ECONOMIC DETERMINANTS OF BOARD CHARACTERISTICS: AN EMPIRICAL STUDY OF INITIAL PUBLIC OFFERING FIRMS

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ECONOMIC DETERMINANTS OF BOARD CHARACTERISTICS: AN EMPIRICAL STUDY OF INITIAL PUBLIC OFFERING FIRMS

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ABSTRACT

This study examines the associations between the characteristics of boards of directors of initial public offering (IPO) firms, and the nature of these firms' investment opportunities, level of inside share ownership, and firm size. Three characteristics of boards of directors are examined: board size, proportion of outside directors, and the separation of the CEO and chairperson's roles (dual leadership).

Based on a sample of 110 New Zealand firms which made initial public offerings of equity securities over the period 1983 to 1987, this study finds that firms which have lower inside share ownership and larger firms tend to employ larger boards. In addition, the proportion of outside directors is positively related to the extent of growth opportunities available to a firm, and negatively related to inside share ownership. Finally, firms with relatively more growth opportunities, and somewhat surprisingly, smaller firms, are likely to have dual leadership. Although some contrary results are found, the findings from this study are generally consistent with arguments that firms with greater agency problems, attributable to low inside share ownership, significant growth opportunities and large size, are likely to organize their boards of directors to attempt to mitigate these problems.

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INTRODUCTION
The corporate governance role of the board of directors has become an issue of great interest to both researchers and regulatory agencies. The board of directors is often seen as serving a monitoring function, protecting the interests of various stakeholders against management's self-interests (Fama, 1980; Fama and Jensen, 1983). Larger boards (e.g., Zahra and Pearce, 1989), boards with more independent, outside directors (e.g., Fama and Jensen, 1983), and those with the CEO's and chairperson's roles being separated (dual leadership) (e.g., Jensen, 1993), have been argued by researchers to be better able to monitor management.

Regulatory agencies in different countries view certain characteristics of boards of directors as being important determinants of their effectiveness. For example, in the United States (U.S.), the New York Stock Exchange (NYSE) requires that listed companies have audit committees made up only of outside directors. In addition, the Securities and Exchange Commission (SEC) recommended that nominating and compensation committees should be dominated by outside directors (Wolfson, 1984). Brickley, Coles and Jarrell (1994) also discuss calls in the U.S. by the United Shareholders' Association, large public pension funds, legislators and regulators, and the financial press for dual leadership.

The aim of the present study is to examine the determinants of board of director characteristics of New Zealand (N.Z.) firms making initial public offerings of equity securities (IPO firms). It tests the hypotheses that firms which are associated with greater agency problems are likely to maintain larger boards, employ relatively more independent outside directors, and to have dual leadership. Previous research suggests that the investment opportunity set (IOS) (e.g., Smith and Watts, 1992; Gaver and Gaver, 1993), inside share ownership (e.g., Jensen and Meckling, 1976), and size (e.g., Chiôw, 1982) are important determinants of agency problems. The present study investigates associations between these three variables and the board characteristics of board size, proportion of outside directors, and dual leadership.

The present study contributes to the literature on the determinants of board characteristics in three major respects. First, apart from Beatty and Zajac (1994), previous studies have not considered board characteristics of IPO firms. In the IPO context, agency problems are likely to be significant and to have an important influence on board characteristics. Second, previous studies have mainly been conducted in the U.S., where regulatory requirements or pressure means that the choice of board characteristics, particularly the use of outside directors, is not completely voluntary. In contrast, regulatory agencies in
N.Z. have not required or applied pressure on firms to choose boards with particular characteristics, such as using relatively more outside directors. Consequently, any use of these monitoring techniques on the part of N.Z. firms is completely voluntary. Third, unlike previous studies, this study explicitly considers the association between the nature of a firm’s investment opportunity set (IOS) and its board characteristics.

**LITERATURE REVIEW**

Several researchers argue that the board of directors is an important element of corporate governance, particularly for monitoring the behaviour of top managers. For example, the board of directors has been described as perhaps the ultimate internal monitor of top managers (Fama, 1980) and as the “common apex” of the decision control systems of organisations characterised by a separation of ownership and decision-making (Fama and Jensen, 1983).

**Board Size**

Board size, defined as the number of members on the boards of directors, has been argued as affecting the monitoring ability of boards. Larger boards are often believed to be more capable of monitoring the actions of top management because it is more difficult for CEOs to dominate larger boards. Therefore, the independence of the board from the CEO is enhanced, and the board of directors will be less intimidated by the CEO. This greater independence will enhance the board’s ability and willingness to use its decision control powers to ratify or refute decisions made by the CEO (Zahra and Pearce, 1989).

Pfeffer (1973) examines the boards of directors of hospitals for organisation-environment linkages. He finds that the size of hospital boards tends to be larger where more funds are received from private donations and budgets are larger. Since hospitals with more private donations and larger budgets are likely to provide greater opportunities for managers to act opportunistically, this finding may imply that larger boards are employed to mitigate these higher agency costs. In a study of retailing firm failures, Chaganti, Mahajan and Sharma (1985) find that firms which have significantly smaller boards of directors are more likely to fail than firms with larger boards. However, although the findings of Pfeffer and Chaganti et al. can be interpreted as being supportive of agency theory arguments, it should be noted that these studies do not explicitly use the agency theory perspective.

**Outside Directors**

According to Fama and Jensen (1983), the effectiveness of the board for decision control can be enhanced by including on the board outside directors who can arbitrate in disagreements among
managers and perform tasks involving serious agency problems between managers and residual claimants, such as setting executive compensation or searching for replacements for top managers. Fama and Jensen (1983, p. 315) argue that:

...outside directors will monitor the management that chooses them because outside directors have incentives to develop reputations as experts in decision control...The value of their human capital depends primarily on their performance as internal decision managers...They use their directorships to signal to internal and external markets for decision agents that (1) they are decision experts, (2) they understand the importance of diffuse and separate control, and (3) they can work with such decision control systems.

That is, outside directors have incentives to monitor management on behalf of shareholders because the demand for directors' services, and therefore the value of their human capital, is dependent on their effectiveness as decision control specialists.

Many studies have examined the association between the use of outside directors and financial performance, based on the assumption that firms using relatively more outside directors would show better financial performance. Accounting-based measures are typically used for operationalizing firm performance (e.g., Baysinger and Butler, 1985). The results from these studies are mixed. However, apart from the difficulty in capturing the effects of using outside directors in overall firm performance, the rationale underlying these studies has been challenged. Hermelin and Weisbach (1991) explain why a positive relationship between board composition and firm performance may not exist. First, firms may have boards which are optimally weighted between insiders and outsiders. Second, although firms may vary in the severity of their underlying agency problems, they may reduce these problems to approximately the same residual level. Since their residual agency problems are the same, performance will not be related to actions taken to reduce underlying agency problems, such as altering board composition. Therefore, even though a strong outsider-dominated board presumably reduces agency costs, it may be impossible to find a relationship between firm performance and board composition.

Several studies provide empirical support for the importance of outside directors for corporate governance in different contexts, including as a substitute for takeover restrictions (Brickley and James, 1987), removing the CEO for poor firm performance (Weisbach, 1988), in tender offer bid situations (Byrd and Hickman, 1992), and in management buyout situations (Lee, Rosenstein, Rangan and Davidson, 1992). In addition, some studies actually investigate the factors which affect the choice of inside or outside directors.

Brickley and James (1987) find a significant negative relationship between the degree of concentration of ownership, and number and proportion of outsiders, but only in nonacquisition states. This is
consistent with concentration of ownership and outside directors being substitute devices for controlling managerial behaviour. Hermelin and Weisbach (1988) find that when a CEO nears retirement, firms tend to add inside directors and that after a CEO change, inside directors with short tenures are more likely to leave the board. They also observe that inside directors are more likely to leave the board and outside directors more likely to join after a firm performs poorly and when a firm leaves a product market. Kaplan and Minton (1994) investigate the associations between prior financial performance and the appointment of two different types of outside directors to boards of large nonfinancial Japanese corporations - directors employed by banks (bank directors) and those employed by other nonfinancial firms (corporate directors). They find that both types of appointment tend to increase with poor stock performance. In addition, the appointment of bank directors also increases with earnings losses. Beatty and Zajac (1994) suggest that firms which attempt to invoke desirable managerial behaviour through the use of incentive contracts are hampered by the risk aversion of managers. They propose that firms would alleviate this problem by organising their boards of directors to increase their monitoring potential. Consistent with an agency perspective, they find that firms whose managers owned relatively fewer shares use a large proportion of outside directors. Bathala and Rao (1995) find that the use of outside directors is significantly and negatively associated with the proportion of managerial share ownership, the dividend payout ratio, the ratio of long-term debt to the sum of total debt and equity, the firm's growth rate and the volatility of the firm's earnings. Rediker and Seth's (1995) study generally supports the notion that firms substitute one form of corporate governance for another, with the use of outside directors being significantly and negatively correlated with the use of large outside shareholders, insider ownership, and the mutual monitoring potential of top management.

Dual Leadership
It may also be advantageous from a monitoring perspective not to have the CEO of the organisation also performing the chairperson's role because the chairperson is likely to be able to influence the operations of the board (Jensen, 1993). Given that chairpersons are the heads of boards of directors, they are likely to be able to significantly affect the operations of the boards by developing operating procedures, influencing the configuration of committees and serving as the ultimate persons responsible for performance of the boards. The chairperson often schedules meetings and establishes the agendas of the meetings. In addition, and importantly for monitoring, the chairperson is likely to be responsible for communicating information to external directors prior to board meetings (Rechner, 1989).
Studies which have examined the association between dual leadership and performance have found conflicting results (e.g., Rechner and Dalton, 1991; Donaldson and Davis, 1991; Mallette and Fowler, 1992). However, these studies have the same potential weaknesses as those studies which have examined the association between the use of outside directors and performance (see above).

Some studies attempt to provide more direct evidence on the impact of dual leadership on corporate governance. Mallette and Fowler (1992) explore the relationship of dual leadership and the adoption of “poison pills” (takeover defenses) by U.S. industrial manufacturing firms. They find that firms are less likely to adopt poison pills when separate people serve as the CEO and chairperson. However, Kesner, Victor and Lamont (1988) find no evidence of a statistical association between the dual leadership and the commission of illegal acts by Fortune 500 companies. Beatty and Zajac (1994) find that IPO firms which have lower percentages of managerial compensation being derived from incentives, and therefore presumably higher agency costs, are more likely to have a separate CEO and chairperson.

RESEARCH HYPOTHESES

Previous researchers argue that tender offer bids (Byrd and Hickman, 1992) and MBO transactions (Lee et al., 1992) are characterised by significant agency problems. Similarly, IPO firms are subject to significant agency problems. The proposed issue of securities by IPO firms closely resembles the situation described by Jensen and Meckling (1976), where an existing owner-manager is attempting to sell equity claims to outside investors. The sale of equity claims to outside investors leads to a divergence of interests between the owner-manager and outside investors because the owner-manager will not bear the full costs of actions which reduce the value of the firm. However, given rational expectations and a competitive equity market, potential investors will "price protect" by reducing the amount they will pay for the securities, to take into account any monitoring expenditures they will have to incur and the cost of the owner-manager diverging from their interests. Similarly, potential IPO investors can protect themselves against the divergence of interests between owner-managers and themselves by requiring a discount in the offering price of the securities, or as an ultimate form of price protection, declining to participate in the IPO. To reduce the degree of price protection demanded, owner-managers of IPO firms may voluntarily put in place mechanisms for limiting such divergence of interests.

Theoretical and empirical research reviewed in the previous section indicates that the board of directors is an important mechanism for monitoring management and that ability of the board of directors in monitoring management is dependent on board size (e.g., Zahra and Pearce, 1989), the proportion of
outside directors (e.g., Fama and Jensen, 1983), and the existence of dual leadership (e.g., Jensen, 1993).

**Inside Share Ownership**

In the case of IPO firms, major agency problems are likely to exist between potential investors and parties closely associated with these firms. These latter parties (hereafter referred to simply as "inside owners") include promoters, directors, managers, staff, associates and existing shareholders of the firm and have the ability to appropriate wealth from outside investors to themselves. For closely-held firms, existing non-management shareholders often include family members, relatives and other associates of management of the firm and have the ability to benefit from wealth transfers from outside investors. Although some IPO firms are widely-held firms where significant agency problems may exist between management and existing shareholders, it is assumed in this study that all the parties included as "inside owners" have the ability to appropriate wealth from outside investors to themselves.

Inside owners choose the board of directors of IPO firms at the time of the offering of securities. That is, regardless of the number or proportion of shares which may eventually be held by outside investors as a result of the security issuance, inside owners decide the number and composition of the board of directors, and whether the CEO should also be the chairperson of the board. Given the ability of potential outside investors to price-protect and the incentive for management to self-monitor, inside owners are likely to increase the monitoring ability of the board where agency problems are more significant. This can be achieved by having larger boards, more outside directors, and dual leadership.

Previous research indicates that managerial ownership is negatively related to the use of various monitoring mechanisms, including high-quality auditors (e.g., Simunic and Stein, 1987) and audit committees (Pincus, Rusbarsky and Wong, 1989). For an IPO firm, where potential investors face possible wealth transfers to inside owners, agency costs are likely to be dependent on share ownership by these owners. Therefore, the following hypothesis is tested:

**H1:** The proportion of inside share ownership is negatively related to board size, proportion of outside directors, and dual leadership.

**Investment Opportunity Set**

An important factor which may affect the level of monitoring demanded by potential IPO investors is the availability of growth options to the IPO firm. Firm investment may take the form of investment in
assets-in-place, which represent existing investments, or investment in growth options, which represent future investment opportunities (Myers, 1977). Investment in assets-in-place are likely to be less risky because they are tangible and can be traded in secondary markets (Anderson, Francis and Stokes, 1993). Further, there is less discretion available to existing owners and managers where investment opportunities are in the form of assets-in-place, making wealth transfers from potential investors to existing owners/managers more difficult. In contrast, investments in growth options are riskier because managerial discretion tends to be greater and the value of these investments is contingent in nature (e.g., on managerial skill). Consequently, firms with a greater proportion of assets-in-place are likely to have lower agency costs compared to firms with a greater proportion of growth options (Bradbury, 1990). According to Smith and Watts (1992), managerial actions are less observable where the proportion of firm value represented by growth opportunities increases relative to assets-in-place. In such situations, outside shareholders without the inside information and specialised knowledge of managers will find it difficult to determine the investment opportunities available to the firm. In contrast, the maintenance and supervision of existing assets are more readily observable.

The above discussion suggests that IPO firms with significant proportions of growth options are more likely to have boards of directors with greater ability to monitor managers. This leads to the following hypothesis:

**H2:** The availability of growth opportunities is positively related to board size, proportion of outside directors, and dual leadership.

**Firm Size**

Previous agency theory-based studies suggest that firm size may be positively related to agency costs and to the use of various monitoring mechanisms, such as external auditing (Chow, 1982), audit committee formation (e.g., Pincus *et al.*, 1989), and voluntary disclosure of financial information (e.g., Chow and Wong-Boren, 1987). Similarly, larger firms may employ greater monitoring through the board of directors to overcome agency problems. According to Zahra and Pearce (1989, p. 294):

As firms become bigger, the control function becomes vital. Large organizational size is often associated with complex operations that require careful integration. As a result, a board becomes a major instrument of control as companies become larger.

Therefore, the following hypothesis is tested:

**H3:** Firm size is positively related to board size, proportion of outside directors, and dual leadership.
DATA COLLECTION

Sample Selection
The sample for this study is based on N.Z. firms which made initial public offerings of equity securities between 1983 and 1987, and which subsequently listed on the N.Z. Stock Exchange (NZSE). There were no IPOs in N.Z. between the stock market crash in October 1987 and December 1988. IPOs remained relatively infrequent for much of the period after December 1988. The following types of firms are excluded from the study:

1. Oil and gas exploration firms and mining firms - these are typically no-liability firms which are involved in highly speculative activities, which may affect their comparability with other firms.

2. Firms making offerings of securities which are not available for subscription by the general public, where agency problems may be less significant.

3. Unit trusts - the nature of these entities, and therefore their governance structures, may not be comparable to other types of firms.

A total of 110 firms which met the selection criteria are included in the study.

Variable Measurement
Except where indicated otherwise, information for measuring the variables employed in the study was obtained from the prospectuses issued by the sample firms.

*Board Size (BRDSIZE).* This variable is measured by the total number of members on the board of directors.

*Proportion of Outside Directors (OUTDIR).* The definition of outside directors adopted in this study includes only *independent* outside directors. Under this definition, directors with the following affiliations with the firm are *not* deemed to be outside directors: (1) an employee of the firm; (2) an individual or member of a firm which has sold or proposes to sell assets or other business interests to the firm; (3) a director or employee of a related firm, (4) an individual who provides consulting or other services to the firm or who is a member of a firm which provides such services; or (5) a major shareholder or a director appointed by a major shareholder. The number of outside directors is then divided by the total number of directors.
Dual leadership (DUALEAD). A binary variable is used to measure the existence of dual leadership. Firms which have CEOs also serving as chairpersons of the board are coded as 0, and those with dual leadership as 1.

Investment Opportunity Set (IOS). Previous studies operationalise growth opportunities in several ways, including market value to book value of total assets (e.g., Smith and Watts, 1992), market value to book value of equity (e.g., Gaver and Gaver, 1993), earnings to price ratio (e.g., Gaver and Gaver, 1993), variability of returns (e.g., Smith and Watts, 1992), research intensity (e.g., Skinner, 1993), and inclusion of security in growth-oriented mutual funds (Gaver and Gaver, 1993). However, none of these studies focused on IPO firms.

For the IPO firms included in the present study, many of these measures cannot be used. Information on R&D expenditure is typically not available. Many IPO firms do not have previous earnings histories and all IPO firms do not have market prices prior to listing. One possibility is to calculate market value using market price after listing, and to calculate book value on the basis of the pre-IPO book value of assets adjusted by the amount to be raised through the IPO. However, this is not done because of the well-documented underpricing phenomenon for IPO firms and the systematic nature of this underpricing (e.g., Saunders, 1990). In this study, four alternative measures are used to operationalise the investment opportunity set (IOS) and these are discussed below.

Variance of Returns. Variance of returns (VARRET) has been used in previous studies to operationalise IOS (e.g., Smith and Watts, 1992). It is expected that firms with greater variance of returns are those with relatively more growth opportunities, and that these firms will provide greater monitoring through their board of directors. However, since price and returns data for IPO firms are only available after listing, this measure can only be calculated on an ex post basis for these firms. Consequently, there are limitations associated with this particular measure.

VARRET is measured by the variance of the difference between the firm's equity return and the market return, i.e., Var(r_i - r_m). Returns for the first twenty trading days after listing, excluding the initial return, are used to this variable. This is similar to the method used by Beatty (1989) to calculate the ex post measure of ex ante uncertainty for IPO firms, except that returns are adjusted for market movements. This adjustment is important because the study extends over several years, where significant differences in market conditions may have existed. The measure used assumes that all IPO firms have the same market risk, an assumption consistent with most previous studies involving IPO firms (Saunders, 1990).
Operating History. For IPO firms, another potential measure of the IOS variable is the existence of an operating history. An IPO firm is sometimes formed through the conversion of an existing unlisted firm to a publicly-listed firm with little change in operations. In this case, the major purpose of the IPO may be to allow the firm to increase its access to outside capital or its spread of shareholding to meet listing requirements, or to allow existing shareholders to reduce their shareholding. Alternatively, a new firm may be formed by merging or acquiring existing firms, with these existing firms often becoming subsidiaries of the new firm. In both cases, the IPO firms have previous operating histories and potential investors in these firms will be acquiring claims in a combination of future growth opportunities and existing assets-in-place.

On the other hand, an IPO firm may be formed to commence operations for the first time. Potential investors in such start-up firms, which do not have past operating histories, will be acquiring claims in future growth opportunities because these firms do not have existing assets-in-place. It is expected that firms without operating histories will have relatively more growth opportunities and that these firms will provide greater monitoring through their board of directors.

Another closely-related measure used in this study is the number of years of operating history. That is, rather than measuring operating history as a binary variable, operating history here is measured by a continuous variable. The assumption underlying this measure is that relatively more established firms are likely to have more assets-in-place compared to growth opportunities. Both measures of operating history have the advantage of being an ex ante measures of the IOS variable.

The existence of an operating history (HISTDUM) is measured by a binary variable, with firms having operating histories coded as 1; and those without operating histories coded as 0. Years of operating history (HISTCON) is measured by the number of years between the date of formation of the IPO firm and the prospectus date.

Offering Size. Another potential measure of the IOS variable for IPO firms is the relative size of the offering. Assuming that IPOs are designed primarily to fund growth opportunities, the relative size of the offering (OFFER) can proxy for the extent of growth opportunities available to the IPO firm. OFFER is measured by the amount to be raised through the IPO divided by firm size (see below). This measure has the advantage of being ex ante in nature but has the major limitation of ignoring growth opportunities in existing assets. Further, although relative offering size is likely to affect the need to enhance the reputation of the offeror, and therefore the monitoring ability of the board of directors, it may be a relatively weak measure of IOS.
Each of the three measures is likely to partially and imperfectly measure the IOS. Following Gaver and Gaver (1993, 1995), a combined IOS measure is derived by factor analysing the three continuous IOS measures of VARRET, HISTCON and OFFER. According to Hair, Anderson and Tatham (1995, p. 373): ‘Variables for factor analysis are generally assumed to be of metric measurement’. Therefore, in this study, the dummy variable, HISTDUM, is not included in the factor analysis. As Gaver and Gaver (1993, p. 133) note: ‘The investment opportunity set is inherently unobservable and is likely to be imperfectly measured by any single empirical proxy’ (p.133), and factor analysis allows the isolation of ‘the underlying construct that is common to all of the measures’ (p. 137). To assess the robustness of the results, the relationship between selected individual IOS measures and board characteristics is also examined. This is discussed further in the “Data Analysis and Results” section.

**Inside Share Ownership (INOWN).** First, the number of ordinary shares retained by inside owners is computed. This is done by adding the following: shares to be issued to existing shareholders, promoters, management, directors, staff, and associates (including related firms), and shares outstanding before the initial public offering. The number of ordinary shares retained by inside owners is then divided by the total number of ordinary shares outstanding after the completion of the issue (assuming all shares to be issued were subscribed).

**Firm Size (SIZE).** Firm size is measured by market value of ordinary shares (calculated by multiplying the total number of shares after the issue and the first listing price), plus book value of total debt and preference shares immediately prior to the IPO.

**DATA ANALYSIS AND RESULTS**

**Descriptive Statistics**

Table 1 shows descriptive statistics for the independent and dependent variables included in the study. The natural log transformation is applied to VARRET, HISTCON and SIZE in order to reduce the skewness in their distributions. This results in approximately normal distributions for these variables.

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**Put Table 1 here**

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Although the use of outside directors is voluntary in N.Z., it is evident from Table 1 that IPO firms on average employ a majority of these directors. Also, most of the IPO firms have dual leadership. These characteristics may be indicative of significant agency conflicts existing in the IPO context.
Factor Analysis

Following Gaver and Gaver (1993, 1995), the continuous measures of IOS - $ln(VARRET)$, $ln(SIZE)$ and OFFER - are factor analysed to derive an aggregate IOS measure. Common factor analysis is used to decompose each of the three measures into one or more common factor(s) and a factor unique to each of the individual measures.

Table 2 presents the results of the factor analysis, including the starting communalities of the individual measures, and the eigenvalues of the reduced correlation matrix of the three individual measures. As explained by Gaver and Gaver (1993), “the number of factors needed to approximate the original correlations among the individual measures is equal to the number of summed eigenvalues needed to exceed the sum of the communalities” (p. 137). Since the first eigenvalue alone is greater than the sum of the three communalities, one common factor is extracted as an aggregate IOS measure. The factor extracted is labelled IOSSCORE and the factor score for each firm is used as the primary IOS measure in the subsequent analyses.

Correlations

Table 3 presents the Pearson correlations among the continuous explanatory variables, including correlations between the aggregate IOS measure (IOSSCORE) and the three underlying individual IOS measures. In view of the significant correlations among the explanatory variables, IOSSCORE, INOWN and $ln(SIZE)$, a multivariate analysis should be used to analyse the relationship between these variables and each board characteristic. A multivariate analysis allows an assessment of the relative importance of each explanatory variable after controlling for the correlations between them.

The significant correlations between IOSSCORE and the underlying individual IOS measures provide further support for the argument that the individual IOS measures contributes significantly to the variation in IOSSCORE. Note, however, that the high correlations between IOSSCORE, and INOWN and $ln(SIZE)$, can affect the ability to make inferences from the estimates of the coefficients of these
variables. Since Table 3 also indicates that one of the individual IOS measures, \(\ln(\text{VARRET})\), is not as highly correlated with INOWN and \(\ln(\text{SIZE})\), the sensitivity of the potential impact of multicollinearity can be assessed by re-running the analysis with \(\ln(\text{VARRET})\) substituted for IOSSCORE.

Put Table 3 here

**Multivariate Tests**

**Board Size.** Ordinary least squares (OLS) regression is used to examine the relationship between board size and the explanatory variables, and the following model is estimated:

\[
\text{BRDSIZE} = \alpha + b1\text{IOS} + b2\text{INOWN} + b3\text{SIZE}
\]

Three separate models are estimated, using three alternative IOS measures of IOSSCORE, \(\ln(\text{VARRET})\) and HISTDUM. Recall that HISTDUM is the categorical IOS measure not used in the factor analysis to derive IOSSCORE, while \(\ln(\text{VARRET})\) is used because it is less highly correlated with the other explanatory variables.

Put Table 4 here

The results of this regression are shown in Table 4. All three estimated models are significant at \(p<.05\), with \(R^2\) ranging from 8.42 percent to 12.16 percent. For all three models, firm size and inside share ownership are significantly related to board size in the expected direction at \(p<.05\) or better. However, the direction of the associations for the three IOS measures are in the opposite direction to that predicted, with one (IOSSCORE) being marginally significant \((p<.10)\) and another (HISTDUM) being significant at \(p<.05\). Therefore, overall, there is only weak support for the argument that IPO firms with greater agency costs are likely to use larger boards of directors to attempt to reduce these costs.
**Proportion of Outside Directors.** OLS regression is also used to examine the multivariate relationship between the proportion of outside directors and the explanatory variables, and the following model is estimated:

\[
\text{OUTDIR} = a + b1\text{IOS} + b2\text{INOWN} + b3\text{SIZE}
\]

Put Table 5 here

As Table 5 shows, all three models are significant at \(p<.001\), with \(R^2\) ranging from 16.69 percent to 18.54 percent. The IOS measure in each of the three models is significant at \(p<.05\) or better, while the inside share ownership variable is significant at \(p<.05\) or better, with the direction of these associations being consistent with expectations. However, although directionally consistent, firm size is not statistically significant in all three models. The results are consistent with the argument that firms associated with greater agency costs are likely to use relatively more outside directors for monitoring purposes.

**Dual Leadership.** Finally, since dual leadership is a binary variable, logit analysis is used to estimate the relationship between this variable and the explanatory variables, and the following model is estimated:

\[
\text{DUALEAD} = a + b1\text{IOS} + b2\text{INOWN} + b3\text{SIZE}
\]

Put Table 6 here

The results of the logit analysis are shown in Table 6. All three models are significant at \(p<.05\) or better, with \(R^2\) (likelihood ratio index) ranging from 9.93 percent to 14.98 percent. All three IOS measures are related to dual leadership in the expected direction, with IOSSCORE and \(\ln(\text{VARRET})\) being significant at \(p<.01\), and HISTDUM only marginally significant (\(p<.10\)). However, the direction of the statistically significant association between firm size and dual leadership (all at \(p<.05\)) is contrary to expectations. Finally, inside share ownership is not significantly related to dual leadership. Therefore, there is only weak support for the agency theory predictions of choice of dual leadership.
SUMMARY AND DISCUSSION

This study examines the impact of agency problems on characteristics of boards of directors of initial public offering (IPO) firms. Agency conflicts are expected to be significant for IPO firms because the partial ownership of shares by owner-managers after the IPO creates incentives for them to exercise their own preferences rather than maximise the value of the firm (Jensen and Meckling, 1976). Cross-sectional differences in agency costs are expected to be related to inside share ownership, the nature of the investment opportunity set, and firm size. Boards with more directors, relatively more outside directors and dual leadership are expected to be more effective in monitoring management. Larger boards may be preferred in high agency cost situations because it may make it more difficult for CEOs to manipulate or dominate the board members. Outside directors are more independent of management and are generally believed to have greater incentives to monitor management (Fama and Jensen, 1983). Similarly, dual leadership may be advantageous from a monitoring perspective because the chairperson of the board of directors is likely to be able to influence the operations of the board. In addition, the chairperson is likely to be responsible for communicating information to external directors prior to board meetings (Rechner, 1989).

Based on a sample of 110 New Zealand firms which made initial public offerings of equity securities over the period 1983 to 1987, this study finds that firms which have lower inside share ownership and larger firms tend to employ larger boards. However, contrary to expectations, there is some evidence that firms expected to have more growth opportunities tend to employ smaller boards. In addition, the proportion of outside directors is positively related to the extent of growth opportunities available to a firm, and negatively related to inside share ownership. Finally, firms with relatively more growth opportunities, and surprisingly, smaller firms, are likely to avoid dual leadership.

The predicted relationships for board size and dual leadership are less strongly supported than those relating to the proportion of outside directors. The finding that firms with relatively more growth opportunities tend to employ smaller boards is puzzling because managers of such firms are expected to have greater discretion (Smith and Watts, 1992), making the greater monitoring provided by larger boards more important. However, this relationship was found only when the existence or length of operating history is used to measure the investment opportunity set variable. It is possible that this finding is attributable to operating history capturing factors other than the extent of growth opportunities. In particular, it is possible that as firms become more established (and therefore having longer operating histories), more directors are added to the board, perhaps through the promotion of the CEO and other senior executives to the board. In addition, more established firms may be able to afford larger boards. Similarly, the positive relationship between firm size and board size, although
consistent with an agency interpretation, may be due to larger firms being more able to afford larger boards to supervise their operations.

There are at least two potential explanations for the relatively weak findings for dual leadership. First, most firms in the sample have dual leadership, which makes it difficult to find a statistical relationship for this variable. Second, there are costs and benefits associated with dual leadership (and other board characteristics), and the hypotheses in the present study focus on the benefits associated with dual leadership. It may be that the costs of dual leadership, which include agency problems associated with having a non-CEO chairperson, information costs, costs of changing the succession process, and other costs (Brickley, Coles and Jarrell, 1994), outweigh the benefits of dual leadership. Interestingly, the preponderance of firms in the present study with dual leadership can be contrasted with the findings of Brickley et al. (1994) who find that most firms in their sample have unitary leadership. The difference may be due to differences in institutional environment, but it may also be due to the different types of firms included in the two studies. While the present study focuses on IPO firms, Brickley et al. focus on large existing firms included in a Forbes survey of executive compensation. They argue that their findings indicate that unitary leadership is the equilibrium and that dual leadership “signify normal succession periods or extraordinary, transitory events” (p. 5). Perhaps IPOs represent “extraordinary, transitory events” and these firms move towards unitary leadership as the benefits of unitary leadership outweigh the costs of unitary leadership. This presents a potential area for future research, that is, do IPO firms adopt dual leadership and as they mature, move toward unitary leadership?

Overall, although some contrary results were found, the findings from this study are generally consistent with arguments that firms with greater agency problems, attributable to low inside share ownership, significant growth opportunities and large size, are likely to organize their boards of directors to attempt to mitigate these problems. This raises a number of potential implications. First, since cross-sectional differences in the level of monitoring provided by the board of directors appear to be related to the severity of agency problems faced by these firms, regulations mandating all firms to adopt certain board characteristics may result in suboptimal board structures (Hermalin and Weisbach, 1991). Second, since the demand for monitoring is likely to vary across firms according to their agency problems, there may not be a positive relationship between firms adopting greater monitoring, such as more outside directors, and firm performance. For example, as argued by Hermalin and Weisbach (1991), firms with the most significant agency problems which use relatively more outside directors may have greater residual agency problems (Hermalin and Weisbach 1991).
Therefore, these firms may continue to perform relatively more poorly than other firms. Alternatively, the use of board of directors with greater monitoring ability may reduce agency problems across firms to approximately the same level, and result in no relationship between board characteristics and firm performance.

There are limitations associated with the present study. First, in developing the study hypotheses, this study only considered the board of directors' role in monitoring managers. Clearly, boards of directors also perform other roles. The omission of other factors which are not related to the demand for monitoring may explain some of the contrary results found in this study. However, it appears reasonable to conclude from the findings that agency theory at least partly explains the choice of board characteristics. Second, this study only considered the board of directors for controlling divergence of interests between owner-managers and potential investors. In reality, a firm has available other mechanisms for limiting such divergence, including incentive contracts (e.g., Haugen and Senbet, 1981) and market mechanisms (e.g., Fama, 1980). The choice between alternative mechanisms is likely to be affected by the relative costs (and benefits) of these mechanisms. If firms choose from a package of these mechanisms and where these alternative mechanisms may be used as complements or substitutes, single-equation models such as those used in this study may not adequately capture the factors which affect the use of outside directors.
REFERENCES


TABLE 1

Descriptive Statistics for Independent and Dependent Variables (n=110)

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<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
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</thead>
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<tr>
<td>OUTDIR</td>
<td>.58</td>
<td>.26</td>
<td>.60</td>
</tr>
<tr>
<td>DUALLEAD</td>
<td>.85</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BRDSIZE</td>
<td>5.28</td>
<td>1.53</td>
<td>5.00</td>
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<td>VARRET</td>
<td>25.20</td>
<td>60.35</td>
<td>10.77</td>
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<tr>
<td>ln(VARRET)</td>
<td>2.29</td>
<td>1.35</td>
<td>2.38</td>
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<td>HISTDUM</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>HISTCON</td>
<td>9.09</td>
<td>16.39</td>
<td>2</td>
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<td>ln(HISTCON)</td>
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<td>1.27</td>
<td>1.39</td>
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<tr>
<td>OFFER</td>
<td>.46</td>
<td>.59</td>
<td>.33</td>
</tr>
<tr>
<td>INOWN</td>
<td>.53</td>
<td>.23</td>
<td>.58</td>
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<tr>
<td>SIZE (NZ$m)</td>
<td>32.68</td>
<td>138.93</td>
<td>8.88</td>
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<tr>
<td>ln(SIZE)</td>
<td>16.44</td>
<td>1.25</td>
<td>16.23</td>
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</table>

a Proportion of outside directors.

b Dual leadership, zero if no dual leadership, one if there is dual leadership. For this variable, the mean represents the proportion of firms with dual leadership.

c Total number of directors.

d Variance of (Ri-Rm) over the first twenty trading days after listing, excluding the first trading day.

e Existence of operating history, coded 0 for firms without operating histories, and 1 for firms with operating histories. For this variable, the mean represents the proportion of firms with an operating history.

f Number of years of operating history.

g Natural logarithm of (HISTORY + 1). The constant term was added to eliminate zero values of HISTORY prior to taking log (Wall 1986, p. 145).

h Amount of offering divided by firm size.

i Proportion of shares retained by inside owners

j Firm size, measured by sum of market value of ordinary shares plus book value of total debt.
TABLE 2
Common Factor Analysis of Three IOS Measures

<table>
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<td>( \ln(\text{VARRET}) )</td>
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<td>.218</td>
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<td>Median</td>
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<tr>
<td>Mean</td>
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### TABLE 3
Pearson Correlations Between Explanatory Variables (n=110)

<table>
<thead>
<tr>
<th>Variables</th>
<th>ln(VARRET)</th>
<th>ln(HISTCON)</th>
<th>OFFER</th>
<th>IOSSCORE</th>
<th>INOWN</th>
</tr>
</thead>
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<tr>
<td>ln(HISTCON)</td>
<td>-0.4418***</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OFFER</td>
<td>0.2669**</td>
<td>-0.2747**</td>
<td></td>
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<tr>
<td>IOSSCORE</td>
<td>0.8083***</td>
<td>-0.8152***</td>
<td>0.5829***</td>
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</tr>
<tr>
<td>INOWN</td>
<td>-0.0780</td>
<td>0.4226***</td>
<td>-0.4296***</td>
<td>-0.3870***</td>
<td></td>
</tr>
<tr>
<td>ln(SIZE)</td>
<td>-0.2142*</td>
<td>0.3316***</td>
<td>-0.4479***</td>
<td>-0.4146***</td>
<td>0.4746***</td>
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* Significant at p<0.05 (two-tailed); ** Significant at p<0.01 (two-tailed); *** Significant at p<0.001 (two-tailed).
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<th>Model 2</th>
<th>Model 3</th>
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<td>IOS:</td>
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<td></td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>IOSSCORE</td>
<td>+</td>
<td>-.3123</td>
<td>(.1405)*</td>
<td></td>
</tr>
<tr>
<td>HISTDUM</td>
<td>-</td>
<td>.7243</td>
<td>(2.126)**</td>
<td></td>
</tr>
<tr>
<td>ln(VARRET)</td>
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<td></td>
<td>-.0062</td>
<td>(.051)</td>
</tr>
<tr>
<td>INOWN</td>
<td>-</td>
<td>-.0141</td>
<td>(2.021)**</td>
<td>-.0165</td>
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<td>ln(SIZE)</td>
<td>+</td>
<td>.3922</td>
<td>.3411</td>
<td>(2.317)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.978)**</td>
<td>(2.651)**</td>
<td>(2.553)**</td>
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<td>R²</td>
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<td>.0842</td>
<td>.1216</td>
<td>.1009</td>
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<td>F-value</td>
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<td>3.247</td>
<td>4.891</td>
<td>3.965</td>
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<td></td>
<td></td>
<td>(p&lt;.03)</td>
<td>(p&lt;.01)</td>
<td>(p&lt;.01)</td>
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* For all models, the coefficients and the associated t-statistics (in parentheses) are shown.

* Significant at p<.10 (one-tailed); ** Significant at p<.05 (one-tailed); *** Significant at p<.01 (one-tailed).
# TABLE 5

OLS Regression of Proportion of Outside Directors on Explanatory Variables

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Expected Direction</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
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<tr>
<td>IOS:</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>IOSSCORE</td>
<td>+</td>
<td>.1044 (2.949)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HISTDUM</td>
<td>-</td>
<td>-.1722 (3.153)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(VARRET)</td>
<td>+</td>
<td></td>
<td>.0519</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.714)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INOWN</td>
<td>-</td>
<td>-.0039 (3.494)**</td>
<td>-.0022 (1.798)**</td>
<td>-.0030 (2.641)**</td>
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<tr>
<td>ln(SIZE)</td>
<td>+</td>
<td>.0181 (.867)</td>
<td>.0191 (.927)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td></td>
<td>.1669</td>
<td>.1854</td>
<td>.1766</td>
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<tr>
<td>F-value</td>
<td></td>
<td>7.079 (p&lt;.0002)</td>
<td>8.043 (p&lt;.0001)</td>
<td>7.577 (p&lt;.0001)</td>
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* For all models, the coefficients and the associated t-statistics (in parentheses) are shown.

* Significant at p<.10 (one-tailed); ** Significant at p<.05 (one-tailed); *** Significant at p<.01 (one-tailed).
**TABLE 6**

Logistic Regression of Dual Leadership on Explanatory Variables

<table>
<thead>
<tr>
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<th>Model 1</th>
<th>Model 2</th>
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<td><strong>IOS:</strong></td>
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<td></td>
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<tr>
<td>IOSSCORE</td>
<td>+</td>
<td>1.3022</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(2.520)**</td>
<td></td>
<td></td>
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<tr>
<td>HISTDUM</td>
<td>-</td>
<td>-1.1890</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(1.415)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(VARRET)</td>
<td>+</td>
<td></td>
<td></td>
<td>.6688</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2.347)**</td>
</tr>
<tr>
<td><strong>INOWN:</strong></td>
<td>-</td>
<td>.0084</td>
<td>.0192</td>
<td>.0198</td>
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<tr>
<td></td>
<td></td>
<td>(.748)</td>
<td>(1.150)</td>
<td>(1.264)</td>
</tr>
<tr>
<td>ln(SIZE)</td>
<td>+</td>
<td>-.5081</td>
<td>-.4967</td>
<td></td>
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<td></td>
<td></td>
<td>-.4652</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.966)**</td>
<td>(2.123)**</td>
<td>(1.903)**</td>
</tr>
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<td>Model likelihood index</td>
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<td>.1425</td>
<td>.0993</td>
<td>.1498</td>
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<td>Model likelihood statistic</td>
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<td>13.004</td>
<td>9.061</td>
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<td></td>
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<td>(p&lt;.005)</td>
<td>(p&lt;.03)</td>
<td>(p&lt;.004)</td>
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* For all models, the coefficients and the associated t-statistics (in parentheses) are shown.

* Significant at p<.10 (one-tailed); ** Significant at p<.05 (one-tailed); *** Significant at p<.01 (one-tailed).
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Massey University

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