

FAMILY OWNERSHIP, GOVERNANCE CHOICES AND POST-IPO PERFORMANCE

Bharat A. Jain*, Yingying Shao*

* Department of Finance, Towson University, Towson, MD 21252, USA

Abstract

How to cite this paper: Jain, B. A., & Shao Y. (2017). Family ownership, governance choices and post-ipo performance. *Corporate Ownership & Control*, 14(4-1), 216-226. doi:10.22495/cocv14i4c1art4

How to access this paper online:
<http://dx.doi.org/10.22495/cocv14i4c1art4>

Copyright © 2017 by Virtus Interpress
All rights reserved

The Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0) will be activated starting from July, 2018 followed by transfer of the copyright to the Authors

ISSN Online: 1810-3057
ISSN Print: 1727-9232

Received: 21.03.2017
Accepted: 29.05.2017

JEL Classification: G3
DOI: 10.22495/cocv14i4c1art4

The purpose of this study is to evaluate the extent governance choices at the time of going public differ for family versus non-family firms. In addition, the short and long-run performance of family and non-family firms after their initial public offering (IPO) is examined. The results indicate significant differences between family versus non-family firms on governance choices at the time of their IPO related to dual class structures, board composition, board size, and board leadership structure. Additionally, the results suggest that investors assign a lower valuation at IPO to family firms. Further, governance mechanism that strengthen family control differentially influence post-IPO underpricing. Finally, the results suggest that family firms underperform non-family firms in terms of long-run post-IPO investment performance.

Keywords: Family Firms, IPOs, Underpricing, Governance choices

1. INTRODUCTION

While there is an extensive and growing literature on the governance and performance of both private as well as established publicly traded family firms (Anderson and Reeb, 2003; Morck and Yeung, 2004; Villalonga and Amit, 2006; 2009), relatively less attention has focused on family firms that are transitioning from private to public ownership through an initial public offering (IPO). This study attempts fill this gap in the family firm literature by evaluating the governance choices of family firms at the time of going public and its impact on both short and long run investment performance after going public. Evaluating the effectiveness of alternative governance structures is particularly important around an IPO since it often represents the first time such firms are exposed to agency conflicts (Engel et al., 2002; Baker and Gompers, 2003; Gao and Jain 2011). While for established firms, adoption of governance mechanisms or governance changes are largely incremental and designed to deal with existing agency problems (Baker and Gompers, 2003), in the context of IPO firms, governance mechanisms are designed to balance the often-conflicting interests of pre-IPO owners and the new public shareholders. For instance, since the cost of poor governance choices

are imposed on existing shareholders, board structure is expected to be chosen optimally at the time of the IPO (Baker and Gompers, 2003). However, in the context of family owners, board structure may be designed to preserve the control benefits of family owners at the expense of minority shareholders.

As such, the IPO market provides an ideal setting to study differences in the choice of governance structure and contractual provisions of family firms versus non-family firms and its impact on subsequent performance. Drawing on agency, resource dependence, and behavioural theory, this study evaluates whether the governance choices of family firms at the time of going public are likely to differ from similar non-family firms. Focusing initially on agency considerations, in a typical corporation with diffused ownership, governance mechanisms are largely designed to address the potential conflicts of interests between managers and shareholders and to a lesser extent between shareholders and bondholders (Anderson and Reeb, 2003; Jain and Shao, 2014). In the context of family firms however, research suggests that management participation and access to control enhancing mechanisms has the potential to improve contracting efficiency between managers and shareholders as well as bondholders and

shareholders relative to non-family firms (Anderson and Reeb, 2003; Villalonga and Amit, 2009). On the other hand, family ownership can increase conflicts between family and minority shareholders (La Porta et al., 1999; Anderson and Reeb, 2003; Villalonga and Amit, 2006). For instance, minority shareholder wealth destruction can occur in family firms due to outright expropriation of firm resources and/or avoidance of risky but value enhancing corporate policy choices at the behest of underdiversified family owners whose economic interests are largely tied to the firm (La Porta et al., 1999; Anderson et al., 2012).

In addition to differences in the extent and sources of agency effects, research suggests that behavioural aspects such as socioemotional wealth considerations distinguish family firms from other organizational forms (Gomez-Mejia et al., 2007; 2011; Berrone et al., 2012). Drawing from behavioural agency theory, the concept of socioemotional wealth is based on the premise that family owners receive utility from the emotional and non-economic aspects of owning a business (Gomez-Mejia et al., 2007; Zellweger & Astrachan, 2008). Under the socio-emotional perspective, family owners consider the economic and socioemotional effects of alternative corporate policy choices and when in conflict, often pursue policies that preserve socioemotional wealth even at the expense of economic gains (Gomez-Mejia, et al., 2007, 2011; Berrone et al., 2012; Cennamo et al., 2012; Jain and Shao, 2014; 2015).

As such, due to differences in extent of agency effects and socioemotional wealth considerations, the central governance challenge facing family firms involves striking a balance between preserving the benefits of family participation in governance and management versus the potential costs such participation imposes on minority shareholders (Bennedson, et al., 2007). This would require family IPO firms to not only evaluate how alternative forms of control enhancing mechanisms benefit family owners but also their positive or negative impact on shareholder value. In the context of established firms, Villalonga and Amit (2009) find that family firms tend to adopt various forms of control enhancing mechanisms and that they differentially affect firm value. For instance, they find that adoption of dual class structures and disproportionate board representation negatively influences firm value. On the other hand, the use of pyramids and voting agreements positively influence firm values. It is however, an open question and therefore the focus of this study as to whether family firms adopt governance structures at IPO that primarily benefit family owners at the expense of minority shareholders as suggested by agency theory and socio-emotional considerations or alternatively optimally design governance structures that enhance value for all firm shareholders.

Specifically, this study focuses on three main research questions. First, it assesses whether there are significant differences in the choice of governance mechanisms and contractual provisions adopted at the time of going public by family firms

relative to similar non-family IPO firms. Second, the impact of various governance and control enhancing mechanisms on post-IPO underpricing is evaluated to assess how initial investor valuation is influenced by these choices. Finally, the long run post-IPO investment performance of family firms relative to non-family firms is evaluated after controlling for differences in governance and ownership characteristics.

The rest of the paper is organized as follows. In section 2, drawing from agency, resource dependence, and behavioural theory, hypotheses are developed on the link between family involvement and post-IPO governance choices as well as performance. In section 3, the sample description and definition of variables are provided. In section 4, the empirical findings are discussed. Finally, section 5 discusses the key findings and conclusions of the study.

2. THEORETICAL DISCUSSION AND HYPOTHESIS DEVELOPMENT

2.1. Governance Choices for Family Firms

In evaluating differences in governance structures of family versus non-family firms, the focus is primarily on choice of various board structure variables at the time of going public. Studies on the design and effectiveness of boards have largely focused on aspects such as CEO duality (single individual holding the CEO and Chairman position), board composition (proportion of inside versus outside directors), and board size (Daily and Dalton, 1993; Finkelstein and D'Aveni, 1994; Brickley et al., 1997; Beatty and Zajac, 1994; Baker and Gompers, 2003). Further, the corporate governance literature has largely argued that optimal board design requires striking a balance between emphasizing its monitoring role as advocated by agency theory versus its strategic and advising function as advocated by resource dependence theory (Shleifer and Vishny, 1997; Dalton et al., 1999). For instance, under the agency theory view, board independence is central to its ability to mitigate potential for managerial opportunism (Fama and Jensen, 1983; Shleifer and Vishny, 1997). Resource dependence theory on the other hand, suggests that boards should be constructed to capitalize on their ability to provide resources including skills, expertise, and linkage to other institutions (Dalton et al., 1999). Therefore, drawing from these two perspectives, a considerable body of research has focused on whether and how board structure variables such as CEO duality, board composition, and board size impact the effectiveness of the monitoring and advisory functions of the board.

The corporate governance literature has largely prescribed to the agency view, i.e., optimal board design involves enhancing its monitoring ability. Under the agency view, boards should be designed to enhance their independence and reduce concentration of power in the hands of the CEO. For instance, the agency theory perspective argues against combining the CEO and Chairman position since it reduces the ability of the board to

fulfil its monitoring role, enhances managerial entrenchment, and increases their ability to pursue opportunistic behaviour that may impair shareholder value (Hermalin and Weisbach, 1998; Beatty and Zajac, 1994). On the other hand, an alternative school of thought referred to as stewardship theory (which assumes managers identify with the firm and act as stewards of firm value), argues that combining the CEO and Chairman position can be beneficial since it results in unity of command and authoritative decision making which in turn can enhance firm performance (Donaldson and Davis, 1991; He 2008). In addition, CEO duality can be beneficial since it signals stability and strength of the firm's leadership to internal and external audiences, fosters stronger trust among organizational members, reduces conflict, and better clarifies decision-making authority (Daily and Dalton, 1993; Finkelstein and D'Aveni, 1994; Brickley, Coles, and Jarrell, 1997).

Similarly, on the one hand, the extensive corporate governance literature suggests that outsider dominated boards can alleviate agency costs and more effectively monitor and control management. Outside directors are more likely to be objective and independent and consequently better positioned to resist managerial opportunism (Kosnik, 1987). On the other hand, research suggests that insider dominated boards, while being less independent, may be better positioned to provide knowledgeable inputs, and strategic guidance and direction (Zahra, 1996). Further, inside directors are assumed to possess greater firm specific knowledge and are therefore better positioned to provide advice and expertise (Fama 1980; Fama and Jensen, 1983).

In the context of IPO firms however, there is an ongoing debate as to whether structuring the board to be independent and hence emphasize its monitoring function is more beneficial to shareholders relative to a design structure that facilitates its role as a provider of resources and advisory services (Kroll et al., 2007). Further, the value assigned to monitoring versus advisory functions of the board is likely to differ for family firms relative to similar non-family IPO firms. While board design that emphasizes its monitoring, function can help mitigate manager-shareholder conflicts as well as conflicts between family and minority shareholders (Anderson and Reeb 2004), family firms may derive greater benefits from boards that are designed to optimize their advisory function rather than monitoring. For instance, since the potential for manager-shareholder conflicts in family firms is likely to be lower, it reduces the benefits of emphasizing the monitoring function in board design. Similarly, since family owners have longer investment horizons, they are less likely to push for myopic investment decisions (Anderson et al., 2012) thereby aligning their interests with that of other shareholders. Further, since family owners may exert direct control or de facto control through the use of control enhancing mechanisms, board monitoring may not provide effective protection to minority shareholders.

On the other hand, the ability of boards to serve as resource providers may be more valuable in family firms relative to non-family firms. For instance, in order to protect socio-emotional wealth and ensure long-term survival of the firm, family owners are likely to seek directors who either have firm specific knowledge and can provide expertise and guidance on strategic planning and/or can provide linkages to suppliers, customers, providers of capital, and other such institutions. Finally, an important dimension of socio-emotional wealth is to preserve the firm for future generations (Gomez-Mejia et al., 2007). Therefore, family owners are likely to seek dominance over the board in order to be in a position to ensure that post-IPO policies that are high risk and endanger survival and/or lead to ownership dilution or change of control are not undertaken. The above discussion leads to the following two hypotheses:

Hypothesis 1. Family Firms are more likely to go public with the CEO and Chairman position occupied by the same individual.

Hypothesis 2. Family IPO firms are more likely to go public with a lower proportion of outside directors on their board.

Similarly, research points to the positive as well as negative aspects of board size. On the one hand, research suggests that larger boards are better positioned to provide expertise, knowledge, resources, and strategic advice (Dalton et al., 1999; Zahra, 1994). Further, resource dependence theory suggests that increasing board size helps firms obtain critical resources as well as prestige and legitimacy. On the other hand, larger boards are more difficult to coordinate, less cohesive, more prone to conflict, less likely to become involved in strategic decision-making, and easier for CEOs to control (Jensen, 1993; Yermack, 1996). Overall, research suggests that while larger boards are less effective in providing monitoring services, they are better equipped to provide access to resources. As argued earlier, family firms are more likely to value the board's ability to provide resources over its monitoring function.

Hypothesis 3. Family firms are more likely to go public with a larger board size compared to non-family firms.

2.2. Family Firms and Post-IPO Performance

In the discussion below, the potential impact of family ownership on both short and long run post-IPO performance is evaluated. Consistent with the IPO literature, short run post-IPO performance is evaluated by using the underpricing on the first day of trading as the performance metric. Since underpricing represents a wealth transfer from pre-IPO shareholders to new shareholders, there are two interpretations of its economic significance in the extant literature. On the one hand, viewed from the pre-IPO shareholders' perspective, it effectively represents "money left on the table" (Loughran and Ritter, 2002). Under this view, pre-IPO owners are willing to bear the cost of underpricing since it is expected to be offset by certain economic benefits after going public. On the other hand, it can be viewed as the initial valuation

assigned to the firm by investors based on their evaluation of the future prospects of the firm. Drawing from these two perspectives, several studies in the extant literature have attempted to document the extent of underpricing and seek equilibrium explanations for its persistence. For instance, alternative theories of underpricing include signaling (Allen and Faulhaber, 1989), avoidance of legal liability (Lowry and Shu, 2002), ownership dispersion (Booth and Chua, 1996; Brennan and Franks, 1997), information cascades (Welch 1992), winners curse (Rock, 1985), and prospect theory (Loughran and Ritter, 2002).

In the context of family firms, drawing from the above literature, arguments exist to support both a positive and negative relationship between family ownership and post-IPO underpricing. On the one hand, family firms may be willing to bear the cost of underpricing if it helps preservation of socioemotional wealth. For instance, reducing post-IPO litigation risk, achieving higher post-IPO ownership dispersion, and maintaining family influence and reputation are all aspects that tend to enhance socio-emotional wealth. As such, family firms may be more willing than non-family firms to incur the cost of underpricing in order to reduce litigation risk and costs (Lowry and Shu, 2002), reduce post-IPO ownership concentration (Brennan and Franks, 1997), signal quality (Allen and Faulhaber, 1989), or generate interest in the offering (Welch, 1992).

Hypothesis 4. Post-IPO underpricing is higher for family firms compared to non-family firms.

On the other hand, since underpricing represents a wealth transfer from family owners to new shareholders, family firms may be less willing to bear the cost of underpricing in order to signal quality, increase investor interest, or increase ownership dispersion. Similarly, post-IPO investors may be concerned regarding the potential for family owners to influence corporate policy choices that enhance their socio-emotional wealth but adversely affect the economic interests of other shareholders. For instance, underdiversified, risk averse family owners may be willing to forego risky but potentially value enhancing projects that are preferred by well diversified minority shareholders. Similarly, reluctance to raise equity after the IPO to avoid ownership dilution (Jain and Shao, 2015) may constrain firm growth. Finally, the weaker board monitoring capability in family firms may also adversely affect initial investor valuation. For all the above reasons, investors may assign a lower initial valuation to family IPO firms relative to similar non-family firms.

Hypothesis 4 A. Post-IPO underpricing is lower in family firms relative to non-family firms.

In addition to short-term underpricing, the impact of family ownership on the long-term investment performance of IPO firms is evaluated. Extant research has been ambiguous in terms of whether family involvement positively or negatively influences firm performance. For instance, family ownership and control in publicly traded U.S. firms is perceived to be less efficient and profitable ownership structure relative to dispersed ownership firms (Anderson and Reeb, 2003). The

combination of ownership and access to control enhancing devices allow family firms to extract private rents and non-pecuniary benefits thereby draining resources from value enhancing projects (Fama and Jensen, 1983; Schleifer and Vishny, 1997; Anderson and Reeb, 2003). Further, family firms often limit executive management positions to family members limiting the pool from which to draw talented executives potentially leading to a competitive disadvantage (Anderson and Reeb, 2003). Finally, risky long term investments with distant payoffs may be viewed as a threat to socio-emotional wealth (Gomez-Mejia et al., 2011). Consequently, family ownership could result in underinvestment subsequent to the IPO, due to avoidance of risky but value enhancing projects. As such, for the above described reasons, family firms may be expected to underperform their non-family counterparts in terms of post-IPO investment performance.

Hypothesis 5. Family IPO firms underperform relative to non-family IPO firms in terms of long-run post-IPO investment performance.

However, the extant literature also promotes an alternative viewpoint arguing that combining ownership and control can be advantageous and lead to superior performance (Anderson and Reeb, 2003). For instance, the family's historical presence, large equity ownership, and control of management and director positions provides them with the opportunity to exert significant influence and control (Anderson and Reeb, 2003; Villalonga and Amit, 2006). Additionally, the longer investment horizons of family firms can mitigate potential for myopic investment decisions and increases investment efficiency (Stein 1989). Further, due to management participation, agency conflicts are lower in family firms which in turn can result in more efficient investment and financing decisions.

Hypothesis 5 A. Family IPO firms have higher post-IPO investment performance relative to non-family firms.

3. DATA DESCRIPTION AND METHODOLOGY

3.1. Sample Description

Initially, all firms that issued initial public offerings during the period 1997-2000 are identified from the Securities Data Corporation (SDC) New Issues Database. The sample firms are tracked for a ten-year period after going public, i.e., until year 2010 on CRSP and Compustat to evaluate their post-IPO performance. Consistent with extant IPO literature, foreign issuers, unit offerings, reverse LBOs, equity carveouts, real estate investment trusts, financial firms, issues raising less than \$5 million, and offering priced less than \$5 per share are excluded. Next, the sample is confined to firms that are less than 15 years old at the time of the IPO to keep the focus on relatively young firms that go public. Finally, to ensure information on family involvement and ownership data, only firms whose IPO prospectuses are available from the SEC's EDGAR database are retained. As a result of the above restrictions, the final sample consists of 857 IPO firms.

Next, the sample firms are segmented into family and non-family firm sub-samples. There is however, no universally accepted definition of family firms in the extant literature. Therefore, the family firm literature has used a variety of approaches to classify firms as family versus non-family (Miller et al., 2007). For instance, researchers have used ownership thresholds ranging from 5% to 50% to define family firms (La Porta et al., 1999; Gomez-Mejia et al., 2011). In line with the extant literature on U.S. publicly traded family firms (Anderson and Reeb, 2003; Villalonga and Amit, 2006; 2009), firms are classified as family firms if either the founder has controlling ownership and/or if two or more individuals related by blood or marriage and with a combined ownership of more than five percent are involved in managing the firm or serving on the board. On the basis of this definition of family firms, 119 of the 857 sample firms are classified as family owned and the remaining 738 firms are classified as non-family IPO firms. The main variable of interest is Family which is a dichotomous variable that takes the value of 1 if the IPO firm is a family firm and zero otherwise.

3.2. Variable Selection

In this section, the main variables of interest and their measurement are described. Specifically, the various governance structure, post-IPO performance, and control variables are described below.

3.2.1. Board Structure Variables

Focusing initially on board characteristics, the three variables of interest include CEO Duality, Board Composition, and Board Size. The variable CEO Duality is dichotomous and takes on the value 1 if the CEO and Chairman position is held by the same individual and zero otherwise. Board Composition is measured by the proportion of outside directors serving on the board. Finally, Board Size is measured by the total number of directors that serve on the board. The definitions of all three of the above described variables are consistent with the extant corporate governance literature (Boone et al., 2007).

3.2.2. Post-IPO Performance Variables

In line with the extant IPO literature, the short run post-IPO performance is evaluated on the basis of the first day initial returns (underpricing). The variable Underpricing is measured as the difference between closing price at the end of the first day of trading minus the offering price as a percentage of the offering price (Loughan and Ritter, 2002; Ritter and Welch, 2002).

In order to evaluate the long-run post-IPO performance, stock returns over three, five, and ten-year time windows subsequent to the IPO are estimated. Further, consistent with the IPO literature on long-run performance, buy and hold abnormal returns (BHARs) are computed as the difference between the buy and hold returns of the

sample firms and the benchmark firms. Specifically, the event study approach is followed to compute the three, five, and ten year buy-and-hold abnormal returns (BHAR) for family and non-family IPO firms. The BHAR are computed based on using the CRSP equally weighted index as the benchmark. For each IPO firm, the first CRSP listed trading day is considered as event day zero. Each IPO firm is tracked from day one until the earlier of its delisting date or 10th anniversary after going public. The results are reported for three year equally weighted buy and hold returns (3Yr EWBHAR) and five year equally weighted buy and hold abnormal returns (5YrEWBHAR). The results for the ten-year BHARs have not been reported in the paper for brevity purposes but are briefly discussed in the results section.

3.2.3. Control Variables

In the various regression specifications, firm size, risk of the offering, firm stage of development (firm age) and adoption of control enhancing mechanisms (dual class structures) are included as controls. Therefore, the variable Firm Size is measured as the gross proceeds raised at the IPO. The variable Firm Age is measured as 1 + time between incorporation of the firm and the IPO, measured in years. The variable Risk proxies for the riskiness of the firm and is measured by the standard deviation of the first thirty days of aftermarket returns. The variable Dual Class is a dichotomous variable that takes the value 1 if the IPO firm adopts a dual class structure and zero otherwise. All the above variables have been measured in line with the extant IPO literature (Ritter, 1991; Jain and Kini, 1999; Loughran and Ritter, 2002; Loughran and Ritter, 2004; Jain and Kini, 2008; Goa and Jain, 2011).

4. RESULTS

4.1. Univariate Comparisons

In Table 1, a comparison of firm and offering characteristics of family versus non-family IPO firms is provided. The mean (median) values for the overall sample as well as for sub-samples of family versus non-family IPO firms are reported. In addition, test statistics on the differences in mean (median) values for family and non-family firms are reported. The results suggest that family firms raise significantly lower proceeds at the IPO and are at a more mature stage in their development as measured by firm age compared to non-family firms. The post-IPO cash holdings of family firms are significantly lower than non-family firms. Further, family firms are less risky and generate higher operating cash flows relative to non-family firms. In terms of post-IPO investments, while the median capital expenditures of family firms are higher, the median R&D intensity is lower relative to non-family IPO firms.

Table 2 provides a comparison of the governance structure choices of family IPO firms relative to non-family firms. The governance variables analysed include board structure

variables, ownership variables, and adoption of dual class ownership structures. The results in Table 2 suggest that the governance choices of family IPO firms are fundamentally different from that of non-family IPO firms. For instance, family IPO firms are more likely to adopt CEO duality with 81.25% firms going public with the two positions combined compared to 52.11% for non-family firms and the difference is statistically significant. In addition, the results in Table 2 indicate that family IPO firms are characterized by significantly smaller board sizes compared to non-family IPO firms. The mean (median) size of the board of family firms is 5.70(5.00) compared to 6.67(7.00) for non-family IPO firms and this difference is statistically significant. Further, the results suggest that the board of directors of family IPO firms are structured to be less independent compared to non-family IPO firms. For instance, the mean (median) proportion of outside directors for family IPO firms is 55.99% (60.00%) compared to 65.65% (66.67%) for non-family IPO firms and the difference is statistically significant.

The results in Table 2 also indicate significant differences in the ownership structure of family and non-family firms. The mean (median) CEO ownership in family IPO firms is 39.41% (37.45%) compared to 9.85% (5.40%) for non-family IPO firms and the difference is statistically significant. Similarly, the mean (median) officer /director ownership (excluding the CEO) for family IPO firms is 18.63% (15.94%) compared to 35.06% (35.00%) for non-family IPO firms and this difference is statistically significant. The family IPO firms also have a significantly higher tendency to seek to preserve control rights by issuing dual class stocks relative to non-family IPO firms. The mean (median) proportion of family IPO firms with dual class stocks is 13.27% (0.00%) compared to 5.18% (0.00%) for non-family IPO firms and this difference is statistically significant. Overall, the governance structure of family firms concentrates significantly more power in the hands of the CEO relative to non-family firms.

In Table 3, the distribution of lock-up options segmented by whether the IPO firm is a family or non-family firm is reported. Lock-up options are considered a form of governance mechanism since they restrict the rights of certain pre-IPO owners from selling their shares for a defined duration after going public. As has been documented in the extant literature, the duration of lock-up options has the potential to serve as a signalling mechanism since the pre-IPO owner-manager's willingness to accept a longer lock-up can effectively signal their confidence in the prospects of the firm (Brav and Gompers, 2003; Arthurs et al., 2009). In addition, Brav and Gompers (2003) suggest that lock-ups can serve as a commitment device to alleviate moral hazard problems regarding actions of managers in the aftermarket. In the context of family firms, investors are likely to be concerned that the motivation to go public is for the family to diversify its holdings or exit weak businesses rather than pursue growth prospects. As such, lock-up options can serve as a valuable signalling/commitment device indicating that

family owners will not immediately seek to divest their holdings. Additionally, the extant literature has documented that typically IPO firms agree to lock-up options for 180 days. Therefore, deviations from this 180-day period have the potential to be informative. The results in Table 3 indicate that 47.06% of family IPO firms deviate from a lock-up period of 180 days compared to 51.36% for non-family IPO firms.

4.2. Determinants of Board Structure Variables at IPO

This section describes the results of a multivariate analysis of the determinants of board structure variables of family IPO firms. The results are reported in Table 4 with the first two specifications being cross-sectional regressions while the third represents a logit regressions. The dependent variables in models 1, 2, and 3 are Board Composition, Board Size and CEO Duality respectively and are as defined earlier. The main independent variable of interest in all three models is Family which is a dichotomous variable that takes on the value 1 if the IPO firm is a family run firm and zero otherwise. In addition, consistent with extant studies on determinants of board structure (Boone et al., 2007), all three models include a common set of four control variables to account for factors other than family involvement on board structure choices at the time of IPO. The four control variables include Dual Class, Firm Age, Firm Size, and Risk and are measured as defined earlier.

The results from model 1 in Table 4 indicate that the coefficient of Family is negative and significant indicating that the board of directors of family IPO firms has lower proportion of outsider directors compared to similar non-family IPO firms. As such, Hypothesis 2 is supported. Further, the coefficient of Risk and Firm Size are both positive and significant indicating that riskier and larger IPO firms are associated with higher levels of board independence. The coefficient of Dual Class is negative and significant indicating such firms structure their boards to be less independent.

In model 2 of Table 4, the results of the regression analysis estimating determinants of board size are reported. The results indicate that the coefficient of the variable Family is negative and significant indicating smaller board sizes for family firms relative to similar non-family firms. This result is opposite to the predictions of Hypothesis 3. Further, the results indicate that Firm Size and Firm Age are positively related to Board Size. Finally, in model 3 of Table 4, the results of a logit regression analysis estimating the determinants of CEO Duality are reported. The results suggest that the coefficient of Family is positive and significant thereby indicating that CEO duality is more likely in family IPO firms relative to similar non-family IPO firms. Therefore, Hypothesis 1 is supported.

Overall, the results suggest that the board structure of family IPO firms are characterized by lower proportion of outsiders, are smaller in size, and are more likely to combine the CEO and

Chairman position compared to similar non-family IPO firms. The results suggest that family IPO firm boards are constructed to be less independent and designed to concentrate greater power in the hands of the CEO compared to non-family IPO firms. The results can be viewed in the context of agency and stewardship theory. Under the agency view, structuring boards to be less independent would suggest that family owners are willing to sacrifice economic profits to enhance control and preserve socioemotional wealth. On the other hand, stewardship theory would suggest that family owners attempt to concentrate power in the hands of management at the time of going public is driven by a desire to increase cohesiveness, speed of decision-making, and reduce conflict which in turn would enhance shareholder wealth. An examination of the post-IPO performance of family versus non-family firms provides an opportunity to distinguish between these two alternative explanations for governance choices of family IPO firms. If family firms underperform similar non-family firms, the agency theory argument for board structure design would be supported. On the other hand, superior post-IPO performance of family firms would support the stewardship theory argument. In the following sections, we evaluate the post-IPO performance of family and non-family firms.

4.3. Determinants of Underpricing at IPO

Cross-sectional regressions are estimated to evaluate the impact of family ownership on post-IPO underpricing. In order to isolate the family ownership effect from other governance variables, control variables are included to account for differences in governance characteristics relative to non-family firms. In addition, consistent with the extant literature on IPO underpricing, the variables Firm Size, Risk, and Firm Age are included as controls. Therefore, the following cross-sectional regressions are estimated:

$$\text{Underpricing} = \alpha + \beta_1 \text{Family} + \beta_2 \text{Board Composition} + \beta_3 \text{CEO Duality} + \beta_4 \text{Board Size} + \beta_5 \text{Firm Age} + \beta_6 \text{Firm Size} + \beta_7 \text{Risk} + \beta_8 \text{Dual Class} \quad (1)$$

The dependent and independent variables are as defined earlier. The results of the regression analysis are reported in Table 5. In all three models, a common set of control variables such as Firm Size, Firm Age, Dual Class, and Risk are included. The results in all three models indicate that the coefficient of Family is negative and significant. As such, the results suggest that investor apply a lower initial valuation to family IPO firms. Therefore, Hypothesis 4A is supported. Further, the results suggest that board structure variables differentially influence underpricing. While CEO Duality and Board Composition are positively related to underpricing, Board Size is negatively related. Finally, consistent with the extant literature, the control variables Firm Age, Firm Size, and Dual Class are negatively related while Risk is positively related to underpricing. Overall, the results of reduced underpricing for family firms are consistent with the argument that

family owners are motivated by socio-emotional considerations rather than purely economic considerations and therefore unwilling to "leave money on the table". Further, investors recognize family owners focus on socio-emotional wealth and account for it by lowering initial valuation at the IPO. Further, in line with Villalonga and Amit (2009) findings for seasoned firms, the results indicate that governance variables that strengthen family control subsequent to going public differentially affect firm valuation.

4.4. Long-Run Investment Performance

In this section, the post-IPO long-run investment performance of family and non-family IPO firms are evaluated. Therefore, cross-sectional regression models of the following form are estimated:

$$\text{EWBH}(t=k) = \alpha + \beta_1 \text{Family} + \beta_2 \text{Board Composition} + \beta_3 \text{CEO Duality} + \beta_4 \text{Board Size} + \beta_5 \text{Dual Class} + \beta_6 \text{Firm Age} + \beta_7 \text{Risk} + \beta_8 \text{Firm Size} \quad (2)$$

The dependent variable is the equally weighted abnormal buy and hold return of IPO firms measured over time windows ($k = 0-3$ years and $k = 0-5$ years and $k = 0 = 10$ years). The main independent variable of interest is Family. In addition, governance variables Board Composition, Board Size, and CEO Duality are included as independent variables. Finally, the control variables Firm Age, Firm Size, Dual Class, and Risk are included. The results of the cross-sectional regressions are reported in Table 6. In models 1 and 2, the dependent variable is the three year BHARs while in models 3 and 4 it is the five year BHARs. Focusing initially on the three-year post-IPO investment returns, the results from models 1 and 2 indicate that the coefficient of Family is negative and significant. None of the three board structure variables are significant. The coefficient of Dual Class is however negative and significant. Further, while Firm Size negatively influences three-year investment returns, the reverse is the case with Risk. The results with 5-year investment performance in models 3 and 4 are similar in that once again the coefficient of Family is negative and significant. Further, for purposes of brevity, the results with ten year BHAR are not reported in the paper. The results are however, qualitatively similar to those reported in Table 6. Overall, the results suggest that family firms underperform non-family firms in terms of long-run investment performance. Therefore, Hypothesis 5 is supported.

5. DISCUSSION AND CONCLUSIONS

At the time of going public, family firms are faced with governance decisions that are likely to shape the extent of post-IPO agency conflicts among various firm stakeholders as well as the ability of family owners to exert control over corporate policy choices and the strategic direction of the firm. Despite the extensive IPO literature, relatively little is known regarding the governance choices of family firms as they make the transition from private to public ownership and its impact on post-

IPO performance. The results of this study indicate that the governance choices of family IPO firms differ from that of non-family IPO firms. Specifically, the results of this study suggest that the board in family IPO firms is designed to concentrate greater power in the hands of the CEO and pre-IPO shareholders. For instance, family IPO firms demonstrate a significantly higher propensity to adopt CEO Duality and tend to have a lower proportion of outside directors serve on the board. Further, family IPO firms have a higher propensity to seek to preserve the benefits of control by issuing multiple classes of stock with unequal rights.

In terms of post-IPO performance, the results suggest that family control influences both short and long-run performance measures. For instance, in terms of initial investor valuation, family IPO firms exhibit lower levels of underpricing compared to non-family firms. Additionally, the three-year and five-year long-run post-IPO investment performance of family firms is weaker than similar non-family IPO firms. Further, the results suggest that while board structure variables differentially influence post-IPO underpricing, they do not materially influence long-run performance. Overall, the results of this study support the agency and socio-emotional theory argument that family firms design their boards at IPO to be less independent in order to pursue the interests of family owners when they conflict with interests of other shareholders. In addition, investors recognize the motives of family owners to pursue their interests at the expense of other shareholders and account for it by assigning a lower valuation at the IPO.

This study attempts to make several contributions to the literature. It provides initial insights on how socio-emotional wealth considerations influence governance choices and performance of family firms that transition from private to public ownership. In addition, it provides insights on how boards of newly public firms are designed to strike a balance between the often-competing interests of family owners and minority shareholders. Finally, the study provides evidence of the economic impact of family ownership on short and long-run performance of newly public firms.

As is the case with most empirical studies, this study suffers from certain limitations. A central challenge in family firm research and a topic of considerable debate in the extant literature is the issue of how to define family firms. The definition adopted in this study while widely used in the literature, represents one among various alternatives that can be used to define family firms. Data limitations constrain the ability to evaluate whether adoption of alternative definition of family firms may produce additional insights related to the governance and performance of family IPO firms. In addition, there is considerably heterogeneity in the extent of family involvement in terms of ownership, management and board participation. Access to more detailed data regarding the extent of family participation in the ownership and governance of IPO firms can provide

insights as to whether and how alternative forms of family participation influence governance choices and performance. Finally, the use of longer sample periods than that deployed in this study can help address the question as to whether IPO market conditions influence the governance choices and performance of family firms relative to non-family firms. Future research that focuses on the above issues is likely to provide valuable additional insights on the link between alternative governance regimes and the performance of newly public firms.

REFERENCES

1. Allen, F., & Faulhaber, G. R. (1989). Signaling by underpricing in the IPO market. *Journal of Financial Economics*, 23, 303-323.
2. Anderson, R. C., & Reeb, D. M. (2003). Founding family ownership and firm performance: evidence from the S&P 500. *Journal of Finance*, 58, 1301-1329.
3. Anderson, R. C., & Reeb, D. M. (2004). Board Composition: balancing family influence in S&P 500 firms. *Administrative Science Quarterly*, 209-237.
4. Anderson, R. C., Duru, A., & Reeb, D. M. (2012). Investment policy in family controlled firms. *Journal of Banking and Finance*, 36, 1744-1758.
5. Arthurs, J. D., Busenitz, L. W., Hoskisson, R. E., & Johnson, R. A. (2009). Signaling and initial public offerings: the use and impact of the lock-up period. *Journal of Business Venturing*, 23, 360-372.
6. Baker, M., & Gompers, P. A. (2003). The determinants of board structure at the initial public offering. *Journal of Law and Economics*, 46, 569-597.
7. Beatty, R. P., & Zajac, E. J. (1994). Top management incentives, monitoring, and risk sharing: a study of executive compensation, ownership and board structure in initial public offerings. *Administrative Science Quarterly*, 39, 313-336.
8. Bennedsen, M., Nielsen, K. M., Pérez-González, F. & Wolfenzon, D. (2007). Inside the family firm: The role of families in succession decisions and performance. *The Quarterly Journal of Economics*, 122, 647-691.
9. Berrone, P., Cruz, C., & Gomez-Mejia, L. R. (2012). Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches and agenda for future research. *Family Business Review*, 25, 258-279.
10. Boone, A. L., Field, L. C., Karpoff, J. M. & Raheja, C. G. (2007). The determinants of corporate board size and composition: An empirical analysis. *Journal of Financial Economics*, 85, 66-101.
11. Booth, J. R., & Chua, L. (1996). Ownership dispersion, costly information, and IPO underpricing. *Journal of Financial Economics* 41, 291-310.
12. Brennan, M. J., & Franks, J. 1997. Underpricing, ownership and control in initial public offerings of equity securities in the U.K. *Journal of Financial Economics*, 45, 391-413.
13. Brickley, J. A., Coles, J. L. & Jarrell, G. (1997). Leadership structure: separating the CEO and Chairman of the Board. *Journal of Corporate Finance* 3, 189-220.
14. Cennamo, C., Berrone, P., Cruz, C., & Gomez-Mejia, L. R. 2012. Socioemotional wealth and proactive stakeholder engagement: Why family-controlled

- firms care more about their stakeholders. *Entrepreneurship Theory & Practice*, 36, 1153-1173.
15. Daily, C. M., & Dalton, D. R. (1993). Board of directors leadership and structure: control and performance implications. *Entrepreneurship Theory and Practice*, 17(3), 65-81.
 16. Dalton, D. R., Daily, C. M., Johnson, J. L. & Ellstrand, A. E. (1999). Number of directors and financial performance: A meta-analysis. *Academy of Management Journal*, 42 (6), 674-686.
 17. Davis, J. H., Schoorman, F. D., & Donaldson, L. (1997). Towards a stewardship theory of management. *Academy of Management Review*, 22(1), 20-47.
 18. Donaldson, L., & Davis, J. H., (1991). Stewardship theory or agency theory. CEO governance and shareholder returns. *Australian Journal of Management*, 16, 49-64.
 19. Engel, E., Gordon, E. A., & Hayes, R. (2002). The roles of performance measures and monitoring in annual governance decisions in entrepreneurial firms. *Journal of Accounting Research* 40, 485-518.
 20. Fama, E. F. (1980). Agency problems and the theory of the firm. *Journal of Political Economy*, 88, 288-307.
 21. Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *Journal of Law and Economics*, 26(2), 301-325.
 22. Finkelstein, S., & D'Aveni, R. A. (1994). CEO duality as a double edged sword: how board of directors balance entrenchment avoidance and unity of command. *Academy of Management Journal*, 37(5), 1079-1108.
 23. Gao, N., & Jain, B. A. (2011). Founder CEO management and the long run investment performance of IPO firms. *Journal of Banking and Finance*, 35, 1669-1682.
 24. Gomez-Mejia, L. R., Haynes, K. T., Nunez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. (2007). Socioemotional wealth and business risks in family controlled firms: Evidence from Spanish olive oil mills. *Administrative Science Quarterly*, 52, 106-137.
 25. Gomez-Mejia, L. R., Cruz, C., Berrone, P., & De Castro, J. (2011). The bind that ties: Socioemotional wealth preservation in family firms. *Academy of Management Annals*, 5, 653-707.
 26. He, L. (2008). Do Founders matter? A Study of executive compensation, governance structure, and firm performance. *Journal of Business Venturing* 23, 257-279.
 27. Hermalin, B. E. & Weisbach, M. S. (1998). Endogenously chosen board of directors and their monitoring of the CEO. *American Economic Review*, 88, 96-118.
 28. Jain, B. A., & Kini, O. (1999). The Life Cycle of IPO Firms. *Journal of Business Finance and Accounting*, 26, 1281-1307.
 29. Jain, B. A. & Kini, O. (2008). The impact of strategic investment choices on post-issue operating performance and survival of U.S. IPO Firms. *Journal of Business Finance and Accounting*, 35, 459-490.
 30. Jain, B. A., & Shao, Y. (2014). Family involvement and post-IPO investment policy. *Family Business Review*, 27, 287-306.
 31. Jain, B. A., & Shao, Y. (2015). Family firm governance and financial policy choices in newly public firms. *Corporate Governance: An International Review*, 23(5), 2015, 452-468.
 32. Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance*, 48(3), 831-880.
 33. Kosnik, R. D. (1987). Greenmail: a study of board performance in corporate governance. *Administrative Science Quarterly*, 32, 163-165.
 34. Kroll, M., Walters, B. A., & Le, S. A. (2007). The impact of board composition and top management team ownership structure on post-IPO performance in young, entrepreneurial firms. *Academy of Management Journal*, 50(5), 1198-1216.
 35. La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (1999). Corporate ownership around the world. *Journal of Finance*, 54, 471-517.
 36. Loughran, T., & Ritter, J. R. (2002). Why don't issuers get upset about leaving money on the table in IPOs? *Review of Financial Studies* 15, 413-445.
 37. Loughran, T., & Ritter, J. R. (2004). Why has IPO underpricing changed over time? *Financial Management*, 33, 5-37.
 38. Lowry, M., & Shu, S. (2002). Litigation risk, and IPO underpricing. *Journal of Financial Economics*, 65, 309-335.
 39. Miller, D., Breton-Miller, I. L., Lester, R. H., & Cannella, A. A. (2007). Are family firms really superior performers? *Journal of Corporate Finance*, 13, 829-858.
 40. Morck, R. & Yeung, B. (2004). Family control and the rent-seeking society. *Entrepreneurship: Theory and Practice*, 28, 391-409.
 41. Ritter, J. R. (1991). The long-run performance of initial public offerings. *The Journal of Finance*, 46, 3-27.
 42. Ritter, J. R., & Welch, I. (2002). A review of IPO activity, pricing, and allocations. *Journal of Finance*, 57, 1795-1828.
 43. Rock, K. (1986). Why new issues are underpriced? *Journal of Financial Economics*, 15, 187-212.
 44. Shleifer, A. & Vishny, R. (1986). Large Shareholders and Corporate Control. *Journal of Political Economy*, 94, 461-488.
 45. Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *The Journal of Finance* 52, 737-783.
 46. Stein, J. C. (1989). Efficient capital markets, inefficient firms: A model of myopic corporate behavior. *Quarterly Journal of Economics*, 104, 655-669.
 47. Villalonga, B. & Amit, R. (2006). How do family ownership, control and management affect firm value? *Journal of Financial Economics*, 80, 385-417.
 48. Villalonga, B., & Amit, R. (2009). How are U.S. family firms controlled? *Review of Financial Studies*, 22, 3047-3091.
 49. Welch, I. (1992). Sequential sales, learning, and cascades. *Journal of Finance*, 47, 695-732.
 50. Yermack, D. (1996). Higher market valuation of companies with small board of directors. *Journal of Financial Economics*, 40, 185-211.
 51. Zahra, S. A. (1996). Governance, ownership and corporate entrepreneurship: the moderating impact of industry technological opportunities. *Academy of Management Journal*, 39, 1713-1735.
 52. Zellweger, T. M., & Astrachan, J. H. (2008). On the emotional value of owning a firm. *Family Business Review*, 21, 347-363.

APPENDIX

Table 1. Comparison of the characteristics of family versus non-family IPO firms

Variable	All Firms		Non-Family IPO Firms		Family IPO Firms		Family Vs Non-Family IPO Firms
	N	Mean (Median)	N	Mean (Median)	N	Mean (Median)	t(Z)
Amount Raised at IPO (\$M)	826	71.65 (50.05)	713	73.79 (51.60)	113	58.13 (40.00)	-1.94* (-3.33)***
Firm Age (years)	808	5.6089 (5.00)	699	5.4248 (4.00)	109	6.7889 (6.00)	3.37*** (3.10)***
Risk of Offering	826	0.0678 (0.0645)	713	0.0694 (0.0672)	113	0.0577 (0.0502)	-3.59*** (-3.74)***
Total Sales (\$m)	805	94.58 (29.26)	696	96.23 (27.70)	109	84.07 (37.84)	-0.44 (1.35)
Operating Cash Flow/TA	796	-0.1162 (-0.0851)	687	-0.1269 (-0.1024)	109	-0.0491 (0.0429)	1.93* (3.40)***
Cash/TA	806	0.4969 (0.5432)	696	0.5121 (0.5593)	110	0.4008 (0.4074)	-3.50*** (-2.87)***
Capital Expenditures/TA	794	0.0760 (0.0450)	686	0.0746 (0.0434)	108	0.0853 (0.0564)	1.11 (2.48)***
R&D/Sales	545	1.9994 (0.27)	485	0.1986 (0.2899)	60	0.3888 (0.1604)	1.09 (-2.44)***

Note: Table 1 provides a comparison of firm and IPO offering characteristics for family and non-family IPO firms. All variables are measured in the year of the IPO. The t(Z) statistic for difference in mean (median) values for family and non-family IPO firms are also reported.

Table 2. Comparison of internal governance characteristics of family versus non-family IPO firm

Variable	All Firms		Non-Family IPO Firms		Family IPO Firms		Family Vs Non-Family IPO Firm
	N	Mean (Median)	N	Mean (Median)	N	Mean (Median)	t(Z)
CEO Duality	820	0.5609 (1.00)	708	0.5211 (1.00)	112	0.8125 (1.00)	-7.01*** (-5.76)*
Board Size	824	6.54 (6.00)	712	6.67 (7.00)	112	5.70 (5.00)	-3.81*** (-4.53)***
Board Composition	823	0.6433 (0.6666)	711	0.6565 (0.6667)	112	0.5599 (0.6000)	-4.20*** (-4.64)***
CEO Ownership	821	13.88% (6.70%)	709	9.85% (5.40%)	112	39.41% (37.45%)	12.85*** (9.78)***
Officer/Director Ownership	821	32.82% (32.70%)	709	35.06% (35.00%)	112	18.63% (15.94%)	-9.70*** (-6.28)***
Dual Class	826	0.0629 (0.00)	713	0.0518 (0.00)	113	0.1327 (0.00)	2.44*** (3.28)***

Note: Table 2 provides a comparison of board structure variables, ownership variables, and adoption of dual class structures by family and non-family firms. The t(Z) statistic of differences in mean (median) values for family and non-family IPO firms are also reported.

Table 3. Distribution of lock-up options for family versus non-family IPO firms

Firm Type	N	Lock-Up < 180 Days N (%)	Lock-Up=180 Days N(%)	Lock-Up > 180 Days N(%)
Family Firms	119	44 (36.97%)	63(52.94%)	12(10.08%)
Non- Family Firms	738	340 (46.07%)	359(48.64%)	39(5.28%)
All Firms	857	384(44.81%)	422(49.24%)	51(5.95%)

Note: The number (percentage) firms that adopt lock-up options less than 180 days, equal to 180 days and greater than 180 days are reported for the overall sample as well as for family and non-family IPO firms respectively.

Table 4. Determinants of board structure for family versus non-family IPO firms

<i>Specifications</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
<i>Dependent Variable</i>	<i>Board Composition</i>	<i>Board Size</i>	<i>CEO Duality</i>
Independent Variables	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (p-value)
Intercept	0.5022 (13.92 ^{***})	5.1990 (13.93 ^{***})	0.5681 (0.1763)
Family	-0.0812 (-4.40 ^{***})	-0.9062 (-4.73 ^{***})	1.4255 (0.0001 ^{***})
Dual Class	-0.1117 (-4.99 ^{***})	-0.2717 (-1.17)	0.0691 (0.7880)
Firm Age	0.0117 (0.89)	0.2594 (1.89)	-0.1164 (0.4399)
Firm Size	0.0143 (1.64)	0.3490 (3.87 ^{***})	-0.0677 (0.5031)
Risk	0.4800 (2.36 ^{**})	1.6026 (0.76)	-1.8841 (0.4166)
Model Fit	RSq=0.0934	RSq=5.90	2 LR= 44.46 (p=0.0001)

Note: Results of OLS regressions (Model 1 and 2) and logit models (Model 3) are reported estimating determinants of board structure variables. The dependent variables are Board Composition, Board Size, and CEO Duality in models 1, 2, and 3 respectively. The main independent variable of interest is Family. Additionally, the variables Firm Age, Firm Size, and Risk are included as controls.

Table 5. Family ownership and post-IPO underpricing

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
<i>Dependent Variable</i>	<i>Underpricing</i>	<i>Undepricing</i>	<i>Underpricing</i>
Intercept	-0.83 (-5.80 ^{***})	-0.80 (-5.56 ^{***})	-0.80 (-4.46 ^{***})
Family	-0.13 (-1.75)	-0.14 (-1.72)	-0.15 (-1.83)
CEO Duality		0.24 (1.91)	0.27 (1.86)
Board Composition			0.25 (1.65)
Board Size		-0.03 (-2.24 ^{**})	-0.03 (-2.30 ^{**})
Dual Class	-0.073 (-1.84*)		-0.64 (-1.69*)
Firm Age	-0.09 (1.84)	-0.10 (1.89)	-0.11 (1.98 ^{**})
Firm Size	-0.21 (-6.26 ^{***})	-0.20 (-5.65 ^{***})	-0.22 (-5.87 ^{***})
Risk	7.61 (10.00 ^{***})	7.41 (9.66 ^{***})	7.14 (9.03 ^{***})
R-sq	0.16	0.17	0.17

Note: Results of OLS regressions estimating the determinants of post-IPO underpricing are reported. The dependent variable is Underpricing. The main independent variable of interest is Family. Additional independent variables include board structure variables and control variables such as Firm Age, Firm Size, Risk and Dual Class. The t-statistics are reported in parenthesis and significance levels indicated