BOARD GOVERNANCE AND IPO PERFORMANCE IN THE SHORT-RUN AND LONG-RUN

Ray da Silva Rosa*, H.Y. Izan**, Michelle Ching- Yi Lin, Suzanne Ching- Fang Lin*******

Abstract

In light of the best practice recommendations released by the Australian Stock Exchange (ASX) in March 2003, this study tests the relationship between initial public offering (IPO) firm performance and board governance quality, captured by board size, board leadership, board composition, and director's share ownership. Based on a sample of Australian IPO firms that lodged prospectuses with ASX between 1994 and 1999, we do not find evidence that links underpricing to board structures at the time of IPO. IPO firms' board structures are insignificant in explaining the level of IPO underpricing, and board size is the only board governance variable significant in explaining long-run aftermarket performance, after controlling for the size of the firm. That is, IPO firms with larger boards at the time of issuance perform better in the long-run, consistent with the resource dependence theory. Thus, we conclude that ASX's best practice recommendations are likely to distort the market-driven practices already in place, and our findings lead us to question the role played by the board of directors in signalling firm quality.

Keywords: Corporate Governance, Board of Directors, IPO Performance

** Business School, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Perth, Australia, Tel: +61-8-6488-2974 ; Fax: +61-8-6488-1047 ,E-mail: ray.dasilvarosa@uwa.edu.au*

*** Business School, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Perth, Australia, Tel: +61-8-6488-2627 ; Fax: +61-8-6488-1068, E-mail: izan.izan@uwa.edu.au*

**** Corresponding author. Department of Banking and Finance, Takming University of Science and Technology, 56, Sec. 1, Huanshan Rd., Neihu, Taipei 11451, Taiwan, Tel: +886-2-2658-5801,E-mail: mcylin@takming.edu.tw*

***** Department of Finance and Taxation, Takming University of Science and Technology, 56, Sec. 1, Huanshan Rd., Neihu, Taipei 11451, Taiwan, Tel: +886-2-2658-5801. E-mail: suzannelin@takming.edu.tw*

1. Introduction

In March 2003, the Australian Stock Exchange (ASX) released new corporate governance guidelines, which included debatable "best practice" recommendations such as the adoption of an independent board and separation of the roles of chairperson and CEO. Given the premise that strong corporate governance enhances shareholder value and, by extension, increases initial public offering (IPO) issuers' appeal to investors, this study examines the relationship between IPO performance, including IPO underpricing and post-IPO long-run performance, and board governance quality, captured by board composition, board leadership, board size and share ownership of directors. These outcomes are addressed as they are important dimensions of firm performance that may be reasonably assumed to be associated with the quality of corporate governance.

For many issuing firms, the IPO is the first time they are required to establish a formal board of directors as part of the listing requirements (Certo *et al.*, 2001b). They are most likely to adopt an "optimal" board structure given their incentives to maximise appeal to investors. Accordingly, the corporate governance choices that IPO firms make and their subsequent performance provide a robust "market tested" basis for an evaluation on the relative efficacy of different corporate governance mechanisms; whether firms that conform more closely to the ASX recommendations are associated with lower underpricing and better long-run performance

This study provides incremental contributions to previous IPO studies in Australia, including Lee et al. (1996) and Balatbat et al. (2004). Specifically, Lee et al. (1996) examine initial underpricing and long-run post-listing returns to Australian IPOs between 1976-1989. Thus, in addition to market adjusted returns used in Lee et al. (1996), this study also estimates decile adjusted buy-and-hold returns to control for firm size. Further, in Lee et al.'s (1996) study, they only incorporate variables, such as, issue size, time to listing, retained ownership, underpricing and underpricing squared, in the cross-sectional analysis of sharemarket returns to IPO firms. They do not

examine the relationship between board structures of IPO firms and the aftermarket performance.

This study also provides an extension to Balatbat et al.'s (2004) study that investigates the board of directors and the operating performance of Australian IPOs over the period 1976-1993. The incremental contributions made by this study include that this study examines the sharemarket performance of IPO firms both in the short-run and in the long-run while Balatbat et al. (2004) focus on IPO firms' operating performance. Further, Balatbat et al. (2004) examine IPOs between 1976 and 1993 while this study tests IPOs over a more recent time period (1994-1999) where there are more IPO activities and the issue of corporate governance is more prominent. In Australia, the number of IPOs was less than ten a year between 1976 and 1983 (Lee, 2003) while the average number of IPOs between 1994 and 1999 is much higher, at 53 a year. In addition, between 1994 and 1999, corporate governance, especially corporate board composition and leadership, had been subject to much attention. The increased focus of shareholder activists, among others, on the board of directors suggests that over time investors would be more likely to factor in the quality of the board in their decisions to participate in an IPO. These events indicate the importance of corporate governance issues over the sample period (1994-1999) that this study examines.

Overall, we find that IPO firms' board structures are unrelated with the level of IPO underpricing. Board size, after controlling for the size of the firm, is significant in explaining long-run aftermarket performance. IPO firms with larger boards at the time of issuance perform better in the long-run. The results lead us to question the role played by the board of directors in signalling firm quality. Our findings also suggest that ASX's best practice recommendations are likely to distort the market-driven practices already in place.

The remainder of the paper is organised as follows. Section 2 summarises the ASX best practice recommendations on board structures. Section 3 develops the hypotheses tested in this paper. Section 4 describes the sample and data sources. Section 5 provides variable definitions and summary statistics on these variables. Section 6 reports the test results on the relationship between IPO underpricing and initial board structures. Section 7 reports the test results on the relationship between post-IPO long-run performance and initial board structures. Section 8 concludes.

2. ASX best practice recommendations on board structures

Principle Two of the ASX's 2003 best practice corporate governance guidelines deals directly with the board structure, and states that a company should structure the board to add value. In this regard, Recommendations 2.1 and 2.2 are that a majority of the board should comprise independent directors, and the chairperson should be an independent director, respectively. Consistent with this last point, Recommendation 2.3 is that the roles of chairperson and chief executive officer be performed by different individuals.

There are no specific recommendations on how large or small a company board should be. However, the specific recommendations on the size of the nomination, audit and remuneration committees and the major recommendations from Principle 2 implicitly impose a minimum board size requirement. *By inference*, each company needs four independent directors and a total of six directors on the board are required for compliance with the spirit of the recommendations (da Silva Rosa *et al.*, 2004a).

3. Development of hypotheses

The main hypothesis is that good governance leads to positive signals about issuing firm quality and better firm outcomes, including lower underpricing at the IPO and better long-run performance These tests can provide an insight into the preference of investors who arguably are best placed to assess the appropriateness of the recommendations outlined in the ASX best practice recommendations, which we use as "indicators" of good governance.

3.1 Board size

Because IPO firms are typically less established and require the establishments of access to critical resources, market power and brand name recognition in the market, the resource dependence theory is likely to be more relevant to IPO firms compared to mature firms. According to Pfeffer and Salancik (1978), the board should be larger the greater the reliance on external resources because larger boards can enhance external linkages, bring in multiple perspectives, enhance the power of the board relative to the CEO, and coopt resources from a firm's environment (Finkle, 1998). Therefore, IPO firms that adopt larger boards are expected to have lower underpricing and better long-run aftermarket performance.

H1a: IPO underpricing is lower for issuing firms with larger boards at the time of IPO.

H1b: Post-IPO long-run performance is higher for issuing firms with larger boards at the time of IPO.

3.2 Board leadership

Given that there is relatively little public information available about firms making initial public offerings, the level of information asymmetry between outside investors and the first time issuers is potentially high. Thus, at the time of IPO, adopting dual leadership can be considered as one way of increasing the board's independence from the management (Certo *et al.*,

2001b) and reducing the uncertainty about the intrinsic value of issuing firms. Recommendation 2.3 of the ASX best practice recommendations specifically suggests that the roles of chairperson and chief executive officer should be performed by different individuals. Hence, this study expects that IPO firms that adhere to ASX's recommendations by adopting a dual leadership structure should have lower underpricing (that is, less wealth loss to initial shareholders at the time of IPO) and better aftermarket performance.

H2a: IPO underpricing is lower for issuing firms with a dual leadership structure at the time of IPO.

H2b: Post-IPO long-run performance is higher for issuing firms with a dual leadership structure at the time of IPO.

3.3 Board composition

Because of high information asymmetry between the firm and outside investors at the time of issuance, it can be particularly important for IPO firms to adopt an independent board. This is because having an independent board by appointing a majority of outside directors on the board is one way of communicating the quality of governance structures to potential investors. The reason why board independence can be used as a signal of firm quality is that it indicates that the company has an effective control system in place.

According to Recommendations 2.1 and 2.2 of ASX best practice recommendations, companies should adopt an independent board. If board independence is value-adding as claimed by agency theorists, corporate governance reformers and regulators, this value should be reflected in the offer price at the time of IPO to avoid a transfer of wealth from original shareholders to first day investors and in the long-run performance. Therefore, we expect that the higher the proportion of independent directors on the board, the lower the underpricing and the better the long-run aftermarket performance.

H3a: IPO underpricing is lower for issuing firms that have a higher proportion of independent directors on the board at the time of IPO.

H3b: Post-IPO long-run performance is higher for issuing firms that have a higher proportion of independent directors on the board at the time of IPO.

3.4 Director ownership

Directors who have high financial stakes in the firm are more likely to ensure stringent monitoring of the management to protect their interests. Given the high information asymmetry at the time of the IPO, a high level of director ownership at that time can help signal the quality of an issue and thus be associated with better long-run performance and less wealth loss to initial shareholders at the IPO.

H4a: IPO underpricing is lower for issuing firms with higher director ownership at the time of IPO.

H4b: Post-IPO long-run performance is higher for issuing firms with higher director ownership at the time of IPO.

4. The sample and data sources

The sample for this research comprises IPO firms that lodged prospectuses with the ASX between 1994 and 1999 and were successfully listed on the ASX. Initial public offerings during this period are identified using the Connect 4 database and checked against the "Additions to the Official List" in the ASX Fact Book published yearly. The final sample size comprises 320 IPO firms that lodged prospectuses between 1994 and 1999. Note that entitlements, rights issues, withdrawn offers, offers by foreign companies, and IPOs by real estate investment trusts (REITs), unit trusts and pooled development funds are excluded from the final sample.

Details of the IPO offers, including the issue prices and total shares offered, and the information on boards of directors, including board size, leadership structures, board composition and directors' share ownership, were hand collected from company prospectuses maintained by the Connect 4 database. Industry sectors and accounting information (such as total revenue) were obtained from the Aspect Financial database. IPO firms' listing date, delisting date and delisting details were also obtained from the Aspect Financial database. The Share Price and Price Relatives (SPPR) database, supplied by the Centre for Research in Finance, was used to obtain monthly share price data for calculating post-IPO long-run returns. Daily share price data and ASX All Ordinaries Accumulation Index value were gathered from the Core Research Data (CRD) database, provided by Securities Industry Research Centre of Asia-Pacific (SIRCA), to calculate IPO underpricing (or initial day returns) and immediate aftermarket returns.

5. Summary statistics on dependent, independent and control variables

This section defines the dependent, independent, and control variables used to test the hypotheses developed earlier and provide summary statistics.

5.1 Dependent variables

5.1.1 IPO underpricing (UPRICE)

IPO underpricing is measured by initial returns. The more an issue is underpriced, the higher the initial returns. The raw initial return (RIR) on the first day of

trading is defined as the percentage difference between the offer price and the Day 1 closing price. To adjust for market movements between the prospectus date and the first trading day of the IPO, market adjusted initial return (MAIR) is also calculated by subtracting the return to ASX All Ordinaries Accumulation Index from the RIR.

Raw and market adjusted initial returns by sample (or prospectus) years and over the entire sample period are reported in Table 1. The Table shows that the overall average RIR and MAIR are 26.7% and 24.9% respectively, with the year 1998 having the highest average RIR of 79.1% and MAIR of 75.3%. Over the sample period 1994-1999, positive RIRs and MAIRs are observed for most IPO firms. Of the total 320 IPOs, about two third of the IPOs (203 firms) have MAIRs greater than zero, suggesting that most IPOs have been underpriced.

5.1.2 Post-IPO long-run performance (LRRETURN)

The post-IPO long-run performance is assessed using equal-weighted buy-and-hold abnormal returns. Equal-weighted returns are used in all analyses in this study as Brown and Warner (1980) suggest that an equal-weighted benchmark is more powerful than a value-weighted benchmark in detecting abnormal performance. Also, the buy-and-hold return (BHR) method is adopted here because it can measure the actual investor behaviour more closely. The mean abnormal buy-and-hold return adjusted for size decile (i.e., decile adjusted return[1] AR_T) is defined as the difference between the BHRs to sample IPO firms ($R_{T,\text{IPO}}$) and the BHRs to the decile to which sample firms belong (Brown & da Silva Rosa, 1998). A positive (or negative) value of AR indicates that IPOs outperform (or underperform) a portfolio of control firms matched on size. To control for the survival bias, only firms that have survived over the entire event-window are included in the control portfolio.

Table 2 reports the summary statistics for the post-IPO long-run performance over various event-windows, which are expressed in months relative to the listing month. In addition to raw buy-and-hold returns and decile adjusted returns, Table 2 also reports equal-weighted and value-weighed market adjusted BHRs, where the market portfolio includes all firms that have the share price available for calculating the BHRs over the given event-window. As the biases associated with market adjusted returns are more severe the wider the event-windows (da Silva Rosa *et al.*, 2004b), this paper places more weight on decile adjusted returns. As discussed in Brown and da Silva Rosa (1998) and da Silva Rosa et al. (2004b), because the decile and market adjusted returns are generated conditioning on survival, the return estimates incorporate a deliberate "look-ahead" bias. Hence, the relative performance, which is a more meaningful assessment of post-IPO long-run performance, is focused on here.[2]

Table 2 shows that the median adjusted returns are consistently negative across different measures and event-windows, in line with what have been documented in prior IPO studies that there is a negative drift in long-run returns. The poor performance extends to five years post-listing, though it is more significant over the first two years post-IPO. Specifically, over the event-window [+1,+24], well over 95% of all control portfolios (or 979 of the 1,002 control portfolios) have a higher average (equal-weighted) decile adjusted return than the average return of –11.6% to sample IPO firms.

5.2 Independent variables

5.2.1 Board size (BSIZE)

Board size is measured by the total number of directors on the board, including alternate directors. Panel A of Table 3 reports the summary statistics of sample IPO firms' board size. The average and median board size for the sample is five. Thus, in comparison with the board size implicit in ASX's best practice recommendations, the boards of IPO firms appear to fall short of 1 director on average.

In an earlier study on Australian IPOs conducted over the period between 1976 and 1993, Balatbat et al. (2004) report an average board size of five for IPO firms, which is the same as what we have found. Shekhar and Stapledon (2005) examine Australian IPOs during the period between 1993 and 2001 that overlaps with this study's sample period and again report an average board size of five for IPO firms. Together, these findings suggest that the board size of Australian IPO firms has, on average, remained relatively stable at five over time and that the board size of six members implicit in the best practice recommendations may in fact *not* the "best practice".

In Table 4, we examine the number and percentage of IPO firms with board size that is greater or smaller than the overall median board size of five by industry groups. Resources industries, including gold and other metals sectors, are found to have

[1] The procedures involved in obtaining the size-decile return for each sample firm are described below (Brown & da Silva Rosa, 1998): (1) identify all firms listed on the ASX that have sufficient share price data available for calculating BHRs over the given event-window; (2) rank the firms based on their market capitalisation at the beginning of the event-window; (3) sort them into size-deciles with decile one comprising the smallest ten percent of firms; (4) calculate the BHRs for the deciles that sample firms belong to.

[2] As noted in da Silva Rosa et al. (2004b, p. 118), although the estimate of abnormal returns cannot be attributable to a feasible investment strategy, it does not matter since "our principal interest is not in estimating precise point estimates of abnormal return but in detecting if our experimental sample firms exhibit significant abnormal performance".

relatively more firms with smaller boards; specifically, 37 out of the total 50 firms in these two sectors have less than five directors on their boards. On the other hand, retail, media, and tourism & leisure sectors have relatively more firms with larger boards. The observed variations in IPO firms' board size across industries suggest that one board size does not fit all. Thus, the approach adopted by the ASX best practice recommendations, that is, without setting a specific number of directors for all company boards, is preferred over those exchange listing requirements or mandates from institutional investors that set a rigid uniform standard and restrictions on the number of board members.

5.2.2 Board leadership (LEADER)

Board leadership is measured by a binary variable and is coded as 1 if the CEO and chairman positions are separated (i.e., a dual leadership structure) and as 0 if the same person serves both the roles of the CEO and the chairman (i.e., a unitary leadership structure). Panel B of Table 3 shows the percentage of firms that have the same person as the chairperson and the CEO and the percentage of firms that adopt a dual leadership structure. The most common leadership structure among IPO firms across the sample period is dual leadership, represented by 90% of firms. Overall, IPO firms show an overwhelming conformance with Recommendation 2.3 of ASX's corporate governance guidelines. Interestingly, the percentage of firms that separate the roles of chairperson and the CEO is significantly lower in Balatbat et al.'s (2004) study (55% of firms) for IPOs between 1976-1993 compared with this study (90% of firms). The difference in the sample periods studied is likely to be the main contributing factor for the observed difference in findings. The move to a dual leadership structure is one of the more dramatic changes in the IPO board structure observed in the late 1990's. The change can be attributed to the demands placed on companies by shareholder activists and governance reformers for the adoption of a dual leadership structure.

Complementing Panel B which provides an analysis on the independence of chairpersons on the firm level, Panel C of Table 3 investigates the independence of chairpersons at the individual level whereby the directorships held by chairpersons are classified into three categories according to their degree of independence with the company, including independent, grey and executive directorships. In this thesis, independent directors are defined to include those who are not current or past employees of the corporation, and do not have substantial or potential business or family ties with management. Grey directors refer to those who are either former employees of the firm or are affiliated with managers. Inside directors are full-time employees of the firm.

Recommendation 2.2 is that the chairperson be an independent director. Compliance with 2.2 would normally ensure compliance with 2.3 although not *vice versa* and so one might expect Recommendation 2.3 to have preceded Recommendation 2.2. Table 5.3 shows that in each sample year, approximately 50% of the chairpersons are independent directors, suggesting that while some of the ASX recommendations reflect widespread contemporary practice, others entail significant departures.

5.2.3 Proportion of independent directors (INDEPDIR)

Consistent with the above analysis, an independent director is defined as a director who is not a current or past employee of the corporation, does not have substantial business or family ties with the management, nor does he/she have potential business ties with the firm. Directors who are employees of banks, law and consulting firms are excluded by the last criterion. Note that the definition of an independent director adopted by this study is consistent with the definition provided in ASX's best practice recommendations.[3]

In Panel D of Table 3, we report the proportion of independent directors on IPO boards. The average and median proportions of independent directors are both 33%, suggesting that Recommendation 2.1 that requires a majority of independent board members is not a widely adopted practice among IPO firms.

5.2.4 Director ownership (DIROWN)

Director ownership is measured by the total number of shares (excluding options) held directly, indirectly, or beneficially by directors and/or director-related entities as a proportion of total shares outstanding at the time of IPO. Panel E of Table 3 presents summary statistics of directors' share ownership at the time of IPO. Across the sample, the median percentage of ownership held by directors is 23% and the mean is 27%. To test for the possible curvilinear relationship between director ownership and IPO performance documented in Morck, Shleifer and Vishny (1988) and McConnell and Servaes (1990), squared director ownership is included in the robustness test.

Table 5 compares board and firm characteristics, including board leadership, board composition, directors' interests, operating history, firm size and post-listing revenue, of IPO firms that adopt a large board (i.e., greater than the median board size of five) and a small board (i.e., smaller than the median board size of five). Results from Wilcoxon Rank-Sum Test that tests for any significant differences in median

[3] Principle Two of the new guidelines states that "an independent director is independent of management and free of any business or other relationship that could materially interfere with – or could reasonably be perceived to materially interfere with – the exercise of their unfettered and independent judgement" (ASX, 2003, p.19)

values of these variables (except for board leadership) between these two groups are also presented. IPO firms with larger boards are found to have significantly higher proportion of independent directors and less executive directors on the board compared with IPO firms with smaller boards. The former also have significantly longer operating history, larger firm size and higher revenue in the first year following listing, suggesting that their abilities to adopt larger boards and appointing more independent directors to the board are backed by good firm performance and pre-IPO operating experience.

Overall, the results show that the board structures of IPO firms with larger boards are more in line with ASX's best practice recommendations. The median board size for this group of firms is six, consistent what is implicit in the best practice recommendations. Also, firms with larger boards have more independent directors with an average of 36.5% on the board while firms with smaller boards have a lower average of 28.1%. However, even for firms with larger boards, the majority of board members are not represented by independent directors. Thus, consistent with the previous conclusion made on board independence, the conformance by IPO firms is still a long way from best practice recommendations.

5.3 Control variables

5.3.1 Operating history (OPHIST)

Operating history is measured by the number of years the issuing firm has been incorporated prior to the IPO, computed as the listing year minus the year of incorporation. The average operating history of IPO firms is 7 years and the median is 2 years. Ritter (1991) shows that the older the IPO firm, the lower the initial return and the higher the long-run performance. Thus, operating history is expected to be negatively related with initial returns but positively related with long-run performance.

5.3.2 Firm size (LnFSIZE)

Firm size is measured by the natural logarithm of the book value of total assets immediately before the initial public offering. It is controlled for because larger IPO firms are associated with a higher survival rate in the aftermarket (Jain & Kini, 1999) and better sharemarket performance [Megginson and Weiss (1991); Mikkelson, Partch and Shah (1997)]. The median firm size across the sample is $5.8 million while the average is $228 million, which reduces to $44 million when the four largest firms in the whole sample (Bank of Western Australian Ltd, Qantas, Telstra Corporation Ltd, and Cable & Wireless Optus) are excluded.

5.3.3 Offer size (LnOFFER)

Offer size is measured by the natural log of total capitalisation at the offer price. That is, the product of offer price and total number of shares offered in the prospectus. The average offer size across the sample is $91.3 million while the median is $8 million, suggesting that there are some large issues over the sample period. The reason for controlling for the size of the offer is that small IPOs are argued to face greater information asymmetry than large IPOs (Jain, 1995) and have been found to underprice more (Michaely & Shaw, 1994). In addition, Ritter (1991) shows that smaller issues have a greater tendency of experiencing not only high adjusted initial returns but also poor aftermarket performance.

5.3.4 Tech industry (TECH)

Tech industry is measured by a binary variable and is coded as 1 if the IPO firm belongs to one of the high-tech industries and 0 otherwise. A dummy variable for high-tech firms is included in the analysis because previous IPO research have documented strong industry effects on IPO outcomes [e.g. Gompers (1996); Hoffmann-Burchardi (2001)]. Koretz (2000) notes that the median first day return for technology IPOs is 63.1% while the median return for all IPOs is only 30.4%.

There has been no consensus in previous research as to which industry codes represent high-tech industries. This study follows Certo et al.'s (2001a) classifications[4] and considers the following ASX industry sectors as high-tech industries: network operator (ASX sector 181), cables (sector 182), equipment & services (sector 183), other telecommunications (sector 184), pharmaceuticals (sector 211), biotechnology (sector 212), computer & office services (sector 226), and high technology (sector 228). Using this classification scheme, 24% of the sample firms (or 77 firms) are considered high-tech.

5.3.5 Time delay (TDELAY)

Time delay measures the number of days from the date the prospectus was lodged with ASX and the listing date. Because of the existence of both informed and uninformed traders in the market (Rock, 1986), following Lee et al. (1996), this variable proxies for the degree of informed demand. Both the studies by Lee et al. (1996) and How, Izan and Monroe (1995) have reported a significant negative relationship between the time delay in listing and the level of underpricing. This study finds that Australian IPOs between 1994 and 1999 have an average (or median)

[4] In Certo, Covin, Daily, and Dalton's (2001a) study, they consider the following 2-digit SIC codes as representing high-tech industries: computer hardware (SIC 35), computer software (SIC 73), semiconductors and printed circuits (SIC 36), biotechnology (SIC 28), telecommunications (SIC 48), pharmaceuticals (SIC 28), specialty chemicals (SIC 28), and aerospace (SIC 37).

time delay of 60 days (or 51 days). This is consistent with what has been noted in Lee et al. (1996) that after lodging prospectuses Australian IPO firms typically take an average of seven to eight weeks before commencing the public trading.

6. Test of IPO underpricing and initial board structures

In this section, we test if IPO firms with better governed boards are associated with less wealth loss to vendors at the time of IPO. Thus, ***IPO underpricing***, measured by market adjusted initial returns, is used as the dependent variable in the multivariate regression. We use board characteristics, including board size, leadership structure, board composition, and director ownership, to proxy for the quality of board governance. Based on the recommendations by ASX, we posit that IPO firms whose board structures are more in line with the best practice recommendations (i.e., have larger boards, dual leadership, higher proportions of independent directors, and higher director ownership) have lower underpricing (or lower initial returns).

To test how the board structures adopted by issuing firms at the time of IPO affects the level of underpricing, we follow the approach taken by Certo et al. (2001b) and Filatotchev and Bishop (2002) and use the hierarchical multiple regression analysis. **Model 1** is based on the findings reported in earlier studies and includes only the control variables, including proxies for ex ante uncertainty, the degree of informed demand, and industry effects. In **Model 2**, we include additional board governance variables and report the results of the main effects, including both the control variables and the test variables of interest (i.e., measures of board size, board leadership, proportion of independent directors, and director ownership).

Models 3-6 are robustness tests. **Model 3** includes an additional squared term of director ownership to capture any non-linearity between insider ownership and firm performance identified by McConnell and Servaes (1990). **Model 4** excludes the operating history variable, **Model 5** excludes firm size and **Model 6** excludes board size, due to the possible multicollinarity between these variables.

The following shows the regression model of Model 2:

$$UPRICE_{it} = \beta_0 + \beta_1.BSIZE_{it} + \beta_2.LEADER_{it} + \beta_3.INDEPDIR_{it} + \beta_4.DIROWN_{it} + \beta_5.OPHIST_{it} + \beta_6.LnFSIZE_{it} + \beta_7.LnOFFER_{it} + \beta_8.TDELAY_{it} + \beta_9.TECH_{it} + \varepsilon_{it}$$

Variable	Definition
UPRICE	The market adjusted initial return is measured by the raw initial return adjusted for return to the ASX All Ordinaries Accumulation Index
BSIZE	Total number of directors on the board
LEADER	1 if different people hold the positions of chairperson and CEO, and 0 otherwise
INDEPDIR	Proportion of independent directors on the board
DIROWN	Percentage of shares held directly, indirectly, or beneficially by directors and/or director-related entities relative to the total number of shares outstanding at the time of IPO
OPHIST	Number of years the IPO firm has been incorporated prior to the IPO
LnFSIZE	Natural log of the total assets an issuing firm has immediately prior to the IPO
LnOFFER	Natural log of the product of offer price and total number of shares offered in the prospectus
TDELAY	Number of days between the date the prospectus was lodged with ASX and the listing date
TECH	1 if the IPO firm belongs to one of the high-tech industries, including network operator (ASX sector 181), cables (sector 182), equipment & services (sector 183), other telecommunications (sector 184), pharmaceuticals (sector 211), biotechnology (sector 212), computer & office services (sector 226), and high technology (sector 228), and 0 otherwise

6.1 Univariate results: IPO underpricing and initial board structures

Table 6 compares the board structures and firm characteristics between two groups of IPO firms, one group with positive market adjusted initial returns and the other with negative market adjusted initial returns, using Wilcoxon Rank-Sum Test, which tests for the differences in median values between two independent sample groups. Firms with positive market adjusted initial returns (i.e., firms whose shares were underpriced at IPOs) are found to have larger median firm size and higher director ownership, both statistically significant at the 10% level. These firms are also found to have shorter time delay between prospectus date and the listing date, significant at the 1% level, compared with firms that were overpriced (i.e., with negative market adjusted initial returns).

6.2 Multivariate results: IPO underpricing and initial board structures

Table 7 reports the hierarchical regression results, together with the expected sign for each coefficient. **Model 1** replicates earlier studies and regresses market adjusted initial returns on all control variables

in this study. The regression has an adjusted R-squared of 4.4% and F-statistic of 3.433, which is significant at the 1% level. We find some consistent results with previous studies. The coefficient estimate for the offer size is significantly negative at the 10% level, suggesting that larger issues have lower ex ante uncertainty and less underpricing. Also, the coefficient estimate for the tech industry dummy variable is positive and significant at the 1% level. This suggests that high-tech firms tend to underprice more, consistent with previous research findings [e.g. Certo et al. (2001a); Koretz (2000)].

Model 2 regresses market adjusted initial returns on all board characteristics under investigation and the control variables. The adjusted R-squared is 4.2% and the F-statistic is 2.285, significant at the 5% level. Contrary to the hypotheses, our results show that for all board characteristics examined, none have any significant effect on the level of underpricing. The tech industry dummy is the only variable that is statistically significant and is positively related with IPO underpricing.

Model 3 is based on Model 2 but includes an additional variable, director ownership squared, to test for the possible curvilinear relationship between director ownership and firm performance that has been suggested by Morck et al. (1988) and McConnell and Servaes (1990). Model 3 has an adjusted R-squared of 4.1% and F-statistic of 2.115, significant at the 5% level. The results are largely unchanged from Model 2. The estimated coefficient for director ownership squared is insignificant, thus providing no support for a non-linear relationship between director ownership and IPO underpricing.

In summary, the regression results on IPO underpricing show that board governance variables lack any significant explanatory power and that the tech industry dummy is the most important explanatory variable for the level of IPO underpricing. Thus, despite the anticipation that better governance by having quality boards will lower the uncertainty at the IPO and reduce information asymmetry between firms and outside investors, whether firms conform to the best practice recommendations or not do not appear to have any impact on the level of underpricing or vendors' wealth at the time of listing.

7. Test of post-IPO long-run performance and initial board structures

In this section, we test whether the long-run performance of IPO firms is influenced by the nature of the board structure. If a firm's board structure is an important part of corporate governance system, board governance variables, including board size, dual leadership, proportions of independent directors and director ownership, are expected to be associated with post-IPO long-run performance. In particular, IPO firms that conform to ASX best practice recommendations are hypothesised to have better long-run performance.

To examine if the board structures at the time of IPO influences the post-IPO long-run performance, multivariate regression analyses are conducted to examine cross-sectional determinants of the aftermarket performance. Models 1-5 regress on the adjusted returns over the event-window [+1,+36], defined in months relative to the listing month and Models 6-10 regress on the adjusted returns over the event-window [+1,+48].

Models 1 and 6 report the results of main effects and the regression model used is as follows:

$$LRRETURN_{it} = \beta_0 + \beta_1.BSIZE_{it} + \beta_2.LEADER_{it} + \beta_3.INDEPDIR_{it} + \beta_4.DIROWN_{it} + \beta_5.UPRICE_{it} + \beta_6.OPHIST_{it} + \beta_7.LnFSIZE_{it} + \beta_8.LnOFFER_{it} + \beta_9.TDELAY_{it} + \beta_{10}.TECH_{it} + \varepsilon_{it}$$

Variable	Definition
LRRETURN	The long-run performance of IPOs is measured by decile (or market) adjusted buy-and-hold returns (BHRs) for the three year aftermarket period (excluding the initial return period) for Models 1-5 and for the four year aftermarket period for Models 6-10. Decile adjusted BHR is defined as the difference between the BHRs to sample IPO firms and the BHRs to the decile to which sample firms belong. Market adjusted BHR adjusts for the returns to the market portfolio, which includes all firms that have the share price available for calculating the BHRs over the given event-window. Equal-weighted returns are used in all analyses in this study as Brown and Warner (1980) suggest that an equal-weighted benchmark is more powerful than a value-weighted benchmark in detecting abnormal performance
BSIZE	Total number of directors on the board
LEADER	1 if different people hold the positions of chairperson and CEO, and 0 otherwise
INDEPDIR	Proportion of independent directors on the board
DIROWN	Percentage of shares held directly, indirectly, or beneficially by directors and/or director-related entities relative to the total number of shares outstanding at the time of IPO
UPRICE	The market adjusted initial return is measured by raw initial return adjusted for return to the ASX All Ordinaries Accumulation Index
OPHIST	Number of years the IPO firm has been incorporated prior to the IPO
LnFSIZE	Natural log of total assets that an issuing firm has immediately prior to the IPO
LnOFFER	Natural log of the product of offer price and total number of shares offered in the prospectus
TDELAY	Number of days between the date the prospectus was lodged with ASX and the listing date
TECH	1 if the IPO firm belongs to one of the high-tech industries, including network operator (ASX sector 181), cables (sector 182), equipment & services (sector 183), other telecommunications (sector 184), pharmaceuticals (sector 211), biotechnology (sector 212), computer & office services, (sector 226) and high technology (sector 228), and 0 otherwise

7.1 Univariate results: Post-IPO long-run performance and initial board structures

Table 8 compares the board structures and firm characteristics between firms with positive and negative long-run returns, measured by decile

adjusted returns, using Wilcoxon Rank-Sum Test. Panel A divides IPO firms into two groups based on decile adjusted returns over a three-year holding period while Panel B divides the firms using the returns over a four-year holding period. More significant differences between the two groups of firms are observed over a longer holding period, that is, in Panel B. Both Panels show that IPO firms with positive long-run returns have significantly larger boards and larger firm size compared with firms that performed more poorly in the long-run.

In addition, Panel B shows that IPO firms with positive long-run returns over a four-year holding period have been in operation for a longer period of time prior to the IPO and have a shorter time delay between prospectus date and listing date compared to firms with negative long-run returns. Overall, the results indicate that IPO firms with positive long-run returns tend to be larger and older, and have larger boards.

7.2 Multivariate results: Post-IPO long-run performance and initial board structures

Results of multivariate regression tests are presented in Table 9. Two measures of long-run performance are used; Panel A uses the equal-weighted decile adjusted returns, and Panel B uses the equal-weighted market adjusted returns. Two different holding periods are also tested. Models 1-5 report results over a three-year holding period, and Models 6-10 report results for a four-year holding period. The following thus discusses the results from Panel A.

7.2.1 Test variables

Consistent with the resource dependence theory, the size of the board at the time of IPO is found to be significantly positively associated with post-IPO long-run performance, suggesting that IPO firms with larger boards perform better in the long-run. This result is not driven by the firm size effect as Models 4 and 9 shows that when the board size variable is omitted from the regression model, the firm size variable does not become statistically significant. Other board governance variables are, however, never significant.

7.2.2 Control variables

The coefficient estimate for time delay between prospectus date and listing date is significantly negative. Assuming that time delay is an appropriate proxy for the degree of informed demand at IPO, Lee et al. (1996, p. 1206) argue that because issues that fill and list more quickly have better long-run performance, one can infer that "informed investors are able to distinguish underpriced issues relative to their 'true value'".

An inverse relationship is also observed between long-run performance of IPOs and IPO underpricing, consistent with the findings of Ritter (1991) and Levis (1993). Although this relationship is significant only for decile adjusted returns over a three-year holding period, it provides some support for the fads hypothesis. The fads hypothesis suggests that initial underpricing and long-run underperformance are due to the over-optimism on the part of investors that cause a temporary overvaluation of initial issues, leading to a downward price adjustment later on. The results from Models 5 and 10 show that in contrast to the finding of Lee et al. (1996), this study does not find a curvilinear relationship between the level of underpricing and post-IPO long-run returns over both event-windows. The variable, underpricing squared, is never significant.

One thing to note from Panel A is that the explanatory power of each regression model is relatively low, similar to that reported in Lee et al.'s (1996) study on cross-sectional variation of long-run returns for a holding period of one, two and three years. The adjusted R-squared for all models tested ranges between 1% and 3% except for Model 9, which excludes the board size variable and has an adjusted R-squared of less than 1%. Lee et al. (1996) argue that "we did not expect that these [long-run returns] models would have high explanatory power (and economic significance) because this implies that long-run sharemarket performance could be predicted at the IPO date" (Lee *et al.*, 1996, p. 1207).

As Ritter (1991) provides evidence that post-IPO long-run performance is sensitive to the market benchmark used, additional regressions are estimated using equal-weighted market adjusted returns as robustness tests. The results are reported in Panel B of Table 9. Qualitatively similar results are found. Board size (+)[5], IPO underpricing (–), and time delay (–) are significantly related with post-IPO long-run performance as in the case when long-run returns are measured by decile adjusted returns.

Overall, board size is the only board governance variable found to be significant in explaining post-IPO long-run performance. Larger boards at the IPO are associated with better long-run performance. While an independent board, including separating the roles of chairperson and CEO, having an independent chairperson and having a majority of independent directors on the board, is more heavily emphasised in best practice recommendations compared to the size of the board, it is surprising to find that none of the former proxies for governance quality are significant in explaining long-run performance across different performance measures and event-windows. Together, the findings from IPO underpricing and long-run performance suggest that whether IPO firms conform

[5] The positive or negative sign in the bracket indicates the direction of relation between explanatory variables and the long-run returns.

to the best practice recommendations on board structures do not have much impact on their performance; that is, neither conformance or deviations from the recommended best practice will lead to better or worse firm outcomes.

As for the control variables in the long-run performance analysis, we find that both the level of IPO underpricing and time delay are significantly associated with long-run returns; both are negatively related with long-run performance. These results are consistent with the findings of prior studies, which have documented that larger underpricing at the IPO is associated with poorer long-run performance, and a shorter time delay is related to better long-run performance.

8. Conclusion

Our analyses show that contrary to the expectation that better governed firms should have less underpricing, IPO firms' board structures, including board size, board leadership, board composition and director ownership, at the time of listing are found to have no significant relationship with the level of IPO underpricing. Larger board size is associated with better post-IPO long-run performance, consistent with the resource dependence theory. However, other board governance variables, including board leadership, board composition and director ownership, have no impact on long-run aftermarket performance.

Overall, board governance lacks significant explanatory power for IPO firm outcomes. Thus, despite the strong emphasis placed by best practice recommendations on board independence, our findings lead us to question if the new corporate governance guidelines have any bearing or real effect on improving firm performance.

Moreover, the findings from this research cast doubts on the signalling or the certification role played by the boards of directors at the time of IPO. Apart from the reported relationship between board size and post-IPO long-run performance, initial board characteristics have no explanatory power for IPO performance. In other words, our study based on a sample of IPO firms finds only a weak relationship between board structure and firm performance, which previous studies also struggle to find. Thus, even though Jensen (1993, p. 862) argues that there is an implicit relationship between boards of directors and firm performance because "(t)he board, at the apex of the internal control system, has the final responsibility for the functioning of the firm", the bulk of research over several decades on the link between board structures and firm performance shows that the precise relationship remains inconclusive (Dalton & Daily, 1999).

Furthermore, a recent study by Chemmanur and Paeglis (2005) documents that higher management quality and reputation are associated with lower underpricing. Thus, it may be the quality of managers rather than the structure of the board that certifies firm quality at the time of the IPO. As the study by Chemmanur and Paeglis (2005) is based a sample of US IPO firms and does not incorporate measures for board structures in the IPO underpricing regression, future research can examine if the same conclusions can be reached using Australian IPOs as the sample.

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Appendices

Table 1. Descriptive statistics for raw and market adjusted initial returns

Panel A
Raw initial returns (RIRs)

Prospectus year	n	Mean (%)	Median (%)	SD (%)	Min (%)	Max (%)	Positive^	Fair*	Negative#
1994	69	0.66	0.00	20.90	-45.00	60.00	33	5	31
1995	23	9.55	5.00	33.39	-20.00	140.00	14	0	9
1996	48	15.45	6.50	56.39	-30.40	370.00	31	2	15
1997	52	18.94	6.75	78.89	-69.19	546.50	33	4	15
1998	25	79.06	64.00	156.65	-82.50	458.00	14	0	11
1999	103	44.34	19.24	63.93	-31.67	342.00	80	6	17
1994-1999	320	26.67	8.82	72.79	-82.50	546.50	205	17	98

Panel B
Market adjusted initial returns (MAIRs)

Prospectus year	n	Mean (%)	Median (%)	SD (%)	Min (%)	Max (%)	Positive^	Fair*	Negative#
1994	69	2.80	2.23	21.04	-41.28	66.05	38	0	31
1995	23	4.46	0.22	35.09	-32.21	141.06	13	0	10
1996	48	11.92	3.60	56.18	-34.68	363.26	27	0	21
1997	52	18.47	5.34	78.34	-34.02	545.64	32	0	20
1998	25	75.29	55.11	156.37	-102.34	458.61	14	0	11
1999	103	41.32	15.91	62.85	-28.75	332.32	79	0	24
1994-1999	320	24.90	7.15	71.99	-102.34	545.64	203	0	117

^ Positive records number of IPO firms whose initial returns are greater than zero. # Negative records number of IPO firms whose initial returns are less than zero. * Fair records number of IPO firms whose initial returns are equal to zero.

Raw initial return is measured by $$R_{i,t} = \frac{P_{i,1} - P_{i,0}}{P_{i,0}}$$

Market adjusted initial return is measured by $$R'_{i,t} = \frac{P_{i,1} - P_{i,0}}{P_{i,0}} - \frac{M_{i,1} - M_{i,0}}{M_{i,0}}$$

where $R_{i,t}$ = Raw initial return of company i on the day of initial listing; $P_{i,1}$ = Closing price of company i on the first trading day; $P_{i,0}$ = IPO offer price as per prospectus of company i; $R'_{i,t}$ = Market adjusted initial return of company i on the day of initial listing; $M_{i,1}$ = ASX All Ordinaries Accumulation Index on the first trading day of company i; $M_{i,0}$ = ASX All Ordinaries Accumulation Index at the prospectus date of company i.

Table 2. Summary statistics of post-IPO long-run performance

Event-windows		Raw BHRs	E Decile Adj R	V Decile Adj R	E Mkt Return	V Mkt Return	Sample No
[+1,+12]	Mean	-4.58%	-0.88%	-0.50%	-5.90%	-6.92%	314
	Median	-19.81%	-16.07%	-15.32%	-20.74%	-23.17%	
	Min	-94.86%	-96.95%	-96.25%	-105.11%	-95.82%	
	Max	871.55%	839.05%	837.57%	843.01%	867.98%	
	SD	82.24%	76.31%	76.02%	77.84%	81.37%	
	No of control portfolios with a higher mean return	*593*	*543*	*544*	*564*	*593*	
[+1,+24]	Mean	-8.66%	-11.56%	-11.11%	-15.23%	-13.98%	301
	Median	-37.88%	-40.34%	-36.38%	-43.44%	-44.03%	
	Min	-98.90%	-221.57%	-220.32%	-126.64%	-102.48%	
	Max	880.01%	856.66%	852.64%	847.64%	873.55%	
	SD	105.07%	102.95%	102.90%	101.40%	104.58%	
	No of control portfolios with a higher mean return	*988*	*979*	*980*	*983*	*988*	
[+1,+36]	Mean	10.81%	3.98%	4.69%	0.99%	2.67%	292
	Median	-49.13%	-50.14%	-49.30%	-57.09%	-57.49%	
	Min	-99.70%	-170.73%	-160.93%	-127.18%	-121.95%	
	Max	2209.61%	2197.47%	2200.42%	2200.61%	2203.32%	
	SD	220.64%	217.44%	217.28%	218.61%	219.50%	
	No of control portfolios with a higher mean return	*284*	*269*	*269*	*277*	*284*	
[+1,+48]	Mean	17.49%	8.24%	9.57%	4.69%	4.79%	242[#]
	Median	-50.26%	-52.22%	-50.40%	-59.55%	-62.63%	
	Min	-99.20%	-164.58%	-165.94%	-132.52%	-116.99%	
	Max	2926.89%	2911.63%	2915.62%	2912.39%	2905.98%	
	SD	253.48%	251.48%	251.66%	252.58%	252.54%	
	No of control portfolios with a higher mean return	*193*	*187*	*187*	*191*	*193*	
[+1,+60]	Mean	29.86%	20.71%	22.48%	15.19%	10.17%	175*
	Median	-47.77%	-51.82%	-49.57%	-64.28%	-68.45%	
	Min	-98.60%	-173.37%	-155.29%	-136.82%	-125.85%	
	Max	1994.06%	1970.45%	1968.45%	1981.48%	1969.12%	
	SD	273.16%	270.09%	270.24%	272.54%	272.31%	
	No of control portfolios with a higher mean return	*80*	*74*	*74*	*79*	*80*	

The event-windows are defined in months relative to the listing month. ***Raw BHRs*** (buy-and-hold returns) is the BHRs to sample IPO firms. ***E Decile Adj R*** is the equal-weighted decile adjusted returns, which is defined as the difference between BHRs to sample IPO firms and BHRs to the decile to which sample firms belong. ***V Decile Adj R*** is the value-weighted decile adjusted returns. ***E Mkt Return*** is the equal-weighted market adjusted return, which is the Raw BHRs adjusted for returns to the market portfolio. The market portfolio is defined to include all firms that have the share price available for calculating the BHRs over the given event-window. ***V Mkt Return*** is the value-weighted market adjusted return. ***Sample No*** shows the number of sample firms with the share price data available over the event-window. The number in bold italic below each return is the significance test, which shows the number of control portfolios, out of 1002, that have a return greater than the average return to sample IPO firms.

[#] Due to the finish date of the database at the time of data collection, IPO firms (38 firms) that were listed in and after December 1999 do not have the post-four year share price data. * The post-5 year share price data for IPO firms listed in and after December 1998 was not available at the time of data collection.

Table 3. Summary statistics of board characteristics

Panel A. Board size

Summary statistics:	1994	1995	1996	1997	1998	1999	1994-1999
Mean	5.06	5.87	4.67	5.02	5.88	5.20	5.17
Median	5.00	5.00	4.00	5.00	5.00	5.00	5
Mode	5	5	4	5	4	4	5
Minimum	3	3	3	3	4	3	3
Maximum	9	14	10	11	12	9	14
Standard Deviation	1.5	2.6	1.3	1.5	2.0	1.4	1.6

Board size is measured by the total number of directors on the board.

Panel B. Role of chairperson

Leadership structure	1994		1995		1996		1997		1998		1999		1994-1999	
	No. of firms	%	No. of firms	%	No. of firms	%	No. of firms	%	No. of firms	%	No. of firms	%	No. of firms	%
Unitary leadership	4	6	3	14	6	13	5	10	5	20	10	10	33	10
Dual leadership	65	94	19	86	42	88	47	90	20	80	93	90	286	90
Total	69	100	22*	100	48	100	52	100	25	100	103	100	319	100

Unitary leadership is where the same person holds the positions of the chairperson and CEO; dual leadership is where different people perform the roles of chairperson and CEO. * The total number of firms in 1995 for this analysis is reduced by one because Leo Shield Exploration NL has joint chairpersons, one being executive and the other being non-executive. Therefore, it cannot be classified as either unitary or dual leadership.

Panel C. Independence of chairperson

Number and proportion of chairpersons holding …	1994		1995		1996		1997		1998		1999		1994-1999	
	No. of firms	%	No. of firms	%	No. of firms	%	No. of firms	%	No. of firms	%	No. of firms	%	No. of firms	%
Independent directorship	30	43%	10	45%	24	50%	29	56%	17	68%	58	56%	168	53%
Grey directorship	29	42%	7	32%	15	31%	16	31%	3	12%	28	27%	98	31%
Non-exe directorship	59	86%	17	77%	39	81%	45	87%	20	80%	86	83%	266	83%
Executive directorship	10	14%	5	23%	9	19%	7	13%	5	20%	17	17%	53	17%
Total	69	100%	22*	100%	48	100%	52	100%	25	100%	103	100%	319	100%

An independent director is a director who is not a current or past employee of the corporation, does not have substantial business or family ties with management, nor does he/she have potential business ties with the firm. A grey director is a director who is either a former employee of the firm or is affiliated with managers through current or potential future business or family ties (e.g. employees of banks, law and consulting firms). An executive director refers to a director who is a full-time employee of the firm.
* The total number of firms in 1995 for this analysis is reduced by one because Leo Shield Exploration NL has joint chairpersons, one being executive and the other being non-executive.

Panel D. Proportion of independent directors on the board

Summary statistics:	1994	1995	1996	1997	1998	1999	1994-1999
Mean	31.25%	33.62%	26.15%	34.51%	30.59%	37.05%	33.00%
Median	33.33%	33.33%	25.00%	33.33%	28.57%	33.33%	33.33%
Minimum	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Maximum	80.00%	66.67%	75.00%	90.91%	60.00%	87.50%	90.91%
Standard Deviation	20.46%	16.31%	21.60%	25.53%	17.39%	20.78%	21.34%

An independent director is a director who is not a current or past employee of the corporation, does not have substantial business or family ties with management, nor does he/she have potential business ties with the firm.

Panel E. Director ownership

Summary statistics:	1994	1995	1996	1997	1998	1999	1994-1999
Mean	19.24%	15.37%	15.37%	23.41%	33.83%	34.46%	26.72%
Median	17.11%	3.16%	23.03%	19.75%	36.16%	36.46%	23.09%
Minimum	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Maximum	66.00%	76.33%	76.33%	99.50%	70.42%	84.96%	99.50%
Standard Deviation	19.65%	22.32%	22.32%	24.10%	23.61%	24.40%	23.50%

* Director ownership is measured by the total number of shares held directly, indirectly, or beneficially by directors and/or director-related entities as a proportion of total shares outstanding at the time of IPO as disclosed in prospectuses.
** The total number of IPO firms for this analysis is reduced in some sample years (1994 by 4 firms, 1996 by 1 firm and 1999 by 1 firm) because directors' shareholdings were not disclosed in these firms' prospectuses.

Table 4. Number and percentage of firms with board size greater and smaller than the median board size of five by industry groups

		Larger board		Smaller board		Firm characteristics at IPO			
ASX Sector	No. of firms in the industry	No. of firms with board size > 5 members	% of firms with board size > 5 members	No. of firms with board size < 5 members	% of firms with board size < 5 members	Average operating history	Median operating history	Average firm size ($m)	Median firm size ($m)
01 Gold	27	0	0.0%	21	17.5%	2.7	1.0	1.8	0.5
02 Other Metals	23	4	3.7%	16	13.3%	4.0	1.0	4.6	0.7
03 Diversified Resources	2	1	0.9%	1	0.8%	7.5	7.5	8.2	8.2
04 Energy	17	3	2.8%	9	7.5%	3.6	2.0	5.1	0.7
05 Infrastructure & Utilities	4	1	0.9%	1	0.8%	2.5	1.5	59.7	4.1
06 Developers & Contractors	8	3	2.8%	2	1.7%	10.3	7.0	87.3	30.8
07 Building Materials	3	1	0.9%	0	0.0%	14.3	11.0	51.0	51.0
08 Alcohol & Tobacco	6	2	1.8%	2	1.7%	9.7	7.0	37.0	28.3
09 Food & Household Goods	6	3	2.8%	1	0.8%	8.3	11.5	23.1	20.9
10 Chemicals	1	0	0.0%	0	0.0%	34.0	34.0	61.7	61.7
11 Engineering	5	1	0.9%	0	0.0%	13.4	8.0	42.4	39.2
12 Paper & Packaging	1	0	0.0%	1	0.8%	4.0	4.0	NA	NA
13 Retail	18	12	11.0%	2	1.7%	9.2	5.0	104.7	17.3
14 Transport	5	3	2.8%	0	0.0%	15.8	1.0	2,176.4	138.7
15 Media	21	11	10.1%	3	2.5%	5.3	1.0	66.7	7.1
16 Banks & Finance	2	2	1.8%	0	0.0%	8.0	8.0	5,056.5	5,056.5
17 Insurance	2	2	1.8%	0	0.0%	41.0	41.0	1,401.8	1,401.8
18 Telecommunications	34	13	11.9%	8	6.7%	7.0	2.0	1,086.9	6.4
19 Investment & Financial Services	22	7	6.4%	10	8.3%	3.9	1.5	29.5	6.5
20 Property Trusts	0	0	0.0%	0	0.0%				
21 Healthcare & Biotechnology	25	12	11.0%	9	7.5%	5.8	4.0	56.0	5.8
22 Miscellaneous Industries	75	20	18.3%	33	27.5%	7.7	3.0	11.7	7.0
23 Diversified Industrials	0	0	0.0%	0	0.0%				
24 Tourism & Leisure	13	8	7.3%	1	0.8%	4.1	2.0	91.2	20.9
Average / Total	320	109	100%	120	100%	6.7	2.0	227.8	5.8

Board size is measured by the total number of directors on the board. **Operating history** is measured by the number of years the IPO firm has been incorporated prior to the IPO. **Firm size** is measured by total assets at the prospectus date. **NA** means the information is not available in the prospectuses.

Table 5. Descriptive statistics and univariate tests of differences in board and firm characteristics between firms with larger boards and firms with smaller boards

			Board characteristics					Firm characteristics		
		n	Board Size	Dual Leadership	% of Indep Dir	% of Exe Dir	DIRs' interests	Operating History	Firm Size	1st Yr Revenue
IPO firms with ….				(No. of firms)				(Years)	($m)	($m)
Larger board	mean	109	6.90	96	0.365	0.353	0.27	8.89	612.55	412.55
	median		6.00		0.333	0.333	0.22	4.50	19.25	43.65
Smaller board	mean	120	3.73	104	0.281	0.415	0.25	4.34	6.05	13.35
	median		4.00		0.250	0.417	0.22	1.00	1.49	0.46
Total		229								
Wilcoxon Rank-Sum Test between firms with a larger board and firms with a smaller board										
Z			13.592		3.027	-2.255	0.156	3.748	7.635	7.980
Sig.			0.000		0.002	0.024	0.876	0.000	0.000	0.000
			***		***	**		***	***	***

Larger board means that the board size is greater than the median of five members; **smaller board** means that the board size is smaller than the median of five members. **Board size** is measured by the total number of directors on the board. **Dual leadership** is when different people hold the positions of chairperson and CEO. **% of Indep Dir** measures the percentage of independent directors on the board. **% of Exe Dir** measures the percentage of executive directors on the board. **DIR's interests** is measured by the total number of shares held directly, indirectly, or beneficially by directors and/or director-related entities as a proportion of total shares outstanding at the time of IPO. **Operating History** is measured by the number of years the IPO firm has been incorporated prior to the IPO. **Firm size** is measured by total assets an

issuing firm has immediately prior to the IPO. **1st Yr Revenue** is measured by the total revenue (excluding interest revenue) in the first year following listing.
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 6. Univariate tests of differences in board structures and firm characteristics between firms with positive and negative market adjusted initial returns

	N	Uprice	BSize	IndepDir	DirOwn	OpHist	FSize $m	OfferSize $m	TDelay
Positive initial return	203								
Mean		0.494	5.158	0.322	0.291	7.094	132.431	39.607	56.187
Median		0.207	5.000	0.333	0.250	3.000	7.025	8.000	50.000
Negative initial return	117								
Mean		-0.177	5.188	0.343	0.225	5.931	407.481[a]	181.022[b]	68.231
Median		-0.113	5.000	0.333	0.204	2.000	3.200	8.000	55.000
Sample differences									
Wilcoxon Z		14.899	-0.278	-0.856	1.945	1.002	1.872	-0.018	-2.468
Asymp. Sig.		(0.000)	(0.781)	(0.292)	(0.052)	(0.216)	(0.061)	(0.985)	(0.001)
		***			*		*		***

*** Significant at 1% level (2-tailed). * Significant at 10% level.
Uprice is measured by market adjusted initial returns; that is, the raw initial returns adjusted for returns to the ASX All Ordinaries Accumulation Index. **BSize** is measured by the total number of directors on the board. **IndepDir** measures the percentage of independent directors on the board. **DirOwn** is the director ownership, measured by the total number of shares (excluding options) held directly, indirectly, or beneficially by directors and/or director-related entities as a proportion of total shares outstanding at the time of IPO. **OpHist** is measured by the number of years the IPO firm has been incorporated prior to the IPO. **FSize** is measured by the total assets an issuing firm has immediately prior to the IPO. **OfferSize** is measured by the product of offer price and total number of shares offered in the prospectus. **TDelay** measures the number of days from the date the prospectus was lodged with ASX to the listing date. Sample differences are tested using Wilcoxon Rank-Sum Test for any significant differences between median values.
[a] The average firm size falls to $136.731 million after excluding Telstra Corporation Limited.
[b] The average offer size falls to $60.572 million after excluding Telstra Corporation Limited.

Table 7. Pooled OLS regression of initial board structures and IPO firm characteristics on the level of IPO underpricing

		Models					
Variable	Exp sign	1	2	3	4	5	6
Op history	–	0.001	0.000	0.000		0.000	0.000
		(0.339)	(0.144)	(0.144)		(0.016)	(0.230)
Firm size (ln)	–	0.000	-0.005	-0.004	-0.004		-0.003
		(0.030)	(-0.346)	(-0.286)	(-0.337)		(-0.205)
Offer size (ln)	–	-0.042 *	-0.044	-0.042	-0.044	-0.048 *	-0.031
		(-1.830)	(-1.622)	(-1.557)	(-1.632)	(-1.730)	(-1.211)
Time delay	–	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
		(-0.636)	(-0.545)	(-0.576)	(-0.544)	(-0.532)	(-0.525)
Tech industry	+	0.207 ***	0.197 ***	0.204 ***	0.197 ***	0.197 ***	0.198 ***
		(2.868)	(2.707)	(2.804)	(2.715)	(2.716)	(2.716)
Board size	–		0.020	0.021	0.020	0.019	
			(0.856)	(0.861)	(0.864)	(0.853)	
Leadership	–		-0.038	-0.032	-0.038	-0.039	-0.035
			(-0.368)	(-0.310)	(-0.373)	(-0.376)	(-0.348)
Indep Dir	–		0.020	0.024	0.020	0.019	0.026
			(0.182)	(0.218)	(0.185)	(0.176)	(0.242)
Dir own	–		0.167	0.440	0.167	0.161	0.186
			(1.475)	(1.297)	(1.476)	(1.449)	(1.590)
Dir own squared				-0.399			
				(-0.919)			

Table 7 continued

Constant	0.856	**	0.839	*	0.765	*	0.830	*	0.840	*	0.694	*
	(2.291)		(1.871)		(1.668)		(1.928)		(1.866)		(1.679)	
Adjusted R^2	0.044		0.042		0.041		0.046		0.046		0.043	
F-stat	3.433	***	2.285	**	2.115	**	2.580	**	2.563	**	2.471	**
N=263#												

The dependent variable is the **IPO underpricing** measured by market adjusted initial returns; that is, the raw initial returns adjusted for returns to the ASX All Ordinaries Accumulation Index. **Op history** is measured by the number of years the IPO firm has been incorporated prior to the IPO. **Firm size** is measured by the natural logarithm of total assets an issuing firm has immediately prior to the IPO. **Offer size** is measured by the natural log of the product of offer price and total number of shares offered in the prospectus. **Time delay** measures the number of days from the date the prospectus was lodged with ASX and the listing date. **Tech industry** is coded as 1 if the IPO firm belongs to one of the high-tech industries and 0 otherwise. **Board size** is measured by the total number of directors on the board. **Leadership** is coded as 1 if different people hold the positions of chairperson and CEO and 0 otherwise. **Indep Dir** measures the percentage of independent directors on the board. **Dir own** is measured by the total number of shares (excluding options) held directly, indirectly, or beneficially by directors and/or director-related entities as a proportion of total shares outstanding at the time of IPO. **Dir own squared** is the square of director ownership.

*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level. Numbers in parentheses are *t*-statistics. The analysis uses heteroscedasticity-consistent covariance matrix.

Ten firms have market adjusted initial returns that is greater than three standard deviation from the mean; therefore they are considered as outliers and removed from the analysis. 47 firms are also excluded from the analysis because they have missing board or firm characteristic information.

Table 8. Univariate tests of differences in board structures and firm characteristics between firms with positive and negative long-run returns

Panel A: [+1,+36]	N	DecAdjR	BSize	IndepDir	DirOwn	Uprice	OpHist	FSize $m	OfferSize $m	TDelay
Positive LR return	61									
Mean		2.187	5.590	0.306	0.278	0.209	8.590	668.086	271.006	57.689
Median		0.683	5.000	0.286	0.224	0.070	4.000	9.249	8.632	51.000
Negative LR return	185									
Mean		-0.649	5.108	0.329	0.271	0.292	5.951	78.744	43.286	58.654
Median		-0.687	5.000	0.333	0.229	0.093	2.000	3.497	7.650	0.000
Sample differences										
Wilcoxon Z		11.707	2.259	-1.005	-0.122	-0.601	1.267	2.266	0.728	0.062
Asymp. Sig.		(0.000)	(0.024)	(0.215)	(0.894)	(0.548)	(0.205)	(0.018)	(0.461)	(0.950)
		***	**					**		

Panel B: [+1,+48]	N	DecAdjR	BSize	IndepDir	DirOwn	Uprice	OpHist	FSize $m	OfferSize $m	TDelay
Positive LR return	47									
Mean		2.699	5.979	0.346	0.258	0.070	11.660	1041.655	376.203	51.362
Median		0.996	5.000	0.333	0.219	0.027	5.000	9.249	10.000	50.000
Negative LR return	156									
Mean		-0.676	5.019	0.333	0.265	0.252	5.535	38.159	39.265	62.500
Median		-0.685	5.000	0.333	0.224	0.075	2.000	5.168	7.890	52.000
Sample differences										
Wilcoxon Z		10.284	2.087	-0.955	-0.551	-1.054	2.274	2.122	1.272	-1.784
Asymp. Sig.		(0.000)	(0.002)	(0.229)	(0.582)	(0.292)	(0.018)	(0.024)	(0.170)	(0.074)
		***	***				**	**		*

*** Significant at 1% level (2-tailed). ** Significant at 5% level. * Significant at 10% level.

Panel A divides sample firms into two groups based on (equal-weighted) decile adjusted returns (denoted as **DecAdjR**) over the even-window [+1,+36]. **Panel B** divides sample firms into two groups based on (equal-weighted) decile adjusted returns over the even-window [+1,+48]. **BSize** is measured by the total number of directors on the board. **IndepDir** measures the percentage of independent directors on the board. **DirOwn** is the director ownership, measured by the total number of shares (excluding options) held directly, indirectly, or beneficially by directors and/or director-related entities as a proportion of total shares outstanding at the time of IPO. **Uprice** is the market adjusted initial returns; that is, the raw initial returns adjusted for returns to the ASX All Ordinaries Accumulation Index. **OpHist** is measured by the number of years the IPO firm has been incorporated prior to the IPO. **FSize** is measured by the total assets an issuing firm has immediately prior to the IPO. **OfferSize** is measured by the product of offer price and total number of shares offered in the prospectus. **TDelay** measures the number of days from the date the prospectus was lodged with ASX to the listing date. Sample differences are tested using Wilcoxon Rank-Sum Test for any significant differences between median values.

Table 9. Pooled OLS regression of initial board structures and IPO firm characteristics on post-IPO long-run performance

Panel A: Dependent variable: (equal-weighted) decile adjusted returns

		[+1,+36]					[+1,+48]				
Variable	Exp sign	1	2	3	4	5	6	7	8	9	10
BSize	+	0.097 **	0.100 **	0.108 **		0.097 **	0.185 ***	0.189 ***	0.186 ***		0.184 ***
		(2.120)	(2.162)	(2.240)		(2.114)	(2.766)	(2.822)	(2.808)		(2.727)
Leader	+	-0.195	-0.199	-0.165	-0.194	-0.192	0.310	0.309	0.312	0.327	0.312
		(-0.607)	(-0.611)	(-0.512)	(-0.596)	(-0.603)	(1.316)	(1.313)	(1.333)	(1.329)	(1.338)
IndepDir	+	-0.293	-0.289	-0.302	-0.255	-0.307	-0.323	-0.324	-0.323	-0.244	-0.330
		(-0.920)	(-0.914)	(-0.930)	(-0.798)	(-0.962)	(-0.820)	(-0.822)	(-0.818)	(-0.606)	(-0.838)
DirOwn	+	0.107	0.097	0.193	0.195	0.120	0.214	0.199	0.222	0.358	0.209
		(0.358)	(0.325)	(0.680)	(0.659)	(0.394)	(0.479)	(0.448)	(0.510)	(0.755)	(0.466)
Uprice	–	-0.150 *	-0.151 *	-0.151 *	-0.144	-0.307	-0.143	-0.144	-0.143	-0.115	-0.258
		(-1.693)	(-1.697)	(-1.706)	(-1.593)	(-1.037)	(-1.514)	(-1.519)	(-1.499)	(-1.207)	(-0.778)
Uprice2	Non-linear					0.059					0.041
						(0.704)					(0.454)

Table 9 continued

N	F-stat	Adj R^2		Constant		Tech		TDelay		LnOffer		LnFSize		OpHist
						–		–		+		+		+
241	1.447	0.018	(0.762)	0.945	(0.161)	0.028	(-1.765)	-0.004 *	(-1.403)	-0.116	(1.391)	0.045	(0.654)	0.003
241	1.586	0.022	(0.709)	0.813	(0.193)	0.034	(-1.746)	-0.004 *	(-1.369)	-0.111	(1.553)	0.048		
241	1.390	0.014	(0.726)	0.902	(0.084)	0.014	(-1.764)	-0.004 *	(-1.047)	-0.079			(1.100)	0.005
241	1.263	0.010	(0.247)	0.273	(0.164)	0.029	(-1.700)	-0.004 *	(-0.807)	-0.055	(1.624)	0.053	(0.951)	0.005
241	1.383	0.017	(0.810)	1.001	(0.273)	0.046	(-1.676)	-0.004 *	(-1.438)	-0.119	(1.392)	0.045	(0.692)	0.004
200	1.596	0.029	(0.818)	1.039	(-1.561)	-0.304	(-2.209)	-0.005 **	(-1.544)	-0.127	(0.103)	0.004	(0.484)	0.003
200	1.770 *	0.034	(0.769)	0.919	(-1.530)	-0.298	(-2.203)	-0.005 **	(-1.513)	-0.123	(0.195)	0.007		
200	1.782 *	0.034	(0.810)	1.034	(-1.564)	-0.305	(-2.203)	-0.005 **	(-1.516)	-0.124			(0.548)	0.003
200	1.055	0.003	(-0.192)	-0.230	(-1.385)	-0.278	(-2.221)	-0.005 **	(-0.133)	-0.009	(0.494)	0.017	(1.030)	0.006
200	1.463	0.025	(0.834)	1.064	(-1.397)	-0.282	(-2.139)	-0.005 **	(-1.559)	-0.129	(0.129)	0.004	(0.491)	0.003

Panel B: Dependent variable: (equal-weighted) market adjusted returns

Variable	Exp sign	[+1,+36] 1	2	3	4	5	[+1,+48] 6	7	8	9	10
BSize	+	0.096 **	0.099 **	0.105 **		0.096 **	0.182 ***	0.189 ***	0.182 ***		0.180 ***
		(2.057)	(2.095)	(2.130)		(2.054)	(2.686)	(2.772)	(2.723)		(2.638)
Leader	+	-0.174	-0.177	-0.150	-0.172	-0.170	0.330	0.329	0.329	0.347	0.333
		(-0.544)	(-0.548)	(-0.466)	(-0.534)	(-0.539)	(1.299)	(1.294)	(1.299)	(1.334)	(1.326)
depDir	+	-0.348	-0.344	-0.355	-0.310	-0.363	-0.364	-0.365	-0.365	-0.287	-0.376
		(-1.072)	(-1.067)	(-1.078)	(-0.951)	(-1.117)	(-0.912)	(-0.918)	(-0.912)	(-0.701)	(-0.939)
DirOwn	+	0.030	0.019	0.097	0.116	0.044	0.184	0.159	0.181	0.325	0.176
		(0.098)	(0.064)	(0.340)	(0.390)	(0.144)	(0.412)	(0.358)	(0.416)	(0.689)	(0.393)
Uprice	–	-0.179 **	-0.180 **	-0.180 **	-0.173 *	-0.355	-0.192 *	-0.193 *	-0.192 *	-0.165 *	-0.367
		(-2.001)	(-2.003)	(-2.015)	(-1.905)	(-1.171)	(-1.925)	(-1.930)	(-1.906)	(-1.657)	(-1.072)
Uprice2	Non-linear					0.066					0.062
						(0.766)					(0.672)
OpHist	+	0.003		0.005	0.005	0.003	0.005		0.005	0.008	0.005
		(0.651)		(1.020)	(0.940)	(0.693)	(0.802)		(0.859)	(1.316)	(0.810)
nFSize	+	0.035	0.038		0.043	0.035	-0.002	0.003		0.012	0.000
		(0.995)	(1.123)		(1.229)	(1.002)	(-0.039)	(0.091)		(0.308)	(-0.006)

Table 9 continued

LnOffer	+	-0.107		-0.102		-0.077		-0.046		-0.109		-0.124		-0.116		-0.125		-0.008		-0.126	
		(-1.249)		(-1.216)		(-1.012)		(-0.651)		(-1.286)		(-1.468)		(-1.394)		(-1.489)		(-0.110)		(-1.487)	
TDelay	–	-0.004	*	-0.004	*	-0.004	*	-0.004	*	-0.004	*	-0.005	**	-0.004	**	-0.005	**	-0.005	**	-0.005	**
		(-1.857)		(-1.834)		(-1.868)		(-1.787)		(-1.759)		(-2.259)		(-2.225)		(-2.244)		(-2.273)		(-2.202)	
Tech	–	0.026		0.032		0.015		0.027		0.046		-0.290		-0.280		-0.289		-0.264		-0.257	
		(0.148)		(0.178)		(0.087)		(0.151)		(0.271)		(-1.431)		(-1.377)		(-1.409)		(-1.269)		(-1.220)	
onstant		0.939		0.812		0.905		0.274		1.002		1.025		0.822		1.027		-0.221		1.064	
		(0.752)		(0.705)		(0.724)		(0.247)		(0.806)		(0.781)		(0.666)		(0.777)		(-0.180)		(0.806)	
	Adj R^2	0.015		0.018		0.014		0.006		0.014		0.030		0.033		0.035		0.005		0.027	
	F-stat	1.354		1.485		1.374		1.172		1.316		1.610		1.761	*	1.798	*	1.115		1.498	
	N	241		241		241		241		241		200		200		200		200		200	

Models 1-5 use decile (or market) adjusted return over the event-window [+1,+36] as the dependent variable, and Models 6-10 use the decile (or market) adjusted return over the event-window [+1,+48] as the dependent variable. **BSize** measures the number of directors on the board. **Leader** is coded as 1 for dual leadership and 0 otherwise. **IndepDir** measures the percentage of independent directors on the board. **DirOwn** is the proportion of shares held directly, indirectly, or beneficially by directors and/or director-related entities at the time of IPO. **Uprice** is the market adjusted initial return. **Uprice2** is the square of underpricing. **OpHist** measures the number of years the IPO firm has been incorporated prior to the IPO. **LnFSize** is the natural log of total assets immediately prior to the IPO. **LnOffer** is the natural log of the product of offer price and total number of shares offered in the prospectus. **TDelay** measures the number of days from the prospectus date to the listing date. **Tech** is coded as 1 if the IPO firm belongs to high-tech industries and 0 otherwise. ***, **, and * indicate significance at 1%, 5% and 10% levels, respectively. Numbers in parentheses are the *t*-statistics, using heteroscedasticity-consistent covariance matrix.