 & ≤ 50	0.618	0.132	0.024	0.106	0.018
Standard error	0.333	0.037	0.007	0.037	0.006
t-statistic	1.858	3.567	3.487	2.852	2.858
Significant (at % level of significance)	10	1	1	1	1
Ind > 50 & ≤ 60		0.143	0.024	0.122	0.019
Standard error	NS	0.058	0.011	0.059	0.01
t-statistic		2.458	2.18	2.079	1.938
Significant (at % level of significance)		5	5	5	5
Ind > 60 & ≤ 74			0.023		
Standard error	NS	NS	0.012	NS	NS
t-statistic			1.977		
Significant (at % level of significance)			5		
Ind > 74					
Standard error	NS	NS	NS	NS	NS
t-statistic					
Significant (at % level of significance)					
R^2	0.131	0.24	0.116	0.219	0.16
(Sig)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note: As in Table 1A.

Table 9B: OLS Regression Estimates: Board Independence Categories and Performance (2000-01 to 2002-03)

Dependent Variables →	Tobin's Q	S/A	EBIT/A	TobinQ T+1	S/AT+1	EBIT/A T+1
Constant	-0.024	-0.037	0.133	1.511	0.054	0.156
Ind > 33 & ≤ 50	0.537	0.216	0.033	0.402	0.191	0.033
Standard error	0.198	0.055	0.01	0.15	0.057	0.01
t-statistic	2.709	3.907	3.32	2.681	3.337	3.378
Significant (at % level of significance)	1	1	1	1	1	1
Ind > 50 & ≤ 60	0.642	0.279	0.033	0.51	0.235	0.041
Standard error	0.291	0.078	0.014	0.21	0.08	0.014
t-statistic	2.205	3.605	2.398	2.427	2.921	2.995
Significant (at % level of significance)	5	1	5	5	1	1
Ind > 60 & ≤ 74	0.52	0.195	0.03		0.174	0.025
Standard error	0.277	0.081	0.015	NS	0.084	0.014
t-statistic	1.874	2.395	2.063		2.055	1.769
Significant (at % level of significance)	10	5	5		5	10
Ind > 74						
Standard error	NS	NS	NS	NS	NS	NS
t-statistic						
Significant (at % level of significance)						
R^2	0.199	0.243	0.173	0.229	0.215	0.216
(Sig)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note: As in Table 1A.

coefficients were again estimated using data for the period 2000-01 to 2002-03. At the first instance, the coefficients were estimated by leaving out the dummy for category 1 and using dummies for categories 2, 3, 4, and 5. The results are shown in Table 9B.

The coefficients with respect to category 2 (independence greater than 33% and upto 50%) were positive and significant at 1 per cent level of significance. Although the coefficients of category 3 (board independence greater than 50% and up to 60%) were higher, the *t*-statistic was lower. The coefficients as well as the t-statistics got lowered as we moved to category 4 (board independence greater than 60% and up to 74%). Again, with category 5 (independence greater than 74%), insignificant results were obtained. The regressions were again estimated by excluding the dummy for category 2 and including the dummy for category 1 (board independence less than 33%) and no significant coefficients were obtained for category 1 with any of the dependent variables.

Inference

Different proportions of independent directors do not have identical impact on firm performance. There is no impact on the firm performance when the board independence is less than 33 per cent or greater than 74 per cent. The results strongly suggest having board independence between 50 and 60 per cent if one looks at higher coefficients for that category (Although the *t*-statistic is lower than that for the category of 33% to 50% and is mostly significant at 5% level of significance. A closer look, however, shows that it is very close to being significant at 1%). The impact of board independence on firm performance is less when the board independence is between 60 to 74 percent.

Therefore, it can be said that different proportions of board independence have dissimilar impact on firm performance. The results support the argument of Lawerence and Stapledon (1999) who say that it is important to have some independent directors on a company board, but not too many of them.

Performance and Board Size

To analyse the reverse relationship of the impact of firm performance on board size, regressions were run with board size as dependent variable and different performance measures as explanatory variables. The coefficients with the lag values of performance measures as explanatory variables were also estimated to see whether a bad performance that year led to a change in the board size the next year.

OLS Estimates

The OLS estimates are shown in Table 10. The coefficients on the explanatory variables were negative and significant in majority of the regressions. In other cases, they were negative but not significant. The consistent negative sign shows that a bad performance may lead to new additions to the board.

Table 10: OLS Estimates: Performance and Board Size@@

Explanatory Variables →	TQ	MASR	S/A	EBIT/A	TQ T-1	MASR T-1	S/A T-1	EBIT/A T-1
Constant	3.53		3.884	3.868			3.749	3.834
Coefficient	-0.008	-ve but	-1.464	-1.566	-ve but	-ve but	-1.437	-1.456
Standard error	0.002	NS**	0.229	0.521	NS**	NS**	0.222	0.445
t-statistic	-3.97		-6.387	-3.005			-6.481	-3.271
Significant (at %level of significance)	1		1	1			1	1
R^2	0.194		0.249	0.195			0.251	0.195
(Sig)	(0.00)		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)

@@ Dependent variable is board size in all regressions.

** NS: Coefficient not significant at even 10 percent level of significance.

Note: As in Table 1A.

Random Effects Estimates

These are reported in Table 11. Again negative coefficients were obtained in most of the regressions except in the cases where the current and lag values of the EBIT/assets ratio were the explanatory variables. Even for these cases, the coefficient had a negative sign. These results were consistent with the OLS estimates.

Robustness Checks

Robustness checks were performed with logarithmic transformation of board size as dependent variable with two explanatory variables, namely, Tobin's *Q* and sales/assets ratio as these two variables were significant in both the OLS as well as random effects estimates. The other two variables were omitted, as consistent results were not obtained across previous estimations. The results are reported in Table 12.

Even when the board size was taken in logarithmic terms, the results did not change. The coefficients on the explanatory variables were negative and significant. Thus the causality obtained earlier can be said to be free from any specification biases and applies consistently across different specifications.

Inference

Firm performance inversely influences board size. This supports the argument of Hermalin and Weisbach (1988) that firm performance can alter the composition of the board but they had not given the direction, i.e., whether a bad performance would increase or decrease the board size. The results of the analysis here suggest an inverse relationship between the two.

Performance and Board Independence

Next, the analysis was carried out for determining whether the proportion of independent directors on the board is a determinant of the firm performance. The methodology used was similar to the one used in the previous section. Regressions were run with board independence as dependent variable and different performance measures as explanatory variables. The coefficients with the lag values of performance measures as explanatory variables were also estimated to see whether a bad performance that year led to a change in board independence the next year.

OLS Estimates

The OLS estimates are shown in Table 13. Not all coefficients were significant. The accounting-based performance measures had significant coefficients, but MASR did not, both with the current and the lag values. In the case of Tobin's *Q* only the lag value was significant at 10 per cent level of significance. But, all the coefficients were negative, whether significant or not. The results

Table 11: Random Effects Estimates: Performance and Board Size@@

Explanatory Variables →	TQ	MASR	S/A	EBIT/A	TQ T-1	MASR T-1	S/A T-1	EBIT/A T-1
Constant	3.599	3.594	3.73		3.64	3.51	3.82	
Coefficient	-0.011	-0.07	-0.901	-ve	-0.0167	-0.08	-0.672	-ve
Standard error	0.056	0.737	0.205	but NS**	0.01	0.039	0.204	but NS**
z-statistic	-1.95	-1.98	-4.38		-1.69	-2.05	-3.28	
Significant (at %level of significance)	10	5	1		10	5	1	
R^2	0.188	0.188	0.227		0.185	0.181	0.222	
(Sig)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	

@@ Dependent variable is board size in all regressions.

** NS: Coefficient not significant at even 10 percent level of significance.

Note: As in Table 1A.

Table 12: Robustness Checks: OLS Estimates: Performance and Log Board Size@

Explanatory Variables →	TQ	Sales/Assets
Constant	1.648	1.676
Coefficient	-0.003	-0.138
Standard error	0.002	0.047
t-statistic	-1.696	-2.936
Significant (at % level of significance)	10	1
R^2	0.183	0.183
(Sig)	(0.00)	(0.00)

@ Dependent variable is Log of board size in all regressions.
Note: As in Table 1A.

Table 13: OLS Estimates: Performance and Board Independence @@

Explanatory Variables →	TQ	MASR	S/A	EBIT/A	TQ T-1	MASR T-1	S/A T-1	EBIT/A T-1
Constant			63.847	61.126	64.873		63.682	60.88
Coefficient			-3.302	-5.408	-0.213		-3.961	-5.454
Standard error	-ve	-ve	1.136	1.901	0.127	-ve	1.11	1.899
t-statistic	NS**	NS**	-2.907	-2.845	-1.681	NS**	-3.56	-2.871
Significant (at %level of significance)			1	1	10		1	1
R^2			0.185	0.186	0.18		0.188	0.188
(Sig)			(0.00)	(0.00)	(0.00)		(0.00)	(0.00)

@@ Dependent variable is board independence in all regressions.
** NS: Coefficient not significant at even 10 per cent level of significance.
Note: As in Table 1A.

showed an inverse relationship between performance and board independence suggesting that a bad performance results in more independent directors being added to the board. The constant term was high as the board independence was expressed in percentage terms, for example 65 per cent and not 0.65.

Random Effects Estimates

The results are shown in Table 14. The results were similar to the OLS estimates. The coefficients on the explanatory variable continued to be negative.

Robustness Checks

Robustness checks were performed with logarithmic transformation of board independence as the dependent variable with two explanatory variables, namely, Tobin's *Q* and EBIT/assets, the choice being one market-based measure and one accounting-based measure. The results are reported in Table 15A. The results did not change even with the logarithmic specification. The coefficients on the explanatory variables were negative and significant with significant *R* square values.

Thus, the causality obtained earlier can be said to be free from any specification biases and applies consistently across different specifications.

But, the inverse relationship needed to be interpreted with caution. The increase in board independence could not have been a result of a bad performance but was mandated by the guidelines requiring a specified percentage of independent directors, which was 33.33 per cent in the case of a non-executive chairman and 50

Table 14: Random Effects Estimates: Performance and Board Independence@@

Explanatory Variables →	TQ	MASR	S/A	EBIT/A	TQ T-1	MASR T-1	S/A T-1	EBIT/A T-1
Constant	59.57		60.05	57.96	59.54		60.29	57.36
Coefficient	-0.132		-5.403	-11.14	-0.077		-2.573	-11.05
Standard error	0.08	-ve	1.43	4.82	0.039	-ve	1.43	4.89
z-statistic	-1.65	NS**	-3.75	-2.31	-1.974	NS**	-1.79	-2.26
Significant (at %level of significance)	10		1	5	5		10	5
R^2	0.08		0.063	0.085	0.082		0.073	0.085
(Sig)	(0.00)		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)

@@ Dependent variable is board independence in all regressions.
** NS: Coefficient not significant at even 10 percent level of significance.
Note: As in Table 1A.

Table 15A: Robustness Checks: OLS Estimates: Performance and Log Board Independence@

Explanatory Variables →	TQ	EBIT/Assets
Constant	4.225	4.019
Coefficient	-0.007	-0.138
Standard error	0.004	0.319
t-statistic	-1.748	4.088
Significant (at % level of significance)	10	1
R^2	0.191	0.204
(Sig)	(0.00)	(0.00)

@ Dependent variable is Log of board independence in all regressions.
Note: As in Table 1A.

per cent in the case of an executive chairman. Thus, it could be possible that the board independence had increased to comply with the guidelines at a time when the performance was poor resulting in the inverse relationship in the results. To check for this, the OLS coefficients were estimated again with the data where the board independence is already 50 per cent or more. In this situation, there would have been no need to add independent directors to meet the guidelines. The results are shown in Table 15B. The coefficients were negative as before.

Inference

Firm performance inversely influences board independence. This result is supported in literature by Hermalin and Weisbach (1988) but contradicts the findings of Agrawal and Knoeber (1996). Firms do tend to increase board independence under adverse circumstances due to the pressure exerted by the stakeholders and on the assumption that adding of independent directors will bring in new expertise. Similarly, the problematic independent directors are weeded out at the times of good performance when nobody cares to protest.

Endogenous Determination of Performance and Board Size

In this section, results of the tests for endogenous determination of firm performance and board size are reported.

OLS Estimates

The coefficients for the following equations were estimated by the OLS method with two measures of performance, i.e., Tobin's *Q* and EBIT/Assets with all other control variables:

Performance = $\delta 0 + \delta 1$ performance t-1 + $\delta 2$ board size t-1.....(1a)

Board size t = $\delta 0 + \delta 1$ performance, t-1 + $\delta 2$ board size t-1.....(1b)

The results are shown in Table 16A and 16B. In both the tables, both cross-lagged parameters (highlighted in bold) were significant implying reciprocal causality, which is consistent with endogeneity. The *R* squares and *t*-statistic values were high because the lagged value of dependent variable was one of the explanatory variables.

Inference

Board size and firm performance are endogenously determined which is consistent with the results of Bhagat and Black (2002).

Performance and Board Independence

In this section, results of the tests for endogenous determination of firm performance and board independence are reported.

OLS Estimates

The coefficients for the following equations were estimated by the OLS method with two measures of performance, i.e., Tobin's *Q* and EBIT/assets with all other control variables:

Performance = $\delta 0 + \delta 1$ performance t-1 + $\delta 2$ board ind t-1 .....(1a)

Board ind t = $\delta 0 + \delta 1$ performance, t-1 + $\delta 2$ board ind t-1.....(1b)

Table 15B: OLS Estimates: Performance and Board Independence @@

Explanatory Variables →	TQ	MASR	S/A	EBIT/A	TQT-1 T-1	MASR	S/A T-1	EBIT/A T-1
Constant			54.465	55.092			54.43	55.05
Coefficient			-0.016	-3.036			-0.201	-3.28
Standard error	-ve	-ve	0.006	0.602	-ve	-ve	0.062	0.599
t-statistic	NS**	NS**	-2.666	-5.49	NS**	NS**	-3.204	-5.47
Significant (at %level of significance)			1				1	1
R^2			0.058	0.058			0.054	0.57
(Sig)			(0.00)	(0.00)			(0.00)	(0.00)

@@ Dependent variable is board independence in all regressions.
** NS: Coefficient not significant at even 10 percent level of significance.

Table 16A: Endogenous Determination of Performance (Tobin's *Q*) and Board Size

Dependent Variables →	Tobin's *Q*	Board Size
Constant	-0.843	0.444
Tobin's *Q T*-1	0.308	**-0.02**
Standard error	0.033	0.01
t-statistic	9.255	-2.015
Significant (at % level of significance)	1	5
Board Size *T*-1	**-0.078**	0.853
Standard error	0.035	0.017
t-statistic	-2.228	50.319
Significant (at % level of significance)	5	1
R^2	0.223	0.804
(Sig)	(0.00)	(0.00)

Note: As in Table 1A.

Table 16B: Endogenous Determination of Performance (EBIT/A) and Board Size

Dependent Variables →	EBIT/Assets	Board Size
Constant	0.088	0.321
EBIT/Assets *T-1*	0.56	**-0.47**
Standard error	0.024	0.205
t-statistic	22.915	-2.29
Significant (at % level of significance)	1	5
Board Size *T-1*	**-0.002**	0.852
Standard error	0.001	0.017
t-statistic	-2.25	50.124
Significant (at % level of significance)	5	1
R^2	0.487	0.803
(Sig)	(0.00)	(0.00)

Note: As in Table 1A.

Table 17A: Endogenous Determination of Performance (Tobin's *Q*) and Board Independence

Dependent Variables →	Tobin's *Q*	Board Independence
Constant	-1.242	7.219
Tobin's *Q T-1*	0.311	-0.114
Standard error	0.033	0.061
t-statistic	9.339	-1.878
Significant (at % level of significance)	1	10
Board Independence *T-1*		0.848
Standard error	**Not**	0.016
t-statistic	**Significant**	51.833
Significant (at % level of significance)		1
R^2	0.221	0.806
(Sig)	(0.00)	(0.00)

Note: As in Table 1A.

Table 17B: Endogenous Determination of Performance (EBIT/A) and Board Independence

Dependent Variables →	EBIT/Assets	Board Independence
Constant	0.08	5.798
EBIT/Assets *T-1*	0.564	-8.334
Standard error	0.025	3.117
t-statistic	22.56	-2.671
Significant (at % level of significance	1	1
Board Independence *T-1*		0.844
Standard error	**Not**	0.016
t-statistic	**Significant**	51.46
Significant (at % level of significance)		1
R^2	0.484	0.807
(Sig)	(0.00)	(0.00)

Note: As in Table 1A.

The results are shown in Table 17A and 17B. In both the tables, one of the cross-lagged parameters (highlighted in bold) was not significant implying that there is no reciprocal causality, which is consistent with endogeneity not being present in this case. The *R* squares and *t*-statistic values were high just because the lagged value of dependent variable was one of the explanatory variables.

Inference

Board independence and firm performance are not endogenously determined.

RECOMMENDATIONS

Board Size

Literature finds that the smaller boards are more efficient than the larger ones. A larger board impairs the performance of the firm. Larger boards are dysfunctional; their contributions get marred and are easily manipulated by the CEO's. The board size should be large enough to have the people with the required expertise and knowledge to efficiently run the company and yet be so small that meaningful discussions can take place. This is facilitated when the boards are small so that the members get acquainted well enough to have frank discussions, reach a consensus, and allow for every director to contribute. More often than not, in the case of large boards, the members get divided into sub-groups who are at loggerheads with each other which does more harm than good to the company (Cadbury, 2002).

The study recommends limiting the board size to 6 as advocated by Jensen (1993) (anything between 6 to 8) and less than the recommendations of Lipton and Lorsch (1992) who suggest limiting the board size to 8 to 9 members. Corporate governance norms may bring this issue to the attention of the firms instead of going for legislative changes.

Director Categories and Performance

The study found mixed evidence that independent directors add value and improve the performance of the firm. It is pertinent to mention that there was no conflicting evidence that they destroy value. These results suggest that independent directors have so far failed to perform their monitoring role effectively. This can be attributed to the fact that 'board independence' is something that has just started getting importance and is catching on in India. It will take some time for the effects to come.

Another reason for this can be that there is a limited pool of talent from where the independent directors can be taken. This is exhibited by the presence of the same person as the independent director on the boards of many companies. At the time of data collection, it was observed that the cross-board phenomenon was also prevalent — a person (say, Mr X) may be an executive director (or CEO) in one company where some other person (say, Mr Y) is an independent director. Now, Mr Y, in turn, is an executive director (or CEO) of a company where Mr X is an independent director. In such cases, it is doubtful that either of them will contribute as an independent director to the board on which they are appointed or will bring in independent judgements and their lack of interference and monitoring will be proportional to what they expect others to do on the board where they are the executive directors (or CEO). Therefore, it is suggested that the guidelines on corporate governance should take into account the 'cross-board' phenomenon while defining the criteria for a person to be eligible for appointment as an independent director. Cadbury (2002) adds another dimension to this by saying that the practice to have executive directors of other companies on the board of the company needs to be discouraged as such people have a mindset similar to that of the executive directors who are already there on the board. He argues that people with different backgrounds and having different perspectives required in today's dynamic and global world, should be added.

Lack of training to function as independent directors, and ignorance of the procedures, tasks, and responsibilities expected of them, can be other reasons why the study did not find independent directors contributing towards the performance of the firms. There is thus a need for training programmes for independent directors. Merely adding such persons to the board may increase the proportion of independent directors without improving the performance.

Some companies had no independent directors till the end of the financial year 2002-03. This shows that compliance with the guidelines or listing agreements left a lot of scope for improvement. Very recently, in 2005, a company (ONGC) was threatened with delisting if it did not add independent directors to its board to meet the minimum stipulated norms. This was one of the first cases where action was contemplated and it came four years after the deadline to implement the guidelines.

The findings of the study suggest that the proportion of independent directors should be between 50 and 60 per cent. The results do not support board independence beyond 60 per cent or below 33 per cent. The study thus suggests that there is an optimum proportion of board independence. The overall insignificant results with regard to board independence can be attributed to the presence of companies in the sample where the board independence was either below 33 per cent or more than 60 per cent.

Board size and performance as also board independence and performance were found to be inversely related. This means that a bad performance leads to an increase in both board size as well as board independence. Independent directors are added under pressure from the stakeholders on the grounds of bringing in expertise and independent judgement as also to provide transparency at the time of poor results. This addition of independent directors need not be accompanied by the removal of a director in some other category; as a result, both the size and the proportion of board independence increases which is what the results seem to suggest. The study found evidence of endogenous determination of board size and performance. A bad performance leads to an increase in board size, which in turn hampers performance. No evidence was found for endogenous determination of board independence and performance.

LIMITATIONS

There are a variety of mechanisms and market forces that reduce agency costs and complement or substitute board independence. Despite providing for controls in the analysis, the impact of governance mechanism is difficult to segregate.

The data has been collected from databases like PROWESS and Capitaline. Mistakes were detected in the data and were corrected. While care was taken to ensure

that all corrections are made, some of them might have been inadvertently overlooked. The classification of the directors into different categories was as mentioned in the corporate governance reports which are a part of the annual reports. It was assumed that the companies are reporting fairly to the regulators and the stock exchanges, as misrepresentation would entice legal actions.

The data for performance measures tend to be noisy. Many factors influence the performance of the firm and not all of them would have been controlled for in the study. Also if the board composition effects are anticipated by the market then the market-based performance measures tend to become irrelevant for an analysis to determine the impact of board composition.

This study has taken data for six financial years, as prior to that, corporate governance was not reported in the financial statements. Studies on board composition should be conducted for a longer time horizon.

GUIDELINES FOR FUTURE RESEARCH

The qualifications of the directors, their age, and whether the effect of board composition is moderated by these factors, need to be looked into. The companies have now started disclosing information on these variables in their annual reports, therefore further studies can be taken up with them.

Different companies can have different board compositions that are appropriate. Further studies can be taken up to see which board composition is suitable for different companies which are in different stages of the life cycle (starters, fast growth, mature, etc). Boardroom behaviour is also very important. Future researchers can observe and study boardroom behaviour by actually attending the board meetings.

Besides composition, other factors like number of meetings, the time for which they last, the attendance records of independent directors, the number of agenda items in the board meeting, etc., are also important and can be included in the future studies.

Strong substitution effects are present amongst the various aspects of governance conduct. Substitution between monitoring by the outside directors and the large shareholders, as well as monitoring by the inside directors in determining the performance can be studied.

REFERENCES

Agrawal, A and Knoeber, C (1996). "Firm Performance and Mechanisms to Control Agency Problems between Managers and Shareholders," *Journal of Financial and Quantitative Analysis*, 31(3), 377-397.

Aggrawal, Rajesh and Andrew Samwick (1999) "The Other Side of Trade Off: The Impact of Risk on Executive Compensation," *Journal of Political Economy*, 107(1), 65-105.

Alshimmiri, T (2004). "Board Composition, Executive Remuneration and Corporate Performance: The Case of REITS," *Corporate Ownership and Control*, 2(1), 104-119.

Andres, P D; Azofra, V and Lopez, F (2005). "Corporate Boards in OECD Countries: Size, Composition, Functioning and Effectiveness," *Corporate Governance*, 13(2), 196-210.

Balasubramanian, N (2005). "Corporate Law Reforms in India : Management and Board Governance: Two and a Half Cheers to the Dr J J Irani Committee," *Chartered Secretary*, 35(7), 978-984.

Bateman, T S, and Strasser, S (1983). "A Crosslagged Regression Test of the Relationship between Job Tension and Employee Satisfaction," *Journal of Applied Psychology*, 68(3), 439-445.

Baysinger, B D and Butler, H N (1985). "Corporate Governance and the Board of Directors: Performance Effects of Changes in Board Composition," *Journal of Law, Economics, & Organizations*, 1(1), 101-124.

Bhagat, S and Black, B (1997). "Do Independent Directors Matter?" Working Paper, Columbia University.

Bhagat, S and Black, B (2000). "Board Independence and Long-Term Firm Performance," Working Paper, University of Colorado.

Bhagat, S and Black B (2002). "The Non-Correlation Between Board Independence and Long- Term Firm Performance," *Journal of Corporation Law*, 27(2), 232-273.

Cadbury, Adrian (2002). *Corporate Governance and Chairmanship: A Personal View*, New York: Oxford University Press.

Cadbury Committee (1992). *Report of the Committee on Financial Aspects of Corporate Governance*, United Kingdom: Financial Reporting Council.

Chung, K H and Pruitt, S W (1994). "A Simple Approximation's of Tobin's *q*," *Financial Management*, 23 (3), 70-74.

Confederation of Indian Industry (1999). "Desirable Corporate Governance – A Code," http://www.ciionline.org/services/68/default.asp? Page= Corporate%20 Governances% 20.htm, downloaded on June 15, 2003.

Dalton, C M and Dalton, D R (2005). "Board of Directors: Utilizing Empirical Evidence in Developing Practical Prescriptions," *British Journal of Management*, 16(1), 91-97.

Dalton, D and Kesner, I (1987). "Composition and CEO Duality in Boards of Directors: An International Perspective," *Journal of International Business Studies*, 18 (3), 33–42.

Dalton, D R, Daily, C M; Ellstrand, A E and Johnson, J L (1999). "Number of Directors and Financial Performance: A Meta-Analysis," *Academy of Management Journal*, 42(6), 29-47.

Davidson, W N; Rangan, N and Rosenstein, S (1997). "Regulation and Systematic Risk in the Electric Utility Industry: A Test of the Buffering Hypothesis," *Financial Review,* 32(1), 163-184.

Eisenberg, T; Sundgren, S and Wells, M T (1998). "Large Board Size and Decreasing Firm Value in Small Firms," *Journal of Financial Economics*, 48 (1), 35-54.

Green, W H (1997). *Econometric Analysis*, Third Edition, N J, Upper Saddle River: Prentice-Hall.

Greenbury Report (1995). *Directors' Remuneration: Report of a Study Group*, London: Gee Publishing.

Hambrick, Donald C and Jackson, Eric M (2000). "Ownership Structure, Boards and Directors," Paper presented at the August 2000 meeting of the Academy of Management, Toronto.

Hampel Report (1998). "Committee on Corporate Governance," *Report on Corporate Governance*, London: Gee Publishing.

Healey, P M (1985). "The Effect of Bonus Schemes on Accounting Decision," *Journal of Accounting & Economics,* 7(1/2/3), 85-107.

Hermalin, B and Weisbach, M (1988). "The Determinants of Board Composition," *The RAND Journal of Economics*, 19(4), 589-606.

Hermalin, B and Weisbach, M (1991). "The Effects of Board Composition and Direct Incentives on Firm Performance," *Financial Management*, 20(4), 101-112.

Higgs Report (2003), *Review of the Role and Effectiveness of Non-executive Directors.* http:// www. independent director.co.uk /governance/higgs.phphtml, downloaded on July 15.

Hsiao, C (1986). *Analysis of Panel Data*, First Edition, Cambridge, England: Cambridge University Press.

Jacobson, R (1987). "The Validity of ROI as a Measure of Business Performance," *American Economic Review*, 77(3), 470-478.

Jensen, M (1993). "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems," *Journal of Finance*, 48(3), 831-80.

Klein, A (1998). "Firm Performance and Board Committee Structure," *Journal of Law and Economics*, 41(1), 275-299.

Kothari, S P and Warner, J B (1997). "Measuring Long-Horizon Security Price Performance," *Journal of Financial Economics*, 43(3), 301-339.

Lawerence, J and Stapledon, G (1999). "Is Board Composition Important? A Study of Listed Australian Companies," http://papers.ssrn.com/sol3/papers.cfm?abstract_id=193528, downloaded on December 29, 2002.

Lipton, Martin and Lorsch, Jay (1992.) "A Modest Proposal for Improved Corporate Governance," *Business Lawyer*, 48(1), 59-77.

Maher, M and Andersonn, T (2001). "Corporate Governance: Effect on Firm Performance and Economic Growth," OECD Working Paper.

Mak, Y T and Kusnadi, Yuanto (2003). "Size Really Matters: Further Evidence on the Negative Relationship between Board Size and Firm Value," National University of Singapore Business School Working Paper, Singapore.

Naresh Chandra Committee Report (2002). Department of Company Affairs, Government of India, New Delhi.

Securities and Exchange Board of India (1999). "Report of the Kumar Mangalam Birla Committee on Corporate Governance," http://www.sebi.gov.in/commreport/corpgov.jsp?uc_sub_sec_id=48&uc_sec_id=5, downloaded on June 15, 2003.

Securities and Exchange Board of India (2003) "Report of the N R Narayana Murthy Committee on Corporate Governance," http://web.sebi.gov.in/commreport/clause49.html, downloaded on June 15, 2004.

Smith Jr, C W and Watts, R L (1992). "The Investment Opportunity Set and Corporate Financing, Dividend and Compensation Policies," *Journal of Financial Economics*, 32(3), 263-292.

Verma, J R (1997). "Corporate Governance in India: Disciplining the Dominant Shareholder," *IIMB Management Review*, 9(4), 5-18.

Weimer, J and Pape, J C (1999). " A Taxonomy of Systems of Corporate Governance," *Corporate Governance An International Review*, 7(2), 152-166.

Yermack, D (1996). "Higher Market Valuation of Companies with a Small Board of Directors," *Journal of Financial Economics,* 40(2), 185-212.

Ajay K Garg is an Assistant Professor in Finance and Accounting Area at the Indian Institute of Management, Lucknow (IIML). Before joining IIML, he had been working as Reader, University Business School (UBS), Panjab University, Chandigarh from where he is currently on leave. He has obtained his Doctoral degree from the Indian Institute of Management, Bangalore and an MBA from UBS, Panjab University, Chandigarh. He has a professional experience of 14 years. He has published several articles in refereed national and international journals and has national and international conference presentations to his credit.