ESSAYS ON SECURITY ISSUANCE

A Dissertation

presented to

the Faculty of the Graduate School

at the University of Missouri-Columbia

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

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MAY 2007

The undersigned, appointed by the Dean of the Graduate School, have examined the dissertation entitled

ESSAYS ON SECURITY ISSUANCE

presented by Brett C. Olsen, a candidate for the degree of Doctor of Philosophy, and hereby certify that, in their opinion, it is worthy of acceptance.

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To my best friend and loving wife, Jamie, who helped me seek out and fulfill my dream. Her unwavering support is unmatched, as is my enduring love for her. My one and only goal in life is her happiness. I pledge my heart, my soul, and my very existence to the pursuit of this goal.

I love you, TT…

A I W I Y

ACKNOWLEDGEMENTS

I gratefully thank the members of my committee – Paul Brockman, Steve Ferris, Andy Puckett, and Chris Wikle – for their help and support during the development and completion of my dissertation. Special thanks are required for Paul Brockman in the assistance in the second essay of the dissertation. I hope its subject matter and results provide a fruitful future that we both envision.

I want to extend special gratitude to John Howe for his role as my dissertation chair. His mentoring role throughout my doctoral studies, especially during the job market process, helped make my four years at the University of Missouri a rewarding experience. I hope I can fulfill his expectations and remain an academic colleague and friend.

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ABSTRACT

When a firm requires funds for financing operations, managers face several alternatives. Managers may raise funds through the public markets or the private sector. They may issue equity, debt, or a mix of equity and debt. The type of security issued, size of the offering, and the timing and pricing of the issue represent additional options for firm managers. Mangers must consider the costs and benefits for the firm related to each alternative. Influencing the assessment of the costs and benefits are the incentives of the managers, which may or may not align with those of the firm's other stakeholders.

This dissertation addresses the decision making process of firm managers when faced with raising funds for firm operations. I examine three broad corporate finance issues by employing a comprehensive hand-collected dataset of firms issuing common stock purchase warrants. These securities, which provide holders the option of buying shares of stock in the issuing firm for an exercise price, possess features that allow me to evaluate research questions related to corporate governance, ownership and liquidity, and the market for corporate control.

Chapter two, my first essay, analyzes the choice of securities issued by new firms at the initial public offering (IPO). Schultz (1993) contends that warrants in equity offerings reduce agency conflicts in IPO firms. Examining unit IPO firms (firms that issue warrants with shares) versus a matched set of shares-only firms shows that warrants act as a substitute for other governance mechanisms. Adjusting for selection bias, the evidence shows that unit IPO firms are more likely to have: 1) less independent boards, 2) board outsiders owning a smaller fraction of the firm, 3) the CEO also holding the

chairman post, 4) external blockholders owning a smaller fraction of the firm, and 5) lower debt/equity ratios. The boards of unit IPO firms have fewer directors, but the characteristics of unit IPO firms suggest that they would have smaller boards.

Chapter three, my second essay, examines ownership and liquidity. After issuing new equity via a rights offering or a public underwritten offering, Kothare (1997) shows that the liquidity of the issuing firm's stock increases as the concentration of share ownership decreases. I examine this relation for firms that issue common stock purchase warrants as part of various methods of raising capital. Firms that issue warrants as part of an equity offering, a public offering, and an IPO experience a significant decrease in ownership concentration after warrant exercise. Firms issuing warrants within a private placement show an increase in ownership concentration by external equity holders following warrant exercise. Despite these changes, the various measures of liquidity employed do not significantly show a change in the issuing firm's stock liquidity, inconsistent with the findings of Kothare.

Chapter four, my third essay, examines the market for corporate control. Lipton's Warrant Dividend Plan of 1982 suggests that firms can avert a takeover by issuing warrants as a dividend to firm shareholders. I examine a hand-collected sample of firms announcing and distributing warrants as dividends from 1993 through 2006. Firms that issue warrants as dividends are similar to firms that issue warrants using other methods; the firms are smaller, younger, and riskier relative to comparable firms. Firms in the sample do not exhibit the expected characteristics of firms that issue takeover defenses based on the corporate control literature. The evidence suggests that firms issue warrants as dividends for reasons other than as a takeover deterrent.

Chapter 1: INTRODUCTION

Firm managers face many crucial decisions during the life of the firm. One

decision relates to obtaining external funds to finance operations. Managers have several

options available to them, including the form, source, and timing of the financing. Firms

could issue debt or equity to raise funds, and these security choices are available both

privately through the placement market or bank debt, and publicly through the bond or

stock markets. The choice is actually more complex as managers must choose the details

of their firm's debt and equity offerings, such as covenants, sizes, and prices. Timing the

offers provides another facet that increases the complexity of firm financing.

This dissertation attempts to shed light on the managerial decision process related

to obtaining funds for financing firm operations. I deploy three separate essays, each

using a hand-collected dataset, to examine how the issuance of certain securities interacts

with various corporate finance issues. I use firms that issue common stock purchase

warrants as a test instrument. Warrants have certain features, discussed within each

essay, that provide an effective method for testing research questions related to the issues

I am studying. These issues include corporate governance, ownership, liquidity, and the

market for corporate control.

My first essay, Chapter 2 in this document, focuses on the free cash flow theory

of Jensen (1986). At the initial public offering (IPO), firm managers receive proceeds,

which they do not necessarily have to use in the best interests of the shareholders.

Schultz (1993) shows that adding warrants to an IPO mitigates the agency costs

associated with the cash received as proceeds. Managers have fewer funds at their disposal with a unit IPO (an offering of shares plus warrants), requiring them to prove to the market that their firm has future viable prospects. If the market agrees, the stock price will appreciate, providing warrantholders the opportunity to exercise. The exercise of warrants provides additional funds to the firm, allowing managers to continue financing operations and to retain their jobs.

If warrants reduce the agency conflicts associated with the free cash flow of proceeds, then warrants are by definition a corporate governance mechanism. I posit that warrants act as a substitute for other governance mechanisms in IPO firms. I use two stage switching regressions, a method used more frequently of late in the corporate finance literature, to show that firms that issue warrants at the IPO (unit IPO firms) possess the qualities of a less effective corporate governance structure. Compared to a matched sample of shares-only IPO firms, unit IPO firms have 1) less independent boards, 2) outsiders on the board owning a smaller fraction of firm equity, 3) a greater likelihood of one person holding both the CEO and board chairman positions, 4) external blockholders owning a smaller fraction of firm equity, and 5) less debt. I also find that the boards of unit IPO firms are smaller than the boards of shares-only IPO firms, which is inconsistent with the weaker governance structure prediction. However, the characteristics of unit IPO firms predict these firms would have smaller boards. Unit IPO firms are smaller, riskier, and younger than are their shares-only IPO firm counterparts, consistent with the findings of Schultz (1993) and How and Howe (2001).

My second essay, Chapter 3 in this document, focuses on the relation between the ownership structure of the firm and the liquidity of the firm's stock. Kothare (1997) tests

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the equity financing paradox, the question as to why firms prefer public underwritten equity offerings (SEOs) to rights offerings when the former is more expensive to the firm. Comparing the two offering methods, Kothare finds that following SEOs, the ownership concentration significantly decreases, i.e., the issuing firm's ownership structure becomes more diffuse. These firms also experience a significant increase in liquidity of their stock. Demsetz (1968) contends that more players in the market for a firm's stock would improve the stock's liquidity. Kothare finds an increase in concentration (not significant) following rights offerings and an expected decrease in liquidity.

Warrant exercise is an event that will alter the ownership structure of the firm. I examine various methods of warrant issuance – including public and private offerings, and equity and debt offerings – and compare the change in ownership concentration to the subsequent change in the liquidity of the issuing firm's stock. I measure liquidity using several parameters, such as spreads, depths, and other trading characteristics. Following warrant exercise overall, in the group of public offerings, in the group of equity offerings, and in the IPO firms of my sample, I find that ownership concentration significantly decreases, consistent with Kothare (1997). I find a general but non-significant increase in ownership concentration following SEOs and private placements. Despite my finding of a significant decrease in ownership concentration at a similar magnitude, the liquidity of the issuing firm's stock does not change, which is inconsistent with Kothare's findings. This result raises the question regarding the applicability of Kothare's results to other securities and offering methods.

My third essay, Chapter 4 in this document, examines warrant dividends and their use as a takeover deterrence. In 1982, reacting to the Supreme Court's *Edgar v. MITE Corp.* decision that preempted state takeover statutes, Martin Lipton developed the Warrant Dividend Plan. Using this plan, firms gain extra time to consider a pending takeover bid to try to increase the premium for their shareholders. From an alternative perspective, warrant dividends and other poison pill defenses insulate inefficient managers, allowing them to retain their jobs. The control management has over the board's election process also makes the repeal of a poison pill difficult for potential acquirers or disgruntled shareholders.

My objective with the third essay is to learn more about the firms issuing warrants as dividends. I posit that firms issuing warrant dividends will possess characteristics similar to other firms issuing poison pills. I find that firms issuing warrants as dividends are similar to firms issuing warrants using other methods; compared to typical firms (industry medians); these firms are small, young, and risky. In general, firms that issue warrant dividends do not possess those features associated with poison pill firms. Warrant dividend firms do not have higher agency costs, do not have weaker corporate governance structures, and do have other takeover defenses available to deploy. Managers of warrant dividend firms receive equity-based compensation, which is consistent with the expectation for poison pill firms. The evidence suggests that firms issue warrants as dividends for reasons other than as a takeover deterrent.

Managers must weigh the costs and benefits of the various methods of raising finances, and the incentives of these managers influence this examination. The objective of my dissertation is to better understand the decision making process of managers in the

context of their firm's financing plans. Using the common stock purchase warrant as a testing mechanism to examine different corporate finance issues, my research provides several conclusions. First, warrants may substitute for a weak corporate governance structure in IPO firms. As Gillan, Hartzell, and Starks (2006) point out, the research literature lacks the examination of the interrelations among governance mechanisms and the extent to which the different mechanisms may complement or substitute for each other. The results of my first essay help fill this void.

Second, because the exercise of outstanding warrants alters the ownership structure of the firm, managers must consider the resulting effects on the liquidity of their firm's stock. The various methods firms use to issue warrants affects the structure of ownership in different ways, requiring managers to decide on the best course of action when considering the issuance of warrants.

Third, the motives of managers are difficult to discern, and this is especially true within the market for corporate control. My examination of firms that announce a warrant dividend, one method firms use to deter a takeover, is an example of the challenge researchers have in deciphering managerial incentives.

Overall, this dissertation shows that the corporate finance literature benefits from the examination of different issues using an alternative perspective, such as warrant-issuing firms.

Chapter 2: SECURITY CHOICE AND CORPORATE GOVERNANCE

1. Introduction

Underlying the choices available for the timing, source, and form of financing are

the motives of the managers. Managers seek to maximize their utility, and their

objectives influence their decisions regarding the choice and timing of the firm's

financing obligations. The incentives of firm managers do not necessarily align with the

interests of the owners of the firm, the shareholders. The misalignment of managerial

incentives and shareholder interests represents agency conflicts within the firm. Jensen

and Meckling (1976) argue that managers, shareholders, and bondholders will implement

monitoring and bonding arrangements to reduce the agency conflicts between them.

These arrangements could include compensation contracts and other governance devices.

An alternative for the young firm is the choice of security offering.

Schultz (1993) argues that offering warrants with shares at the initial public

offering (IPO) helps mitigate the agency costs inherent in the relationship between

managers and shareholders of the firm. In his model, managers must focus on proving

the future viability of the firm to the market to retain their jobs. If a unit offering (an

offering of warrants with shares) reduces agency costs, it takes on the role of a

governance mechanism. I contend that issuing warrants at the IPO in the form of a unit

offering acts as a substitute for other governance mechanisms of the firm.

I compare governance mechanism measures for unit IPO firms and shares-only

IPO firms from 1996 through 2004. Specifically, I examine the characteristics of the

board of directors, the ownership of external blockholders, and the level of debt as governance mechanisms available to the firm. If unit offerings act as a governance mechanism substitute, the firm will possess traits associated with less effective governance. To test the hypotheses, I match a sample of unit IPO firms to shares-only IPO firms using market value, industry, and offer date. In addition to statistically comparing the two samples with univariate tests, I implement two-stage switching regressions that alleviate the possible selection bias of my sample.

I find that unit IPO boards are less independent and more likely to have one person holding both the CEO and board chairman positions than are the boards of shares-only IPO firms. Independent outside board members for unit IPO firms own less equity in the firm than do their shares-only counterparts, reducing the potential influence they can wield over the insiders on the board and skewing the alignment of interests with shareholders. I also find that unit IPO firms have a lower level of equity ownership by external blockholders. Unit IPO firms go public with less debt than do their shares-only matched IPO firms. External blockholders and debtholders can play a monitoring role in firms, and the findings suggest that warrants substitute for the lack of these stakeholders as governance mechanisms. The boards for unit IPO firms are also smaller, but despite the apparent conflict with my general contention, the characteristics of the firm appear to outweigh the security choice in influencing this governance mechanism. Unit IPO firms are smaller, younger, and riskier than shares-only IPO firms, and each of these characteristics leads to smaller boards regardless of the security choice of the firm.

This research expands the corporate governance literature by examining a hand-collected dataset consisting of unit IPO firms and a matched sample of shares-only IPO

firms. To my knowledge, this is the first study that tests the agency cost hypothesis of Schultz (1993) by investigating governance mechanisms of the firm. In a recent working paper, Gillan, Hartzell, and Starks (2006) contend that the corporate governance structures of firms consist of interrelated mechanisms, developed as responses to their associated costs and benefits. They identify a lack of research examining the interrelations among governance mechanisms and the extent to which the different mechanisms may complement or substitute for each other.

Jiraporn and Ning (2006) find that firms with more restricted shareholder rights pay out higher dividends, showing that dividends substitute for weak shareholder rights. Also looking at dividends, Officer (2006) examines firms that should pay dividends based on their characteristics and finds that firms paying dividends have weaker governance structures. This finding suggests that paying out dividends acts as a substitute for other governance mechanisms because dividend payments reduce the free cash flow available for managers to potentially squander (Jensen, 1986), which is similar to my argument regarding the availability of proceeds to managers of IPO firms. My essay also investigates the interrelation of corporate governance mechanisms, identifying warrants issued at the IPO as a potential substitute for other governance mechanisms within the firm.

The potential selection bias arising from the decision to issue warrants provides an appropriate application to use the two-stage switching regression. Dunbar (1995) examines underwriter compensation in IPOs for unit IPO firms compared to shares-only IPO firms, using the two-stage method to find that underpricing and other offering costs are reduced when firms include warrants as underwriter compensation in the equity

offering. Byoun and Moore (2003) use this method to examine the wealth effects to shareholders of firms issuing equity in the secondary market, finding that firms issuing warrants in the secondary offering experience higher abnormal returns. Similar to these studies, I employ the two-stage regression to measure the decision effects of firms choosing to issue warrants with shares on the governance mechanisms of the firm.

2. Agency costs and security choice

Jensen and Meckling (1976) formalize the concept of agency conflicts among the key stakeholders of the firm. Managers make decisions that increase their utility but not necessarily to the benefit of the firm's other stakeholders. Shareholders and debtholders try to advance their interests through their influence with firm management. Managers, shareholders, and debtholders develop monitoring and bonding mechanisms to better align the incentives among the parties. The agency costs of the firm include the costs of implementing these mechanisms plus the residual losses of imperfect mechanisms.

In a levered firm, shareholders might want the firm to invest in high risk, negative net present value (NPV) projects as a means of transferring wealth from bondholders (Black and Scholes, 1973). Debtholders attach restrictive covenants or convertibility options to new debt to minimize the likelihood that managers will attempt to risk shift. The covenants and convertibility features are the monitoring and bonding mechanisms used by managers and debtholders to mitigate the agency costs associated with debt in the firm. Warrants are one convertibility feature suggested by several studies (e.g., Jensen and Meckling, 1976; Green, 1984; Kahan and Yermack, 1998) to be a partial remedy to the agency problem of risk shifting. Issuing warrants attached to a debt offering provides

the opportunity for debtholders to share the benefits of increasing stock prices with shareholders, reducing the incentive of managers and shareholders to pursue excessively risky projects.

Firms also attach warrants to equity issues. At the IPO, firms must choose the most opportune time within its development cycle and consider the overall state of the equity markets in deciding when to go public. The characteristics of the firm influence the choice of IPO securities. Firms can choose to issue shares of only stock at the IPO or issue shares of stock and warrants to purchase stock together as a unit offering. One major difference between these two offering types relates to the proceeds received by the IPO firm.

Schultz (1993) applies the free cash flow theory of Jensen (1986) to the unit offering. With the unit offering, the firm receives a reduced level of initial funds at the offer date. Managers can ill afford to misuse the proceeds because the warrants provide incentives to increase the firm's stock price. Schultz compares the unit offering structure to the staged financing of venture capital. Managers in these firms must focus on proving the viability of the firm to achieve the goals set forth by the venture capitalists. The firm receives funding at each successful stage, allowing the firm to proceed further in its development cycle and managers to retain their jobs.

In unit IPO firms, managers must strive to prove the firm's economic viability to the market. If the firm shows investors its future prospects are achievable, the market rewards the firm by increasing the stock price. When the stock price exceeds the exercise price of the warrants, the warrants are exercised and additional funds flow into the firm, similar to successfully reaching the next stage in a venture capital-backed firm.

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Alternatively, if the firm cannot prove the feasibility of its projects, the stock price will fail to reach the exercise price of the warrants, and the firm will likely go bankrupt.

In his agency-cost-minimization hypothesis, Schultz proposes that firms with higher agency costs are more likely to issue shares with warrants at the IPO to reduce the conflicts within the firm. Schultz shows that unit IPO firms are younger, smaller, and riskier firms, suggestive of greater agency conflicts. Firms going public at an earlier point in their development, firms with fewer assets, and firms with riskier projects have greater difficulty in determining the worth of their future prospects. A fourth characteristic of unit IPO firms from Schultz's study is the retention of equity by insiders. Directors and managers of the unit IPO firm retain fewer shares subsequent to the IPO, leading to greater agency conflicts in the firm because insiders have reduced incentives to act in the best interest of shareholders.

Denis and McConnell (2003, p.2) define corporate governance as "the set of mechanisms…that induce the self-interested controllers of a firm…to make decisions that maximize the value of the firm to its owners." Using the unit offering to reduce agency costs fits this definition of a corporate governance mechanism. If warrants act as a governance mechanism, the question becomes whether warrants complement or substitute for other mechanisms within the firm. Boards of directors represent one such mechanism, discussed next, while external blockholders and debtholders represent additional governance mechanisms available to the firm.

3. Boards of directors

One obligation of the board of directors is the mitigation of the agency conflicts between managers of the firm and shareholders to better align the interests of the two parties, fitting Denis and McConnell's definition of a corporate governance mechanism. The research on the monitoring role of boards is quite extensive, evaluating board characteristics and their effects on firm performance and decisions. I extract from the literature the aspects of the board regarded as "good" or "bad" features in a corporate governance sense. Good boards possess the characteristics that lead to decisions that are more effective and move the managers' interests closer to those of shareholders. By contrast, bad boards further misalign the interests of managers and shareholders of the firm. Four characteristics of boards embody the distinction between good and bad governance.

The first board characteristic is the number of directors on the board. Lipton and Lorsch (1992) and Jensen (1993) argue that larger boards are less effective than smaller boards. Agency conflicts within the board, such as director free-riding, increase with the size of the board, reducing the board's effectiveness in monitoring firm management. Research on board size shows a negative relationship between the number of directors on the board and the performance of the firm. Yermack (1996) evaluates the influence of board size in large U.S. firms on firm performance as measured by Tobin's q. Eisenberg, Sundgren, and Wells (1998) obtain similar results in their examination of smaller Finnish corporations. If smaller boards are more effective than larger boards and warrants act as a governance mechanism substitute, then the board of directors of unit IPO firms will be

larger than the board of directors of shares-only IPO firms (Table 1 summarizes the hypotheses).

> *Hypothesis 1*: The board of directors of unit IPO firms will have fewer
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> members than the board of directors of shares-only IPO
>
> firms.

The second board characteristic is the degree of independence, captured by the proportion of independent outside directors on the board. I follow the general convention in the literature (e.g., Yermack, 1996) in categorizing the members of the board. Inside directors are current executives of the firm. Gray directors include any former firm executives, founders of the firm, board members involved in business or legal arrangements with the firm, and any board member with a familial relation with an insider, gray director, or other firm employee. I categorize any board members not defined as insiders or grays as independent outside directors, or more simply, outsiders.[1] The prevailing view in the literature is that a higher ratio of outsiders on the board leads to a more effective board. The interests of a board's outside directors better align with the interests of firm shareholders than do the interests of inside or gray directors.

Fama and Jensen (1983) describe outside directors as "arbiters" who perform tasks involving significant agency problems between managers and owners. Hermalin and Weisbach (1998) contend that a board's independence depends on a bargaining game between the board and the CEO: the CEO prefers a less independent board, while the board prefers to maintain its independence. Following a period of poor firm

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[1] To more accurately categorize board directors into the inside, gray, and outside groups, I review the sections of the offering prospectus describing each director and the special transactions between the firm and its board members.

performance, the bargaining model predicts that a more independent board is better able to remove the CEO (Weisbach, 1988). The ability of the board to remove a CEO following poor firm performance is an example of the board's effectiveness. In a recent working paper examining compliance to recommendations of the *Cadbury Report* by London Stock Exchange firms, Dahya and McConnell (2005) find that firms that added outside directors to meet the recommended count of three on the board improved operating performance compared to noncompliant peers, their already-in-compliance peers, and their peers that added insiders to the board.

Together these studies support the position that boards with a higher ratio of outsiders will be more effective in resolving the conflict between firm management and shareholders. I predict that unit IPO firms will have a lower ratio of outsiders on the board than will shares-only IPO firms.

> *Hypothesis 2*: The board of directors of unit IPO firms will have a smaller
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> fraction of outsiders than will the board of directors of
>
> shares-only IPO firms.

The third board characteristic is the fraction of the firm's equity held by outside members of the board. The alignment hypothesis of Jensen and Meckling (1976) and the entrenchment hypothesis of Morck, Shleifer, and Vishny (1988) contend that greater levels of ownership by outside directors lead to stronger boards. Bhagat, Carey, and Elson (1999) observe a direct relationship between director equity holdings and board effectiveness, specifically the ability of the board to replace firm management during periods of poor performance. Howton, Howton, and Olson (2001) find a positive relation between outsider equity ownership and long-term performance of the firm. If the

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effectiveness of the board increases with the equity holdings of its outside members, then the equity ownership of board outsiders for unit IPO firms will be less than the equity ownership of the outsiders on the boards of shares-only IPO firms.

> *Hypothesis 3*: The equity holdings of outside directors of unit IPO firms will be less than the equity holdings of outside directors of shares-only IPO firms.

The fourth characteristic that helps determine the effectiveness of the board is the separation of leadership. A separation of leadership exists when two people occupy the CEO and board chairman positions, helping the board maintain a higher level of independence from firm management. Hermalin and Weisbach (2003, p.18) describe the independence of the board of directors from the CEO as "probably the most important factor determining a board's effectiveness." When one person holds both seats, she controls the board meetings as well as the content and flow of information from the firm. Board members are more likely to acquiesce to the CEO's wishes if she also is the board chairman (Jensen, 1993). Beatty and Zajac (1994) find that firms are more likely to separate the leadership positions to improve the degree of monitoring when the incentives for managers to align their interests with shareholders are reduced. Separating the CEO and board chairman posts should lead to a more effective board of directors.

Categorizing the separation of leadership as a governance mechanism, unit IPO firms will be less likely to have two people holding the CEO and board chairman positions than are shares-only IPO firms.

Hypothesis 4: The likelihood of one person holding both the CEO and

chairman positions will be greater for unit IPO firms than

for shares-only IPO firms.

4. External blockholders and debtholders

As the firm reaches the IPO stage, governance mechanisms other than warrants

are available to take the monitoring role not assumed by the board. Unaffiliated external

blockholders, defined as external shareholders owning at least 5% of a firm's shares prior

to the offering who are also not employees or directors of the firm, represent one entity

that potentially assumes a monitoring role (Shleifer and Vishny, 1986). External

blockholders can provide an offsetting effect to value-reducing entrenchment by

managers (Denis, Denis, and Sarin, 1997). If external blockholders represent a

governance mechanism of the firm and the equity ownership of these blockholders

quantifies their monitoring role, then the external blockholders of unit IPO firms will own

a smaller fraction of the firm subsequent to the IPO compared to the equity ownership of

shares-only IPO firm blockholders.

Hypothesis 5: The equity holdings of external blockholders of unit IPO

firms will be smaller than the equity holdings of external

blockholders of shares-only IPO firms.

Owners of the firm's debt represent another entity outside the board of directors

that can provide a monitoring role over firm management (Diamond, 1984). Banks, for

example, possess firm-specific information that provides certification of the firm's value

and ability to pay debts (Fama, 1985; James, 1987). Debtholders are concerned about the

ability of IPO firms to repay their debts and should pay close attention to the practices of these young firms. Unit IPO firms deserve scrutiny because they are typically younger and riskier than are their shares-only IPO colleagues (Schultz, 1993). How and Howe (2001) find that unit IPO firms own less debt, implying that the reduced presence of banks and other creditors subjects the firm to less monitoring. I predict that warrants will substitute for the lack of the governing role provided by debtholders, resulting in unit IPO firms having lower debt levels compared to shares-only IPO firms.

> *Hypothesis 6*: The debt levels of unit IPO firms will be less than the debt
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> levels of shares-only IPO firms.

5. Data

Unit IPOs present a unique setting for evaluating the corporate governance characteristics that influence the equity issuance choice. Development of the dataset entails several steps, summarized in Table 2. I develop a comprehensive hand-collected dataset by first downloading the IPOs with the unit offering flag from Thomson Financial's *SDC New Issues* database that occurred between 1996 and 2004, yielding 160 unit offerings. Jay Ritter's website[2] identifies 34 stock-plus-warrant IPOs incorrectly classified as shares-only IPOs. The *SDC New Issues* database provides firm information (name and ticker symbol), offer date, market value, and proceeds of the offer. The prospectus for each firm supplies data for firm balance sheets, boards, and beneficial share ownership. From the 194 offerings in the initial sample, I eliminate 62 issues because of the inability to obtain prospectuses, of which 36 are from issues before May 6,

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[2] http://bear.cba.ufl.edu/ritter/ipodata.htm

1996. Beginning at this date, the Securities and Exchange Commission (SEC) requires firms to submit all forms electronically, while prior to this date, electronic submission was voluntary.

To compare the characteristics of unit IPOs to shares-only IPOs, I implement a matched-firm approach, selecting a shares-only IPO firm for each unit IPO. For all shares-only IPOs issued within 12 months of the unit IPO, I match firms based on their two-digit SIC codes. I select the shares-only IPO firm with the closest market value of equity, which equals the number of shares outstanding following the offer times the offer price. If the prospectus for an identified matched shares-only firm is unavailable, I select the firm with the next closest market value to the unit IPO firm. If this substitution repeats itself until the matches available are exhausted, I extend the time window beyond ±12 months to identify a matched firm with available data.

Following this matching process and the subsequent review of prospectuses from the matching firms, I identify firms incorrectly labeled within *SDC*, resulting in an additional 12 firms for the sample. The final sample of unit IPO firms consists of 144 firms. I obtain other firm characteristics and stock price data from prospectuses, company 10-K filings, the Center for Research in Security Prices (CRSP), Compustat, and Standard & Poor's *Daily Stock Price Record*.

5.1. Comparison to Schultz's 1993 sample

Schultz evaluates 167 unit IPOs issued from 1986 through 1988. By contrast, my sample includes 144 unit IPOs over a longer time period, from 1996 through 2004. The drop in unit IPO frequency is still apparent if I compare my original sample size of 194

firms. I cannot directly compare sample sizes, but must instead investigate the change in

the fraction of all IPOs that are issued with warrants. Figure 1 provides a timeline of unit

IPO frequency based on SDC data. As the figure shows, the fraction of all IPOs that

issue warrants has decreased generally since 1970. The unit IPO fraction (the number of

unit IPOs divided by the number of all IPOs) for the Schultz sample is 0.214, decreasing

nearly 80% to a fraction of 0.047 for my sample. The total number of unit IPOs drops

from 278 to 160 in spite of a sample period three times as long.

Table 3 provides the distribution of the 144 unit IPO firms in the sample, breaking

the distribution down by industry two-digit SIC codes in similar fashion to Schultz

(1993). The business services industry (SIC code 73) has the largest representation in the

sample with 25 unit IPO firms and in Schultz's sample with 26 firms from a three year

period (1986-1988). Comparing the two distributions by industry, the most significant

difference is the number of financial firms (SIC codes 60-67) offering units at the IPO.

The Schultz sample has 3 of 149 (2%) while my sample has a higher frequency of

financial firms issuing units with 13 of 144 (9%). Schultz identifies a general tendency

for high-tech firms and service industry firms to issue warrants at the IPO. My sample

mimics this result, as 52 of 144 firms (36%) fall into these categories compared to 68 of

167 (40%) in Schultz's sample.

5.2. Offering details

Table 4 provides details of the offerings for the unit and matched sets. Unit IPO

firms offer more shares when considering both the initial shares offered at the IPO and

the shares offered through the warrants issued. The median shares-only firm offers two

million shares, and the average unit IPO firm offers 1.28 million shares at the IPO, but

2.8 million when including the warrant exercise. This relation is reinforced when

examining the fraction of equity offered at the IPO. The potential equity fraction offered

by the median unit IPO firm, which includes the initial offering shares plus the potential

shares from warrant exercise, is 110% of the existing outstanding shares entering the

IPO.[3] Shares-only IPO firms offer half that fraction, issuing 52% of the firm. Unit firms

issue shares at lower prices ($5.75 vs. $8.00), yielding less than half the proceeds at the

IPO ($7.25M vs. $16M), reaffirming the fact that initial proceeds for firms issuing unit

IPOs are less than the proceeds for their traditional shares-only counterparts.

The exercise price for issued warrants is typically 20% above the offer price of

shares at the IPO, requiring the firm to prove to the market its future growth prospects are

viable, as described in the staged financing scenario of Schultz (1993). Further

inspection finds that 29 unit IPO firms issue warrants at or below the offer price of the

units. While these firms are statistically comparable to firms that issue warrants out of

the money, the median firm that issues warrants at or in the money at the offer date is

nearly five years younger.

Schultz (1993) finds a general tendency for unit IPO firms to employ underwriters

of lower reputation than firms that issue shares only. Carter and Manaster (1990)

establish an ordinal ranking for underwriters based upon the location in a filing's

tombstone announcement. Firms higher on the tombstone list receive larger numbers (the

underwriter listed first receives a rating of 9, the second 8, and so on), i.e., the higher the

rating integer, the more reputable underwriter. I obtain the underwriter reputation

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[3] I use the term "potential" to describe the inability of IPO firms to predict if warrantholders will have the opportunity to exercise their warrants in the future.

rankings from Jay Ritter's website (see footnote 1), which updates the Carter-Manaster

sample to include underwriters managing equity offerings through 2004.[4] In my sample,

unit IPO firms use underwriters with lower Carter-Manaster ratings than their shares-only

counterparts (3.1 vs. 6.1).

Unit IPO firms establish a median life of 5 years for the warrants offered. Day

one returns, or underpricing, for unit IPO firms are higher for the average firm, but not

statistically significant. The 3.8% return for the median unit IPO price is more than

double the 1.78% return found by Jain (1994). Similar to my sample, Jain did not find a

statistical difference between the underpricing of unit IPO firms and shares-only firms.

5.3. Firm characteristics

Table 5 provides the descriptive statistics for the sample. For the 144 firm sets,

the median market values for the unit IPO firm set is $19.4M and the matched shares-

only IPO firm set is $22.1M, which are quite similar despite a larger difference in the

means ($35.99M for the unit set, $53.33M for the matched set). The difference-in-means

test shows no statistical difference in the two sets, although the difference-in-medians test

does show that the sample is different statistically at the 5% level.

Unit IPO firms are smaller, riskier, and younger than are shares-only firms,

consistent with prior literature (Schultz, 1993; Jain, 1994; How and Howe, 2001). In

addition to a smaller market capitalization, unit IPO firms have a lower asset value

(median $7.03M) compared to shares-only IPO firms ($30.21M). I measure risk in two

ways. Barry, Muscarella, and Vetsuypens (1991) identify the volatility of returns

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[4] I apply Ritter's notation and add 0.1 to the ranking integers to aid other researchers in distinguishing his
updated rankings from Carter and Manaster (1990) and Carter, Dark, and Singh (1998).

immediately following the offering acts as a good proxy for *ex ante* uncertainty. Consistent with their definition, I use the standard deviation of stock returns from the first 20 trading days subsequent to the IPO, excluding the first day. The median standard deviation of returns is 0.048 for unit IPO firms compared to 0.036 for shares-only IPO firms, significantly different at the 1% level.

The second risk measure is the *Zscore*, defined by Mutchler (1985) and used by Feroz et al. (2006) to evaluate firm-specific risk measures of IPO firms. The *Zscore* relation is defined as follows:

$$Zscore = 0.120 * NTWL + 0.159 * CFTL + 0.132 * CRATIO \\ - 0.032 * LEVLT - 0.138 * LEV + 0.187 * NISALE$$

where *NTWL* is net worth divided by total liabilities, *CFTL* is operating cash flows divided by total liabilities, *CRATIO* is the current ratio, *LEVLT* is long-term debt divided by total assets, *LEV* is total liabilities divided by total assets, and *NISALE* is income before interest and taxes divided by sales. Firms in financial distress will have a *Zscore* less than zero, while a positive *Zscore* indicates a healthy firm. This relation provides another useful metric for risk when considering the limited pre-IPO data available for researchers. As expected, unit IPO firms have a significantly lower *Zscore* than do shares-only IPO firms. The median *Zscore* for my unit IPO set is -0.28, indicating that the typical unit IPO firm is in financial distress. By contrast, the median *Zscore* for the shares-only IPO set is 1.47, depicting financial health, and supporting the conclusion that unit IPO firms are riskier than shares-only IPO firms.

Firm age is defined as the number of years from firm incorporation to the offering. Unit IPO firms have a median age of 7.75 years while shares-only IPO firms'

median age is 11.08 years. Ritter (1991) uses firm age as a proxy for the uncertainty of

firms entering the IPO. With this in mind, the firm age comparison indicates that unit

IPO firms are younger and riskier. Asset tangibility, measured as the value of property,

plant, and equipment divided by total assets, is significantly lower for unit IPO firms

(median of 0.090 vs. 0.111). Unit IPO firms are less likely to originate as a component of

a parent firm, as indicated by the carve-out / spin-off dummy variable, and offer greater

growth opportunities when measured with the market-to-book ratio (median of 2.50 vs.

0.88), statistically different at the 1% level.

I define R&D intensity as the amount of R&D spending divided by total assets.

Several firms either fail to disclose the level of R&D spending through Compustat or

have zero spending. For the 125 firms without R&D data, I review the prospectus and

the subsequent four quarterly SEC filings. Prospectuses for 26 firms include R&D data.

For the remaining 99 firms, the quarterly filings did not have R&D data, so I conclude

that R&D spending for these firms equals zero. Current U.S. GAAP dictates disclosure

of aggregate R&D expenditures, providing confidence in my assumption. The two sets

of firms are not statistically different in their R&D spending intensity. If I remove firms

without R&D expense identified in the SEC filings, the two samples differ significantly

in their mean R&D intensity, but not in their median intensity values.

The operating cash flow to sales ratio for unit IPO firms compared to shares-only

IPO firms is statistically lower (median of -0.44 vs. -0.03), providing another indication

of the financial risk faced by unit IPO firms as they go public. Nineteen firms report zero

revenues, making the calculation of the cash flow to sales ratio impossible. For these

firms I assume the ratio equals zero. The findings are robust to the exclusion of these 19
firms.

6. Univariate results

To evaluate the six hypotheses, I first compare governance characteristic data for
the unit set to the matched set, evaluating the statistical significance between the unit IPO
firms and their corresponding shares-only IPO matched firms. Table 6 describes the
board characteristic, ownership, and debt data for the 144 matched sets (288 firms) in the
sample.

The first hypothesis states that the board size for unit IPO firms is larger than for
shares-only IPO firms. In my sample, the unit set median board size is one director less
(5) than the matched set median board size (6). The mean size differs by 0.99, with the
mean and median difference tests statistically significant at the 1% level. The first
prediction is not consistent with the results. The difference in board size is only one
director different in size between the two boards, perhaps calling into question the
economic significance of this parameter. Another possible explanation for the board size
difference lies with the matched firm set. As firms age and grow, the board of directors
also grows in size (Baker and Gompers, 2003; Boone et al., 2004). Recall from Table 5
that the shares-only IPO firms are older and larger than are unit IPO firms, suggesting
that the typical unit IPO firm will have a smaller board no matter the offering method
used at the IPO. I revisit the board size comparison in Sections 7.3 and 7.4.

The second hypothesis states that unit IPO firm boards are less independent than
are shares-only IPO firm boards. In other words, the fraction of independent outside

directors on the boards of the unit set will be less than the fraction on the boards of the matched set. From Table 6, the median unit IPO firm typically has one less outsider on its board compared to the median shares-only IPO firm. The resulting degree of independence follows this trend, with a statistically significant (at the 1% level for the mean and median) lower degree of independence for the unit set compared to the matched set. The median (mean) level of independence is 40% (35.4%) for unit IPO firms and 50% (47.5%) for shares-only IPO firms. Reviewing the board size difference, shares-only IPO firms appear to make up the difference in board size by having an additional outside director. Although the data do not fully support the first hypothesis regarding board size, the composition of the shares-only board in general reflects better governance characteristics than does the unit board.

The third hypothesis states that the outside directors on the boards of unit IPO firms beneficially own a smaller percentage of their firm's shares compared to the outside directors of shares-only IPO firms. Table 6 provides the equity holdings subsequent to the offering and shows that outside directors of unit IPO firms hold a statistically significant smaller fraction of their firm's outstanding shares. Board outsiders own a median of 0% (mean = 3.5%) of the unit IPO firm compared to 1.6% (mean = 8.2%) of the shares-only IPO firm. The alignment of incentives between shareholders and outsiders on the board is worse for unit IPO firms than for shares-only IPO firms because of the reduced equity holdings. In addition, in the bargaining hypothesis of Hermalin and Weisbach (1998), the smaller fraction of outside director ownership for unit IPO firms translates into less power in the relationship with the firm's CEO.

The fourth hypothesis states that unit IPO firms are less likely than shares-only IPO firms to separate the posts of board chairman and firm CEO into two distinct positions, i.e., one person will occupy each position. A dichotomous variable distinguishes the separation of leadership within a firm. If there is a separation of leadership and two people hold these positions (one in each), the firm receives a value of one. If one person holds both positions, the firm receives a value of zero. With this definition, the hypothesis predicts the separation of leadership variable for the unit IPO set to be less than the variable for the matched shares-only IPO set. Table 6 shows that the difference in the separation of leadership between the unit set and the matched set is not significant, with the mean values of the separation dichotomous variable nearly equal. The prospectuses for 24 firms fail to clearly identify a board chairman. For the 24 firm sets where one or both firms did not identify a board chair, I take the conservative position and assume a value of zero, i.e., one person holds both positions. After removing these firms from the sample, the median value of the separation of leadership variable for the unit IPO set is 0.37 and for the shares-only IPO set the value is 0.41, not significantly different from each other and quantitatively similar to the full sample results.

The fifth hypothesis states that the fraction of the firm's equity owned by external blockholders will be smaller for unit IPO firms than for shares-only IPO firms. I quantify blockholder ownership by summing the equity fractions owned by unaffiliated external blockholders, who each hold at least 5% of the firm, subsequent to the offering. In Table 6, the median blockholder ownership for unit IPO firms (0.057) is smaller than the ownership of shares-only IPO firm blockholders (0.081), although this difference is not

statistically significant. Other measures of blockholder presence, including the number of external blockholders subsequent to the offering and the ownership of the largest blockholder only, provide quantitatively similar results.

The sixth hypothesis states that debt levels of unit IPO firms will be less than debt levels of shares-only IPO firms. A firm's debt level is measured using total liabilities of the firm and the ratio of total debt to equity. The median unit IPO firm holds $2.75M in total liabilities on the balance sheet, compared to a significantly higher value of $7.22M for the median shares-only IPO firm. The median debt/equity ratio for unit IPO firms is 0.149, significantly smaller at the 1% level than the ratio for shares-only IPO firms, 0.249. Using long-term debt instead of total debt provides similar results.

7. Two-stage switching regression

Heckman (1979) describes two possible reasons why the sample could have selection bias. First, self-selection can occur because of the sample firms and their decision to issue warrants at the IPO. Second, the decisions made as a researcher regarding sample selection can also create a selection bias. In my case, as an example, selection bias prevents me from reliably estimating how much equity a unit IPO firm's external blockholder would have owned had the firm issued shares only at the IPO. In the presence of selection bias, estimating regression models using OLS could produce inefficient and inconsistent estimates. To address this issue, I employ a two-stage switching regression method.[5]

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[5] Several researchers have applied two-stage switching regressions. The method is based primarily on Lee (1978), Maddala (1991), Shehata (1991), and Dunbar (1995). Li and Prabhala (2005) provide an excellent review of applying self-selection models to corporate finance issues.

The two-stage switching regression model includes a decision model and separate determinant models.

$$OT_i^* = aZ_i - e_i \tag{1}$$

$$GM_{ni} = b_n X_{ni} + v_{ni} \tag{2}$$

$$GM_{ui} = b_u X_{ui} + v_{ui} \tag{3}$$

In Eq. (1), OT^* is a latent variable representing the firm's offering type choice either to issue units at the IPO ($OT = 1$ iff $OT^* \geq 1$) or shares only ($OT = 0$ iff $OT^* < 0$); Z is a vector of determinants representing firm characteristics that influence the offering type decision; a is a vector of coefficients; and e is a random error term. In Eq. (2) and Eq. (3), GM_n and GM_u are observed values of the governance mechanisms if the firm decides to issue shares only or units; X_n and X_u are vectors of determinants of the governance mechanisms for the firm that issues shares only or units; b_n and b_u are vectors of coefficients; and v_n and v_u are random error terms.

I cannot directly estimate Eq. (2) and Eq. (3) using OLS because the selection bias causes v_n and v_u to be correlated with e, i.e.,

$$E(v_n \mid OT_i^* = 0) \neq 0 \tag{4}$$

$$E(v_u \mid OT_i^* = 1) \neq 0 \tag{5}$$

If the error means for Eq. (2) and Eq. (3) equal zero, OLS provides consistent coefficient estimates. The intuition behind the two-stage switching regression method is to find the expression for the means in Eq. (4) and Eq. (5) and adjust the error terms so that the expressions become equalities. Estimation methods that do not make this adjustment fail to account for the selection bias, ignoring any information that could exist in the

relationship between the offering type decision and the governance mechanism measures.

I assume that the covariance matrix of (v_n, v_u, and e) is trivariate normally distributed.[6]

The conditional means of the error terms become

$$E(v_n \mid OT_i = 0) = \sigma_{ne}\left[\frac{f(aZ_i)}{1 - F(aZ_i)}\right] \tag{6}$$

$$E(v_u \mid OT_i = 1) = \sigma_{ue}\left[-\frac{f(aZ_i)}{F(aZ_i)}\right] \tag{7}$$

where σ_{ne} and σ_{ue} represent the covariances of v_n with e and v_u with e; f represents the

standard normal density function; and F represents the cumulative normal distribution

function. The terms in brackets are the Mills ratios, representing the selection bias

correction terms for each sample firm in the shares-only IPO and unit IPO groups.

The first stage of the procedure estimates the offering type decision relation in Eq.

(1) for the total sample using probit analysis. For each sample observation I generate the

Mills ratio using the estimated value of (aZ). The second stage estimates the governance

mechanism relations in Eq. (2) and Eq. (3) using OLS with the Mills ratios added to the

relationships. Rewriting the equations for the second stage produces

$$GM_{ni} = b_n X_{ni} + \sigma_{ne}\left[\frac{f(aZ_i)}{1 - F(aZ_i)}\right] + w_{ni} \tag{8}$$

$$GM_{ui} = b_u X_{ui} + \sigma_{ue}\left[-\frac{f(aZ_i)}{F(aZ_i)}\right] + w_{ui} \tag{9}$$

where w_n and w_u are random error terms with $E(w) = 0$. By including the Mills ratios,

which adjust for selection bias, the OLS estimates of Eq. (8) and Eq. (9) generate

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[6] I also run the entire two-stage switching regression after implementing a transformation of the data as prescribed by Lee (1983) to account for non-normally distributed errors. The results and final conclusions do not change. I discuss details of this process in Section 8.

consistent estimates of b_n and b_u. The Mills ratios measure the covariance between the offering type decision and the governance mechanism decision or state. The statistical significance of the Mills ratio coefficients provides useful information about the interrelation between the offering type decision and the governance mechanism. If the offering type choice and the size of the board, for instance, are independent (i.e., the Mills ratio coefficient is not significant), then a change in offering type does not influence the size of the board.

Reviewing Eq. (2) and Eq. (3), the expected value of the error terms u_n and u_w are captured in the Mills ratios of Eq. (8) and Eq. (9). Li and Prabhala (2005) contend that the error terms represent the private information driving the offering type decision being modeled. Correcting for selection bias is analogous to testing for the private information. The significance of the Mills ratio coefficients test for the effects of private information on the offering decision, and this relation is the general framework of the two-stage switching regression.

The offering type decision and the governance mechanism could be endogenously determined, resulting in a simultaneity issue with my procedure, which assumes the decision determinants are exogenous. Li and Prabhala (2005) recommend the use of structural self-selection models, which incorporates $GM_u - GM_n$ as an additional explanatory variable describing the net gain achieved for firms choosing to issue units at the IPO. Using to the Shehata (1991) model as an example, Maddala (1991) considers the issue of simultaneity in the two-stage switching regression method. He argues against the solution offered by Li and Prabhala that adding the differential between the two choices (in my case, a unit IPO or a shares-only IPO) being evaluated would result in a

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model that is logically consistent but difficult to interpret. For example, I would have difficulty explaining how the difference in board sizes between unit IPO firms and shares-only IPO firms determines the choice of offering type.

Maddala also discusses adding the dependent variables being examined, i.e., the governance mechanism, to the decision model to solve the logic problem. However, he contends that interpreting the results would be difficult when trying to sort out the interrelations among the other determinants and the variable of interest. After considering the alternatives for the researcher, Maddala recommends not adding the differential term or incorporating the dependent variable into the decision model, explaining that the specification of the selection model accounts for the simultaneity indirectly.

After completing the adjusted estimation from the OLS regression, I forecast the mean value of the governance mechanisms (the dependent variables) for the alternative offering type. The coefficient $\hat{b}_n$ from Eq. (8) replaces b_u in Eq. (3), the original determinant model, allowing me to determine the mean value of unit IPO firms had they chosen to issue shares only at the IPO. In similar fashion, the coefficient $\hat{b}_u$ from Eq. (9) replaces b_n in the original determinant model Eq. (2) to determine the mean value of GM_n for shares-only IPO firms had they chosen to issue warrants at the IPO. I ignore the Mills ratio terms in Eq. (8) and Eq. (9) when forecasting the alternative offering results because the estimates already incorporate the correction for selection bias.

Three issues associated with the switching regression method require attention. The error terms in Eq. (8) and Eq. (9) are heteroscedastic, and the standard errors are underestimated. The underestimation occurs because I use a nonrandomly selected

sample to estimate a behavioral relationship, resulting in an omitted variables bias

(Heckman, 1979). Greene (1981) expands the procedure developed by Heckman,

proposing a method that provides the correct variance-covariance matrix of the OLS

estimates. I implement this correction procedure, which addresses both issues, into the

methods and refer the reader to the noted references for further details. Multicollinearity

among the determinants is the third issue, but Variance Inflation Factor (VIF) tests find

no evidence of significant multicollinearity in the regressions.

7.1. Explanatory variables for the offering type decision model

I review the literature on warrants to select the vector of determinants *Z* that

influence the offering type decision for the firm at the IPO. Table 7 summarizes the

variables and expected relations in the offering type decision model. Consistent with the

findings from Schultz (1993), Jain (1994), and How and Howe (2001), firms that issue

warrants with shares at the IPO are likely to be smaller, riskier, and younger than are their

shares-only IPO counterparts. I use the amount of proceeds and the total assets of the

firm as metrics representing the size of the firm. For the risk measure, I employ the two

measures described earlier, the standard deviation of returns during the firm's first 20

days of trading (excluding day one) and the *Zscore*. Firm age is measured as the natural

log of days from incorporation to the offering. Unit IPO firms are also more likely to sell

a larger portion of the firm's equity in the IPO than are shares-only IPO firms. The

agency-cost-minimization hypothesis supported by Schultz (1993) shows that a younger,

smaller, and riskier firm has greater difficulty determining if the firm has worthwhile

projects to pursue. In addition, if the firm sells a larger fraction of the equity in the IPO,

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agency costs become a bigger concern because insiders have reduced incentives to act in the best interest of shareholders. I also input as an offering decision determinant the rank of the underwriter based on Carter-Manaster reputational rankings.

7.2. Explanatory variables for the governance mechanism determinants models

Although the corporate governance literature is extensive, the characteristics of the governance mechanisms for an IPO firm can differ markedly from the characteristics of a more mature firm. As this study focuses on IPO firms, I rely on other IPO studies to provide the vectors of determinants for the governance mechanisms of the firms, X_n and X_u, summarized in Table 8.

Baker and Gompers (2003) evaluate board characteristics at the IPO and find that board size increases with firm size, asset tangibility, and the age of the CEO, but decreases with the presence of a founder as the firm's CEO. Firms that are larger and more complex require more directors on the board, implied by the findings of Yermack (1996) and Denis and Sarin (1999). Consistent with Hermalin and Weisbach (1998), the CEO plays a strong role in shaping the composition of the board, and CEO succession issues influence board size and composition as the CEO ages. Baker and Gompers do not discuss the negative relationship between the CEO being a founder and board size. CEOs who are also founders of the firm will have significant influence in board makeup, perhaps unwilling to add outsiders to maintain control, leading to smaller boards. Boone et al. (2004) find larger boards in larger firms and in firms that spend less on R&D, an information asymmetry proxy. Firms face higher monitoring costs for the board's

outside directors when information is more difficult to obtain, resulting in a smaller board size.

Baker and Gompers (2003) find that the ratio of outside directors on the board increases with the size of the firm and the presence of venture capital backing, but decreases with asset tangibility, the level of cash flows, and the tenure of the CEO. The authors posit that firms that are larger, have fewer tangible assets, have lower cash flows, and are venture capital-backed have more outsiders on the board as a result of the firm's history of needing more external financing. The decrease in board independence as CEO tenure increases is consistent with the bargaining between the CEO and board outsiders presented in Hermalin and Weisbach (1998). Boone et al. (2004) find boards with a greater degree of independence in larger firms, in venture capital-backed firms, and in firms with shorter-tenured CEOs. They also find that the ratio of outsiders on the board is higher if the CEO owns less equity in the firm, if outsiders own more equity in the firm, and if the IPO firm is not a carve-out or spin-off from a parent firm. The equity holdings of the CEO and board outsiders represent the power held by the respective parties, again relating to the bargaining power model of Hermalin and Weisbach (1998). Intuitively, if the firm is an equity carve-out of a parent firm, the board will most likely consist of a higher percentage of insiders rather than outsiders.

Filatotchev and Bishop (2002) argue that entrenched managers will resist creating a more diverse board and avoid providing any incentives for outsiders to gain in monitoring and control. Their results show that outsider equity ownership decreases with

insider ownership.[7] Outsiders would likely increase their equity holdings in firms with

more growth opportunities and reduced risk. Alternatively, outsiders could see the IPO

as a chance to liquidate all or a portion of their holdings. I add measures for growth

opportunities (market-to-book) and risk (firm age, stock return volatility, and *Zscore*),

and wait for the results to provide more details on the relations with outsider ownership.

Beatty and Zajac (1994) find that the likelihood of a separation of leadership

decreases with the equity ownership of board insiders, implying that more monitoring is

required due to the reduced incentives borne by the low equity holdings of management.

The authors' arguments imply an equilibrium state within the firm. Board insiders could

decide to retain a higher fraction of the firm to maintain the power and control they

possess with the CEO also holding the chairman position. I add two intuitive

determinants, suggesting first that if the CEO is also the founder of the firm, he is more

likely to simultaneously hold the position of chairman to retain a high level of control.

Second, in the presence of venture capital, the firm is more likely to have a separation of

leadership because of the monitoring power held by the venture capitalist.

Pham, Kalev, and Steen (2003) examine the effects of underpricing on ownership

structure, but the only significant variable determining blockholder ownership is the

firm's first day return, a parameter unknown to blockholders participating in the IPO. I

expect blockholders to alter their equity holdings in similar fashion as board outsiders.

Using the Filatotchev and Bishop (2002) argument from the outsider ownership measures

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[7] Filatotchev and Bishop (2002) also find significant relations between CEO experience and two of the governance mechanisms, outsider equity ownership and the separation of leadership. They define experience as the number of management positions and board memberships held over the last five years before the IPO. At the IPO, five years is longer than the lives of much of the sample, leading us to exclude these determinants from the analysis.

above, I expect a negative relation between blockholder ownership and insider ownership. I reserve identifying an exact relation between blockholder ownership and the remaining variables – firm risk, growth opportunities, and firm age – until after the two-stage regression analysis.

Barry and Mihov (2005) compare the performance of IPO firms based on the prevalence of debt financing versus the presence of venture capital backing. From 1980 through 2002, the median (mean) total debt to total asset ratio is 0.26 (0.33) for their sample of nearly 6,000 firms. These numbers are encouraging when comparing them to the statistics, but the Barry and Mihov study and other research are limited in their evaluation of the determinants of debt financing for firms approaching the IPO. Debtholders are more likely to provide financing to firms with less risk and less information asymmetry. I define high-risk firms as younger firms; firms with higher standard deviation of returns in the first 20 days of trading after the IPO, excluding the first day; and firms with lower *Zscore*s. High R&D intensity captures information asymmetry (Gompers, 1995). Firms with more stable cash flows are more likely to pay off debts, but the dataset lacks the quantity of years to adequately measure cash flow variance. I add the cash flow to sales ratio in an attempt to quantify this parameter. Finally, debtholders are more likely to finance firms in which insiders hold limited power, defined in the model with the equity ownership of insiders subsequent to the IPO.

Table 9 provides descriptive statistics of firm characteristics related to the governance mechanisms detailed in Table 8. Of the four CEO traits examined, only the equity holdings of the CEO are significantly different between the two types of firms. CEOs of unit IPO firms own 14.6% (median) of the firm compared to 9.4% for

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shares-only CEOs. The two CEO groups are similar in age and tenure, as well as the likelihood of the CEO being a founder of the firm. Related to CEO holdings, the equity ownership of insiders as a whole is significantly larger in unit IPO firms. Consistent with Schultz (1993) and How and Howe (2001), unit IPO firms sell a greater percentage of equity at the IPO, yet insiders retain more compared to insiders of shares-only IPO firms. Further examination shows that insiders other than the CEO own a statistically similar fraction of equity for either type of firm. Whether the level of equity ownership by the unit IPO firm CEO indicates entrenchment or alignment (Morck, Shleifer, and Vishny, 1988) is an open question outside the scope of this analysis. Unit IPO firms are less likely to have the presence of venture capital within the firm, which seems intuitive since unit IPOs act in a similar manner as the staged financing of venture capital (Schultz, 1993).

7.3. Expectations for the Mills ratio

　　The two-stage switching regression method allows for three tests of the overall hypotheses developed earlier. For the first test, the offering type decision model in Eq. (1) analyzes the expectations related to the type of firm choosing to issue warrants at the IPO. Based on the extant literature, I expect smaller, younger, and riskier firms to be more likely to issue warrants at the IPO.

　　The second test evaluates the six hypotheses based on the relation of corporate governance structure and the offering type decision. In general, these hypotheses state that the corporate governance structure, represented by six different mechanisms, is a less effective structure than it would have been if warrants had not been used. To restate,

when the firm incorporates a less effective corporate governance structure, the firm is more likely to issue warrants at the IPO.

The third test relates to the Mills ratio coefficients when estimating Eq. (8) and Eq. (9). The sign and significance of these coefficients indicates the degree and direction of any selection bias inherent in the sample. Since it is difficult to generalize when examining six different governance mechanisms, I will use board size to describe the expectations associated with the Mills ratio coefficients. If firms use warrants at the IPO when board size is high as hypothesized, then the errors in Eq. (9) should be positive when the error in Eq. (1) is negative, leading to a negative coefficient on the Mills ratio. If firms do not use warrants when board size is low, then the errors in Eq. (8) should be negative when the error in Eq. (1) is positive, leading to a negative coefficient on the Mills ratio. A significant coefficient on the Mills ratio indicates selection bias. The expectations for the third test of the two-stage switching regression are summarized in Table 10.

7.4. Empirical results of the bias correction

I apply the two-stage switching regression procedure to each of the governance mechanisms from the hypotheses: board size, the ratio of outsiders on the board, the fraction of the firm owned by the outsiders, the separation of leadership, the fraction of the firm owned by external blockholders, and the debt/equity ratio. In the first stage, the probit analysis using Eq. (1) provides estimates of the offering type decision for the entire sample. Table 11 summarizes the results of the probit analysis.

Models (1), (2), and (3) use the natural log of proceeds as the proxy for firm size, which is statistically significant in each model. The variability of returns is also significant while my second measure of risk, the *Zscore*, does not indicate a difference in the financial health of the firm as intended. Unit IPO firms are generally younger than shares-only IPO firms. How and Howe (2001) show a significant relation here while Schultz (1993) does not. Consistent with the literature, firms that issue a larger fraction of equity at the IPO are more likely to issue warrants with shares. The decision model, unlike previous research, shows that underwriter reputation plays a significant role in determining the offering type decision. The variable *UWlow* equals 1 if the underwriter's ranking is less than 6.1, on a scale of 0.1 to 9.1, and equals 0 otherwise. Unit IPO firms are statistically (at the 1% level) more likely to have an underwriter with a low reputational rank.

Models (4), (5), and (6) use the natural log of total assets as the proxy for firm size, which is statistically significant in each model. The results are largely similar with the previous three models, excluding the non-significant coefficients associated with the return variability. For both sets of models, the results imply that the offering type decision model has good explanatory power and classificatory ability. Model (1) correctly identifies 77% of all firms, and Model (4) correctly identifies 78% of firms. In general, these results indicate that unit IPO firms are more likely to be smaller and riskier than shares-only IPO firms, and more likely to sell a higher fraction of equity while using a less reputable underwriter.

I select Model (1) from the decision model as the base model for the second stage because it correctly categorizes 95% of unit IPO firms and uses proceeds as its size

measure, used previously by Schultz (1993). Using Model (4) does not alter the results. Table 12 summarizes the results of the second stage, which estimates using OLS the governance mechanism relationships while correcting for selection bias, represented by the Mills ratios (see Eq. (8) and Eq. (9)). The table also includes the uncorrected OLS regressions (see Eq. (2) and Eq. (3)), providing a look at the influence of selection bias on the results. The first general observation based on comparing the results of the firms that issued units at the IPO and those that issued shares only is that these two groups exhibit different behavior with respect to the governance mechanisms analyzed. Throughout each panel in Table 12, differences in the size, sign, and significance of the various coefficients are common when comparing the OLS estimates to the bias-adjusted estimates. A second observation is the general lack of sufficient power to draw strong conclusions, but the results provide a clear indication of the governance mechanism relationships at the IPO for the alternative offering types.

Panel A of Table 12 examines the board size of the firm. The Mills ratio coefficient is negative for both the unit IPO set and the shares-only IPO set, consistent with the predictions for these coefficients, i.e., firms issue warrants when board size is high and avoid issuing warrants when board size is low. The coefficient is significant for each firm set, indicating the presence of selection bias in the sample. The coefficient on the dummy variable identifying a founding CEO is negative and significant in the unit set, implying that with a founding CEO, firms that issue units at the IPO will likely have smaller boards. For the shares-only IPO set, the age of the CEO, the tangibility of assets, and the level of R&D expenditures are important parameters. Shares-only firms with older CEOs will have larger boards. Shares-only firms with more tangible assets will

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have smaller boards, inconsistent with the board literature which predicts that more complex firms require larger boards. In shares-only firms, board size decreases with the intensity of R&D spending.[8]

Panel B of Table 12 describes the determinants of board independence, measured as the ratio of outsiders on the board. Selection bias affects neither sample, as shown by the insignificant coefficients on the Mills ratios. CEOs with longer tenure in unit IPO firms are more likely to work with more independent boards, inconsistent with prior research that predicts the growing power of CEOs staying longer at a firm, resulting in more influence over board member selection. The equity ownership of outsiders on the board is positive and significant at the 1% level for both sets of firms, consistent with the bargaining model of Hermalin and Weisbach (1998), which suggests that if outsiders hold more power, with equity ownership as a proxy, they will have an advantage over the CEO in maintaining an independent board. Cash flows hold a stronger relationship with unit IPO firms, where unit IPO firms with lower cash flow to sales ratios have boards that are more independent.

Selection bias affects both firm sets when examining the determinants of outsider equity ownership, summarized in Panel C of Table 12. The Mills ratio coefficients are negative and significant. While the significance of the coefficient implies selection bias effects, the sign is not consistent with the prediction that firms issue warrants when outsider equity ownership is low and issue only shares when ownership is high. The age of the firm and the equity ownership by insiders are significant parameters for both sets of firms. Outsiders on the boards of older firms own a larger portion of the firm's equity.

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[8] Regarding the issue concerning R&D expense disclosure, the board size results do not change if R&D intensity is removed from the determinant model.

I use age in this instance as a proxy for firm risk. This relation suggests that outsiders will own more of a lower risk firm. This relation is mitigated by the ownership level of insiders, as is evident in the results. For unit IPO firms, higher levels of growth opportunities lead to reduced equity ownership by board outsiders, implying that outsiders on the board may see the IPO as an opportunity to cash out despite the firm's prospects.

In Panel D of Table 12, selection bias is negative and significant for the shares-only IPO set, inconsistent with the prediction that firms issue only shares when the likelihood of a separation of leadership is also high. For unit IPO firms, the coefficient on the equity ownership of inside directors is negative and significant, implying that when insiders on the board are more powerful, the CEO will likely also be the board chairman. For shares-only IPO firms, if the CEO is a founder of the firm, she is more likely to hold both leadership positions.

Panel E of Table 12 provides estimates for the OLS regressions on blockholder presence. Selection bias affects the unit IPO set, which has a negative and significant coefficient on the Mills ratio. I would expect firms to issue warrants when blockholder ownership, which proxies for the level of external monitoring over firm management, is lower, but a positive Mills ratio coefficient should be the result. The equity ownership of insiders is negative and significant for both firm sets, implying overall that blockholder ownership decreases as insider ownership increases, an intuitive and expected result. Blockholders will own less of unit IPO firms that are more financially healthy, indicated by the *Zscore* coefficient (negative and significant). This result appears counter-intuitive, but may suggest that blockholders use the offering as an opportunity to liquidate their

holdings. By contrast, blockholders will own more of shares-only IPO firms with greater growth opportunities (positive and significant coefficient).

The Mills ratio is not significant in the debt level regressions, described in Panel F of Table 12, signifying the absence of selection bias effects related to this parameter. For both sets of firms, greater risk measured using the volatility of stock returns is associated with lower debt/equity ratios, consistent with the expectation that debtholders will avoid riskier firms. Greater information asymmetry in shares-only IPO firms, proxied by R&D intensity, leads to lower debt/equity ratios as expected. Also consistent with expectations, shares-only firms with higher cash flows per sales receive more debt.

The results of the OLS regressions described above suggest that the two sets of firms differ in their characteristics and corporate governance structures and the inter-relations therein. Because of these differences, a method such as the two-stage switching regression, which accounts for selection bias in a sample, is necessary.

7.5. Empirical results for the alternative offering types

The analysis of the unit IPO set, the shares-only IPO set, and the governance relations between the two sets are incomplete at this point. The previous step, which tested for selection bias in the sample, needs to be followed by estimating the means for the governance mechanisms for the alternative offering type decision (Maddala 1991). Table 13 summarizes forecasts of the expected values of the different governance mechanisms for unit IPO and shares-only IPO firms had they decided to use the alternative offering type, describing the relationships using the two-stage switching regressions and the OLS regressions.

If all firms had used the same offering type, the unit offering would be associated with smaller boards (4.61 directors) compared to the shares-only offering (7.13 directors). Reviewing the two-stage estimates for each offering type, the use of warrants at the IPO is associated with smaller boards overall. The OLS estimates show that the difference in board size between the two groups is even larger for the two samples after adjusting for the selection bias. The univariate and multivariate methods show that the boards for unit IPO firms are smaller, inconsistent with the initial hypothesis. Reviewing the descriptive statistics from Table 5, firms that issue units at the IPO are smaller, younger, and riskier firms compared to their shares-only counterparts. These three characteristics represent traits of smaller boards. In fact, unit IPO firms possess many traits associated with small boards. In their IPO board of directors study, Baker and Gompers (2003) find that smaller boards are more likely for firms that are smaller and have lower asset tangibility. The IPO study by Boone et al. (2004) finds that firms that are smaller, have more growth opportunities, have greater return volatility, and are younger will have smaller boards. The characteristics of unit IPO firms appear to outweigh the governance mechanism traits of the unit IPO offering choice in determining the size of the board.

The degree of independence of the board for the two-stage estimates exhibits the same directional relationship as the OLS estimates. Higher ratios of outsiders on the board are clearly associated with shares-only IPO firms. The OLS estimates are similar to the two-stage estimates, a result of the absence of selection bias related to the board independence mechanism. The results hold when defining board independence as the number of outsiders on the board rather than the ratio.

The fraction of equity owned by board outsiders is consistent with my hypothesis that unit IPO firms have a lower fraction of ownership compared to shares-only IPO firms. The selection bias adjustment in the OLS regressions results in varying effects on the coefficients for outsider ownership in the switching regressions. The amount of risk plays a large role with the fraction of equity ownership by outsiders on the board, with a large positive coefficient for the shares-only firms compared to a negative coefficient for the unit firms. The OLS estimates show that outsider ownership is lower for unit IPO firms, a disparity that increases when taking into account the selection bias with the two-stage estimates.

For the separation of leadership mechanism, the bias from selectivity is clearly evident because the coefficients for each variable differ depending on the offering type decision. Also recall from the univariate results that no distinguishable difference in the separation parameter was evident between the unit IPO and shares-only IPO sets. This relation repeats in Table 13 for the OLS estimates, showing mixed results for this mechanism. According to OLS, the likelihood of separation of leadership decreases if all firms had chosen to issue warrants, but the estimates show that unit IPO firms and shares-only IPO firms would increase the likelihood by choosing the alternative offering method. Table 13 shows that the result of the different signs and varying magnitudes of the coefficients is an increased likelihood of leadership separation if firms had chosen to issue shares only at the IPO.

When examining the switching results for blockholder presence, the results shadow those for the separation of leadership. The univariate data show external blockholders owning less of unit IPO firms, but the difference is not statistically

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significant. The OLS switching regressions show mixed results. Shares-only firms would have increased blockholder ownership if they had chosen to issue units instead, but blockholders would have owned more in shares-only firms when looking at the results for all firms and for unit IPO firms. Adjusting for selection bias clarifies the relation, showing the blockholder ownership is higher when firms select to offer shares only at the IPO. The results hold when quantifying blockholder presence as the number of blockholders rather than their corresponding equity ownership levels.

The OLS estimates show that debtholders prefer investing in shares-only IPO firms when reviewing the all-firms and shares-only-IPO-firms datasets. By contrast, debtholders avoid unit firms if they had instead issued shares only. These results are inconsistent with my hypothesis. The selection-bias adjusted coefficients applied in the two-stage estimates make the results clear and consistent. In all cases, debtholders avoid firms that issue warrants at the IPO.

8. Sensitivity tests

I perform robustness checks to solidify the results obtained in the univariate tests and the two-stage switching regressions. I discuss, but do not report, the results below.

8.1. The matching algorithm

The procedure used to match unit IPO firms with similar shares-only firms results in several failed matches because of unavailable firm prospectuses. In these cases, I accept the shares-only firm with the next closest market value to the unit IPO firm. This process leads to a statistically significant difference in median market values. Imposing a

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± 30% restriction on market values in the matching algorithm reduces the sample from 144 to 89 matched sets. The quantitative relations hold for each governance mechanism. Restricting the sample further to exclude firms outside a range of ± 25%, ± 20%, and ± 15% does not alter the results.

8.2. Effects of industry

Much of the corporate finance literature that includes categorization by industry excludes financial firms (SIC codes 60-67) from the dataset. I choose to include these firms to bolster the size of the sample. Most of the results remain unchanged after removing financial firms from the sample. The only pertinent change after removing financial firms occurs when examining the presence of blockholders in the switching regressions. In the full sample and the unit IPO sample, the switching regressions provide the clear result of blockholders holding more equity in shares-only IPO firms after adjusting for selection bias. After removing financial firms, shares-only IPO firms would have greater blockholder ownership if they had issued warrants at the IPO, in contrast to the original results. Examining the OLS regressions correcting for selection bias does not provide a clear reason why the shift occurs. The coefficient on the Mills ratio for both firm sets is not significant, eliminating the possibility of an increased sensitivity in the relation between the blockholder presence mechanism and the offering type decision. When measuring blockholder presence as the number of blockholders rather than their aggregate ownership, the original results hold.

8.3. Effects of offering year

Figure 1 shows that the fraction of IPOs issuing units drops dramatically after 1998. Also, the influence of the IPO market in the late 1990s, ending with the tech bubble collapse in 2001, is unclear in my results. I conjecture that firms had an easier path towards an IPO in the late 1990s, perhaps making warrants as an alternative offering type unnecessary irrespective of the corporate governance structure within the firm. I attempt to evaluate the effects of the late 1990s by examining only those firms offering equity prior to 2001. If the characteristics of IPO firms dramatically change after 2001, perhaps I will notice a corresponding change in my analysis. Unfortunately, due to the extremely low frequency of unit IPOs in the new century (which is inconsistent with the market run-up argument above predicting that after 2001 more firms with less effective governance structures will issue warrants at the IPO), I am unable to perform a complete test comparing the two sample groups, before and after 2001. After eliminating the firm sets with at least one firm offering equity after 2000, I find that the overall results are quantitatively similar to the full sample.

8.4. Distributions of governance mechanisms

Baker and Gompers (2003) note that board size and board independence are not normally distributed. Following their robustness tests in lieu of the OLS regressions within the two-stage switching method, I evaluate board size using maximum likelihood regressions with board size following a Poisson distribution. Although the switching analysis yields unlikely board sizes of fewer than two directors, the directional results do not change. Smaller boards are associated with unit IPO firms.

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Board independence is not normally distributed and is truncated at 0% and 100%. To address this issue, Baker and Gompers (2003) perform tobit regressions. I employ their methods for board independence, outsider equity ownership, and blockholder equity ownership, because these variables each suffer the truncation issue. For each of the governance mechanisms, the switching regressions yield quantitatively identical results with changes only in the magnitude of the final numbers.

The final robustness check concerning the distributions of the governance mechanisms relates to the separation of leadership dichotomous variable. The main results use an OLS regression, ignoring the 0/1 nature of the leadership variable. I run a logistic regression to account for the dichotomy and achieve similar results, although the unit IPO firms' likelihood of a separation of leadership is represented by negative numbers. Despite this result, the relations remain unchanged as do the conclusions regarding the separation of the CEO and chairman positions.

8.5. Offering warrants at or in the money

Several unit IPO firms issue warrants with an exercise price at or below the share offer price. While these warrants are not immediately exercisable, one must consider these offerings with suspicion. If insiders are less than confident that their firm has viable economic prospects desired by the market, one way to obtain additional funds more quickly is to issue warrants at or in the money. This scenario returns the evaluation to the original issue of more proceeds available to squander, described by the free cash flow theory of Jensen (1986). If firms that issue warrants with exercise prices at or below the share offer price are systematically different than firms that issue warrants out of the

money, I should see a change in my results. Examining the 29 firm sets issuing warrants at or in the money and comparing them to the remaining sample of 115 firm sets provides no distinct differences in the firm or governance characteristics. The two-stage switching regression results produce results similar to the full sample.

8.6. Non-normality of the error distributions in the decision model

When employing the two-stage switching regression, many studies assume trivariate normal distribution of the error terms in the decision model and the pair of determinant models. Goldberger (1983) found that adjustments for selection bias are sensitive to the normality assumption. Lee (1983) discusses the solution to the problem, showing that the marginal distribution of the errors in the decision model in Eq. (1) and determinant models in Eq. (2) and Eq. (3), rewritten here,

$$OT_i^* = aZ_i - e_i \tag{A1}$$

$$GM_{ni} = b_n X_{ni} + v_{ni} \tag{A2}$$

$$GM_{ui} = b_u X_{ui} + v_{ui} \tag{A3}$$

can be transformed into a standard normal random variable $N(0,1)$ as follows:

$$e_* = J_1(e) \equiv \Phi^{-1}(F(e)) \tag{A4}$$

$$v_{n*} = J_2(v_n) \equiv \Phi^{-1}(G(v_n)) \tag{A5}$$

$$v_{u*} = J_3(v_u) \equiv \Phi^{-1}(H(v_u)) \tag{A6}$$

In Eq. (A4) through Eq. (A6), Φ is the cumulative normal distribution function. By recognizing that $J_1 = \Phi^{-1}F$ is a strictly increasing function, Lee shows ultimately that the trivariate distribution is statistically equivalent to the model below.

$$OT_i^{**} = J_1(aZ_i) - e_{*,i} \tag{A7}$$

$$GM_{ni} = b_n X_{ni} + v_{ni} \tag{A2}$$

$$GM_{ui} = b_u X_{ui} + v_{ui} \tag{A3}$$

To simplify the computations, I refer to Bock and Jones (1968), who provide approximations applicable to the inverse of the cumulative normal distribution function with errors less than 3×10^{-4}.

9. Conclusions

I test the assertion of Schultz (1993) that warrants included in equity offerings reduce agency conflicts in IPO firms. The sample includes 144 unit IPO firms offering equity from 1996 through 2004 and a corresponding set of firms offering shares only, matched on market value, industry, and date of offering. Because the general purpose of corporate governance is to mitigate agency conflicts, I conjecture that warrants act as substitutes for other governance mechanisms of the IPO firm. The hypotheses focus on characteristics of the board, external blockholder ownership, and the debt level of the firm. If warrants act as governance mechanism substitutes, then unit IPO firms will have characteristics associated with less effective governance. Compared to shares-only IPO firms, unit IPO firms will have larger boards, less independent boards, and outsiders on the board that own a smaller fraction of the firm's equity. The likelihood of the CEO to also hold the board chairman position will be greater for unit IPO firms. External blockholders should own less equity, and debt/equity ratios should be smaller in unit IPO firms.

Univariate results generally support the results. Board independence and ownership hypotheses align with the predictions with significant results. The separation of leadership likelihood and ownership by blockholders are not statistically different between unit IPO firms and shares-only IPO firms. The median debt/equity ratio for unit IPO firms is statistically smaller compared to the median ratios for shares-only firms. In the univariate setting, board size for unit IPO firms is smaller, which does not support the original hypothesis.

I correct for the presence of selection bias using a two-stage switching regression based on Lee (1978) and others. The results show that selection bias is present and requires adjustment. More importantly, the results strongly support five of the six hypotheses. Unit IPO firms are associated with less independent boards, outsiders owning fewer shares, CEOs more likely to hold both leadership positions, blockholders owning fewer shares, and a reduced debt level. The size of the board for unit IPO firms continues to be smaller compared to shares-only IPO firms, but it appears that firm characteristics dominate the relation with board size. Unit IPO firms are smaller, younger, and riskier, each a trait associated with smaller boards.

Sensitivity tests show that the presence of external blockholders subsequent to the IPO is not a robust result of the analyses. Eliminating financial firms from the sample results in blockholder ownership values inconsistent with the full sample tests. The reason for the inconsistent blockholder results could reside in the difficulty in determining the motivations of blockholders. External blockholders can provide shared benefits of control through their monitoring role (Shleifer and Vishny, 1986; Barclay and Holderness, 1989), or blockholders can use their voting power to extract private benefits

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of control (Barclay and Holderness, 1992). Simply examining the fractions of equity ownership from firm prospectuses will not provide a distinction of blockholder motives for us to address the robustness issues in the blockholder results.

The declining use of warrants by IPO firms could also affect the conclusions. If data were available during the sample time of Schultz (1993), when unit offerings were more frequent, the governance mechanism relation with unit offerings could differ from the results. If units are a substitute for less effective governance characteristics, this security choice should be used by all IPO firms, inconsistent with the frequency existing in the market. This study suggests that the market would not accept an IPO from an emerging firm with traits of ineffective governance across several measurable mechanisms. Only by adding warrants to the offering will the issuing firm be able to proceed.

Overall, the study shows that warrants issued by IPO firms substitute for other governance mechanisms. Unit IPO firms are younger, smaller, riskier, and employ insiders who retain fewer shares than their shares-only IPO counterparts. Each of these mechanisms is linked at some level to greater agency conflicts, as described by Schultz (1993). This study contributes to the corporate governance and security issuance literature in its evaluation of the relation between security choice and governance, and to the corporate finance literature in general for the use of the two-stage switching regression to alleviate selection bias. This study also adds to the literature examining the interrelation among corporate governance mechanisms within the firm, described by Gillan, Hartzell, and Starks (2006) as a limited area of research.

This research can be extended on several fronts, perhaps applying the hypotheses herein to debt issues with warrants. Such an application could yield less clear results because of the growing complexity of firms as they mature beyond the IPO. Another beneficial application suggested by the results is the continued examination of external blockholders of IPO firms. Studying the retention and sale of shares subsequent to the IPO and later in the life of the firm could provide valuable insight as to the objectives of the various owners of firm shares.

Figure 1: UNIT IPO FREQUENCY
The fraction of IPOS that are unit IPOs from 1970 through 2004. The x-axis represents the fraction of all IPOs that issue warrants based on SDC data. The shaded areas depict the sample studied by Schultz (1993) and my sample. The blue line is the fitted-line trend for all unit IPO fraction data across the entire time period (1970-2004). The red line is the fitted-line trend for unit IPO fraction for the time period after the Schultz sample (i.e., from 1989 through 2004).
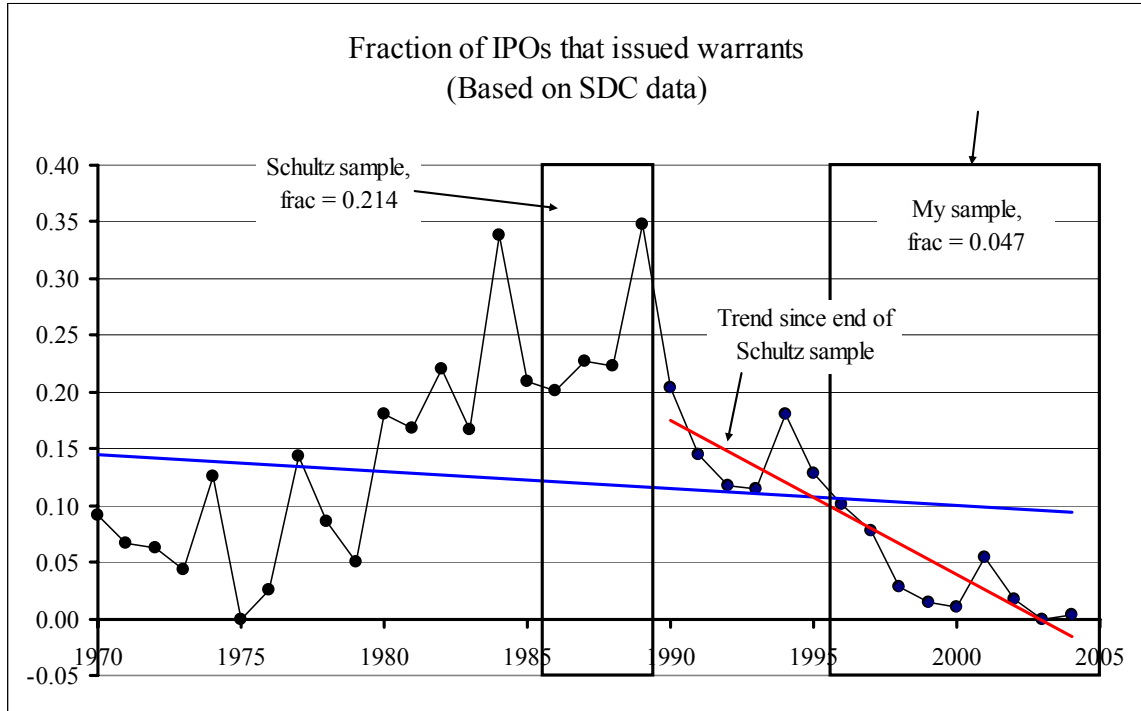
Table 1: HYPOTHESES
Description of the hypotheses developed and tested within the study.

	Governance mechanism	Hypothesis
1.	Board of directors	Unit IPO board size > Shares-only IPO board size
2.	Board of directors	Unit IPO ratio of outsiders < Shares-only IPO ratio
3.	Board of directors	Unit IPO outsider equity ownership < Shares-only IPO outsider ownership
4.	Board of directors	Unit IPO likelihood of leadership separation < Shares-only IPO likelihood
5.	External blockholders	Unit IPO blockholder equity ownership < Shares-only IPO blockholder ownership
6.	Debtholders	Unit IPO debt level < Shares-only IPO debt level

Table 2: SAMPLE DEVELOPMENT
Details of the development of the unit IPO sample.

IPOs with unit offering flag from *SDC New Issues* database from 1996 through 2004	160
Corrections from Jay Ritter's website	+ 34
Firm prospectus unavailable through SEC online retrieval	− 62
Net additions following review of firm prospectus	+ 12
Final unit IPO sample size	144

Table 3: DISTRIBUTION OF UNIT IPO FIRMS AND OFFERINGS
A description of the distribution of firms across industry, represented by their two-digit SIC code.

Industry group	Two-digit SIC	Number of unit IPOs
Business services	73	25
Other manufacturing	20-27, 29-34, 37, 39	19
Financial	60-67	13
Retail trade	52-58	12
Chemicals	28	11
Measuring, analyzing	38	11
Wholesale	50-51	10
Electronic	36	9
Personal services	70-72, 75-79, 82-83,	9
Industrial machinery	35	7
Engineering	87	6
Transportation	40-49	5
Health and legal services	80-81	3
Mining, fishing, farming	1, 10-13	3
Construction	15-17	1

Table 4: OFFERING DETAILS
Details on the offerings for firms issuing unit IPOs and matching firms issuing shares-only IPOs from 1996 through 2004, matched pairwise by industry, market value, and offer date. *Shares offered* represents the number of shares of stock offered by the firm at the IPO, in millions. *Warrants offered* equals the number of individual warrants offered by the firm multiplied by the number of shares for which each warrant is exercisable, in millions. *Fraction of total equity offered – shares and warrants* equals the *Shares offered* plus the *Warrants offered* divided by the number of shares outstanding immediately prior to the offering. *Fraction of total equity offered – shares alone* equals the *Shares offered* divided by the number of shares outstanding immediately prior to the offering. *Fraction of warrant equity offered* equals the *Warrants offered* divided by the sum of the *Shares offered* and the number of shares outstanding immediately prior to the offering. *Offer price* represents the per share price at the IPO, in dollars. *Exercise price* represents the exercise price per warrant, in dollars. *Moneyness* equals the *Exercise price* divided by the *Offer price*. *Proceeds* includes the amount obtained at the IPO from all markets, in $millions. *Fraction of proceeds from warrant exercise* represents the amount of funds received by the issuing firm if the warrants are exercised at the initial exercise price. *Underwriter reputation* represents the Carter-Manaster reputation rating for the lead underwriter of the IPO; the higher the number, the more reputable the underwriter. *Warrant life* is the number of years between the offer date and the exercise date. *Day one return* is the fractional return following the first day of trading of the firm's stock. The far right columns provide the results of difference-in-means tests (t statistic) and difference-in-medians tests (Wilcoxon z statistic) when comparing the unit IPO firms with their matched shares-only IPO firms.

	Unit IPO firms		Shares-only IPO firms		Difference tests	
	Mean	Median	Mean	Median	t	z
Shares offered	1.60	1.28	2.46	2.00	4.23	5.36
Warrants offered	1.93	1.36	-	-	-	-
Total equity offered	3.54	2.80	2.46	2.00	3.57	5.34
Fraction of total equity offered (shares plus warrants)	3.05	1.10	1.28	0.52	2.28	8.48
Fraction of total equity offered (shares alone)	1.39	0.54	1.28	0.52	0.81	1.34
Fraction of warrant equity offered	0.49	0.35	-	-	-	-
Offer price	5.91	5.75	8.88	8.00	7.95	7.17
Exercise price	7.52	6.55	-	-	-	-
Moneyness	1.28	1.20	-	-	-	-
Proceeds	9.47	7.25	22.66	16.00	6.46	6.11
Fraction of proceeds from warrant exercise	0.55	0.55	-	-	-	-
Underwriter reputation	2.75	3.10	5.62	6.10	11.97	9.03
Warrant life	4.46	5.00	-	-	-	-
Day one return (a)	0.038	0.000	0.002	0.000	1.57	0.27

(a) Stock return data for day 1 were unavailable for 17 firms in the sample. N for the unit IPO set is 132 firms. N for the shares-only IPO set is 139 firms.

Table 5: FIRM CHARACTERISTICS
Descriptive statistics for firms issuing unit IPOs and matching firms issuing shares-only IPOs from 1996 through 2004, matched pairwise by industry, market value, and offer date. *Market value* equals the total number of shares outstanding following the offer times the offer price, in $millions. *Total assets* represents the value of total assets, in $millions. *Std dev of returns* is the standard deviation of stock returns based on the first 20 trading days of the firm's stock, excluding day one, subsequent to the offering. *Zscore* is the measure of financial distress used by Mutchler (1985). *Firm age* is the number of years between incorporation of the firm and the offering. *Asset tangibility* equals the value of property, plant, and equipment divided by total assets for the IPO year. *Carve-out / Spin-off* =1 if the firm is an equity derivative of a parent firm and =0 if not. *Market-to-book ratio* equals the market value of equity divided by the book value of assets. *R&D intensity* equals the amount of R&D spending divided by total assets for the IPO year. *Cash flow to sales ratio* equals the operating cash flows divided by the revenues for the IPO year. The far right columns provide the results of difference-in-means tests (*t* statistic) and difference-in-medians tests (Wilcoxon *z* statistic) when comparing the unit IPO firms with their matched shares-only IPO firms.

	Unit IPO firms		Shares-only IPO firms		Difference tests	
	Mean	Median	Mean	Median	*t*	*z*
Market value	35.99	19.40	53.33	22.10	0.92	2.11
Total assets	16.35	7.03	56.09	30.21	5.32	9.13
Std dev of returns (a)	0.063	0.048	0.042	0.036	3.66	4.70
Zscore (b)	-0.57	-0.28	3.11	1.47	4.10	7.05
Firm age	14.36	7.75	17.22	11.08	1.14	2.41
Asset tangibility	0.162	0.090	0.229	0.111	2.53	2.28
Carve-out / Spin-off	0.049	0.000	0.118	0.000	2.14	2.13
Market-to-book ratio	6.817	2.500	1.501	0.880	3.05	8.59
R&D intensity	0.149	0.000	0.068	0.000	1.35	0.29
Cash flow to sales ratio (b)	-7.29	-0.44	-1.44	-0.03	2.27	5.68

(a) Stock return data were unavailable for 25 firms in the sample. *N* for the unit IPO set is 125 firms. *N* for the shares-only IPO set is 138 firms.

(b) *Zscore* and *Cash flow to sales ratios* were unavailable for 19 firms in the sample. *N* for the unit IPO set is 141 firms. *N* for the shares-only IPO set is 128 firms.

Table 6: GOVERNANCE STATISTICS
Governance-related statistics for firms issuing unit IPOs and matching firms issuing shares-only IPOs from 1996 through 2004, matched pairwise by industry, market value, and offer date. *Board size* represents the number of directors sitting on the board. *# of outsiders* represents the number of directors identified as outside members of the board. *Independence* equals the fraction of outsiders on the board. *Outsider ownership* represents the fraction of equity owned by outside board members subsequent to the IPO. *Separation of leadership* equals 0 if one person holds both the CEO and board chairman positions and equals 1 if two people hold the posts. *Blockholder ownership* describes the total fraction of equity owned by all external blockholders, defined as unaffiliated entities owning at least 5% of the firm. *Total liabilities* represents the value of total liabilities, in $millions *Debt/equity ratio* equals the ratio of total debt divided by total assets. The far right columns provide the results of difference-in-means tests (*t* statistic) and difference-in-medians tests (Wilcoxon *z* statistic) when comparing the unit IPO firms with their matched shares-only IPO firms.

	Unit IPO firms		Shares-only IPO firms		Difference tests	
	Mean	Median	Mean	Median	*t*	*z*
Board size	5.20	5.00	6.19	6.00	4.00	4.30
# of outsiders	1.98	2.00	3.11	3.00	4.94	4.79
Independence	0.354	0.400	0.475	0.500	4.47	4.24
Outsider ownership	0.035	0.000	0.082	0.016	3.85	3.90
Separation of leadership	0.306	0.000	0.368	0.000	1.12	1.12
Blockholder ownership	0.107	0.057	0.116	0.081	0.53	1.35
Total liabilities	5.87	2.75	23.44	7.22	4.50	5.95
Debt/equity ratio	0.270	0.149	0.682	0.249	4.18	4.70

Table 7: DECISION DEFINITIONS
Operational definitions of variables in the offering type-decision model

Variable	Predicted sign	Definition
OT	dependent variable	The offering type selected, defined as *OT*=1 if the firm issues warrants with shares and *OT*=0 if the firm issues shares only.
Size	–	Size considers two metrics. First, the size of the offering, measured as the natural log of proceeds. Second, the size of the firm, represented by the natural log of the firm's total assets.
ReturnVar	+	The variability of returns, measured as the standard deviation of stock returns during the first 20 trading days, excluding the first day, following the offer.
Zscore	–	A measure of financial distress used by Mutchler (1985).
FirmAge	–	The age of the firm at the offering, measured as the natural log of the number of days from incorporation to the offering.
Sold	+	The fraction of the firm's equity sold by the firm at the IPO.
UWlow	+	The reputational rank of the underwriter, based on the Carter-Manaster underwriter rankings. If a firm's rank is less than 6.1, *UWlow* equals 1. *UWlow* equals 0 otherwise.

Table 8: GOVERNANCE DEFINITIONS
Operational definitions of variables in the governance mechanism models

Panel A: BOARD SIZE

Variable	Predicted sign	Definition
BoardSize	dependent variable	The number of directors on the board at the offering.
CEOage	+	The age of the CEO at the offering, in years.
CEOfounder	+	An identifier indicating if the CEO is the founder (=1 if CEO is founder, =0 if not).
Tangible	+	Asset tangibility, measured as the ratio of plant, property, and equipment to total assets for the IPO year.
FirmSize	+	The size of the firm, represented by the natural log of the firm's market capitalization, which is measured as the offer price times the number of shares outstanding on the first trading day.
RD	–	The intensity of R&D expenditures, defined as R&D expenses divided by total assets for the IPO year.

Panel B: BOARD INDEPENDENCE

Variable	Predicted sign	Definition
Independence	dependent variable	The fraction of outsiders on the board at the IPO.
CEOtenure	–	The tenure of the CEO at the offering, measured as the natural log of the number of years the CEO has held the position.
CEOown	–	The fraction of the firm's equity owned by the CEO subsequent to the offering.
OutsiderOwn	+	The fraction of the firm's equity owned by the board's outside members subsequent to the offering.
Tangible	–	Asset tangibility, measured as the ratio of plant, property, and equipment to total assets for the IPO year.
FirmSize	+	The size of the firm, represented by the natural log of the firm's market capitalization, which is measured as the offer price times the number of shares outstanding on the first trading day.
CFtoSales	–	The amount of operating cash flow divided by revenues for the IPO year.
VC	+	An identifier indicating the presence of venture capital backing at the IPO (=1 if VC-backed, =0 if not).
Carveout	–	An identifier indicating if the firm is an equity carveout or spin-off from a parent firm (=1 if carveout/spin-off, =0 if not).

Table 8: GOVERNANCE DEFINITIONS continued

Panel C: OUTSIDER EQUITY OWNERSHIP

Variable	Predicted sign	Definition
OutsiderOwn	dependent variable	The fraction of the firm's equity owned by the board's outside members subsequent to the offering.
ReturnVar	+ / −	The variability of returns, measured as the standard deviation of stock returns for the first 20 trading days, excluding the first day, following the offering.
Zscore	+ / −	A measure of financial distress used by Mutchler (1985).
GrowthOpps	+ / −	The growth opportunities available to the firm, measured as the ratio of the market value of equity to the book value of assets.
FirmAge	+ / −	The age of the firm at the offering, measured as the natural log of the number of days from incorporation to the offering.
InsiderOwn	−	The fraction of the firm's equity owned by the board's inside members subsequent to the offering.

Panel D: SEPARATION OF LEADERSHIP

Variable	Predicted sign	Definition
CEOCOB	dependent variable	An identifier indicating the separation of the two top leadership positions in the firm (=1 if one person holds each post, =0 if one person holds both posts).
InsiderOwn	−	The fraction of the firm's equity owned by the board's inside members subsequent to the offering.
VC	+	An identifier indicating the presence of venture capital backing at the IPO (=1 if VC-backed, =0 if not).
CEOfounder	−	An identifier indicating if the current CEO is a founder of the firm (=1 if CEO is founder, =0 if not).

Table 8: GOVERNANCE DEFINITIONS continued

Panel E: BLOCKHOLDER PRESENCE

Variable	Predicted sign	Definition
BlockOwn	dependent variable	The fraction of the firm's equity owned by external blockholders – defined as unaffiliated entities owning at least 5% of the firm – subsequent to the offering.
InsiderOwn	–	The fraction of the firm's equity owned by the board's inside members subsequent to the offering.
ReturnVar	+ / –	The variability of returns, measured as the standard deviation of stock returns for the first 20 trading days, excluding the first day, following the offering.
Zscore	+ / –	A measure of financial distress used by Mutchler (1985).
GrowthOpps	+ / –	The growth opportunities available to the firm, measured as the ratio of the market value of equity to the book value of assets.
FirmAge	+ / –	The age of the firm at the offering, measured as the natural log of the number of days from incorporation to the offering.

Panel F: DEBT LEVEL

Variable	Predicted sign	Definition
Debt/Asset	dependent variable	Total pro forma debt divided by total pro forma assets.
InsiderOwn	–	The fraction of the firm's equity owned by the board's inside members subsequent to the offering.
ReturnVar	+	The variability of returns, measured as the standard deviation of stock returns for the first 20 trading days, excluding the first day, following the offering.
Zscore	+	A measure of financial distress used by Mutchler (1985).
RD	–	The intensity of R&D expenditures, defined as R&D expenses divided by total assets for the IPO year.
FirmAge	+	The age of the firm at the offering, measured as the natural log of the number of days from incorporation to the offering.
CFtoSales	+	The amount of operating cash flow divided by revenues for the IPO year.

Table 9: ADDITIONAL GOVERNANCE STATISTICS

Governance-related statistics for 144 firms issuing unit IPOs and 144 matching firms issuing shares-only IPOs from 1996 through 2004, matched pairwise by industry, market value, and offer date. *CEO age* is the age in years of the firm's head executive at the time of the offering. *CEO is founder* equals 1 if the CEO was a founder of the firm and equals 0 if not. *CEO tenure* is the tenure in years of the CEO at the time of the offering. *CEO ownership* represents the fraction of equity owned by the CEO subsequent to the IPO. *Insider ownership* represents the fraction of equity owned by board insiders subsequent to the IPO. *VC backing* equals 1 if the firm has venture capital support and equals 0 if not. The far right columns provide the results of difference-in-means tests (*t* statistic) and difference-in-medians tests (Wilcoxon *z* statistic) when comparing the unit IPO firms with their matched shares-only IPO firms.

	Unit IPO firms		Shares-only IPO firms		Difference tests	
	Mean	Median	Mean	Median	*t*	*z*
CEO age	47.9	47.0	47.5	47.0	0.46	0.42
CEO is founder	0.389	0.000	0.410	0.000	0.36	0.36
CEO tenure	3.32	2.17	3.67	2.58	0.80	1.02
CEO ownership	0.215	0.146	0.149	0.094	3.16	3.25
Insider ownership	0.340	0.357	0.291	0.248	1.99	2.34
VC backing	0.097	0.000	0.375	0.000	5.85	5.54

Table 10: SUMMARY OF EXPECTATIONS FOR MILLS RATIO COEFFICIENTS

Governance mechanism		Prediction	Error in decision model	Errors in determinant equation	Expected Mills ratio coefficient
Board size	Unit IPO firms	LARGER	Negative	Positive	Negative
	Shares-only IPO firms	SMALLER	Positive	Negative	Negative
Board independence	Unit IPO firms	LOWER	Negative	Negative	Positive
	Shares-only IPO firms	HIGHER	Positive	Positive	Positive
Outsider equity ownership	Unit IPO firms	LOWER	Negative	Negative	Positive
	Shares-only IPO firms	HIGHER	Positive	Positive	Positive
Separation of leadership (likelihood)	Unit IPO firms	LOWER	Negative	Negative	Positive
	Shares-only IPO firms	HIGHER	Positive	Positive	Positive
Blockholder presence	Unit IPO firms	LOWER	Negative	Negative	Positive
	Shares-only IPO firms	HIGHER	Positive	Positive	Positive
Debtholder presence	Unit IPO firms	LOWER	Negative	Negative	Positive
	Shares-only IPO firms	HIGHER	Positive	Positive	Positive

Table 11: PROBIT RESULTS

Maximum likelihood estimations of the probit regression of an indicator variable taking on the value one when firms issue units and zero when firms issue shares only on various independent variables for 144 unit IPO firms from 1996 through 2004 and their matched shares-only IPO firms. Table 7 describes the variables in the regression. t-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Size (Proceeds)	-0.341 **	-0.387 ***	-0.355 ***			
	(-2.563)	(-2.811)	(-2.587)			
Size (Assets)				-0.307 ***	-0.335 ***	-0.306 ***
				(-4.314)	(-4.468)	(-3.991)
ReturnVar	6.167 **		5.924 **	3.974		3.962
	(2.364)		(2.278)	(1.520)		(1.513)
Zscore		-0.005	-0.003		0.007	0.007
		(-0.346)	(-0.200)		(0.480)	(0.480)
FirmAge	-0.056	-0.041	-0.049	0.038	0.054	0.041
	(-0.728)	(-0.520)	(-0.625)	(0.469)	(0.648)	(0.490)
Sold	0.097 ***	0.090 ***	0.091 ***	0.060 **	0.054 *	0.053 *
	(3.429)	(3.180)	(3.146)	(2.010)	(1.758)	(1.706)
UW low	2.423 ***	2.244 ***	2.294 ***	2.204 ***	2.224 ***	2.196 ***
	(5.918)	(5.526)	(5.446)	(5.531)	(5.289)	(5.277)
Intercept	-1.488 **	-1.015	-1.273	-1.864 ***	-1.730 ***	-1.988 ***
	(-2.307)	(-1.628)	(-1.625)	(-3.333)	(-3.043)	(-2.748)
Log-likelihood	-130.8	-127.8	-124.5	-123.7	-120.3	-119.0
Cases correctly identified as unit IPOs	137 / 144	124 / 144	122 / 144	129 / 144	113 / 144	113 / 144
Cases correctly identified as shares-only IPOs	85 / 144	88 / 144	92 / 144	96 / 144	99 / 144	97 / 144

Table 12: OLS REGRESSIONS
Estimation of regressions on governance mechanisms for 144 unit IPO firms issuing equity between 1996 and 2004 and their matched shares-only IPO firms. Table 8 describes the variables in the regressions. For each offering type, I perform OLS regressions with and without the correction for selection bias. Consistent, heteroscedastic-corrected *t*-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels.

Panel A: BOARD SIZE

Variable	Units		Shares only	
	Bias corrected	Uncorrected	Bias corrected	Uncorrected
Intercept	4.230 ***	4.559 ***	5.408 ***	2.671 **
	(4.917)	(5.026)	(4.071)	(2.352)
CEOage	0.003	0.002	0.049 **	0.058 ***
	(0.254)	(0.123)	(2.273)	(2.763)
CEOfounder	-0.348 ***	-0.383	0.049	0.189
	(-1.018)	(-1.132)	(0.152)	(0.566)
Tangible	-0.459	-0.525	-1.105 *	-0.823
	(-0.514)	(-0.758)	(-1.699)	(-1.039)
FirmSize	0.142	0.260	-0.069	0.269
	(0.647)	(1.220)	(-0.401)	(1.468)
RD	0.067	0.082	-1.963 *	0.121
	(0.949)	(0.987)	(-1.940)	(0.101)
Mills ratio	-1.119 ***		-1.864 ***	
	(-2.715)		(-5.202)	
Adjusted R^2	0.01	0.00	0.20	0.05

Table 12: OLS REGRESSIONS continued

Panel B: BOARD INDEPENDENCE

Variable	Units		Shares only	
	Bias corrected	Uncorrected	Bias corrected	Uncorrected
Intercept	0.242 ***	0.243 ***	0.323 ***	0.390 ***
	(3.330)	(3.418)	(4.106)	(6.284)
CEOtenure	0.006 *	0.006 *	0.003	0.001
	(1.731)	(1.777)	(0.433)	(0.192)
CEOown	0.002	-0.001	-0.158	-0.112
	(0.021)	(-0.010)	(-1.189)	(-0.838)
OutsiderOwn	0.967 ***	0.924 ***	0.757 ***	0.703 ***
	(3.645)	(4.036)	(3.735)	(3.642)
Tangible	-0.029	-0.027	-0.136	-0.143
	(-0.317)	(-0.296)	(-1.506)	(-1.521)
FirmSize	0.021	0.019	0.027	0.020
	(0.992)	(0.934)	(1.384)	(1.055)
CFtoSales	-0.001 ***	-0.001 ***	0.001	0.001
	(-3.483)	(-3.489)	(0.449)	(0.678)
VC	0.063	0.065	0.054	0.046
	(1.208)	(1.284)	(1.237)	(1.068)
Carveout	-0.144	-0.143	-0.054	-0.059
	(-1.312)	(-1.417)	(-1.032)	(-1.184)
Mills ratio	0.010		0.064	
	(0.196)		(1.565)	
Adjusted R^2	0.12	0.13	0.23	0.22

Table 12: OLS REGRESSIONS continued

Panel C: OUTSIDER EQUITY OWNERSHIP

Variable	Units		Shares only	
	Bias corrected	Uncorrected	Bias corrected	Uncorrected
Intercept	-0.003	0.006	0.065 *	0.002
	(-0.100)	(0.245)	(1.727)	(0.060)
ReturnVar	-0.118	-0.154	0.708	0.749
	(-0.953)	(-1.246)	(1.395)	(1.362)
Zscore	-0.000	0.000	0.000	0.002 *
	(-0.350)	(0.072)	(0.299)	(1.817)
GrowthOpps	-0.001 **	-0.001 **	0.002	-0.005
	(-2.222)	(-2.212)	(0.402)	(-0.774)
FirmAge	0.019 **	0.020 **	0.020 ***	0.025 ***
	(2.073)	(2.152)	(3.082)	(3.698)
InsiderOwn	-0.143 ***	-0.145 ***	-0.227 ***	-0.241 ***
	(-2.694)	(-2.732)	(-6.210)	(-5.624)
Mills ratio	-0.018 *		-0.088 ***	
	(-1.754)		(-4.696)	
Adjusted R^2	0.14	0.14	0.37	0.26

Panel D: SEPARATION OF LEADERSHIP

Variable	Units		Shares only	
	Bias corrected	Uncorrected	Bias corrected	Uncorrected
Intercept	0.339 ***	0.401 ***	0.549 ***	0.380 ***
	(3.292)	(4.840)	(5.544)	(4.578)
InsiderOwn	-0.368 **	-0.365 **	0.248	0.265
	(-1.977)	(-1.990)	(1.382)	(1.371)
VC	0.160	0.191	-0.011	0.066
	(1.091)	(1.313)	(-0.130)	(0.791)
CEOfounder	0.033	0.026	-0.293 ***	-0.278 ***
	(0.411)	(0.324)	(-4.034)	(-3.576)
Mills ratio	-0.129		-0.251 ***	
	(-1.038)		(-3.212)	
Adjusted R^2	0.02	0.02	0.12	0.06

Table 12: OLS REGRESSIONS continued

Panel E: BLOCKHOLDER PRESENCE

Variable	Units		Shares only	
	Bias corrected	Uncorrected	Bias corrected	Uncorrected
Intercept	0.157 ***	0.178 ***	0.268 ***	0.251 ***
	(2.862)	(3.244)	(4.757)	(4.055)
InsiderOwn	-0.420 ***	-0.420 ***	-0.290 ***	-0.294 ***
	(-5.355)	(-5.352)	(-5.628)	(-5.792)
ReturnVar	0.043	-0.056	-0.673	-0.662
	(0.410)	(-0.561)	(-1.551)	(-1.548)
Zscore	-0.002 *	-0.001	0.001	0.001
	(-1.717)	(-1.382)	(0.410)	(0.722)
GrowthOpps	0.001	0.001	0.011 *	0.009
	(1.157)	(1.140)	(1.925)	(1.574)
FirmAge	0.014	0.017 *	-0.010	-0.008
	(1.472)	(1.760)	(-1.072)	(-0.881)
Mills ratio	-0.049 **		-0.023	
	(-2.007)		(-1.031)	
Adjusted R^2	0.27	0.26	0.21	0.21

Panel F: DEBTHOLDER PRESENCE

Variable	Units		Shares only	
	Bias corrected	Uncorrected	Bias corrected	Uncorrected
Intercept	0.281	0.283	1.465 ***	1.279 ***
	(1.251)	(1.234)	(3.094)	(2.730)
InsiderOwn	-0.187	-0.184	-0.800	-0.791
	(-0.749)	(-0.738)	(-1.591)	(-1.520)
ReturnVar	-1.281 *	-1.301 **	-9.294 *	-10.404 **
	(-1.899)	(-2.042)	(-1.842)	(-2.110)
Zscore	0.008	0.008	0.014	0.021
	(0.827)	(0.811)	(0.728)	(1.154)
RD	-0.009	-0.008	-1.170 **	-0.805 *
	(-0.358)	(-0.346)	(-2.124)	(-1.695)
FirmAge	0.036	0.037	0.008	0.020
	(1.001)	(1.078)	(0.104)	(0.276)
CFtoSales	0.001	0.001	0.020 **	0.018 *
	(1.024)	(0.928)	(2.033)	(1.879)
Mills ratio	-0.010		-0.240	
	(-0.123)		(-1.270)	
Adjusted R^2	0.00	0.00	0.11	0.11

Table 13: SWITCHING RESULTS

Comparison of average expected values of governance mechanisms if the firms used the actual offering type vs. the alternative. The rows labeled *If firms issued warrants* represents the average expected value of the governance mechanism when assuming that all firms issued units at the IPO, using the vector of estimated coefficients from Eq. (9) for the unit IPO sample. The rows labeled *If firms issued shares only* represents the average expected value of the governance mechanism when assuming that all firms issued shares only at the IPO, using the vector of estimated coefficients of Eq. (8) for the shares-only IPO sample. The coefficient vectors determined for the two-stage and the OLS regressions are applied to Eq. (2) and Eq. (3) using the data for all firms and for each set of firms.

	Two-Stage Estimates				OLS Estimates		
	All firms	Unit IPO firms	Shares-only IPO firms		All firms	Unit IPO firms	Shares-only IPO firms
BOARD SIZE							
If firms issued warrants	4.61	4.61	4.60		5.20	5.20	5.20
If firms issued shares only	7.13	7.10	7.15		6.21	6.23	6.19
BOARD INDEPENDENCE							
If firms issued warrants	0.386	0.360	0.412		0.379	0.354	0.404
If firms issued shares only	0.413	0.384	0.442		0.451	0.426	0.475
OUTSIDER EQUITY OWNERSHIP							
If firms issued warrants	0.033	0.025	0.040		0.043	0.035	0.051
If firms issued shares only	0.131	0.133	0.129		0.070	0.055	0.084
SEPARATION OF LEADERSHIP							
If firms issued warrants	0.273	0.242	0.305		0.341	0.306	0.377
If firms issued shares only	0.508	0.518	0.497		0.368	0.368	0.368
BLOCKHOLDER PRESENCE							
If firms issued warrants	0.092	0.086	0.098		0.121	0.113	0.129
If firms issued shares only	0.133	0.139	0.127		0.117	0.119	0.115
DEBTHOLDER PRESENCE							
If firms issued warrants	0.330	0.289	0.367		0.336	0.295	0.374
If firms issued shares only	0.583	0.324	0.818		0.458	0.197	0.694

Chapter 3: WARRANTS, OWNERSHIP CONCENTRACTION, AND LIQUIDITY

1. Introduction

Issuing equity represents one method of raising capital employed by firms. When managers decide to issue shares of stock, they must consider the effects the new shares have on the trading of the firm's stock. A more diffuse shareholder base leads to greater stock liquidity because more equity holders exist to participate in the market. Conversely, a more concentrated shareholder base results in lower liquidity because of the reduced number of stock owners. Kothare (1997) shows in her study of rights offerings versus public underwritten offerings (SEOs) that the method of equity issuance affects the liquidity of the issuing firm's stock through its effect on the ownership concentration of the firm. In addition to rights offerings and SEOs, there are other methods of raising capital available to firm managers. This essay examines a widely-used fundraising instrument – the common stock purchase warrant – and its effects on the liquidity of the firm's underlying stock through the change in ownership concentration.

Firms offer warrants through various issue methods, as part of public offerings and private placements and as part of stock and debt offerings. Depending on the method of issue, warrants may alter the ownership structure of the firm through their exercise. When managers consider adding warrants to an equity or debt offering, they must weigh the potential consequences that an ownership structure change has on the liquidity of the firm's stock.

This essay examines the liquidity effects of warrant exercise for firms issuing warrants with other securities from 1994 through 2004. I use a hand-collected dataset to identify firms that issue warrants as part of equity offerings, including the initial public offering (IPO), secondary equity offering (SEO), rights offering, private placement of stock, and preferred stock offering. I also examine firms that issue warrants as part of public and private debt offerings. Because firms also raise funds publicly and privately, the dichotomy of public warrants and private warrants is also investigated The relation between the ownership structure of the firm and stock liquidity is compared using various estimation periods before warrant exercise to the structure and liquidity after exercise for each warrant issuance method.

For firms that issue warrants I find that ownership structure becomes significantly less concentrated after warrant exercise, consistent with the ownership concentration change following public underwritten SEOs in Kothare's sample. The change in outside ownership, although not statistically significant, increases, suggesting that equity ownership transitions from internally owned to externally owned following warrant exercise. Because the outside ownership change is not significant, the concentration of ownership overall is becoming more diffuse. This pattern prevails for the full sample of firms, firms issuing equity with warrants, firms raising capital in the public markets, and firms issuing warrants in an IPO. These results are consistent with the hypothesis that ownership concentration will decrease following the warrant exercise when the warrants are issued as part of a public offering.

For private placements that include warrants, inside ownership decreases while the holdings of external blockholders increase. Unlike the public offerings with warrants,

however, the beneficial ownership change also increases, indicating that ownership concentration overall is increasing. These results are consistent with the hypothesis that ownership concentration will increase following the warrant exercise when warrants are issued as part of a private placement. This conclusion is tempered, however, by the small sample size of private placements in this study.

While Kothare (1997) finds a significant decrease in ownership concentration for SEOs, I find an increase in ownership concentration (including inside and outside equity ownership) following warrant exercise for warrants issued in an SEO. This result is not consistent with the hypothesis related to public offerings, but also requires a review of incentives of managers deciding to include warrants as part of an SEO. While the original equity issue decreases concentration, the subsequent exercise of warrants increases ownership concentration.

Despite the significant change in the ownership structure of the firm, the liquidity of the issuing firm's stock, as measured by spreads and depths, does not significantly change. The directional change of these metrics is towards decreased liquidity, inconsistent with the predictions of the literature. The magnitude of change in the fractional holdings of beneficial and inside stockholders in the IPO firms of my sample is quite comparable to the same measures employed by Kothare, confounding the results further. Additional measures of liquidity, specifically trading volume, trade size, dollar volume, and Amihud's (2002) illiquidity measure, change in opposing directions that are not statistically significant, providing little help in drawing conclusions regarding the effects of ownership concentration effects on stock liquidity.

I also compare my results to those of Amihud, Lauterbach, and Mendelson (2003), who examine the change in liquidity of firm stock on the Tel-Aviv Stock Exchange following warrant exercise. They find that the dollar traded volume for a firm's stock increases following warrant exercise, indicating an increase in liquidity. I also show an increase in dollar traded volume after warrant exercise, but this result is tempered by the lack of direction from the bid-ask spread data.

Consistent with the hypothesis that a negative relation exists between the change in ownership concentration and the change in the issuing firm's stock liquidity is found using cross-sectional regressions. Ownership concentration is measured using inside ownership and liquidity is measured by the number and size of trades in the market. This relation is not statistically significant for other measures of ownership concentration and liquidity.

This study contributes to the security issuance, ownership, and liquidity literatures by examining the effects on stock liquidity through changes in ownership structure caused by warrant exercise. To my knowledge, this is the first study that investigates warrants in the various methods of issuance, and also the first study to examine the liquidity effects of warrant exercise in the U.S. market. Studying various forms of capital raising methods available to firms and their consequences broadens the understanding of the decisions and motivations facing managers. The significance of this study applies directly to the choice of security design and its influence on firm value through liquidity and ownership structure effects.

2. Literature review

The motivation for this study originates from the ownership structure and liquidity relation findings of Kothare (1997). To establish a stronger link between our two studies, a review of the equity financing paradox is in order. This paradox is reviewed in the next section, followed by the basic premise of my study, the relation between ownership structure and the liquidity of firm stock.

2.1. Equity offerings and the financing paradox

The equity financing paradox describes the preponderance of underwritten equity offerings despite the significantly lower issuance costs associated with rights offerings. Several studies attempt to explain this anomaly. Smith (1977) documents the average total flotation costs as a percentage of proceeds for underwritten equity offerings at 6.17%, nearly three times the 2.45% average for rights offerings. Smith's proposed solution to the paradox concerns the costs of monitoring management. Underwriters act as additional monitors of managers, offsetting the increased costs associated with underwritten offerings.

Hansen and Pinkerton (1982) contend that firms using underwritten equity offerings are systematically different from firms using non-underwritten rights offerings. Firms issuing equity via a rights offering are more likely to have a large blockholder, either internal or external to the firm. The average block ownership within their sample of rights offerings firms is 61%. The authors compare the monitoring cost hypothesis of Smith (1977) to a comparative cost hypothesis, which predicts that flotation costs will fall as ownership control increases. They compare flotation costs of direct offerings to

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predicted flotation costs of underwritten offerings at the higher levels of centralized control typical of direct offering firms and find that the expected costs of underwritten offerings are significantly less than the actual costs of direct offerings. Hansen and Pinkerton show that actual flotation costs for an offering between $50M and $100M is $0.04 per dollar raised. With centralized control of the firm, similar to the typical rights offering firm, predicted flotation costs increase to $0.10 per dollar raised. Based on the comparative cost hypothesis, only firms with a more concentrated ownership structure benefit from a rights offering.

Hansen (1989) extends the analysis of the equity financing paradox by examining underwritten equity offerings versus underwritten rights offerings. Unlike the firms in Hansen and Pinkerton (1982) issuing non-underwritten rights, firms that use the underwritten variety have a more disperse ownership structure, eliminating the greater expected subscription rate, or "take-up", by the large shareholder. An abnormal price drop of four percent occurs prior to the subscription period of the rights offering, incurring additional costs to shareholders who sell the rights or the new shares obtained from exercising the rights. The author attributes the price drop to transaction costs incurred by the non-intermediated sale of equity that occurs in rights offerings. With public underwritten offerings, the intermediary receives compensation directly for the costs of finding buyers, holding securities, and clearing trades. Alternatively, shareholders act as intermediaries in rights offerings and must attract buyers when selling their rights or balancing their portfolios, resulting in a temporary price drop. The cost increase from the price drop more than offsets the paradoxical difference between firms

issuing equity via rights offerings and firms issuing equity via public underwritten offerings.

The structure of ownership in Hansen and Pinkerton (1982) and the underwriter advantage in Hansen (1989) receive further scrutiny by Eckbo and Masulis (1992). Controlling for ownership, Eckbo and Masulis find that the cost differential associated with the paradox persists. The authors contend that rights offerings are more costly than public underwritten offerings because underwriters provide certification of the offering, reducing the costs of asymmetric information between shareholders and managers described by Myers and Majluf (1984). To explain the use of rights offerings, Eckbo and Masulis claim that the expected "take-up", which may play a substitution role for underwriter certification, is higher in firms with a more concentrated ownership structure. Diffusely held firms are more likely to use underwritten equity offerings.

Using a unique dataset of rights and firm commitment offerings from the 1930s and 40s, Burch, Christie, and Nanda (2001) examine the trend of the preferred methods for firms to raise needed capital. Rights offerings once dominated over the firm commitment offering, and firms favoring these direct equity offerings were larger, had higher market-to-book ratios, higher return on assets, and lower debt levels. Burch, et al. document three trends that support the shift from rights offerings to public underwritten offerings. First, ownership concentration has significantly declined. The literature shows that a firm with a more dispersed ownership structure is more likely to issue equity through a public underwritten offering. Second, underwriting fees have declined dramatically, which has made the underwritten offering more attractive compared to the direct offering method. Third, the use of debt to finance firm needs has grown

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substantially. The larger, "healthier" firms that once favored rights offerings increasingly opt for debt offerings, taking advantage of lower debt underwriting costs and the benefits of financial leverage.

The literature on the equity financing paradox following Kothare (1997), highlighted in the next section, has substantially decreased in frequency. Hansen and Pinkerton (1982) note that the equity financing paradox receives distinction as one of the ten unsolved problems noted by the widely used Brealey-Myers texts. In their seventh edition, cost comparisons of the two offering methods are noticeably absent from the text, including the venerable unsolved list (Brealey and Myers, 2003). Despite the recent lack of attention to the equity financing paradox, much can still be learned about the various methods firms employ to obtain needed funds.

2.2. Ownership concentration and liquidity

Kothare (1997) argues that rights offerings impose other costs on the issuing firm, making them less desirable as a financing method. She finds a reduction in liquidity of the issuing firm's stock following the rights offering while liquidity increases following public underwritten offerings. These changes in liquidity correlate with changes in the ownership structure of the firm. With rights offerings, existing shareholders gain the rights to obtain additional shares of firm stock. If the current shareholders retain and exercise their rights, the additional shares offered by the firm remain in the hands of existing shareholders and the ownership concentration of the firm will increase. Conversely, ownership concentration decreases with public underwritten offerings, barring any major block purchases by existing shareholders. The firm offers the

additional shares to the public market, substantially decreasing the likelihood that existing shareholders can hoard the new shares. Kothare's sample confirms the resulting changes in ownership concentration following the different equity offering methods. Based on these findings, managers take the ownership structure of the firm into consideration when determining the characteristics of the security offered in the market.

With a more concentrated ownership structure, fewer shareholders exist to participate in trading, reducing the liquidity of the firm's stock (Demsetz, 1968). In addition, market makers increase their spreads to offset the greater likelihood of trading against informed investors. Holmstrom and Tirole (1993) contend that higher ownership concentration leads to greater information asymmetry because of the reduced presence of stock market participants of the firm, resulting in greater spreads from the higher adverse selection costs. Less liquidity from larger spreads means greater costs for firms issuing equity with a rights offering, providing a potential solution to the equity financing paradox. Investors holding stocks with larger spreads require higher rates of return to compensate for the higher expected costs of trading (Amihud and Mendelson, 1986).

Heflin and Shaw (2000) examine the level of ownership concentration as represented by holders of large blocks of a firm's stock. The authors find that as the equity fraction held by blockholders increases, liquidity decreases, the informed component of the spread increases, and trading depth decreases. While Shleifer and Vishny (1986) argue that large shareholders help monitor management, increasing firm value, the presence of large blockholders reduces the liquidity of the firm's stock.

The research discussing the relation between ownership concentration and stock liquidity imply that the method used to raise capital is significant in its effects on the

trading activity of the firm's common stock. Liquidity changes directly affect the value of the firm via the cost of capital. These implications provide further motivation to continue to pursue knowledge on different methods of raising capital by firms. My analysis encompasses several security offering types, including equity and debt offerings. Previous literature provides hints as to how ownership structure and liquidity may change based on the type of offering, but this study provides the first look at how ownership structure changes affect liquidity following the exercise of warrants.

2.3. Warrant exercise and liquidity

Amihud, Lauterbach, and Mendelson (2003), in a paper closely related to my research question, examine the exercise of warrants on the Tel-Aviv Stock Exchange and its effects on the liquidity of a firm's stock. Their study looks at stock and warrants deep in the money at expiration. At the expiration date, trading of the two securities consolidates as the firm issues additional shares against the expiring warrants. The warrant exercise is fully anticipated since the expiration date is known to market participants. This institutional structure provides an effective test of the liquidity effects of the trading consolidation of a firm's securities. The authors find stock liquidity improves and stock prices appreciate on average following warrant exercise. My study applies the Amihud, et al. argument to the U.S. market, using the link between ownership structure and stock liquidity from Kothare (1997).

3. Testable hypotheses

The issuance and subsequent exercise of warrants alter the ownership structure of the firm in different ways. Issuing warrants as part of an overall equity or debt offering does not alter the structure of ownership around the date of issue. When warrantholders exercise their warrants, ignoring the possibility of warrant hoarding, the number of shareholders remains the same while the fractional holdings by insiders and blockholders decrease. As an example, let us assume firm XYZ has two million outstanding shares, 30% owned by a controlling blockholder and 70% held diffusely by market investors. Firm XYZ requires capital and decides to issue an additional one million shares together with one million warrants through a public SEO. Each warrant is exercisable for one share of stock at some future date. Assuming the market diffusely purchases all of the offered shares, the ownership structure of XYZ has changed from 30/70 before the offering to 20/80 after the offering. Firm XYZ's stock price increases during the life of the outstanding warrants and eventually exceeds their exercise price. All warrant holders exercise to obtain one share per warrant. The ownership structure of firm XYZ has now changed from 20/80 before warrant exercise to 15/85 after warrant exercise, assuming that the initial buyers at the offering retain the warrants from issue through exercise. Considering this scenario, the ownership concentration of a firm will decrease following warrant exercise for public offerings.

In private placements, there are fewer recipients of warrants compared to public offerings. Modifying the assumption of a diffuse purchase to a targeted offering of 100,000 shares to the controlling blockholder, the ownership structure of firm XYZ has changed from 30/70 before the offering to 33/67 after the offering. After warrant

exercise, the ownership structure changes to 36/64. Considering this scenario, the ownership concentration of a firm increase following warrant exercise for private placements.

> *Hypothesis 1*: For public offerings, ownership concentration will decrease following warrant exercise.

> *Hypothesis 2*: For private placements, ownership concentration will increase following warrant exercise.

When warrant holders exercise their holdings, the liquidity of the issuing firm's stock changes. The different effects of warrant issuance and exercise on the ownership structure provide a new test of the relation between ownership concentration and liquidity. Consistent with Kothare (1997) and others, a decrease in ownership concentration following warrant exercise will lead to increased liquidity in the firm's stock.

> *Hypothesis 3:* A negative relation exists between the change in ownership concentration following warrant exercise and the change in liquidity of the issuing firm's stock.

Wruck (1989) analyzes private placements of equity and finds a correlation between the change in firm value and the change in ownership concentration resulting from the equity sale. Similar to the nonlinear relation between ownership and firm value from Morck, Shleifer, and Vishny (1988), the relation between firm value and ownership concentration changes from positive to negative at 5%, then back to positive at 25%. The purchaser of the equity also plays a role. If the purchaser gains a controlling interest in the firm, gains a seat on the firm's board of directors, or yields authority to firm

management, the marginal effect on firm value is negative. Wruck's finding that ownership becomes more concentrated following a private placement of stock suggests that, based on the extant literature, the liquidity of the firm's stock will decrease. Qian (2005) finds evidence to the contrary, showing that liquidity subsequent to a private placement does not significantly differ from pre-placement liquidity. Despite this conflict related to private placements, the third hypothesis should hold for both public offerings and private placements.

4. Data

The dataset consists of several components, each representing a different method of issuing warrants by firms. I download all domestic unit issues by public firms from Thomson Financial's *SDC New Issues* database that occur between 1994 and 2004. Table 1 describes the SDC sample, which includes 512 public offerings and 201 private placements, all issuing warrants as part of the security package. IPOs make up over 70% of the public offering sample and 50% of the total sample.[9] Equity offerings with warrants are more frequent than debt offerings with warrants with a ratio of 9 to 1 (this ratio does not include the "other" category of private placements, which includes issuances of more than one type of security and issuances missing SEC data). I eliminate firms without available SEC filings, firms with warrants unexpired as of December 31, 2005, and firms with missing CRSP data. The final sample is dominated by public equity offerings, especially IPOs, which account for 70% of all offerings (120 of 172).

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[9] As in Howe and Olsen (2006), the initial IPO sample includes corrections from Jay Ritter's IPO website and from review of prospectuses. Prospectuses prior to May 6, 1996, are largely unavailable online, requiring a review of subsequent SEC filings to fill holes in the data.

For each firm, I review annual reports for every year, beginning with the year of the security offering until warrantholders exercise their holdings or the warrants expire, to develop a timeline of warrant exercise, redemption, or expiration. Initially, I used *Factiva* and *Lexis/Nexis* to identify announcements of changes in expiration date or notices of warrant redemption. Further scrutiny revealed that these sources fail to capture all warrant changes, most notably the silence of firms when warrants expire unexercised. Relying solely on the business-related announcements provided by sources such as *Factiva* without reviewing annual reports for each firm throughout the life of the warrant would lead to a sample set wrought with errors.

4.1. Proceeds and equity fraction offered

Table 2 provides a description of the security issues, detailing the proceeds expected from the offering and the fraction of the firm's total equity offered as warrants. The breakdown in proceeds received by the firms differs based on the method of offering and if the warrants are exercised. As described in Panel A, for the average firm in our overall sample receives more funds at the initial offering ($14.33M) than expected following warrant exercise ($10.47M). This relation holds true for the group of firms issuing debt. When distinguishing between public offerings vs. private placements, firms receive more at the initial offering than expected after exercise of the warrants. By contrast, firms issuing equity and warrants expect to receive a larger fraction of proceeds following warrant exercise ($10.74M) than at the initial offering of the equity ($8.82M).

For those firms whose warrants are exercised, the firm receives more at the initial offering for the entire sample, the debt group, and the public and private groups. The

firms offering debt exhibit a 13 to 1 ratio of funds received at the offer to the funds received after warrant exercise. The average firm issuing equity and obtaining warrant exercise receive $9.80M following exercise compared to $8.21M after the initial equity issuance. When comparing the groups of firms, as Table 2 shows, debt issuers and private issuers receive a smaller fraction of proceeds following warrant exercise because the firms offer a much smaller fraction of the firm's equity as warrants. The average firm in the entire sample offers more than 40% of the firm's equity as warrants, while the average debt and private issuers offer 12.5% and 10.8%, respectively, of firm equity as warrants.

As I dissect the groups further, a similar pattern emerges. In Panel B, the average firm seeking capital using equity in public markets expects to receive more following warrant exercise than at the initial offering. For those firms reaching exercise, the relation holds. The two firms in my sample offering preferred stock are exceptions, receiving fewer funds following warrant exercise. The public debt offering follows the same pattern as described for the entire debt group, with a considerably larger fraction of the proceeds emanating from the initial offering of debt compared to the subsequent exercise of the warrants. The relation between the warrant proceeds and the fraction of equity represented by the warrants seen in the top-level groups repeats here. Warrants in the preferred stock and debt offerings represent 9.5% and 16.5% of the firm's equity, while this percentage ranges from 25% to 51% for common stock offerings. For the IPO sample, firms offer a larger fraction of the firm compared to SEO firms.

Panel C of Table 2 describes firms offering warrants as part of a private placement. For each method of private placement, firms receive more following the

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initial offering than after warrant exercise. The difference between the two events is greater for the private placements of preferred stock or debt as firms receive much less after warrant exercise than at the initial offering. As before, this relation is because of the smaller fraction of equity offered as warrants. One break in the pattern is evident when examining the private common stock offerings. Unlike the public equity offering, private common stock issuers offer a smaller fraction of the firm's equity as warrants. While IPOs offer 51% and SEOs offer 34% of their equity as warrants, private common stock issuances offer 6% of their equity as warrants.

4.2. Firm characteristics

Table 3 reviews the characteristics of firms with warrants that have been exercised for each offering method, statistically comparing firm traits for the year before warrant exercise to the year following exercise. For the full sample and the top-level groups (equity and debt, public and private) in Panel A, the market value of equity increases, reflecting the higher price for the shares (or else warrant exercise would not have been achieved). The amount of total assets significantly increases for the average firm, which is expected as the firm receives cash proceeds from warrant exercise. Overall, firms in the sample groups increase their debt ratios. For the full sample the leverage ratio (debt/asset) increases from 0.53 to 0.56, and the debt/equity ratio increases from a negative 0.51 to a positive 0.20. The increase in the debt ratios occurs as book values of assets and equity increase. The average firm appears to take on a large increase of debt over the warrant exercise period. Only the leverage for the debt offering group

experiences a decrease in its debt ratios, perhaps indicating the debt offering and warrant exercise sufficiently feeds its capital requirements.

Revenues increase, reflecting the improved performance of the firm rewarded by the market, evidenced by the ability of holders to exercise their warrants. The performance of the firms in my sample is quite poor before and after warrant exercise. While firms are able to increase their revenues, they are still poor performers, and in many cases firm performance degrades further. For the full sample, ROA, ROE, and EPS decline following warrant exercise despite an improved profit margin. The debt issuers are able to significantly improve ROA and increase their EPS and profit margin, but the average ROE changes from positive to negative after warrant exercise.

While the market value of the firm increases with each group in Panel A of Table 3, the book value of equity increases to a greater degree, reflected in the decrease in the market-to-book (MTB) value of the firm for the full, equity, and public offering samples. The debt offering and private placement samples show large increases in MTB after warrant exercise.

Patterns similar to the top level groups emerge as the issuance method is divided into public offerings and private placements. The relations within the public offering groups are largely unchanged from the upper level group. A change occurs as we examine the private placement methods, although the small sample size prevents generalization. Similar to all debt offerings and the public debt offering, the common stock private placements experience a decrease in the debt ratios, implying that no additional capital is required beyond the warrant exercise. Unlike the public offerings of equity, the common equity private placement sees an increase in the MTB ratio.

Following exercise of private placement warrants, the firm's market value increase outpaces the increase in the firm's book value of equity. This is very evident in the somewhat anecdotal evidence of the single preferred stock private placement, where the market value of equity decreases and yet the MTB ratio still experiences a sharp increase in magnitude.

Summarizing the characteristics of firms with exercised warrants, it appears that the market is not rewarding the firms for reaching the warrant exercise stage. Although the stock price has increased to allow the exercise, the MTB ratio in general decreases dramatically for the firms in my sample. The lack of performance improvement or, more appropriately for most of the sample, the continued degradation in performance likely plays a role in the market's assessment of these firms. Offerings of debt and private placements are the exception as these firms experience an increase in the MTB ratio while their efficiency ratios remain relatively poor. If the market values firms based on their improvement in future earnings, firms that offer any debt or private equity show an increase in EPS following warrant exercise while most of the other groups show a decrease.

A final note must be made regarding the preceding review of firm characteristic data. When examining the different offering methods, only the IPO group has a large enough sample size allowing such analysis, while the SEO group has a dozen firms in its group. By examining the top-level groups, we can learn some general trends and relations, but we must remain cautious of generalizing every result to the broader population of warrant offerings.

5. Changes in ownership structure

I quantify ownership concentration using three measures employed by Kothare (1997). The first measure, beneficial ownership, represents the aggregate fractional holdings of all owners, internal and external to the firm, of at least five percent of the firm's outstanding shares. The second measure, inside ownership, represents the aggregate fractional holdings of managers and directors of the firm. The third measure, the number of shareholders, represents the number of registered holders of a firm's stock. I add a fourth measure, outside ownership, which represents the aggregate fractional holdings of all external owners that hold at least five percent of firm equity. Ownership data comes from SEC filings before and after warrant exercise. Compustat provides the number of shareholders data.

Table 4 describes the changes in ownership structure for the sample, comparing before to after warrant exercise. For the full sample, beneficial and inside holders of firm equity experience a significant decline in their fractional holdings following warrant exercise. The average beneficial shareholder's equity fraction decreases from 0.396 to 0.324, and the average insider's fraction decreases from 0.332 to 0.257. The average number of registered shareholders increases by more than 100%, although the median change is not significant. The average outside ownership increases by 0.025, but the change is not significant. These results imply that the change in beneficial ownership is driven by the inside ownership change. These patterns repeat themselves with the equity offering group and the public offering group, with varying levels of statistical significance. The fractional holdings by large blockholders is significantly decreasing, reflecting the increased dispersion of the firm's shares following warrant exercise.

The results support my first hypothesis, which predicts that ownership concentration will decrease following warrant exercise in public offerings. The concentration of equity ownership among outsider blockholders is increasing, but not significantly. Adding the shift in outside equity ownership, the ownership structure for the entire sample, the equity offering group, and the public offering group is shifting from internally- to externally-owned.

The change in ownership concentration for private placements that include warrants is not significant largely because only five firms exist in the sample with exercised warrants. Directionally, however, the average firm experiences an increase in the equity fraction owned by beneficial and outside shareholders. Inside owners own less following warrant exercise. The trend represents a shift from concentration of share ownership inside the firm to concentration outside the firm. These results are consistent with my second hypothesis, which predicts an increase in ownership concentration following warrant exercise in private placements. Despite the trends that show an increase in ownership concentration in the hands of equity holders external to the firm, the lack of statistical significance caused by the small sample of private equity firms tempers the development of any strong conclusions.

Referring to Table 4 Panel B and the public issues, the IPO group is the only issuance method with a large enough sample size to make any conjectures, and the group follows with the pattern for the entire sample, firms that issue equity, and public offering firms described above. Beneficial ownership decreases from 0.427 to 0.312, and inside ownership decreases from 0.378 to 0.260, with both changes being statistically significant at the 1% level. The number of shareholders and the equity fraction held by outside

shareholder both increase, albeit without statistical significance, but mirroring the trends of the upper level groups of firms. Overall, the IPO sample group agrees with my first hypothesis in that public offerings exhibit a decrease in ownership concentration.

5.1. Comparison to Kothare (1997)

The SEO group provides several interesting observations. Although only twelve SEO firms exist in the sample, all three measures of fractional ownership indicate an increase in the concentration of ownership. This finding is inconsistent with my first hypothesis, but of more interest is in comparison to the findings of Kothare (1997). Table 5 provides a look at Kothare's results compared to my sample. The contents of Table 2 from Kothare (1997) are repackaged in Table 5 Panel A. The rights offerings in Kothare's sample result in an increase in ownership concentration, reflected in the increase in beneficial and inside ownership (both changes are not statistically significant). By contrast, the public underwritten offerings (SEOs) show a statistically significant decrease in ownership concentration, as measured by the decrease in beneficial and inside ownership and the increase in the number of registered shareholders.

In Table 5 Panel B, my results provide a twist on the results of Kothare. In the entire sample and the IPO offering group, the ownership by beneficial and inside equity holders significantly decreases in similar fashion to Kothare. Indeed, the change in the equity fraction for Kothare's SEO sample and my IPO sample is very comparable. For beneficial owners, fractional holdings decrease by 0.123 for Kothare and 0.115 for me. For inside owners, my sample shows a decrease in fractional holdings of 0.118 while Kothare shows a decrease of 0.101. Although Kothare considers equity only and I focus

on warrant exercise following an equity offering, the scenarios provide comparable results. At the IPO, new shares from the issuing firm are dispersed to potential new investors in the market. If the IPO includes warrants, the new investors will also hold the warrants in their portfolios. As described using an example previously, if these new investors retain their warrants through exercise, the concentration of ownership will decrease even further following exercise.

For an SEO of equity only, shares are diffusely sold to the market, resulting in a decrease in ownership concentration. If the SEO also includes warrants, the preconception is that this scenario should emulate the exercise of warrants following an IPO. However, what I find is that ownership concentration *increases* following warrant exercise when warrants are issued in an SEO. This result suggests that existing shareholders are purchasing the initial packages of warrants and equity offered at the SEO, buying warrants from other warrantholders during the trading period of the warrants prior to expiration, or both. Beneficial, inside, and outside ownership fractions increase by 0.075, 0.035, and 0.031. These changes are not statistically significant, but the trend directly opposes the expectation described above. This result is not consistent with the hypothesis related to public offerings, but also requires a review of incentives of managers deciding to include warrants as part of an SEO. While the original equity issue decreases concentration, the subsequent exercise of warrants increases ownership concentration.

5.2. Ownership change distributions

Figure 1 and Table 6 details the distributions of the changes in ownership for each offering method. By reviewing how the changes in ownership data are distributed, I may learn more about the different offering methods and their effects on ownership structure than I could by studying only the mean changes. The *All offerings* panel shows that while the mean change is negative (and, recall from Table 4 for the beneficial and inside ownership change, statistically significant), approximately 25% of the sample for the ownership metrics is positive. As depicted in the histograms in Figure 1, high outliers may exist for each ownership change metric. However, if these potential outliers are removed from their respective samples, the results to not change. For the beneficial and inside ownership changes, removing the possible outliers provides stronger results because the mean change is statistically significant and negative at the start. For the change in outside ownership, while the mean change is not statistically significant, the removal of the maximum value of 0.605 still provides a positive mean change of 0.009 (0.025 for the full sample). The *Issued with Equity* and *Public offerings* reflect the same relations as these groups dominate the number of observations in the sample. The debt offering has a large range of values, but only five firms in the sample, preventing any strong conclusions from being drawn.

One noteworthy discovery occurs as I compare the *Public offerings* to the *Private placements* of Table 4. I find that the range of the ownership changes is larger for the public offerings than for the private placements. The range of change in beneficial ownership for public offerings is 0.968 (-0.499 to 0.469) compared to 0.336 (-0.096 to 0.240) for private placements. The change in inside ownership ranges 0.973 (public) vs.

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0.021 (private), and the outside ownership ranges 0.874 (public) vs. 0.253 (private).

Private placements appear to have a lesser effect on the change in ownership

concentration than have public offerings.

The maximum values for the change in beneficial and insider ownership noted in

the full sample are from firms that issue warrants as part of an SEO. Recall from above

that SEO-issuing firms experience an *increase* in ownership concentration following

warrant exercise, opposite the results for IPO-issuing firms. Reviewing the distribution

for SEO firms shows that about 50% of the sample has positive ownership fractional

changes. One firm in the SEO group is responsible for the maximum beneficial and

inside ownership changes. Removing this firm from the sample changes the inside

ownership mean change from a positive 0.035 to a negative 0.009, requiring the need for

caution when attempting to make any conclusions about this set of firms.

5.3. Dramatic changes in ownership

Further review of the individual firms and their respective fractional ownership

changes following warrant exercise reveals several dramatic shifts in the concentration of

ownership, summarized in Table 7. Thirteen of the 69 firms in the full sample have

changes in at least one of the ownership metrics greater than 25% of fractional equity

holdings. Ten of these occur with IPOs, and 9 of 10 show a resultant shift towards

greater ownership dispersion, i.e., a negative change in fractional holdings by

blockholders internal and external to the firm. The single exception in the IPO sample is

a shift from internal blockholders to external blockholders, with the outside owners

gaining a majority of the firm's outstanding equity with the warrant exercise.

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Two SEOs and one public debt offering have a resultant change of ownership that is positive, opposite the dramatic changes seen in most of the IPO firms. As seen earlier, warrant exercise following issuance via an SEO results in an increase in ownership concentration, and the two firms showing dramatic changes reflect resultant shifts of 0.340 and 0.292 fractional gains by firm insiders. The public debt offering shows outside owners gaining 60% of the firm just from the warrant exercise.

6. Changes in liquidity

Trades and quotes originate from the NYSE TAQ database. Consistent with the liquidity literature (e.g., Chordia, Roll, and Subrahmanyam (2001)), I eliminate quotes that occur outside normal trading hours, negative prices, negative bid-ask spread quotes, and negative quoted depths. I follow Lee and Ready (1991), ignoring quotes less than five seconds prior to a trade and retaining the first quote prior to this five-second window. I quantify the liquidity of a firm's stock using three categories – spreads, depths, and trading characteristics – averaged over various time windows before and after warrant exercise. For each firm's stock, I calculate the following measures:

Quoted spread	The difference between the bid and ask.
Proportionate spread	The quoted spread divided by the midpoint.
Effective spread	Two times the absolute value of the difference between the transaction price and the midpoint.
Proportionate effective spread	The effective spread divided by the midpoint.
Quoted depth	The size of the bid plus the size of the ask.
Dollar depth	The size of the bid times the bid plus the size of the

ask times the ask.

Number of trades	The total number of transactions.
Number of shares traded	The total number of shares traded.
Trade size	The number of shares traded divided by the number of trades (i.e., the number of shares per transaction).
Dollar volume	The trading volume in dollars, calculated as the stock price times the number of shares traded.
Price	The firm's stock price.
Return volatility	The standard deviation of daily returns.
Illiquidity	The ratio of the daily absolute return to the dollar trading volume.

To account for anomalous records in the TAQ database, I employ several filters of the data consistent with the liquidity literature, eliminating any records that satisfy the following conditions:[10]

Quoted spread	> $5
Effective spread / Quoted spread	> 4.0
Proportionate effective spread / Proportionate quoted spread	> 4.0
Quoted spread / Transaction price	> 0.4

Kothare (1997) compares average proportionate quoted spreads over a 100-day period before the ex-rights day for rights offerings and the offering date for underwritten

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[10] Chordia, Roll, and Subrahmanyam (2001) and Chordia, Sarkar, and Subrahmanyam (2005) are used as guides for the TAQ data filters.

offerings to the average spreads in the 100 days after these dates, inclusive of the rights

or offering date. In a similar manner, I measure pre-exercise average spreads, depths, and

trading volumes over a period of 90 days (i.e., days -100 to -10) and compare them to the

average post-exercise measures over 90 days after warrant exercise (i.e., days +9 to +99),

where day 0 represents the warrant exercise date.[11]

Amihud (2002) employs an illiquidity measure, defined as the ratio of the daily

absolute return to the dollar trading volume on a single day, averaged for one stock over

one year of trades. He describes this parameter as a measure of the daily price response

associated with one dollar of trading volume. I calculate the average illiquidity over the

pre- and post-warrant exercise periods, eliminating the top and bottom 1% of the

distribution as recommended by Amihud.

Kothare (1997), in her Table 1, shows a significant increase in the proportionate

bid-ask spread following rights offerings, and a significant decrease in the proportionate

spread following public underwritten offerings (SEOs). Table 8 provides results of

changes in the different liquidity measures in my sample following warrant exercise. For

the full sample of firms, the various spread, depth, and trading measures exhibit changes

that are not statistically significant. Expanding my view to each of the top-level groups

(equity and debt, public and private) does not provide any significant directions to help

address the overall research question. The entire sample and each group and offering

method within the sample do not provide significant values for any of the spread, depth,

or trading measures. Unfortunately, data limitations require an analysis of directional

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[11] I also quantify the liquidity measures across pre-periods [-100, -1], [-100, -6], [-200, -1], and
[-400, -1]; comparing them to post-periods [0, +99], [+5, +99], [0, +199], and [0, +399].

changes and trends to help provide any assessment of the effects of ownership structure change on the issuing firm's stock liquidity.

The general trend for the full sample is an increase in spreads and the dollar depth, implying that if liquidity of the issuing firm's stock is changing after warrant exercise, the change is towards reduced liquidity. These changes remain for the equity and debt offering groups as well as the public offering and private placement groups. While I cannot identify a statistically significant change, the apparent directional change definitively opposes the decrease in spreads found by Kothare in her SEO sample.

The trend for the trading characteristics is somewhat mixed and lacks statistically significant changes. The trading volume as depicted by the number of transactions, number of shares traded, and the trade size decrease, reflecting a directionally worse environment of trading for the full sample. Opposing this trend are the dollar volume, which increases, and the illiquidity, which slightly decreases. These measures point towards an improvement in liquidity of the issuing firm's stock. The relations for the full sample remain largely unchanged for the other subgroups, equity and debt plus public and private, and the individual offering methods.

At first glance, these results appear to contradict the findings of Amihud, Lauterbach, and Mendelson (2003), which shows that stock liquidity increases significantly following the exercise of warrants on the Tel-Aviv Stock Exchange (TASE). However, Amihud, et al. defines stock liquidity as the change in dollar trading volume pre- to post-exercise.[12] Using only the dollar trading volume as the measure for the

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[12] Amihud, Lauterbach, and Mendelson also use the implicit spread to measure liquidity. Roll (1984) shows that the autocovariance of stock returns provides a good estimation of the bid-ask spread. On the

liquidity of a firm's stock, my results also indicate an increase in liquidity for the overall sample and all subgroups of issuances, excluding only the offerings of preferred stock, both public and private.

In a manner similar to the change in ownership following warrant exercise, I examine the distribution of the changes in liquidity to obtain an understanding of the data beyond the change in the means of each variable. Table 9 provides details of the distribution for each liquidity variable for the full sample of firms. Unfortunately, a review of the maximum and minimum values and the quartile divisions for each variable indicates nothing extraordinary, forcing a review of the individual observations in the sample. The number of trades includes a large negative value that, when removed, retains a mean change of -307 compared to the original -2151. The most dramatic extremes are found in the dollar trading volume, with high and low values many times the typical range of volumes. Removing the extreme values succeeds in providing a number more representative of the sample, but does not change the overall effect of the change (the original change is $3.02M and the sanitized change is $0.24M).

7. Ownership effects on liquidity

For the full sample, as shown in Table 4, the concentration of ownership decreases when measuring the beneficial and inside stock holdings for a firm. According to my third hypothesis, I expect the liquidity of firm stock to increase with a decrease in ownership concentration. For example, the bid-ask spread (as one measure of liquidity) for the typical firm in my sample should decrease, reflecting an increase in liquidity of

TASE, the call auction method for stocks results in a single transaction each day, eliminating the possibility of measuring a more frequent bid-ask spread as I do in my study.

the firm's stock. The changes in liquidity, summarized in Table 7, do not support this hypothesis. My univariate results do not agree with Kothare's findings for rights offerings and public underwritten offerings.

I test further the negative relation between changes in ownership concentration and changes in the liquidity of the firm's stock supported by the literature by running OLS regressions to test if the changes found in the sample follow the predictions of the literature. I regress the change in liquidity, using the various measures, on ownership changes and other determinant variables. Benston and Hagerman (1974) and Stoll (1978) show that liquidity in a firm's stock is positively related to the stock's price and trading volume, and negatively related to the risk of the firm's equity. The functional relation I examine is depicted as *Liquidity = f (Ownership, Price, Volume, Volatility)*.

To agree with the literature, the liquidity measure for a firm's stock should improve, when the ownership fractions decrease (i.e., a negative change in ownership concentration). Table 10 describes the results of the OLS regressions for each liquidity measure as the dependent variable, divided into three panels to reflect the three different ownership change metrics. Kothare (1997) regresses the change in the proportionate spread on each of three ownership changes without additional determinant variables. While her regressions have reduced explanatory power compared to mine, she is able to obtain a statistically significant relation between the change in liquidity (albeit using only one measure) and the change in ownership of issuing firms. Unlike Kothare, I generally find no significant relation between the dependent liquidity variable and the independent ownership variable for the full sample firms.

Referring to the *INSIDE OWNERSHIP* Panel of Table 10, a significant coefficient (10% level) exists for the inside ownership change variable in the regressions for the number of trades and trade size. The two dependent variables are multiples of one another, explaining the two regressions with significant coefficients. Interpreting this result, an increase in ownership concentration of firm insiders (i.e., a positive change in inside fractional ownership) is related to a decrease in the trading volume of the firm's stock as measured by the size of trades in the market. This result is consistent with my third hypothesis, which predicts a negative relation between the change in ownership concentration following warrant exercise and the change in liquidity of the issuing firm's stock.

8. Conclusions

When managers choose to issue new equity, the decision has ramifications for the trading characteristics of the firm's stock. New equity issues change the ownership structure of the firm, which in turn influences stock liquidity. Kothare (1997) compares rights offerings and public underwritten offerings to show that a negative relation exists between concentration of the firm's ownership structure and the liquidity of an issuing firm's stock. I extend her analysis by examining the liquidity and ownership concentration relation for firms that issue warrants as part of debt and equity issues, both public and private.

The exercise of warrants alters the ownership structure of the firm. This effect is strongest in firms that issue warrants as part of equity offerings, public offerings, and in IPOs. The hand-collected warrant sample in this study indicates that offerings that

include warrants experience a significant decrease in the concentration of ownership of the issuing firm following warrant exercise. Also, firms issuing warrants within private placements see an increase in ownership concentration, particularly equity held outside the firm, following warrant exercise. The private placement change in ownership concentration is not statistically significant.

I find mixed results when examining the relation between ownership concentration change and the resulting change in liquidity in the issuing firm's stock. Kothare (1997) finds a statistically significant negative relation using the proportionate spread as the measure of liquidity. Various spread and depth metrics provide non-significant results in my sample, although the directional tendency is towards decrease in stock liquidity. Also, trading volume measures and Amihud's (2002) illiquidity measure move in opposite directions. Employing cross-sectional regressions, a negative relation is found between the change in insider ownership and the change in trade size and frequency, providing some support for the hypothesis relating ownership change and liquidity.

I also compare my results to those of Amihud, Lauterbach, and Mendelson (2003), who examine the change in liquidity of firm stock on the Tel-Aviv Stock Exchange following warrant exercise. They find that the dollar traded volume for a firm's stock increases following warrant exercise, indicating an increase in liquidity. I also show an increase in dollar traded volume after warrant exercise, but this result is tempered by the lack of direction from the bid-ask spread data.

Warrant exercise provides an alternative perspective of the relation between ownership structure change and the liquidity of firm stock. The results are not consistent

with the findings of Kothare (1997) which focuses on the equity financing paradox examining rights offerings and SEOs. I find that warrant exercise does alter the ownership structure of the firm, but the resulting effects on the issuing firm's stock liquidity directionally oppose the negative relation found by Kothare.

This study provides additional depth to the ownership and liquidity relation examined by Kothare (1997). With results showing Kothare's findings are not applicable to all offering methods, future research may provide the opportunity to improve understanding of the managerial incentives for using warrants in its various issuance methods. Also, having a unique sample exhibiting a statistically significant change in the ownership structure of the firm may provide opportunities to examine the effects of ownership changes on other research topics.

FIGURE 1: OWNERSHIP STRUCTURE CHANGE HISTOGRAMS
Histogram representations of the change in the fraction of equity ownership for beneficial, inside, and outside shareholders around the exercise of warrants. The change in ownership equals the equity fraction post-exercise minus the equity fraction pre-exercise.

Change in beneficial ownership
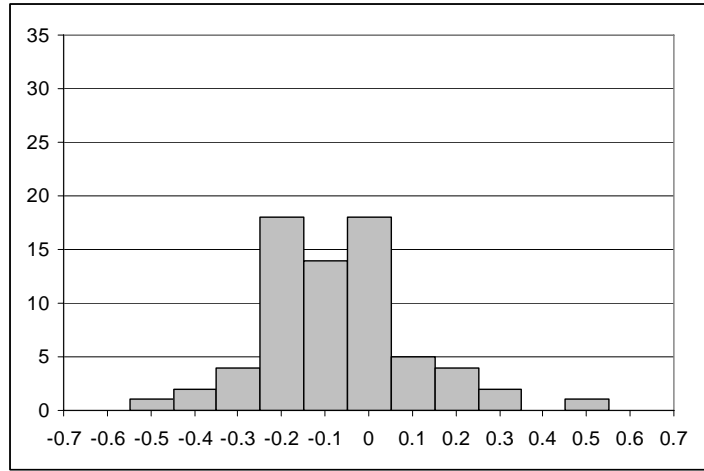
Change in inside ownership
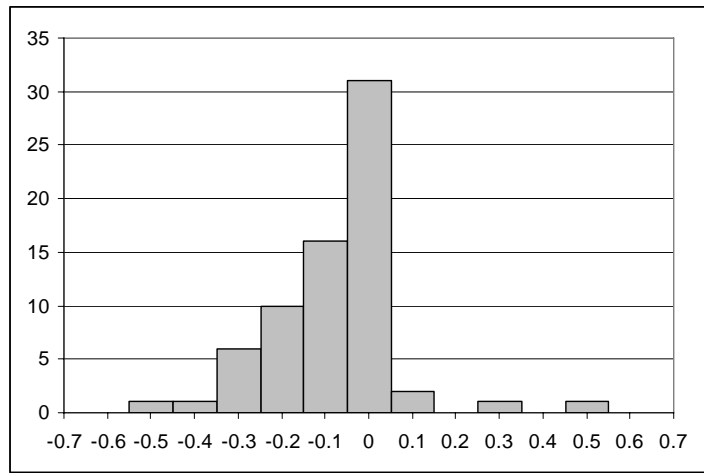
Change in outside ownership
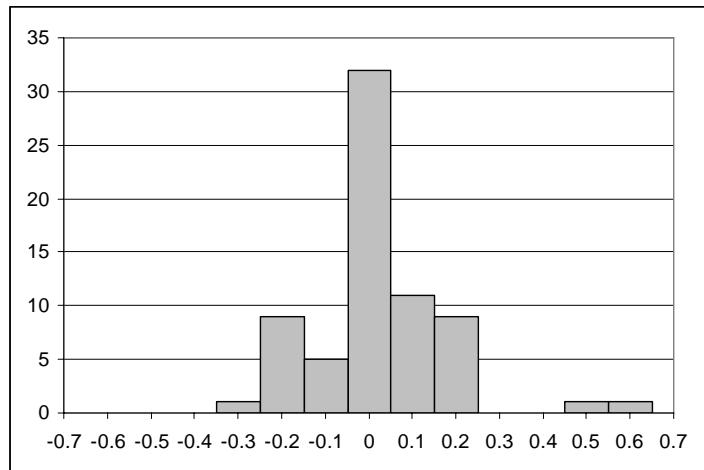
Table 1: SAMPLE DEVELOPMENT

Panel A

	All offerings	Issued with Equity	Issued with Debt	Public offerings		Private offerings
Unit offerings in SDC, 1994-2004	713	552	62	512		201
SEC filings unavailable	-207	-94	-23	-95		-112
Warrants expire after 12/31/05	-52	-48	-3	-15		-37
CRSP data missing	-282	-250	-25	-241		-41
FINAL SAMPLE	172	160	11	161	(a)	11

Panel B

	Public offerings					Private offerings			
	IPOs	SEOs	Debt	Preferred	Rights	Preferred	Debt	Common	Other
Unit offerings in SDC, 1994-2004	363	70	47	23	9	16	15	71	99
SEC filings unavailable	-49	-17	-19	-8	-2	-3	-4	-15	-90
Warrants expire after 12/31/05	-13	0	0	-2	0	-3	-3	-30	-1
CRSP data missing	-181	-24	-20	-11	-5	-9	-5	-20	-7
FINAL SAMPLE	120	29	8	2	2	1	3	6	1

(a) The single "Other" private placement remaining is included in this total. The placement includes common stock, preferred stock, and warrants.

Table 2: SUMMARY STATISTICS OF THE OFFERINGS

This table provides descriptive statistics comparing the proceeds and warrant characteristics for the various methods of security issuance, offered from 1994 through 2004 as identified by SDC's New Issues database. *Offering proceeds* and *Warrant exercise proceeds* are based on the offer price and the number of individual securities offered, in $millions. *Warrants as a fraction of equity* equals the number of warrants offered divided by the sum of outstanding shares prior to the offering and the number of shares, if any, issued. The table provides means and medians (italics).

Panel A: Warrant offerings

	All offerings		Issued with Equity		Issued with Debt		Public offerings		Private offerings	
	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised
N	172	69	161	64	11	5	161	64	11	5
Offering proceeds	14.33	17.28	8.82	8.21	95.09	133.38	14.84	17.97	7.01	8.40
	7.36	*7.50*	*7.20*	*7.30*	*15.00*	*125.00*	*7.40*	*7.45*	*5.30*	*10.00*
Warrant exercise proceeds	10.47	9.83	10.74	9.80	6.55	10.15	10.96	10.19	3.35	5.14
	7.55	*6.47*	*7.71*	*6.73*	*4.90*	*6.13*	*7.80*	*7.10*	*3.38*	*5.38*
Warrants as fraction of equity	0.434	0.362	0.455	0.360	0.125	0.168	0.456	0.386	0.108	0.059
	0.333	*0.281*	*0.377*	*0.292*	*0.028*	*0.058*	*0.360*	*0.301*	*0.028*	*0.08*

Table 2 CONTINUED: SUMMARY STATISTICS OF THE OFFERINGS

Panel B: Public issues

	IPOs		SEOs		Rights		Preferred		Debt	
	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised
N	120	47	29	12	2	0	2	1	8	4
Offering proceeds	9.10	8.75	7.49	6.20	2.34	-	6.25	7.50	127.50	164.20
	7.45	*7.40*	*5.90*	*5.95*	*2.34*	-	*6.25*	*7.50*	*125.00*	*163.00*
Warrant exercise proceeds	11.72	11.08	8.96	6.71	12.31	-	4.03	6.06	8.11	11.24
	8.40	*7.50*	*6.00*	*6.20*	*12.31*	-	*4.03*	*6.06*	*5.52*	*9.07*
Warrants as fraction of equity	0.513	0.436	0.339	0.280	0.253	-	0.095	0.022	0.165	0.206
	0.404	*0.333*	*0.264*	*0.254*	*0.253*	-	*0.095*	*0.022*	*0.084*	*0.084*

Table 2 CONTINUED: SUMMARY STATISTICS OF THE OFFERINGS

Panel C: Private placements

	Common stock		Preferred stock		Debt		Hybrid (a)	
	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised	All issuing firms	Firms with warrants exercised
N	6	3	1	1	3	1	1	0
Offering proceeds	4.90	5.23	16.30	16.30	8.70	10.00	5.30	-
	2.75	*3.00*	*16.30*	*16.30*	*10.00*	*10.00*	*5.30*	-
Warrant exercise proceeds	3.80	5.47	3.54	3.54	2.40	5.78	3.38	-
	3.36	*5.38*	*3.54*	*3.54*	*0.75*	*5.78*	*3.38*	-
Warrants as fraction of equity	0.061	0.084	0.026	0.026	0.019	0.337	0.745	-
	0.083	*0.086*	*0.026*	*0.026*	*0.018*	*0.337*	*0.745*	-

(a) The hybrid placement included common stock, preferred stock, and warrants.

Table 3: SUMMARY STATISTICS OF THE ISSUING FIRMS ACHIEVING WARRANT EXERCISE

This table provides descriptive statistics comparing firm characteristics for each method of security issue, offered from 1994 through 2004 as identified by SDC's New Issues database. I compare firm traits from the year prior to warrant exercise to the same traits from the year following exercise. *Market value* equals the stock price times the number of outstanding shares, in $millions. *Total assets* is represented in $millions. *Leverage* equals the ratio of total debt to total assets. *Debt/Equity* equals the ratio of total debt to the market value of equity. *Revenue* is represented in $millions. *Profit margin* equals the net income divided by revenues. I ignore the profit margin calculation for firms that report zero revenue, reducing the sample size for this parameter only. *ROA* is the return on assets, measured as net income divided by total assets. *ROE* is the return on equity, measured as net income divided by the book value of common equity. *EPS* is the earnings per share, in dollars. *Market-to-book* equals the ratio of the market value of common equity, measured as above, to the book value of common equity. The table provides means and medians (italics). The 1%, 5%, and 10% significance levels of the difference-in-means tests (t-statistic) and the difference-in-medians tests (Wilcoxon z-statistic) are indicated by *, **, and ***, respectively.

Panel A: Warrant offerings

	All offerings			Issued with Equity			Issued with Debt		Public offerings			Private placements	
	Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise	Pre-exercise	Post-exercise		Pre-exercise	Post-exercise
BALANCE SHEET													
Market value	340.92	384.55		101.51	117.29		3405.43	3805.50	356.50	391.47		141.55	295.91
	30.31	*46.76*		*29.10*	*43.52*		*207.04*	*608.99*	*29.10*	*46.60*		*75.79*	*233.23*
Total assets	182.04	345.11		45.02	82.54	**	1935.90	3706.07	189.21	361.99		90.19	129.03
	13.07	*47.89*	***	*12.75*	*44.46*	***	*214.03*	*363.03*	*12.75*	*44.46*	***	*55.90*	*67.55*
Leverage	0.53	0.56		0.51	0.55		0.75	0.65	0.55	0.57		0.32	0.40
	0.42	*0.43*		*0.40*	*0.42*		*0.56*	*0.58*	*0.43*	*0.43*		*0.32*	*0.37*
Debt/Equity	-0.51	0.20		-0.41	0.18		-1.76	0.44	-0.56	0.19		0.19	0.40
	0.02	*0.02*		*0.02*	*0.02*		*0.00*	*0.03*	*0.02*	*0.02*		*0.09*	*0.07*

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Table 3 CONTINUED: SUMMARY STATISTICS OF THE ISSUING FIRMS ACHIEVING WARRANT EXERCISE

Panel A continued: Warrant offerings

	All offerings			Issued with Equity			Issued with Debt			Public offerings			Private placements	
	Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise
OPERATING PERFORMANCE														
Revenue	127.33	205.20		28.49	50.45		1392.51	2186.00		121.83	205.31		197.77	203.81
	13.17	*26.14*	**	*11.30*	*24.55*	**	*192.41*	*891.19*		*13.12*	*25.88*	**	*17.38*	*50.87*
Profit margin	-23.45	-2.03		-25.38	-2.20		-0.76	-0.11		-25.39	-2.17		-0.54	-0.40
	-0.14	*-0.10*		*-0.14*	*-0.15*		*-0.17*	*0.02*		*-0.14*	*-0.07*		*-0.31*	*-0.18*
ROA	-0.51	-0.64		-0.54	-0.70		-0.10	0.08 *		-0.54	-0.67		-0.17	-0.23
	-0.15	*-0.12*		*-0.17*	*-0.15*		*-0.13*	*0.05* *		*-0.20*	*-0.13*		*-0.08*	*-0.05*
ROE	-0.12	-0.15		-0.13	-0.12		0.01	-0.47		-0.11	-0.11		-0.24	-0.61
	-0.22	*-0.07*		*-0.21*	*-0.07*		*-0.22*	*-0.04*		*-0.23*	*-0.07*		*-0.09*	*-0.06*
EPS	-0.66	-0.71		-0.55	-0.71		-2.07	-0.76		-0.69	-0.78		-0.32	0.14
	-0.29	*-0.19*		*-0.29*	*-0.23*		*-0.35*	*0.41*		*-0.31*	*-0.16*		*-0.29*	*-0.22*
Market-to-Book	4.67	2.87		5.22	2.54		-2.46	7.18		4.84	2.71		2.47	4.96
	3.37	*2.16*	**	*3.56*	*2.06*	***	*1.29*	*3.49*	*	*3.38*	*2.06*	**	*1.73*	*3.49*

Table 3 CONTINUED: SUMMARY STATISTICS OF THE ISSUING FIRMS ACHIEVING WARRANT EXERCISE

Panel B: Public issues

	IPOs			SEOs		Preferred		Debt	
	Pre-exercise	Post-exercise		Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
BALANCE SHEET									
Market value	101.30	111.42		41.22	63.42	740.19	567.63	4205.02	4622.26
	28.85	*46.43*		*28.98*	*30.40*	*740.19*	*567.63*	*266.41*	*3171.00*
Total assets	26.94	67.25	***	100.82	146.79	167.90	77.77	2366.37	4541.84
	10.29	*34.90*	***	*33.40*	*50.21*	*167.90*	*77.77*	*930.06*	*3838.56*
Leverage	0.52	0.55		0.59	0.60	0.40	0.46	0.83	0.67
	0.38	*0.41*		*0.52*	*0.59*	*0.40*	*0.46*	*0.85*	*0.61*
Debt/Equity	0.16	0.20		-2.88	0.08	0.00	0.00	-2.28	0.43
	0.02	*0.02*		*0.15*	*0.12*	*0.00*	*0.00*	*-2.21*	*0.02*
OPERATING PERFORMANCE									
Revenue	21.69	42.43		47.61	71.70	160.45	246.38	1511.39	2509.70
	7.07	*13.92*	**	*23.41*	*33.98*	*160.45*	*246.38*	*145.52*	*797.34*
Profit margin	-35.57	-3.03		-0.06	-0.03	0.19	0.08	-0.95	-0.14
	-0.16	*-0.34*		*0.00*	*0.01*	*0.19*	*0.08*	*-0.19*	*0.06*
ROA	-0.71	-0.90		-0.08	-0.10	0.18	0.26	-0.13	0.09
	-0.28	*-0.32*		*-0.01*	*-0.01*	*0.18*	*0.26*	*-0.17*	*0.09*
ROE	-0.90	-0.08		2.93	-0.10	0.30	0.49	-0.00	-0.62
	-0.44	*-0.16*		*0.05*	*0.08*	*0.30*	*0.49*	*-0.25*	*-0.57*
EPS	-0.67	-0.98		-0.27	-0.06	1.26	0.92	-2.64	-1.05
	-0.40	*-0.53*		*-0.01*	*0.10*	*1.26*	*0.92*	*-1.13*	*1.58*
Market-to-Book	6.05	2.09		2.66	2.42	7.31	13.59	-3.51	8.11
	4.94	*2.12*	***	*1.69*	*1.35*	*7.31*	*13.59*	*0.16*	*4.04*

Table 3 CONTINUED: SUMMARY STATISTICS OF THE ISSUING FIRMS ACHIEVING WARRANT EXERCISE

Panel C: Private placements

	Common stock		Preferred stock		Debt	
	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
BALANCE SHEET						
Market value	53.80	235.97	339.28	233.23	207.04	538.44
	63.05	*44.38*	*339.28*	*233.23*	*207.04*	*538.44*
Total assets	43.09	71.53	107.64	67.55	214.03	363.03
	37.03	*47.89*	*107.64*	*67.55*	*214.03*	*363.03*
Leverage	0.28	0.23	0.32	0.72	0.44	0.58
	0.28	*0.19*	*0.32*	*0.72*	*0.44*	*0.58*
Debt/Equity	0.20	0.03	0.03	1.47	0.35	0.47
	0.09	*0.00*	*0.03*	*1.47*	*0.35*	*0.47*
OPERATING PERFORMANCE						
Revenue	11.70	25.66	36.80	50.87	916.97	891.19
	9.23	*13.97*	*36.80*	*50.87*	*916.97*	*891.19*
Profit margin	-0.17	-0.41	-2.21	-0.81	0.01	0.02
	-0.31	*-0.18*	*-2.21*	*-0.81*	*0.01*	*0.02*
ROA	-0.05	-0.19	-0.76	-0.61	0.04	0.05
	-0.08	*-0.05*	*-0.76*	*-0.61*	*0.04*	*0.05*
ROE	-0.06	-0.32	-1.12	-2.20	0.08	0.11
	-0.09	*-0.06*	*-1.12*	*-2.20*	*0.08*	*0.11*
EPS	-0.14	0.22	-1.43	-0.32	0.23	0.41
	-0.29	*-0.22*	*-1.43*	*-0.32*	*0.23*	*0.41*
Market-to-Book	1.94	2.95	4.79	12.44	1.73	3.49
	1.30	*2.32*	*4.79*	*12.44*	*1.73*	*3.49*

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Table 4: CHANGES IN OWNERSHIP STRUCTURE

This table shows the change in ownership for each method of security issue, offered from 1994 through 2004 as identified by SDC's New Issues database. I compare ownership variables from the year prior to warrant exercise to the same variables from the year following exercise. *Beneficial ownership* equals the aggregate fraction of equity owned by holders of at least 5% of firm shares. *Inside ownership* equals the aggregate fraction of equity owned by directors and managers of the firm. *Outside ownership* equals the aggregate fraction of equity owned by external holders of at least 5% of firm shares. *Number of shareholders* represents the number of registered shareholders disclosed in the firm's annual report. The table provides means and medians (italics). The 1%, 5%, and 10% significance levels of the difference-in-means tests (*t*-statistic) and the difference-in-medians tests (Wilcoxon *z*-statistic) are indicated by *, **, and ***, respectively.

Panel A: Warrant offerings

	All offerings			Issued with Equity			Issued with Debt			Public offerings			Private placements	
	Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise
Beneficial ownership	0.396	0.324	**	0.387	0.316	*	0.509	0.426		0.407	0.327	**	0.249	0.281
	0.401	*0.298*	**	*0.389*	*0.283*	**	*0.451*	*0.393*		*0.410*	*0.304*	**	*0.287*	*0.275*
Inside ownership	0.332	0.257	**	0.337	0.256	**	0.266	0.274		0.348	0.269	**	0.129	0.112
	0.305	*0.197*	**	*0.307*	*0.196*	***	*0.265*	*0.227*		*0.321*	*0.217*	***	*0.042*	*0.041*
Outside ownership	0.111	0.136		0.098	0.118		0.278	0.370		0.107	0.130		0.158	0.208
	0.075	*0.069*		*0.068*	*0.066*		*0.287*	*0.275*		*0.073*	*0.068*		*0.156*	*0.275*
Number of shareholders (a)	1251	3650	*	1142	3226		2615	8959		1197	3692	*	2675	2561
	341	*407*		*341*	*407*		*2615*	*8959*		*325*	*396*		*2675*	*2561*

(a) The data for the number of shareholders for each group in Panel A includes, respectively, the following number of firms: 27, 25, 2, 26, and 1.

Table 4 CONTINUED: CHANGES IN OWNERSHIP STRUCTURE

Panel B: Public issues

	IPOs			SEOs		Preferred		Debt	
	Pre-exercise	Post-exercise		Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
Beneficial ownership	0.427	0.312	***	0.276	0.351	0.391	0.210	0.565	0.464
	0.456	*0.305*	***	*0.269*	*0.244*	*0.391*	*0.210*	*0.491*	*0.435*
Inside ownership	0.378	0.260	***	0.261	0.296	0.075	0.084	0.324	0.333
	0.384	*0.217*	***	*0.207*	*0.180*	*0.075*	*0.084*	*0.296*	*0.308*
Outside ownership	0.091	0.109		0.094	0.125	0.337	0.150	0.275	0.394
	0.063	*0.059*		*0.068*	*0.079*	*0.337*	*0.150*	*0.271*	*0.323*
Number of shareholders (a)	1043	3415		1471	1476	-	-	2615	8959
	308	*396*		*1471*	*1476*	*-*	*-*	*2615*	*8959*

(a) The data for the number of shareholders for each group in Panel A includes, respectively, the following number of firms: 22, 2, 0, and 2.

Table 4 CONTINUED: CHANGES IN OWNERSHIP STRUCTURE

Panel C: Private placements

	Common stock		Preferred stock		Debt	
	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
Beneficial ownership	0.222	0.282	0.294	0.284	0.287	0.275
	0.278	*0.182*	*0.294*	*0.284*	*0.287*	*0.275*
Inside ownership	0.189	0.159	0.042	0.041	0.036	0.040
	0.247	*0.195*	*0.042*	*0.041*	*0.036*	*0.040*
Outside ownership	0.069	0.161	0.294	0.284	0.287	0.275
	0.051	*0.086*	*0.294*	*0.284*	*0.287*	*0.275*
Number of shareholders (a)	2675	2561	-	-	-	-
	2675	*2561*	*-*	*-*	*-*	*-*

(a) The data for the number of shareholders for each group in Panel A includes, respectively, the following number of firms: 1, 0, and 0.

Table 5: OWNERSHIP STRUCTURE CHANGE VS. KOTHARE (1997)
This table compares the change in ownership structure of Kothare (1997) compared to my study. The event day for rights offerings is the ex-rights date. The event day for the public underwritten offerings is the offering date. The event day for my study is the warrant exercise date.

Panel A

	Kothare Rights offerings				Kothare Public underwritten offerings			
	Pre-exercise	Post-exercise	Change in ownerhsip		Pre-exercise	Post-exercise	Change in ownerhsip	
Beneficial ownership	0.365	0.404	0.039		0.264	0.142	-0.123	***
Inside ownership	0.235	0.269	0.033		0.284	0.183	-0.101	***
Outside ownership								
Number of shareholders	3443	3558	115		3633	4322	689	***

Panel B

	My study All offerings				My study IPOs				My study SEOs		
	Pre-exercise	Post-exercise	Change in ownerhsip		Pre-exercise	Post-exercise	Change in ownerhsip		Pre-exercise	Post-exercise	Change in ownerhsip
Beneficial ownership	0.396	0.324	-0.072	**	0.427	0.312	-0.115	***	0.276	0.351	0.075
Inside ownership	0.332	0.257	-0.075	**	0.378	0.260	-0.118	***	0.261	0.296	0.035
Outside ownership	0.111	0.136	0.025		0.091	0.109	0.017		0.094	0.125	0.031
Number of shareholders	1251	3650	2399	*	1043	3415	2372		1471	1476	5

Table 6: OWNERSHIP STRUCTURE CHANGE DISTRIBUTIONS
This table describes the distribution of the changes in ownership structure for the various offering methods. The numbers represent the change in the respective ownership variable from pre- to post-warrant exercise. The bold-faced type indicates a maximum or minimum value for the entire sample.

All offerings

	Mean	Min	Q1	Median	Q3	Max
Beneficial ownership	-0.072	**-0.499**	-0.180	-0.078	0.002	**0.469**
Inside ownership	-0.075	**-0.459**	-0.150	-0.044	-0.001	**0.514**
Outside ownership	0.025	**-0.269**	-0.012	0.000	0.062	**0.605**

Issued with Equity

	Mean	Min	Q1	Median	Q3	Max
Beneficial ownership	-0.071	**-0.499**	-0.184	-0.076	0.002	**0.469**
Inside ownership	-0.081	**-0.459**	-0.156	-0.070	-0.006	**0.514**
Outside ownership	0.020	**-0.269**	-0.015	0.000	0.060	0.516

Issued with Debt

	Mean	Min	Q1	Median	Q3	Max
Beneficial ownership	-0.083	-0.156	-0.138	-0.134	-0.012	0.025
Inside ownership	0.008	-0.038	-0.020	0.004	0.032	0.063
Outside ownership	0.093	-0.187	-0.012	-0.005	0.062	**0.605**

Public offerings

	Mean	Min	Q1	Median	Q3	Max
Beneficial ownership	-0.080	**-0.499**	-0.184	-0.095	-0.001	**0.469**
Inside ownership	-0.079	**-0.459**	-0.156	-0.068	-0.009	**0.514**
Outside ownership	0.023	**-0.269**	-0.031	0.000	0.062	**0.605**

Private placements

	Mean	Min	Q1	Median	Q3	Max
Beneficial ownership	0.031	-0.096	-0.012	-0.010	0.035	0.240
Inside ownership	-0.017	-0.092	-0.001	-0.000	0.003	0.004
Outside ownership	0.051	-0.012	-0.010	0.000	0.035	0.241

Table 6 CONTINUED: OWNERSHIP STRUCTURE CHANGE DISTRIBUTIONS

IPOs

	Mean	Min	Q1	Median	Q3	Max
Beneficial ownership	-0.115	**-0.499**	-0.199	-0.124	-0.010	0.298
Inside ownership	-0.118	**-0.459**	-0.201	-0.084	-0.033	0.073
Outside ownership	0.017	**-0.269**	-0.020	0.000	0.059	0.516

SEOs

	Mean	Min	Q1	Median	Q3	Max
Beneficial ownership	0.075	-0.215	-0.043	0.055	0.199	**0.469**
Inside ownership	0.035	-0.221	-0.047	0.002	0.031	**0.514**
Outside ownership	0.031	-0.174	-0.028	0.006	0.115	0.248

Debt

	Mean	Min	Q1	Median	Q3	Max
Beneficial ownership	-0.101	-0.156	-0.147	-0.136	-0.055	0.025
Inside ownership	0.009	-0.038	-0.029	0.006	0.047	0.063
Outside ownership	0.119	-0.187	-0.096	0.029	0.333	**0.605**

Table 7: DRAMATIC CHANGES IN FRACTIONAL EQUITY OWNERSHIP

This table describes the most substantial individual changes in fractional equity ownership following warrant exercise. Individual observations are included in the table if any of the three ownership change metrics (beneficial, inside, and outside ownership change) is 25% or greater (in bold). Resultant gain/loss of fractional holdings equals the sum of the change in inside ownership and the change in outside ownership, attempting to describe the shift in ownership as a result of warrant exercise.

Offering method	Change in beneficial ownership	Change in inside ownership	Change in outside ownership	Resultant gain/loss of fractional holdings
Public equity (IPO)	**-0.279**	-0.083	-0.178	-0.261
Public equity (IPO)	**0.298**	**-0.265**	**0.516**	0.251
Public equity (IPO)	**-0.337**	**-0.276**	0.000	-0.276
Public equity (IPO)	**-0.400**	-0.013	**-0.269**	-0.282
Public equity (IPO)	**-0.440**	**-0.396**	-0.057	-0.453
Public equity (IPO)	**-0.261**	**-0.267**	0.012	-0.255
Public equity (IPO)	-0.167	**-0.343**	0.221	-0.122
Public equity (IPO)	-0.205	**-0.259**	0.102	-0.157
Public equity (IPO)	**-0.499**	**-0.459**	-0.063	-0.522
Public equity (IPO)	**-0.274**	**-0.269**	0.000	-0.269
Public equity (SEO)	**0.469**	**0.514**	-0.174	0.340
Public equity (SEO)	**0.276**	**0.292**	0.000	0.292
Public debt	-0.134	0.063	**0.605**	0.667

Table 8: CHANGES IN LIQUIDITY

This table describes the changes in liquidity measures for each method of security issue, offered from 1994 through 2004 as identified by SDC's New Issues database. I compare liquidity variables averaged over the pre-exercise period, [-100, -10], to the same variables averaged over the post-exercise period, [+9, +99], where day 0 is the exercise date of the warrants. *Quoted spread* equals the difference between the current bid and ask, in dollars. *Proportionate quoted spread* equals the quoted spread divided by the current bid/ask midpoint. *Effective spread* equals two times the absolute value of the difference between the transaction price and the current bid/ask midpoint, in dollars. *Proportionate effective spread* equals the effective spread divided by the current bid/ask midpoint. *Quoted depth* equals the size of the current bid plus the current ask size, in number of round lots. *Dollar depth* equals the bid size times the bid plus the ask size times the ask. *Number of shares traded* is the number of shares traded, in thousands. *Number of trades* represents the frequency of trades. *Trade size* equals the number of shares traded divided by the number of trades. *Dollar volume* is the trading volume in \$millions. *Price* is the average stock price, in dollars. *Return volatility* is the standard deviation of daily returns over the measurement period. *Illiquidity* is the ratio of the daily absolute return to the dollar trading volume, multiplied by 10^6. The table provides means and medians (italics). The 1%, 5%, and 10% significance levels of the difference-in-means tests (*t*-statistic) and the difference-in-medians tests (Wilcoxon *z*-statistic) are indicated by *, **, and ***, respectively.

Panel A: Warrant offerings

	All offerings		Issued with Equity		Issued with Debt		Public offerings		Private placements	
	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
N	45 firms		42 firms		3 firms		42 firms		3 firms	
SPREADS										
Quoted spread	0.191	0.203	0.192	0.204	0.177	0.183	0.197	0.209	0.109	0.125
	0.188	*0.171*	*0.183*	*0.168*	*0.188*	*0.193*	*0.190*	*0.171*	*0.075*	*0.165*
Proportionate spread	0.026	0.024	0.025	0.024	0.037	0.030	0.025	0.024	0.033	0.027
	0.021	*0.018*	*0.021*	*0.018*	*0.037*	*0.044*	*0.021*	*0.018*	*0.040*	*0.030*
Effective spread	0.151	0.164	0.157	0.170	0.079	0.085	0.157	0.170	0.070	0.081
	0.146	*0.139*	*0.151*	*0.141*	*0.099*	*0.112*	*0.149*	*0.140*	*0.036*	*0.076*
Proportionate effective spread	0.120	0.019	0.020	0.019	0.018	0.014	0.020	0.019	0.020	0.017
	0.017	*0.017*	*0.018*	*0.016*	*0.013*	*0.017*	*0.017*	*0.016*	*0.023*	*0.020*
DEPTHS										
Quoted depth	20.60	20.54	19.78	20.27	32.10	24.26	18.53	19.48	49.63	35.40
	17.48	*19.52*	*17.58*	*19.76*	*13.86*	*14.20*	*17.41*	*18.30*	*28.61*	*22.88*
Dollar depth	177.79	205.72	173.26	203.38	241.29	238.47	182.14	210.91	117.00	133.15
	137.93	*184.61*	*137.91*	*175.10*	*168.70*	*219.63*	*138.85*	*185.65*	*112.52*	*131.15*

Table 8 CONTINUED: CHANGES IN LIQUIDITY

Panel A continued: Warrant offerings

	All offerings			Issued with Equity			Issued with Debt			Public offerings			Private placements	
	Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise
N	45 firms			42 firms			3 firms			42 firms			3 firms	
TRADING CHARACTERISTICS														
Number of trades (000s)	18.26	16.11		9.95	9.61		134.67	107.43		18.79	16.43		10.89	11.68
	5.18	*6.55*		*5.17*	*6.03*		*6.92*	*6.70*		*5.20*	*6.03*		*5.15*	*14.47*
Number of shares traded	1179	1003		1181	1018		1150	793		1131	1007		1851	949
	1012	*894*		*1041*	*916*		*608*	*626*		*988*	*892*		*1959*	*1068*
Trade size	0.526	0.361		0.541	0.377		0.314	0.146		0.520	0.372		0.615	0.217
	0.243	*0.166*		*0.265*	*0.200*		*0.088*	*0.066*		*0.229*	*0.200*		*0.458*	*0.071*
Dollar volume	3.92	6.94		2.22	5.37		25.64	27.07		4.15	7.38		0.90	1.32
	0.53	*0.66*		*0.51*	*6.35*		*2.06*	*1.10*		*0.51*	*0.64*		*0.96*	*1.10*
Price	10.43	11.50		9.13	10.73		25.75	22.16		10.78	11.72		5.98	8.69
	7.88	*7.95*		*7.82*	*8.77*		*8.26*	*7.36*		*8.11*	*8.84*		*5.51*	*6.38*
Return volatility	0.051	0.056		0.052	0.056		0.035	0.031		0.053	0.057		0.036	0.038
	0.049	*0.045*		*0.049*	*0.048*		*0.027*	*0.032*		*0.050*	*0.048*		*0.038*	*0.037*
Illiquidity	1.442	1.439		1.523	1.521		0.155	0.145		1.540	1.548		0.224	0.087
	0.175	*0.095*	**	*0.179*	*0.095*	**	*0.044*	*0.065*		*0.178*	*0.097*	*	*0.035*	*0.039*

Table 8 CONTINUED: CHANGES IN LIQUIDITY

Panel B: Public issues

	IPOs		SEOs		Preferred		Debt	
	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
N	32 firms		6 firms		1 firm		3 firms	
SPREADS								
Quoted spread	0.194	0.200	0.214	0.262	0.233	0.248	0.177	0.183
	0.197	*0.171*	*0.146*	*0.147*	*0.233*	*0.248*	*0.188*	*0.193*
Proportionate spread	0.023	0.021	0.034	0.036	0.008	0.010	0.037	0.030
	0.021	*0.017*	*0.034*	*0.038*	*0.008*	*0.010*	*0.037*	*0.044*
Effective spread	0.163	0.172	0.171	0.207	0.124	0.127	0.079	0.085
	0.163	0.141	0.126	0.121	*0.124*	*0.127*	*0.099*	*0.112*
Proportionate effective spread	0.019	0.018	0.030	0.030	0.004	0.005	0.018	0.014
	0.017	*0.015*	*0.029*	*0.029*	*0.004*	*0.005*	*0.013*	*0.017*
DEPTHS								
Quoted depth	16.73	18.88	20.60	19.96	22.97	21.48	32.10	24.26
	16.19	*18.30*	*18.89*	*20.72*	*22.97*	*21.48*	*13.86*	*14.20*
Dollar depth	168.22	200.73	150.77	196.87	638.11	538.05	241.29	238.47
	138.85	*185.65*	*66.72*	*106.32*	*638.11*	*538.05*	*168.70*	*219.63*

Table 8 CONTINUED: CHANGES IN LIQUIDITY

Panel B continued: Public issues

	IPOs			SEOs			Preferred			Debt		
	Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise		Pre-exercise	Post-exercise	
N	32 firms			6 firms			1 firm			3 firms		
TRADING CHARACTERISTICS												
Number of trades (000s)	11.04	10.49		2.60	1.88		16.44	21.50		134.67	107.13	
	5.64	*7.11*		*1.63*	*2.15*		*16.44*	*21.50*		*6.92*	*6.70*	
Number of shares traded	1151	1042		1049	943		927	890		1150	793	
	1003	*916*		*1068*	*985*		*927*	*890*		*608*	*626*	
Trade size	0.474	0.313		0.943	0.854		0.056	0.041		0.314	0.146	
	0.191	*0.139*		*0.705*	*0.457*		*0.056*	*0.041*		*0.088*	*0.066*	
Dollar volume	2.80	6.90		0.27	0.77		4.85	4.38		31.53	33.56	
	0.60	*0.94*		*0.14*	*0.20*		*4.85*	*4.38*		*10.37*	*29.75*	
Price	10.13	11.54		5.32	6.38		28.04	26.75		30.43	26.10	
	8.81	*9.54*		*3.09*	*3.81*		*28.04*	*26.75*		*21.52*	*18.94*	
Return volatility	0.056	0.061		0.047	0.053		0.034	0.031		0.032	0.031	
	0.050	*0.052*		*0.056*	*0.051*		*0.034*	*0.031*		*0.027*	*0.033*	
Illiquidity	0.324	0.396		6.666	6.437		0.006	0.006		0.196	0.183	
	0.171	*0.054*	**	*0.465*	*0.256*		*0.006*	*0.006*		*0.056*	*0.097*	

Table 8 CONTINUED: CHANGES IN LIQUIDITY

Panel C: Private placements

	Common stock		Preferred stock	
	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
N	2 firms		1 firms	
SPREADS				
Quoted spread	0.147	0.177	0.033	0.021
	0.147	*0.177*	*0.033*	*0.021*
Proportionate spread	0.044	0.036	0.013	0.009
	0.044	*0.036*	*0.013*	*0.009*
Effective spread	0.094	0.115	0.023	0.015
	0.094	*0.115*	*0.023*	*0.015*
Proportionate effective spread	0.025	0.022	0.009	0.006
	0.025	*0.022*	*0.009*	*0.006*
DEPTHS				
Quoted depth	60.13	41.65	28.61	22.88
	60.13	*41.65*	*28.61*	*22.88*
Dollar depth	138.00	171.93	75.01	55.60
	138.00	*171.93*	*75.01*	*55.60*

Table 8 CONTINUED: CHANGES IN LIQUIDITY

Panel C continued: Private placements

	Common stock		Preferred stock	
	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
N	2 firms		1 firms	
TRADING CHARACTERISTICS				
Number of trades (000s)	3.31	10.29	26.07	14.47
	3.31	*10.29*	*26.07*	*14.47*
Number of shares traded	2159	1199	1235	450
	2159	*1199*	*1235*	*450*
Trade size	0.898	0.310	0.047	0.031
	0.898	*0.310*	*0.047*	*0.031*
Dollar volume	0.48	1.64	1.02	0.61
	0.28	*1.24*	*1.02*	*0.61*
Price	6.17	9.56	2.51	2.32
	4.93	*6.38*	*2.51*	*2.32*
Return volatility	0.038	0.046	0.021	0.025
	0.038	*0.040*	*0.021*	*0.025*
Illiquidity	0.351	0.122	0.035	0.039
	0.237	*0.040*	*0.035*	*0.039*

Table 9: LIQUIDITY CHANGE DISTRIBUTIONS
This table describes the distribution of the changes in the liquidity and trading characteristics for the entire sample. The numbers represent the change in the respective variable from pre- to post-warrant exercise.

	Mean	Min	Q1	Median	Q3	Max
Spreads						
Quoted spread	0.012	-0.166	-0.030	-0.003	0.038	0.216
Proportionate spread	-0.002	-0.030	-0.006	-0.001	0.004	0.032
Effective spread	0.013	-0.092	-0.021	0.003	0.034	0.194
Proportional effective spread	-0.001	-0.018	-0.005	-0.001	0.003	0.021

	Mean	Min	Q1	Median	Q3	Max
Depths						
Quoted depth	-0.06	-37.91	-1.49	0.86	4.16	14.00
Dollar depth	27.93	-189.12	-19.42	25.83	61.78	351.78

	Mean	Min	Q1	Median	Q3	Max
Trading Characteristics						
Number of trades (000s)	-2.15	-83.30	-2.76	0.25	1.44	25.19
Trade size	-0.165	-1.618	-0.376	-0.022	0.028	0.474
Number of shares traded	-176	-1028	-235	-65	19	412
Dollar volume	3.02	-30.71	-0.40	-0.05	0.66	184.31
Price	1.07	-21.86	-0.95	0.65	2.68	19.03
Return volatility	0.004	-0.031	-0.009	0.003	0.011	0.204
Illiquidity	-0.002	-5.003	-0.197	-0.032	0.026	7.737

Table 10: CHANGES IN OWNERSHIP STRUCTURE AND THE EFFECTS ON LIQUIDITY
This table describes the relation between changes in ownership and changes in proportionate quoted spread
for each method of security issue, offered from 1994 through 2004 as identified by SDC's New Issues
database. I perform OLS regressions on the following general relation:

Liquidity = f (Ownership, Price, Volume, Volatility)

Each parameter is represented as the log ratio of the average value during the post-exercise period [-100,
-10] to the average value during the pre-exercise period [+9, +99]. For the dependent variable *Liquidity*, I
input the various spread, depth, and trading characteristic parameters each in a separate regression model.
For the *Ownership* variable, I input the beneficial, inside, and outside ownership for each dependent
variable, resulting in a set of three OLS regressions for each liquidity variable. Each row in the table
represents a separate OLS regression. Coefficient *p-values* appear in italics below the coefficient value.

BENEFICIAL OWNERSHIP

Dependent Variable	Ownership	Price	Volume	Volatility	R-sq
Quoted spread	-0.073	0.765	-0.196	0.595	0.30
	(0.37)	*(0.01)*	*(0.08)*	*(0.00)*	
Proportionate spread	-0.062	-0.082	-0.294	0.587	0.50
	(0.43)	*(0.77)*	*(0.01)*	*(0.00)*	
Effective spread	-0.070	0.815	-0.185	0.616	0.39
	(0.36)	*(0.00)*	*(0.08)*	*(0.00)*	
Proportional effective spread	-0.057	-0.019	-0.285	0.608	0.49
	(0.45)	*(0.94)*	*(0.01)*	*(0.00)*	
Quoted depth	-0.068	-0.134	0.095	0.024	0.00
	(0.37)	*(0.61)*	*(0.35)*	*(0.88)*	
Dollar depth	-0.086	0.598	0.237	0.044	0.70
	(0.27)	*(0.03)*	*(0.03)*	*(0.79)*	
Number of trades	-0.038	-0.440	0.908	0.046	0.92
	(0.55)	*(0.05)*	*(0.00)*	*(0.73)*	
Number of shares traded	-0.011	-0.499	0.107	-0.149	0.08
	(0.87)	*(0.05)*	*(0.26)*	*(0.31)*	
Trade size	0.027	-0.059	-0.801	-0.195	0.79
	(0.82)	*(0.88)*	*(0.00)*	*(0.42)*	
Illiquidity	-0.036	-2.146	-0.357	1.026	0.76
	(0.82)	*(0.00)*	*(0.11)*	*(0.00)*	

Table 10 CONTINUED: CHANGES IN OWNERSHIP STRUCTURE AND THE EFFECTS ON LIQUIDITY

INSIDE OWNERSHIP

Dependent Variable	Ownership	Price	Volume	Volatility	R-sq
Quoted spread	-0.083	0.781	-0.201	0.558	0.30
	(0.42)	(0.01)	(0.07)	(0.00)	
Proportionate spread	-0.076	-0.003	-0.325	0.581	0.50
	(0.45)	(0.99)	(0.00)	(0.00)	
Effective spread	-0.061	0.829	-0.188	0.578	0.38
	(0.52)	(0.00)	(0.06)	(0.00)	
Proportional effective spread	-0.054	0.055	-0.314	0.602	0.49
	(0.57)	(0.83)	(0.00)	(0.00)	
Quoted depth	-0.142	-0.055	0.061	0.023	0.00
	(0.13)	(0.83)	(0.54)	(0.88)	
Dollar depth	-0.146	0.627	0.224	0.011	0.71
	(0.13)	(0.02)	(0.03)	(0.94)	
Number of trades	0.145	-0.470	0.931	-0.013	0.92
	(0.07)	(0.03)	(0.00)	(0.92)	
Number of shares traded	-0.115	-0.461	0.086	-0.127	0.11
	(0.19)	(0.05)	(0.34)	(0.36)	
Trade size	-0.260	0.009	-0.845	-0.115	0.81
	(0.07)	(0.98)	(0.00)	(0.61)	
Illiquidity	-0.050	-2.261	-0.310	0.962	0.75
	(0.81)	(0.00)	(0.16)	(0.01)	

Table 10 CONTINUED: CHANGES IN OWNERSHIP STRUCTURE AND THE EFFECTS ON LIQUIDITY

OUTSIDE OWNERSHIP

Dependent Variable	Ownership	Price	Volume	Volatility	R-sq
Quoted spread	-0.036	0.817	-0.191	0.510	0.16
	(0.70)	(0.10)	(0.31)	(0.07)	
Proportionate spread	-0.035	-0.221	-0.221	0.568	0.36
	(0.68)	(0.61)	(0.21)	(0.03)	
Effective spread	-0.032	0.831	-0.162	0.581	0.29
	(0.71)	(0.07)	(0.36)	(0.03)	
Proportional effective spread	-0.031	-0.191	-0.194	0.639	0.38
	(0.69)	(0.63)	(0.22)	(0.01)	
Quoted depth	0.049	-0.216	0.083	0.134	0.00
	(0.48)	(0.54)	(0.55)	(0.50)	
Dollar depth	0.061	0.676	0.158	0.068	0.69
	(0.37)	(0.05)	(0.24)	(0.72)	
Number of trades	-0.112	-0.492	0.924	0.099	0.88
	(0.12)	(0.17)	(0.00)	(0.61)	
Number of shares traded	0.026	-0.549	0.115	-0.100	0.00
	(0.74)	(0.18)	(0.47)	(0.66)	
Trade size	0.138	-0.057	-0.809	-0.199	0.73
	(0.27)	(0.93)	(0.00)	(0.57)	
Illiquidity	0.049	-1.487	-0.486	0.517	0.71
	(0.74)	(0.06)	(0.11)	(0.23)	

Chapter 4: WARRANT DIVIDENDS AND TAKEOVER DETERRENCE

1. Introduction

In 1982, Martin Lipton developed and implemented the Warrant Dividend Plan as a method for firms to avoid a hostile takeover bid. Lipton and his supporters contend that boards need ample time to evaluate takeover bids and to increase the premium for the firm's shareholders. Those that oppose this view argue that this style of takeover defense is employed by entrenched managers seeking to retain their jobs and to increase the benefits from an increased takeover premium for their personal equity holdings.

The position opposing Lipton's plan also contends that blocking a potential takeover prevents the market for corporate control from working efficiently. Indeed, while issuing warrants as dividends may avert a potential takeover of the target firm, the major beneficiary of this strategy may not include all shareholders of the firm. Van Hulle and Geens (1993) study warrants as a takeover defense in Belgium and find that large blockholders stand to receive the largest gain from such a strategy. Warrant dividends allow large blockholders to increase their fraction of equity ownership in the target, which equates to a partial offer for the firm at a reduced price.

The Van Hulle and Geens study is the only study I am aware of that examines warrants issued as dividends to shareholders. While their study analyzes the structure of "poison warrants" and how this takeover defense can be implemented within the boundaries of Belgian corporate law, it does not provide any empirical evaluation of firms that issue warrants as dividends. My study is the first to examine U.S. firms that

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announce and distribute warrants as dividends as a potential takeover deterrent. I develop a hand-collected dataset of all firms that announce warrant dividends from 1993 through 2006. The limited sample size of 32 firms allows me to examine the firms from several aspects, applying takeover and warrant literature to predict the type of firm that would issue warrant dividends.

My paper contributes to the takeover literature, adding to studies of poison pills and other takeover defenses and their effects on target and bidding shareholders. My paper adds to the warrant literature by examining another method used by firms to issue warrants, complementing my previous essays that investigate warrants as part of IPOs, SEOs, debt offerings, and private placements.

My findings indicate that firms issuing warrants as dividends have characteristics similar to firms issuing warrants using other methods. Firms issuing warrants are smaller, younger, and riskier relative to comparable firms. I also find that, despite the intentions of the Warrant Dividend Plan crafted by Lipton in 1982, the firms in my sample do not exhibit the characteristics of firms expected to deploy poison pills such as warrant dividends. My firms do not have higher agency costs, do have other takeover defenses available, and do have managers and directors that own a large fraction of the firm's equity. These three general findings, explained in greater detail below, are inconsistent with the typical firm that issues a takeover defense. The results suggest that warrants are issued as dividends for reasons other than as a takeover defense. This alternative prediction is also examined further in the study that follows.

2. Literature review

To establish the motivation for this paper, I first discuss takeover defenses. I begin with the Williams Act of 1968, which decreed that bids by potential acquirers be consummated within twenty business days of the offer. Concerned that only one month to evaluate and respond to a bid, whether friendly or hostile, was insufficient, several states responded by developing takeover statutes that provided boards discretion when faced with evaluating a takeover (the "business judgment rule"). The Supreme Court pre-empted these statutes in *Edgar v. MITE Corp.* in 1982.[13]

In 1982, Martin Lipton devised the "Warrant Dividend Plan" (the Plan), developed as a method for managers to thwart hostile takeovers (Lipton, 1982). Lipton's memorandum reviews the structure of the warrant plan and provides recommendations regarding its implementation by firms. The Plan was successfully implemented in takeover battles in 1982 and 1983, providing additional time for directors to react to an unsolicited bid and try to increase shareholder value. Under the Plan, firms issue a dividend of warrants to its shareholders, providing them the option to exercise the warrant in exchange for one share of common stock. The target firm should have enough approved shares to prevent requiring a shareholder vote prior to issuing the warrant dividend. Avoiding shareholder approval for additional shares allows the firm to issue the dividend at any time. One warrant would be granted for every two to five shares owned, and the exercise price would be set high, recommended at 200%-300% of the underlying stock's price. The expiration of the warrant would be two to five years out

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[13] Lipton and Rowe (2002) provide an historical summary of the market for corporate control and the creation of the poison pill as an element of Delaware corporate law development. Recent surveys of the takeover literature include Andrade, Mitchell, and Stafford (2001) and Holmstrom and Kaplan (2001).

and would not trade separately until a tender offer is made for the firm. When a full or partial tender offer is made, the warrant exercise price would decrease to 75% of the current stock price and the exercise period reset to be at least three years from the offer date.

In a 1983 *Wall Street Journal* article, an investment banker placed the now-familiar moniker "poison pill" on securities issued in a manner modeled on Mr. Lipton's plan (Allen and Swartz, 1983). The extant literature has examined the poison pill in its various forms since the Plan was first implemented. The focus of most of the research disputes the benefits of the poison pill. From the perspective of Lipton, poison pills similar to the warrant dividend provide a target firm's board with additional time to react to a bid and to obtain increased value for target shareholders. From the opposing perspective, poison pills insulate managers from takeovers that may benefit both target and acquiring shareholders. This perspective supports the view that poison pills prevent the disciplining of managers by the market for corporate control, allowing them to seek a higher price or remain entrenched. If managers own shares of the firm or have stock options, a higher price in a takeover is a direct benefit. The conflicting views have yet to be resolved. Much of the literature attempts to resolve this conflict by focusing on returns to shareholders of the target and acquiring firms.

Malatesta and Walking (1988) test the opposing views related to poison pills. The managerial interests hypothesis states that poison pills increase the costs of removing inefficient managers, reducing shareholder wealth. The shareholder interests hypothesis states that poison pills allow target firms to obtain higher premiums, increasing shareholder wealth. The results support the managerial interests hypothesis, showing that

shareholder wealth is adversely affected in firms that employ these defenses. Abnormal

returns are negative for firms following poison pill adoption announcements and positive

for firms abandoning the takeover defense. The authors also find that managers owning

less firm stock are more likely to adopt poison pills because the personal benefits of using

the poison pill exceed the costs of adopting it. Ryngaert (1988) finds similar results in

his paper, but he also finds that only the most restrictive versions of the poison pill reduce

shareholder wealth.

Jarrell, Brickley, and Netter (1988), in their review of takeovers in the 1980s,

discuss that poison pills are very effective takeover deterrents. The authors argue that

poison pills seem to harm target shareholders.

Gilson (2002) argues that if managers use poison pills to seek a better price or

remain entrenched, an agency conflict exists. Gompers, Ishii, and Metrick (2003)

examine the degree of shareholder rights within a firm and the relation to stock returns to

shareholders and find a positive relation between higher agency costs and weak

shareholder rights, which would occur in firms with strong takeover defenses.

To repeal a poison pill, potential acquirers must capture the board. If

shareholders seek to repeal the pill or for any other reason are dissatisfied with the firm's

current manager, they face the same difficult task of capturing the board. Gilson (2002)

and others argue that managers have significant control over the director election process,

making it very difficult to exercise the shareholders' right of election.

Bebchuk, Coates, and Subramanian (2003) examine another takeover defense, the

staggered board. The effective staggered board, defined as a board that requires a bidder

to wait through two annual elections of directors to attempt to replace the board, strongly

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influences the outcome of takeover contests. The presence of an effective staggered board decreases the odds of a change in control. Other takeover defenses, including the pre-bid poison pill, supermajority voting provisions, and fair price provisions, have no significant effect in takeover contests. Board composition also does not influence bid outcomes. The authors also find that target firms with effective staggered boards do not get higher premiums from bidders. The significance of the staggered board study relates to a statement by the authors that in the presence of a poison pill, all other takeover defenses are unnecessary, requiring a potential acquirer to first capture the board to eliminate the poison pill.

The crux of Lipton's position is that takeover defenses like the poison pill, when employed effectively, provide premiums for target shareholders. Bradley, Desai, and Kim (1988) examine the potential synergy obtained by the two shareholder groups following acquisitions. According to their study, successful tender offers increase the combined value of the target and acquiring firms, although target shareholders receive the largest gains. Acquiring firm shareholders received synergistic gains prior to the Williams Act of 1968, but experienced losses in the 1981 to 1984 period. The difference in gains between target and acquiring shareholders is exacerbated in multiple bidder contests.

Comment and Schwert (1995) examine the effects of takeover defenses on shareholder wealth and whether the presence of these defenses alters the market for corporate control, i.e., reducing takeover frequency. The paper focuses on the demise of the 1980s takeover market, during which nearly half of all major U.S. firms received hostile takeover bids (Holmstrom and Kaplan, 2001), and concludes that antitakeover

measures such as poison pills did not deter takeovers, but rather economic and political forces on a broader level. Comment and Schwert also find that poison pills and control share laws lead to premiums for target shareholders, suggesting that the relative bargaining positions of bidders and targets are altered by these antitakeover devices, raising costs to the bidder and gains to the target.

In the only paper I am aware of that examines warrant dividends specifically, Van Hulle and Geens (1993) find that "poison warrants" issued by Belgian firms result in increased benefits to larger shareholders at the expense of smaller shareholders of target firms. My paper is the first to examine warrant dividends in the U.S. market and aims to add to the literature on poison pills by providing a very detailed view of firms that issue warrants and how they differ within their respective industries.

3. Testable hypotheses

Before focusing on the warrant dividend as a takeover deterrent, I first consider the dividend as another method of warrant issuance. Firms that issue warrants, compared to firms that do not, are more likely to be smaller, younger, and riskier (Schultz, 1993; How and Howe, 2001). If firms issue warrants as a dividend, the firm will also exhibit the traits as firms that issue warrants using other methods.

Hypothesis 1: Firms issuing warrants as dividends, relative to the typical

comparable firm, will be smaller, younger, and riskier.

Based on the poison pill literature discussed above and related takeover studies, I expect firms that issue warrants as dividends to exhibit the following general characteristics relative to the average comparable firm that does not issue warrants as

dividends: higher agency costs, weak corporate governance structure, and high external ownership.

If adoption of poison pills is a signal of high agency costs as argued by Gilson (2002), firms issuing warrant dividends as a takeover deterrence should exhibit the characteristics associated with high agency costs. Jensen (1986) contends that managers will use excess cash flow to fund negative NPV projects to increase assets under their control. The monitoring costs of forcing managers to either invest in positive NPV projects or pay out free cash flow are agency costs associated with the manager / shareholder relationship. If firms issuing warrant dividends have high agency costs, then their free cash flow and capital expenditures should exceed the typical comparable firm.

A lower level of ownership by firm insiders reduces the alignment of incentives between managers and shareholders (Jensen and Meckling, 1976). If firms issuing warrant dividends have high agency costs, then managers and directors of the firm will own a smaller fraction of the firm's outstanding shares.

> *Hypothesis 2*: Firms issuing warrants as dividends, relative to the typical comparable firm, will have 1) higher free cash flow, 2) higher capital expenditures, and 3) lower equity ownership by managers and directors.

Firms with weak corporate governance structures have managers with incentives poorly aligned with the interests of shareholders. Similar to the discussion above, this is an agency cost problem. Measurable corporate governance structures found to ameliorate this agency relationship include board

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size, board independence, the separation of the leadership positions (CEO and board chairman), and the equity ownership of directors.

Jensen (1993) argues that larger boards are less effective than smaller boards. Yermack (1996) finds that larger boards are associated with lower Tobin's q. Hermalin and Weisbach (1998) contend that independent directors seek to remain independent from the CEO while the CEO prefers a less independent board. Returning to Jensen (1993), the author contends that directors are more likely to acquiesce to the CEO's wishes if she is also the board chairman. Jensen and Meckling (1976) and Morck, Shleifer, and Vishny (1988) assert that greater equity ownership by outside directors leads to stronger boards as the incentives become more aligned with the interests of shareholders. If firms issuing warrant dividends have weak corporate governance structures, then boards will be smaller, boards will be less independent, a separation of leadership will not exist, and outside directors will own less equity in the firm.

> *Hypothesis 3*: Firms issuing warrants as dividends will have 1) more directors on the board, 2) a lower fraction of outsiders on the board, 3) one person holding both the CEO and board chairman positions, and 4) lower equity ownership by outside directors.

Bebchuk, Coates, and Subramanian (2003) state that other takeover defenses, such as a staggered board, are unnecessary in the presence of a poison pill because of the extreme difficulty in repealing the pill. If a firm issues a

warrant dividend, the firm is less likely to also have other takeover defenses available to deploy.

> *Hypothesis 4*: Firms issuing warrants as dividends will not have other takeover defenses available to use in the event of a tender offer.

The literature favoring poison pills contends that managers adopt poison pills to provide them the opportunity to seek higher premiums in the event of a tender offer. The benefits of this strategy increase when managers are compensated with equity, providing a greater payoff if the takeover is successful. Firm managers issuing a warrant dividend are more likely to have an equity component in their compensation package.

> *Hypothesis 5*: Managers of firms issuing warrants will have an equity-based component included in their compensation package.

4. The sample

To develop my hand-collected dataset, I identify domestic firms issuing warrant dividends by searching *Factiva*, *LexisNexis*, and EDGAR Online from the SEC from 1993 through 2006, only retaining firms with filings available through EDGAR. After reviewing several years of SEC filings for each firm to verify announcement date, distribution date, and warrant details (e.g., exercise price), the final sample includes 32 firms. Figure 1 portrays the frequency of warrant dividend announcements and the number of firms making the announcements. Six firms announced multiple warrant

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dividend issues. No discernible pattern is evident from the announcement frequency chart.

4.1. Announcing firms

Table 1 includes the list of firms that announced warrant dividends. Panel A lists firms that subsequently issued warrants as announced. Panel B identifies firms that did not issue a warrant dividend in spite of their announcement to do so. The median firm age at the time of announcement is 6.9 years for the entire sample. The two groups of firms differ in age, with the median firm age issuing the dividend is 7.1 years and the median firm not issuing is 3.1 years. The median difference is statistically different at the 5% level (Wilcoxon-z = 2.202). Removing multiple announcements (twelve) results in two samples not significantly different from each other. In general, older firms follow through with the announced dividend.

Firms distribute previously announced warrant dividends nearly two months following the announcement. The lag in distribution ranges from a negative value (i.e., the firm provides the dividend to shareholders then follows with the announcement) to over eight months. The maximum value, occurring in the dividend distribution by Action Products International, Inc., results from the firm postponing the actual distribution of the dividends following the announcement. Two firms (American Toys Inc. and Creative Host Services, Inc.) provide multiple issues of warrants based on a single announcement.

In Table 2, I categorize each firm by industry group, identified with the 2-digit SIC code. The industry distribution for firms issuing warrant dividends is similar to the distribution for firms issuing warrants in their IPOs (Howe and Olsen, 2006). The four

categories with the most frequent dividend issuances belong to business services (2-digit SIC 73), manufacturing (20-27, 29-34, 37, 39), retail (52-59), and financial firms (60-67). Sixty percent of the warrant dividend firms and 48% of the IPO sample firms are included within these industry categories.

Using data from Compustat and SEC filings, I examine the characteristics of the warrant dividend firms and the relation to their respective industries for the year of the dividend announcement. Table 3 separates the sample into firms that did distribute warrants (Panel A) from firms that did not distribute warrants following the announcement of the dividend (Panel B). The rightmost column in Table 3 describes the relation of the firm's characteristic value to that of the industry's median value. For each firm, I compare the characteristic value to the median value for that firm's industry. These differences are averaged for the entire group of firms (distributing or non-distributing). For example, the average difference between the distributing firms' total assets and each firm's industry median value for total assets is a negative $128.13M. In other words, the average distributing firm has a total asset value that is $128.13M less than its industry's median firm.

The median firm that distributes warrants is smaller in size based on total asset value ($7.59M vs. $10.25M). Compared to industry medians, both groups of firms are smaller than their respective industries. Distributing firms have a total asset value $128.13M less than the median industry firm's asset value. The average non-distributing firm has a total asset value $84.37M less than the value for the median industry firm. The median asset tangibility, measured as the value of property, plant, and equipment divided by total assets, is 0.29 for non-distributing firms, statistically higher at the 10%

level than the 0.11 median value for distributing firms. This relation is also seen when comparing to industry medians. While distributing firms have tangible assets similar in value to their industries (within 0.01), non-distributing firms have a greater fraction of tangible assets compared to their industries (0.23 greater).

Distributing firms have less debt on their books than non-distributing firms and the industry for each firm. Total liabilities for the average distributing firm are $4.09M ($2.56M median) compared to $8.62M for the average non-distributing firm ($7.70M median). Distributing firms have a lower value of total liabilities, but are more levered than non-distributing firms and the industry medians. The mean debt/asset and debt/equity ratios for distributing firms are 1.56 and 7.99, compared to 0.90 and 2.29 for non-distributing firms. The debt/asset and debt/equity ratios for distributing firms are much higher compared to the industry medians than are the ratios for non-distributing firms.

When examining the operations of the sample firms, I find that non-distributing firms have greater capital expenditures in the year of the announcement ($0.32M median) compared to distributing firms ($0.20M median). Both firms groups spend less than the industry median, but distributing firms spend far less ($13.90M) in comparison to industry than do non-distributing firms ($0.53M). The ratio of capital expenditures to total assets is higher for non-distributing firms (0.37 mean) compared to distributing firms (0.10 mean). Both groups exceed the ratios of the industry median, suggesting that although these firms spend less, their capital spending is high relative to firm size. Cash flows are less negative in distributing firms, with operating cash flows at a negative $0.82M and free cash flow a negative $1.30M, compared to -$0.82M and -$2.30M for

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non-distributing firms.[14] The median free cash flows are significantly different at the 10% level. Both firm groups have cash flows far below the industry medians.

The *Zscore*, as defined by Mutchler (1985), is used to evaluate the potential for financial distress of the firms in the sample. The *Zscore* is calculated as follows:

$$Z\text{-}score = 0.120 * NTWL + 0.159 * CFTL + 0.132 * CRATIO$$
$$- 0.032 * LEVLT - 0.138 * LEV + 0.187 * NISALE$$

where *NTWL* is net worth divided by total liabilities, *CFTL* is operating cash flows divided by total liabilities, *CRATIO* is the current ratio, *LEVLT* is long-term debt divided by total assets, *LEV* is total liabilities divided by total assets, and *NISALE* is income before interest and taxes divided by sales. Firms in financial distress will have a *Zscore* less than zero, while a positive *Zscore* indicates a healthy firm. The *Zscore* for both groups of firms indicate financial distress for most of the firms in the sample. The average distributing and non-distributing firms have negative *Zscore*s, with distributing firms having significantly (at the 10% level) higher *Zscore* values. Both groups have *Zscore*s lower than their industry medians.

The performance of firms announcing warrant dividends substantially lags the performance of the median industry firm. The level of revenues is quite similar between the two groups. Compared to industry medians, however, the distributing firms lag by $78.98M in revenues, and non-distributing firms lag by $59.52M. Profitability and efficiency measures are also quite poor. Net incomes are comparable between the two groups of firms, but the median profit margins are statistically different at the 10% level.

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[14] Free cash flow is measured as follows: operating income before depreciation – interest expense – (total income taxes – the annual change in deferred and investment tax credits) – preferred dividends – regular dividends (Lehn and Poulsen, 1989).

Return on equity is also statistically different between the two groups. Net income and ROE for distributing firms are higher (less negative) than for non-distributing firms.[15] When I examine the profitability and efficiency measures in entirety (net income, profit margin, ROA, ROE, and EPS), I find that firms that distribute warrants perform better overall than do firms that do not distribute warrants. Distributing firms also perform better compared to their respective industries relative to non-distributing firms.

The distributing and non-distributing firm groups have similar MTB ratios that are much greater than the industry medians. This relation suggests that firms announcing warrant dividends are significantly overvalued in the market in relation to other firms in their industry.

4.2. Warrant dividend details

I obtain information about the warrants issued by distributing firms from SEC filings and announcements. Table 4 lists the 22 distributing firms and the details of the warrant issuance. From distribution date to expiration date, the average warrant life is 66.1 months (median 60.9 months). The range across the sample is quite large, with a minimum warrant life of 4.5 months (Innovative Coatings Corp.) and a maximum life of 165.8 months (FTS Group, Inc.). Typically, the number of common stock shares obtainable by warrantholders after exercise is one. Several firms offer one warrant per several shares of stock, resulting in a *Shares per warrant* value less than one.[16] An

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[15] I ignore firms with negative equity on the balance sheet when calculating the ROE and market-to-book ratios. Adding these firms back into the sample would strengthen the results because these firms are poor performers.
[16] *Shares per warrant* represents the number of shares each shareholder would receive if she exercises all of the warrants received in the warrant dividend.

example is Creative Host Services, Inc., which offers shareholders one warrant (exchangeable for one share) for every 40 shares of stock owned. Another notable example is Raven Moon Entertainment, Inc., a firm with multiple warrant issues. Raven Moon's first distribution provides one warrant for every share owned. Later issues provide 75, 40, and 10 warrants for every one share owned.

The exercise price varies across the sample. The mean price is $3.33 and the median $2.75. Raven Moon's second through fifth offerings base their exercise prices on a percentage of the closing price on the date of exercise. Eight firms issue warrant dividends in the money, i.e., with an exercise below the stock price. In fact, each of Raven Moon's warrant dividends is offered in the money. The initial issue has an exercise price of $0.0015 when the price at distribution is $1.515, resulting in a *Moneyness* of 0.00099 ($0.0015 / $1.515). Subsequent offerings specify exercise prices ranging from 50% to 75% of the price at exercise. Although several issues appear to have attractive potential based on the *Moneyness* of the warrants distributed, only one third of the offerings (11 of 32) result in opportunities for warrantholders to exercise.[17] Eight of these offerings, one quarter of the sample, include exercise rates of more than half of the warrants offered in the dividend. Raven Moon is the only firm in the sample that experienced exercise rates of 100%, which is no surprise considering that each offering is in-the-money (*Moneyness* < 1) immediately upon distribution.

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[17] Five of the 32 offerings have expiration dates beyond the date of this study. Only one of these firms, Leasing Edge Corp., has experienced exercise of dividend warrants thus far.

5. Analysis

To better understand firms that offer warrants as dividends, I examine firm characteristics around the announcement date and the warrant life period. Warrant dividends are one method of takeover deterrence (Lipton, 1982), so I also evaluate other takeover defenses and corporate governance characteristics of announcing firms. To complete my study of firms issuing warrants as a dividend to existing shareholders, I look at how each firm has fared during and after the life of the warrants issued to determine the effectiveness of the intended takeover avoidance.

5.1. Firm characteristics around the announcement date

I compare several firm characteristics in the year prior and following the announcement of the warrant dividend. In Panel A of Table 5, pre- and post-announcement data are provided for the distributing and non-distributing firms. These data are in relation to the industry medians, similar to the method from Table 3.

Both groups of firms shrink in size compared to industry medians when measuring firm size in terms of market value or total assets. Firms that do not distribute warrants experience a considerable change in total assets after the announcement date. The relative total asset value compared to industry medians changes from -$68.56M to -$1,247M, a much larger change than that experienced by distributing firms (-$55.95M to -$190.80M). While distributing firms retain a relatively constant level of fixed assets compared to their industry peers, non-distributing firms hold a larger proportion after the announcement compared to prior (0.08 prior vs. 0.45 following).

Distributing and non-distributing firms decrease their level of total liabilities following the announcement, with non-distributing firms substantially reducing total liabilities relative to industry medians, from -$39.73 M before the announcement to -$1,189.25M after the announcement. Despite the large decrease in total assets and total debt in distributing firms, the debt/asset ratio compared to industry medians drifts towards zero, changing from +2.20 to +0.30. By contrast, the debt/asset ratio for non-distributing firms increases from +0.68 to +2.45 relative to industry medians. The debt/equity ratios for each group increases across the announcement date. An increase in equity results in a debt/equity ratio above the industry medians for distributing firms.

Distributing firms experience a dramatic decrease in capital expenditures, spending $16.04M less than industry. Non-distributing firms also spend less, but to a lesser degree ($3.70M). The ratio of capital expenditures to total assets decreases slightly for both groups of firms relative to industry medians. Cash flows for both groups drop following the announcement. Free cash flow after the announcement is less than half of its pre-announcement level. When examining the financial distress indicator, *Zscore*, distributing firms improve their position. In the year prior to announcement, distributing firms have a relative *Zscore* of -121.43 and increase their *Zscore* to -0.65 after the announcement. Non-distributing firms do not fare as well, experiencing a decrease in their *Zscore* from -23.67 to -377.63.

Revenues and net income for distributing and non-distributing firms decline compared to industry. Revenues are $125.68M less than industry for distributing firms and $128.50M for non-distributing firms after the announcement, relative decreases of more than $56M and $84M compared to prior to the announcement. Relative net income

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decreases by double for distributing firms and triple for non-distributing firms. A pattern

emerges from the profitability and effectiveness measures for each group of firms. Profit

margin and ROA improve for distributing firms, with both measures approaching the

industry medians. ROE and EPS do not improve and appear to decrease, but

incorporating the announcement year figures from Table 3 as a midpoint does not

produce a clear trend for ROE, while EPS decreases slightly. Non-distributing firms

experience a substantial decrease in profit margin and ROA relative to industry, with

mixed results for ROE and EPS.

The MTB ratio increases slightly for distributing firms across the announcement

date, but decreases for non-distributing firms, likely because of the sharp drop in market

value relative to industry. I average monthly returns over a 24 month period before and

after the announcement date, excluding the months immediately prior and following the

announcement date. The monthly returns are compared to the industry medians and

averaged across the sample of firms in each group. The results in Table 5 show that

returns for both groups of firms decrease relative to industry medians. Distributing firms

drift toward the industry median while non-distributing firms decrease from a positive

$0.038 to a negative $0.066 relative to industry.

For the distributing firms, the post-announcement data in Panel A of Table 5

discussed above may overlap with the subsequent distribution of the issued warrants. To

address this, I compare the pre-announcement characteristic data to the data following the

distribution date of the warrants. These results are summarized in Panel B of Table 5.

Only minor differences exist between the two sets of data – the data across the

announcement date and the data across the announcement / distribution period. Two

notable exceptions are the changes in ROE and MTB ratios. Across the announcement date, the relative trend in ROE is mixed when considering the year 0 (the year of the announcement) from Table 3. Changing the reference period to the announcement / distribution period confirms a downward trend in ROE, from -0.25 to -12.85. The MTB ratio provides similar results. When considering year 0, the trend in MTB is mixed, but when I look at the trend before announcement and after distribution, the trend is increasing (5.65 to 20.75 relative).

In Panel C of Table 5, I compare firm characteristics prior to the dividend announcement to after warrant expiration. For the change from before the announcement to after warrant expiration described in Panel C, the data compared to the other two sets of period comparisons – i.e., Panel A's before vs. after announcement and Panel B's before announcement vs. after distribution – are very similar with only a few exceptions. For the third period comparison, the capital expenditures decreases when compared to the industry median firms, but the ratio of capital expenditures to total assets changes from a positive 0.03 to a negative 0.01 in relation to the industry median. The other comparisons showed a sustained positive relation. The market-to-book ratio decreases (5.65 to 4.00), opposite the change from the other two period comparisons. Finally, the volatility of monthly returns decreases (0.258 to 0.188), implying a decrease in the riskiness of the stock. This decrease in risk is confirmed by the improved *Zscore* change across the period (-121.43 to -0.14).

Seven of the firms that distributed warrants had a fraction of the warrants exercised. Panel C of Table 5 separates all distributing firms into those with any nonzero fraction of warrants exercised and those with no warrants exercised. The debt ratio

changes differ between the two groups. The debt/asset and debt/equity ratios for the exercised group are negative prior to announcement and positive after warrant expiration. Firms with exercised warrants experienced an improvement in both debt/asset ratio (-0.18 to 0.11) and debt/equity ratio (-0.17 to 3.10), while firms without exercised warrants experienced a decrease in debt/asset ratio (3.25 to 0.14) and little change in debt/equity ratio (-0.42 to -0.39).

Firms with warrants exercised have positive *Zscores*, indicating these firms are financially stable. By contrast, firms without warrants exercised have negative *Zscores*, suggesting some degree of financial distress in these firms. These relations occur before announcement and after warrant expiration. While receiving proceeds from warrant exercise would improve the financial standing of a firm, the positive (and greater in magnitude) *Zscore* prior to the dividend announcement shows that firms with exercised warrants are financially stable despite the future receipt of proceeds.

5.2. Corporate governance and takeover defenses

Fama (1980) identifies the market for corporate control as an external force that mitigates agency costs of managers, thus defining the takeover market as a corporate governance mechanism. I examine the corporate governance structure and identify the presence of other takeover defenses to document this aspect of warrant dividend firms. I obtain all related measures from SEC filings in the year before and after the dividend announcement.

Table 6 provides corporate governance measures and other takeover related items. The average tenure of CEOs for distributing and non-distributing firms is 5.22 and 4.67

years. CEOs for the distributing firms are less likely to hold the board chairman position, but are more likely to be a founder of the firm, as compared to non-distributing firms. Boards of distributing firms are larger, have a larger fraction of outsiders, and are more likely to have a staggered structure. The board and management differences between the two groups are not significant with the exception of the staggered board structure, which is significant at the 10% level.

Equity ownership differs between the two groups. Insiders, defined as current and past employees of the firm plus board members with business or familial relations with the firm, own less of distributing firms. Outsiders on the board, those with no business or family ties with the firm, own more of distributing firms. External non-affiliated shareholders and institutional investors (a subset of the external group) own less equity in distributing firms. The median values for outside owners and institutional owners are significantly different at the 5% level.

Firms that announce warrant dividends but do not distribute are significantly more likely (at the 1% level) to be incorporated in Delaware compared to firms that announce and distribute. I also identify firms that have compensated CEOs with equity and firms with other forms of takeover defenses (e.g., blank check preferred stock). The two groups of firms are statistically indistinguishable in these two dimensions.

Seven firms have a fraction of their dividend warrants exercised. Table 7 provides information for these firms, aiming to understand how board characteristics and equity ownership changes following the warrant period. With the exception of Kestrel Energy, Leasing Edge Corp., and Raven Moon Entertainment, Inc., the board for each firm decreases in size. The fraction of outsiders on the board, a measure of board

independence also decreases in all but two of the firms. Changes in equity ownership

also provide interesting results. In four of the firms, significant changes in the fraction of

equity owned outside of the firm occur over the warrant period. External ownership

increases by 0.35, 0.53, and 0.22 for American Educational Products Inc., Kestrel

Energy, and Marcum Natural Gas Services. External ownership decreases by 0.22 for

Innovative Coatings Corp. Institutional ownership represents the majority of these

changes in ownership.

Examining the equity ownership changes further reveals shifts in ownership

following warrant exercise. American Educational Products Inc. sees a drop in internal

(insider plus outsider ownership) and an increase in external ownership. Innovative

Coatings Corp. ownership becomes more dispersed following warrant exercise as all

large fractional holdings decrease. Kestrel Energy and Marcum Natural Gas Services see

slight increases in internal ownership and large increases in external ownership.

5.3. Reasons for dividend and firm survival

With the intention of evaluating firms that offer warrant dividends as a takeover

deterrence, I examine reasons provided by firms for the warrant announcement. Only

one firm, American Educational Products, Inc., identified a potential takeover situation in

its announcement. No other firm in the sample, in news releases and SEC filings prior to

the dividend announcement, provides any warnings of a potential takeover or tender

offer. The most cited reasons for the warrant dividend relate to general working capital

purposes or as a reward to shareholders. Creative Host Services, Inc. states the warrant

dividend would provide capital needed for continued expansion of the firm. Table 8

summarizes the warrant period events and the latest firm information for each of the distributing firms based on SEC filings and news releases. Panel A shows that the 22 firms that distributed warrants following the announcement are quite active during the warrant period. Thirteen firms acquire other firms and five firms divest portions via sales or spinoffs. Notably, only one firm is involved in a potential takeover. During the warrant dividend period, Vicom, Inc. receives a bid from shareholder Amara Group, Inc. The firm is not taken over, but information available on Vicom does not indicate whether the warrant dividend plan is implemented to specifically deter a potential takeover. None of the warrants is exercised during Vicom's warrant period.

The rightmost column of Table 8 Panel A describes what the firm has faced since the expiration of the warrants. The majority of distributing firms do not fare well. While seven firms continue to be actively traded, most often as a pink sheet or OTC security, the other fifteen firms have been acquired, ceased operations, or faced legal issues. Four firms were acquired after the warrant dividend period. A fifth firm (Computone Corp.) implemented a stockholder rights offering within three months of the end of the warrant period. Four firms were involved in SEC investigations, with one investigation resulting in the arrest of a CEO (eConnect). The firms that did not distribute warrants after the announcement also fare poorly. Two firms are currently trading, two firms were acquired, and three firms (one actively trading) have been involved in SEC investigations of securities fraud.

6. Discussion

My first hypothesis states that firms issuing dividends will be smaller, younger, and riskier relative to comparable firms. From Table 1 the average firm in the sample is 10.8 years in age, making my sample relatively young. From Tables 3 and 5, the firms in my sample have substantially lower total asset values compared to industry medians. Measuring firm size with market value yields the same result. I use the standard deviation of stock returns and the *Zscore* to measure the riskiness of a firm. Firms that issue warrant dividends have lower *Zscore*s, indicating an increased probability of financial failure, and higher return volatilities. These results support my first hypothesis that firms issuing warrants as dividends are similar to firms issuing warrants using other methods in that they are younger, smaller, and riskier than comparable firms.

My second hypothesis states that firms issuing warrants as dividends will have characteristics associated with higher agency costs relative to comparable firms. I compare each firm issuing warrant dividends in my sample with the median firm in its industry. From Tables 3 and 5, the firms in my sample have free cash flow and operating cash flows lower than the industry medians. The relation holds when dividing each term by total assets to normalize by firm size (not reported). Capital expenditures are lower than the industry medians. When I normalize capital expenditures by dividing by total asset value, the relation to the industry median changes to positive. The average fractional equity ownership by insiders of the firms is 0.28 for distributing firms and 0.36 for non-distributing firms. If I consider that outsiders on the board also seek personal gain through higher takeover premiums, the total equity ownership fraction by internal shareholders is 0.33 for distributing firms and 0.37 for non-distributing firms. This level

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of ownership is relatively high, landing within the incentive alignment region identified by Morck, Shleifer, and Vishny (1988).

For the three parameters used to measure high agency costs – cash flows, capital expenditures, and internal equity ownership – only the capital expenditures measure supports my second hypothesis. This support is relatively weak because the capital expenditures/total assets result nearly equals the industry median.

My third hypothesis states that firms issuing warrants as dividends will have weak corporate governance structures. I use board characteristics and director ownership as measures of corporate governance strength. From Table 6, the median sample firm has five directors on the board, below the median of twelve directors in Yermack's 1996 study. The median board is composed of 50% outside members and is not likely to have its chairman also sitting in the CEO position. Outsider directors own less than 5% of the firm's outstanding equity (1% median). The small boards, large fraction of outsiders on the board, and separation of the leadership positions imply a strong governance structure. The equity ownership of outside members is low as predicted, but as a whole, these governance characteristics do not strongly support my third hypothesis. The large fraction of ownership by insiders further weakens my prediction as the incentives become more aligned with the interests of shareholders as ownership exceeds 25% (Morck, Shleifer, and Vishny, 1988).

My fourth hypothesis states that firms issuing warrants as dividends will not have other takeover defenses to employ in the event of a tender offer. Twenty-one of the thirty-two firms in the sample have other takeover deterrents in their arsenal. Fifteen of

the twenty-two firms that actually issue the warrants following the announcement have other takeover defenses. The results do not support my fourth hypothesis.

My fifth hypothesis states that managers of firms issuing warrants will have an equity-based component included in their compensation, hoping to reap the gains of higher takeover premiums associated with poison pills such as warrant dividends. Thirteen of the thirty-two firms in the sample (nine of the twenty-two distributing firms) award equity to the CEO during the year prior to or following the announcement of a warrant dividend. The fraction of CEOs receiving equity is less than 50%, providing some support for my fifth hypothesis. The relatively large fraction of equity owned by managers provides additional support for this hypothesis because these shareholders will directly benefit from higher takeover premiums arising from the use of poison pills.

With four of my five hypotheses providing weakly supportive or non-supportive results, my evaluation of firms issuing warrants as dividends requires an alternative perspective. Only two firms in my sample (American Educational Products Inc. and Vicom, Inc.) faced a potential takeover situation noted in news releases or SEC filings around the announcement of the dividend. Several firms acquired other firms following the dividend announcement. Also, several firms became targets *after* their warrants expired, implying that if the firms issued warrants to deter a takeover, the action was unsuccessful at best. Perhaps firms issue warrants for the very reasons stated in their filings, for general working capital or as a reward to shareholders. Unfortunately, the data does not clearly support these claims either. Capital expenditures do not increase following the warrant dividend announcement, distribution, or exercise. Also, average monthly returns decline following the warrant life period. Few firms have issued warrant

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dividends since the early 1990s. Considering the low frequency of issuance and the

results discussed above, the data evaluated in this study do not strongly support the use of

warrants as a takeover deterrence.

7. Conclusions

In 1982, Martin Lipton developed the Warrant Dividend Plan for firms to

implement when faced with a hostile takeover. The Plan provides the board with

sufficient time to evaluate and to respond to a tender offer with the intention of increasing

the premium for the firm's shareholders. Research opposing the intent of the Plan

focuses on the use of poison pills as insulation for entrenched managers to retain their

jobs and obtain gains on their personal stock holdings and options from higher takeover

premiums. This study is the first to examine in detail U.S. firms announcing and

distributing warrants as dividends.

The warrant literature predicts that firms issuing warrants in any form will be

smaller, younger, and riskier than are comparable firms. The takeover literature supports

the prediction that firms issuing warrant dividends, relative to comparable firms, will

have higher agency costs, fewer takeover defenses other than the warrant dividend

mechanism, and lower ownership by firm managers and directors. The hand-collected

sample of firms announcing a warrant dividend from 1993 through 2006 strongly

supports the predictions related to the characteristics of firms issuing warrants. The data

analyzed opposes or only weakly supports the predictions offered by the literature on

takeovers and poison pills.

These findings suggest an alternative motivation for firms to issue warrants as dividends. Reasons provided by firms in my sample, that the purpose of the warrant dividend is for working capital or as a shareholder reward, are also not supported by the data. Stock returns following the warrant dividend are lower and capital expenditures are not significantly larger than the comparable industry firm. Also, my sample of firms lacks potential takeovers during the warrant life, and several of firms are successfully acquired *after* the warrants expire.

Figure 1: FREQUENCY OF WARRANT DIVIDEND ANNOUNCEMENTS
The bars represent the number of warrant dividend announcements from 1993 through 2006. The thick
lines represent the number of firms involved in the announcements.
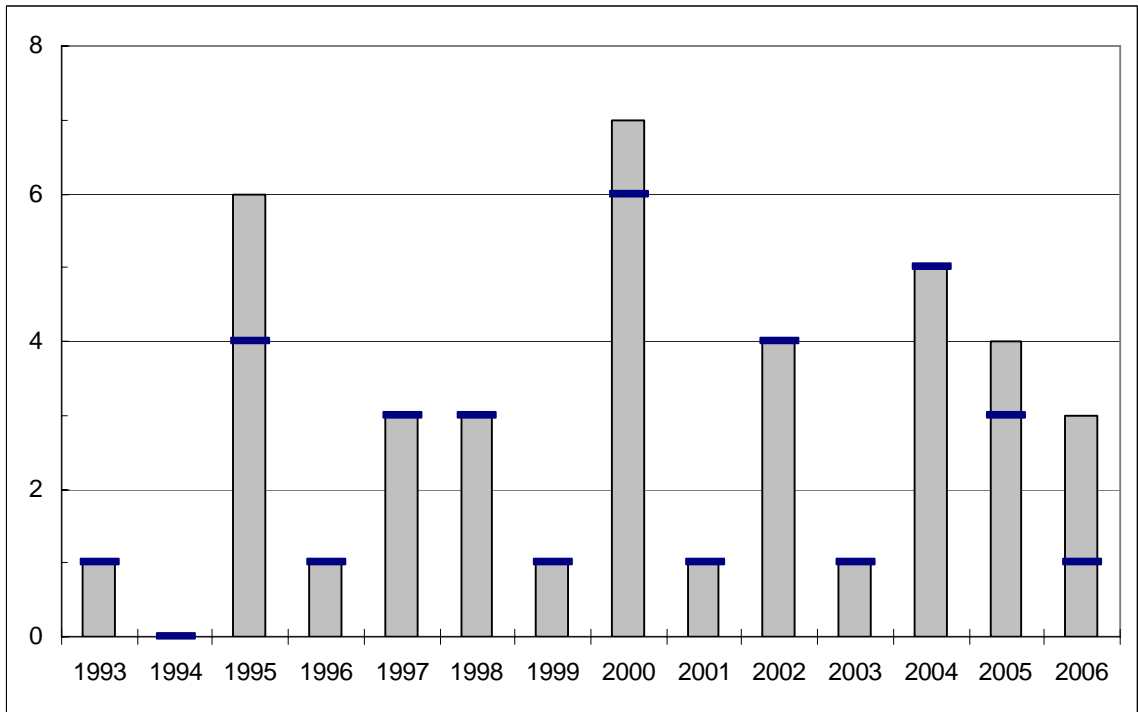
Table 1: WARRANT DIVIDEND ANNOUNCEMENT AND DISTRIBUTION DATES

Details of each warrant dividend announcement from 1993 through 2006. *Firm age* is the number of years from the firm's incorporation date to the warrant dividend announcement date. *Lag in distribution* is the number of days between the announcement and distribution dates.

Firm		Firm age	Dividend announcement date	Dividend distribution date	Lag in distribution
PANEL A: Firms that distributed warrants					
Sample statistics					
	Mean	10.8			55.75
	Min	2.4			-4
	25%	4.1			14.75
	Median	7.1			38.5
	75%	18.2			72.25
	Max	25.4			262
Action Products International, Inc.		22.9	4/24/2003	6/30/2003	67
		24.4	10/29/2004	1/7/2005	70
		25.4	10/31/2005	7/20/2006	262
AESP, Inc.		19.4	10/29/2002	6/1/2003	215
American Educational Products Inc.		10.9	6/4/1997	6/5/1997	1
American Toys Inc.		2.4	7/12/1995	7/28/1995	16
		2.4	7/12/1995	8/30/1995	49
		2.4	7/12/1995	9/29/1995	79
Command Credit Corp		7.0	10/26/1995	10/25/1995	-1
Computone Corp		15.0	6/28/2002	7/10/2002	12
CorVu Corp		4.5	3/21/2000	4/28/2000	38
Creative Host Services, Inc.		13.9	5/16/2000	7/3/2000	48
		13.9	5/16/2000	10/2/2000	139
Dotronix, Inc.		23.7	3/17/2004	8/20/2004	156
eConnect		17.8	6/21/1999	9/1/1999	72
FTS Group, Inc.		7.1	7/20/2004	8/28/2004	39
Innovative Coatings Corp		3.4	12/15/2000	12/22/2000	7
Intellicell Corp.		3.7	11/18/1997	12/10/1997	22
		4.7	11/23/1998	2/16/1999	85
Java Centrale, Inc.		3.7	11/13/1995	12/31/1995	48
Kestrel Energy		21.2	1/18/2000	2/4/2000	17
Leasing Edge Corp		3.7	6/13/1995	8/1/1995	49

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Table 1 CONTINUED: WARRANT DIVIDEND ANNOUNCEMENT AND DISTRIBUTION DATES

Firm	Firm age	Dividend announcement date	Dividend distribution date	Lag in distribution
PANEL A continued: Firms that distributed warrants				
Marcum Natural Gas Services	7.2	6/29/1998	9/10/1998	73
Pipeline Data, Inc.	3.6	1/24/2001	1/20/2001	-4
Premier Development Investment, Inc.	4.2	6/10/2005	6/8/2005	-2
Raven Moon Entertainment, Inc.	6.3	7/24/2005	8/31/2005	38
	6.5	9/13/2005	9/9/2005	-4
	6.8	1/12/2006	2/10/2006	29
	7.1	5/5/2006	5/19/2006	14
	7.4	8/17/2006	9/1/2006	15
Universal Express, Inc.	19.5	10/17/2002	1/31/2003	106
Vicom, Inc.	24.7	3/13/2000	4/11/2000	29

Firm		Dividend announcement date	Dividend distribution date	
PANEL B: Firms that announced without distributing warrants				
Sample statistics				
Mean	*6.0*			
Min	*1.0*			
25%	*1.7*			
Median	*3.1*			
75%	*8.6*			
Max	*21.3*			
AirRover Wi-Fi Corp	1.0	6/30/2004	na	
Computer Motion	11.0	7/1/2000	na	
Digital Communications Technology Corp	9.4	3/31/1997	na	
Equitex, Inc.	21.3	9/30/2004	na	
Hollywood Productions, Inc.	2.4	4/15/1998	na	
Mister Jay Fashions International Inc.	1.7	6/29/1993	na	
	1.7	6/29/1993	na	
	1.7	6/29/1993	na	
Multinet International Corp, Inc	6.1	6/17/2002	na	
Princeton American Corp	3.7	3/1/1996	na	

Table 2: INDUSTRY DISTRIBUTION OF FIRMS ANNOUNCING WARRANT DIVIDENDS

The distribution of each firm that announced a warrant dividend from 1993 through 2006, according to 2-digit and 4-digit SIC codes.

Firm	2-digit SIC	Industry group	4-digit SIC	Industry
Kestrel Energy	1300	Oil and gas extraction	1311	Crude petroleum and natural gas
FTS Group, Inc.	2200	Textile mill products	2253	Knit outerwear mills
American Educational Products Inc.	2700	Printing and publishing	2741	Miscellaneous publishing
Innovative Coatings Corp	3400	Fabricated metal products	3479	Metal coating and allied services
AESP, Inc.	3500	Industrial machinery and equipment	3577	Computer peripheral equipment
Computone Corp			3577	Computer peripheral equipment
Computer Motion	3800	Instruments and related products	3845	Electromedical equipment
Action Products International, Inc.	3900	Miscellaneous manufacturing industries	3944	Games, Toys & Children's Vehicles
Dotronix, Inc.			3999	Manufacturing industries
Vicom, Inc.	4800	Communications	4813	Telephone communications, exc. radio
American Toys Inc.			4899	Communication services
Intellicell Corp.	5000	Wholesale trade - durable goods	5065	Electronic parts and equipment
Hollywood Productions, Inc.	5100	Wholesale trade - nondurable goods	5131	Piece goods and notions
Creative Host Services, Inc.	5800	Eating and drinking places	5812	Eating places
Java Centrale, Inc.			5812	Eating places
Premier Development Investment, Inc.			5812	Eating places
Mister Jay Fashions International Inc.	5900	Miscellaneous retail	5945	Hobby, toy, and game shops
Equitex, Inc.	6100	Nondepository credit institutions	6162	Mortgage bankers and correspondents
Princeton American Corp	6500	Real estate	6512	Nonresidential building operators
Universal Express, Inc.	6700	Holding and other investment offices	6794	Patent owners and lessors
CorVu Corp	7300	Business services	7372	Prepackaged software
AirRover Wi-Fi Corp			7374	Data processing and preparation
Leasing Edge Corp			7377	Computer rental and leasing
Command Credit Corp			7389	Business services
Marcum Natural Gas Services			7389	Business services
Pipeline Data, Inc.			7389	Business services
Raven Moon Entertainment, Inc.	7800	Motion pictures	7812	Motion picture and video production
Digital Communications Technology Corp			7819	Services allied to motion pictures
eConnect	7900	Amusement and recreational services	7999	Amusement and recreation
Multinet International Corp, Inc	8700	Engineering and management services	8741	Management services

Table 3: FIRM CHARACTERISTICS DURING ANNOUNCEMENT YEAR
Details of firms that announced a warrant dividend from 1993 through 2006. *Total assets* is in $millions. *Asset tangibility* is measured as the value of property, plant, and equipment divided by *Total assets*. *Total liabilities* is in $millions. *Debt/Asset* is *Total liabilities* divided by *Total assets*. *Debt/Equity* is *Total liabilities* divided by the book value of equity. *Capital expenditures* is in $millions. *Capital exp/Tot assets* equals *Capital expenditures* divided by *Total assets*. *Cash flows* is the cash flow from operations, in $millions. *Free cash flow* is measured as in Lehn and Poulsen (1989), in $millions (see footnote 2). *Zscore* is the measure of financial distress used by Mutchler (1985). *Revenue* is in $millions. *Net income* is in $millions. *Profit margin* equals *Net income* divided by *Revenue*. *ROA* is the return on assets, measured as *Net income* divided by *Total assets*. *ROE* is the return on equity, measured as *Net income* divided by the book value of equity. *EPS* is the diluted earnings per share. *Market-to-Book* is the market value of equity divided by the book value of equity. The rightmost column, *Relative to industry*, is the difference between a firm's characteristic value and the median characteristic value of the firm's industry. The differences for the group of firms are averaged to determine the value in the column.

PANEL A: Firms that distributed warrants

	Mean	25th percentile	Median	75th percentile	Relative to industry
BALANCE SHEET					
Total assets	8.41	2.37	7.59	12.27	-128.13
Asset tangibility	0.21	0.04	0.11	0.36	-0.01
Total liabilities	4.09	1.46	2.56	7.38	-81.22
Debt/Asset	1.56	0.32	0.50	0.88	1.11
Debt/Equity	7.99	0.27	0.51	1.83	7.40
OPERATIONS					
Capital expenditures	0.84	0.04	0.20	0.32	-13.90
Capital exp / Tot assets	0.10	0.01	0.02	0.08	0.08
Cash flows	-0.86	-1.46	-0.82	0.09	-5.70
Free cash flow	-1.46	-2.41	-1.30	0.05	-5.86
Z-score	-8.23	-0.43	0.09	0.47	-8.60
PERFORMANCE					
Revenue	15.70	1.06	8.95	23.73	-78.98
Net income	-2.51	-4.24	-2.31	-0.07	-2.16
Profit margin	-44.92	-0.67	-0.08	-0.01	-44.87
ROA	-3.68	-1.47	-0.38	-0.01	-3.62
ROE	-14.89	-1.52	-0.56	0.00	-14.91
EPS	-0.35	-0.62	-0.14	-0.02	-0.41
Market-to-Book	32.06	1.46	3.46	11.51	30.33

Table 3 CONTINUED: FIRM CHARACTERISTICS DURING ANNOUNCEMENT YEAR

PANEL B: Firms that announced without distributing warrants

	Mean	25th percentile	Median	75th percentile	Relative to industry
BALANCE SHEET					
Total assets	11.99	0.13	10.25	23.36	-84.37
Asset tangibility	0.39	0.13	0.29	0.41	0.23
Total liabilities	8.62	0.22	7.70	14.58	-33.88
Debt/Asset	0.90	0.45	0.54	0.73	0.34
Debt/Equity	2.29	0.48	0.91	1.39	0.90
OPERATIONS					
Capital expenditures	1.17	0.05	0.32	1.39	-0.53
Capital exp / Tot assets	0.37	0.12	0.19	0.36	0.34
Cash flows	-3.70	-1.24	-0.82	-0.37	-7.29
Free cash flow	-5.64	-3.28	-2.30	-0.71	-8.73
Z-score	-19.06	-47.18	-0.67	0.15	-19.17
PERFORMANCE					
Revenue	11.96	0.00	9.39	18.52	-59.52
Net income	-6.52	-5.55	-3.49	-0.70	-7.32
Profit margin	-100.28	-7.76	-0.74	-0.25	-100.27
ROA	-13.97	-8.12	-0.86	-0.17	-13.96
ROE	-13.05	-24.77	-1.97	-1.33	-13.10
EPS	-0.57	-1.57	-0.17	-0.04	-0.68
Market-to-Book	29.24	3.28	11.19	55.20	27.86

Table 4: WARRANT DIVIDEND DETAILS
Details of each warrant dividend distributed following announcements from 1993 through 2006. *Warrant life* is the length in days between the distribution date and the expiration date of the warrants. *Shares per warrant* is the number of shares per share owned a warrantholder will receive of all warrants received are exercised. *Exercise price* is the price in dollars at which the warrant may be exchanged for shares. *Moneyness* indicates the degree at which the warrant is in-the-money at the distribution date, calculated as the exercise price divided by the underlying share price. Values less than one indicate warrants that are in-the-money upon distribution. *Fraction exercised* is the fraction of warrants that are exercised by warrantholders during the warrant life.

Firm		Warrant life	Shares per warrant	Exercise price	Moneyness	Fraction exercised
Sample statistics						
	Mean	66.1	4.5	3.33	4.37	0.18
	Min	4.5	0	0	0	0
	25%	30.2	0.2	1.19	0.92	0.00
	Median	60.9	1.0	2.75	1.39	0.00
	75%	91.4	1.0	3.80	1.82	0.08
	Max	165.8	75.0	13.20	56.00	1.00
Action Products International, Inc.		89.6	1	2.00	1.02	0.47
		30.3	1	3.00	1.08	0.10
		46.7	1	3.25	1.64	0.00
AESP, Inc.		55.1	1	1.50	2.11	0.00
American Educational Products Inc.		107.3	1	10.00	2.05	0.05
American Toys Inc.		60.9	1	3.80	1.38	0.00
		60.9	1	3.80	1.69	0.00
		60.9	1	3.80	1.52	0.00
Command Credit Corp		91.4	3	3.50	56.00	0.00
Computone Corp		11.9	0.2	0.70	0.92	0.00
CorVu Corp		60.8	0.1	8.00	32.00	0.00
Creative Host Services, Inc.		134.3	0.025	13.20	1.08	0.00
		126.7	0.025	8.32	1.15	0.00
Dotronix, Inc.		90.0	0.75	2.50	0.92	0.00
eConnect		86.1	1	1.00	3.57	0.00
FTS Group, Inc.		165.8	0.1	0.25	1.67	0.00
Innovative Coatings Corp		4.5	0.5	1.00	0.60	0.23
Intellicell Corp.		55.3	0.5	1.00	0.31	0.00
		91.3	0.5	4.00	1.39	0.00
Java Centrale, Inc.		6.3	0.1	3.00	1.23	0.00
Kestrel Energy		94.2	0.1	1.25	0.43	0.02
Leasing Edge Corp		61.4	1	2.125	1.42	0.07
Marcum Natural Gas Services		152.2	0.25	4.00	2.03	0.78
Pipeline Data, Inc.		129.7	0.333	2.50	2.84	0.00
Premier Development Investment, Inc.		78.0	0.02	3.50	1.75	1.00

Table 4 CONTINUED: WARRANT DIVIDEND DETAILS

Firm	Warrant life	Shares per warrant	Exercise price	Moneyness	Fraction exercised
Raven Moon Entertainment, Inc. (a)	10.2	1	0.0015	0.00	1.00
	29.7	1	*	*	1.00
	5.6	75	*	*	1.00
	5.6	40	*	*	0.00
	7.6	10	*	*	0.00
Universal Express, Inc.	30.4	0.16	0.10	0.11	0.00
Vicom, Inc.	76.1	1	2.25	0.34	0.00

(a) The exercise price for Raven Moon Entertainment, Inc. warrants are based on a percentage of the share price at the time of warrant exercise.

Table 5: CHANGE IN FIRM CHARACTERISTICS

The change in firm characteristics for firms that announced a warrant dividend from 1993 through 2006. Panel A compares characteristic values from the year before the announcement date to the year after the announcement date. Panel B compares characteristic values from the year before the announcement date to the year after the distribution date. *Market value* equals the number of outstanding shares times the share price at the fiscal year end, in $millions. *Total assets* is in $millions. *Asset tangibility* is measured as the value of property, plant, and equipment divided by *Total assets*. *Total liabilities* is in $millions. *Debt/Asset* is *Total liabilities* divided by *Total assets*. *Debt/Equity* is *Total liabilities* divided by the book value of equity. *Capital expenditures* is in $millions. *Capital exp/Tot assets* equals *Capital expenditures* divided by *Total assets*. *Cash flows* is the cash flow from operations, in $millions. *Free cash flow* is measured as in Lehn and Poulsen (1989), in $millions (see footnote 2). *Zscore* is the measure of financial distress used by Mutchler (1985). *Revenue* is in $millions. *Net income* is in $millions. *Profit margin* equals *Net income* divided by *Revenue*. *ROA* is the return on assets, measured as *Net income* divided by *Total assets*. *ROE* is the return on equity, measured as *Net income* divided by the book value of equity. *EPS* is the diluted earnings per share. *Market-to-Book* is the market value of equity divided by the book value of equity. *Average return* is the average monthly return over a two-year period excluding the month around the announcement date. *Return volatility* is the standard deviation of monthly returns over a two-year period excluding the month around the announcement date. The values in this table are relative to industry medians, as in Table 3, calculated as the difference between a firm's characteristic value and the median characteristic value of the firm's industry. The differences for the group of firms are averaged to determine the value in the column.

	PANEL A: Before vs. After announcement date					PANEL B: Before announcement vs. After distribution	
	Firms distributing warrants		Firms not distributing			Firms distributing warrants	
	Before	After	Before	After		Before	After
BALANCE SHEET							
Market value	-45.88	-89.69	-66.22	-160.39		-45.88	-94.02
Total assets	-55.95	-190.80	-68.56	-1247.26		-55.95	-204.52
Asset tangibility	0.01	-0.05	0.08	0.45		0.01	-0.05
Total liabilities	-30.01	-125.49	-39.73	-1189.25		-30.01	-134.79
Debt/Asset	2.20	0.30	0.68	2.45		2.20	0.35
Debt/Equity	-0.34	1.81	-0.62	-0.04		-0.34	2.45

Table 5 CONTINUED: CHANGE IN FIRM CHARACTERISTICS

| | PANEL A: Before vs. After announcement date | | | | | PANEL B: Before announcement vs. After distribution | |
| | Firms distributing warrants | | Firms not distributing | | | Firms distributing warrants | |
	Before	After	Before	After		Before	After
OPERATIONS							
Capital expenditures	-3.75	-16.04	-1.40	-3.70		-3.75	-17.23
Capital exp / Tot assets	0.03	0.01	0.13	0.08		0.03	0.00
Cash flows	-4.38	-7.68	-5.14	-6.94		-4.38	-8.44
Free cash flow	-4.63	-9.43	-6.27	-17.70		-4.63	-9.71
Z-score	-121.43	-0.65	-23.67	-377.63		-121.43	-0.71
PERFORMANCE							
Revenue	-69.35	-125.68	-43.84	-128.50		-69.35	-136.14
Net income	-1.97	-4.18	-5.41	-18.91		-1.97	-4.28
Profit margin	-663.30	-1.17	-103.46	-2020.81		-663.30	-1.30
ROA	-20.40	-0.69	-4.80	-206.25		-20.40	-0.79
ROE	-0.25	-5.50	-8.01	-3.35		-0.25	-12.85
EPS	-0.33	-0.47	-0.81	-1.00		-0.33	-0.45
Market-to-Book	5.65	8.40	184.58	-1.10		5.65	20.75
Average return	0.021	0.007	0.038	-0.066		0.021	0.007
Return volatility	0.258	0.297	0.332	0.272		0.258	0.309

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Table 5 CONTINUED: CHANGE IN FIRM CHARACTERISTICS

PANEL C: Before announcement vs. After expiration

	All distributing firms		Firms with warrants exercised		Firms without warrants exercised	
	Before	After	Before	After	Before	After
BALANCE SHEET						
Market value	-45.88	-105.30	-28.00	-49.44	-56.68	-94.49
Total assets	-55.95	-269.46	-33.50	-135.45	-65.93	-349.87
Asset tangibility	0.01	-0.16	0.09	-0.14	-0.02	-0.17
Total liabilities	-30.01	-152.71	-14.73	-84.12	-36.80	-193.86
Debt/Asset	2.20	0.13	-0.18	0.11	3.25	0.14
Debt/Equity	-0.34	0.92	-0.17	3.10	-0.42	-0.39
OPERATIONS						
Capital expenditures	-3.75	-15.59	-2.80	-15.64	-4.17	-15.56
Capital exp / Tot assets	0.03	-0.01	0.04	-0.02	0.02	-0.01
Cash flows	-4.38	-16.88	-0.64	-11.05	-6.05	-20.37
Free cash flow	-4.63	-23.49	-2.53	-8.37	-5.56	-32.57
Z-score	-121.43	-0.14	1.26	0.97	-182.77	-0.98
PERFORMANCE						
Revenue	-69.35	-145.97	-19.03	-61.51	-91.72	-196.65
Net income	-1.97	-5.33	-1.23	-2.02	-2.30	-7.32
Profit margin	-663.30	-1.60	-0.64	-0.02	-994.64	-2.79
ROA	-20.40	-0.54	-0.17	-0.01	-29.40	-0.86
ROE	-0.25	-2.39	-0.27	-0.51	-0.23	-3.80
EPS	-0.33	-0.52	-0.29	-0.97	-0.35	-0.24
Market-to-Book	5.65	4.00	-0.91	-0.90	10.03	7.68
Average return	0.021	0.001	0.032	0.004	0.028	-0.004
Return volatility	0.258	0.188	0.226	0.101	0.318	0.240

Table 6: CORPORATE GOVERNANCE STRUCTURE AND TAKEOVER DEFENSES

Details of the corporate governance structure and various takeover items for firms that announced a warrant dividend from 1993 through 2006. All values are obtained from the appropriate SEC filings immediately prior to the announcement date. *CEO tenure* is the tenure in years for the CEO at the announcement date. *Separation of leadership* equals 1 if the firm has one person as the CEO and a different person as the board chairman, and equals 0 otherwise. *CEO founder* equals 1 if the CEO is a founder of the firm, and 0 otherwise. *Board size* is the number of directors on the board. *Fraction of outsiders* equals the number of independent directors divided by *Board size*. *Staggered board* equals 1 if the board is a staggered board, and 0 otherwise. *Insiders* is the fractional equity ownership of current and former employees and people with business or familial relations with current and former employees. *Outsiders* is the fractional equity ownership of directors with no business or familial relation to the firm outside of board membership. *External* is the fractional equity ownership of all non-affiliated external shareholders that beneficially own at least 5% of the firm's outstanding shares. *Institutional* is the fractional equity ownership of all non-affiliated institutional investors that beneficially own at least 5% of the firm's outstanding shares. *Delaware incorporation* equals 1 if the firm is incorporated in Delaware, and 0 otherwise. *Equity compensation* equals 1 if the CEO received equity-based compensation during the announcement year, and 0 otherwise. *Other takeover defenses* equals 1 if the firm has specified in any previous SEC filing (and not rescinded) that a takeover defense other than a warrant dividend plan (Lipton, 1982) is available to the firm, and 0 otherwise. ***, **, * indicate significance at the 1%, 5%, and 10% levels.

	Firms distributing warrants	Firms not distributing			Firms distributing warrants	Firms not distributing	
BOARD and MANAGEMENT				**OWNERSHIP**			
CEO tenure	5.22	4.67		Insiders	0.28	0.36	
	4.92	*1.28*			*0.19*	*0.29*	
Separation of leadership	0.33	0.29		Outsiders	0.04	0.01	
	0.00	*0.00*			*0.01*	*0.00*	**
CEO founder	0.19	0.17		External	0.09	0.17	
	0.00	*0.00*			*0.00*	*0.15*	
Board size	4.56	3.83		Institutional	0.03	0.14	
	5.00	*4.00*			*0.00*	*0.11*	**
Fraction of outsiders	0.46	0.38		**OTHER**			
	0.50	*0.40*		Delaware incorporation	0.28	0.80	***
					0.00	*1.00*	***
Staggered board	0.12	0.00	*				
	0.00	*0.00*		Equity compensation	0.64	0.67	
					1.00	*1.00*	
				Other takeover defenses	0.56	0.60	
					1.00	*1.00*	

Table 7: CHANGES IN CORPORATE GOVERNANCE STRUCTURE AND TAKEOVER DEFENSES

Details of the changes in corporate governance structure and various takeover items for firms that announced a warrant dividend from 1993 through 2006 and experienced exercise of warrants during the warrant life. All values are obtained from the appropriate SEC filings before and after the warrant life period. *Fraction of warrants exercised* equals the fraction of warrants issued exercised by warrantholders at or prior to the warrant expiration date. *Board size* is the change in the number of directors on the board. *Fraction of outsiders* equals the change in the fraction of independent directors on the board. *Insider ownership* is the change in the fractional equity ownership of current and former employees and people with business or familial relations with current and former employees. *Outsider ownership* is the change in the fractional equity ownership of directors with no business or familial relation to the firm outside of board membership. *External ownership* is the change in the fractional equity ownership of all non-affiliated external shareholders that beneficially own at least 5% of the firm's outstanding shares. *Institutional ownership* is the change in the fractional equity ownership of all non-affiliated institutional investors that beneficially own at least 5% of the firm's outstanding shares.

	Fraction of warrants exercised	Board size	Fraction of outsiders	Insider ownership	Outsider ownership	External ownership
Action Products International, Inc.	0.47	-2	-0.25	-0.04	0.01	-0.04
	0.10	-2	-0.25	-0.04	0.01	-0.04
American Educational Products Inc.	0.05	-2	0.00	-0.08	-0.05	0.35
Innovative Coatings Corp.	0.23	-1	-0.10	-0.23	-0.03	-0.22
Kestrel Energy	0.02	1	-0.12	0.00	0.02	0.53
Leasing Edge Corp.	0.07	-	-	-	-	-
Marcum Natural Gas Services	0.78	-2	-0.17	0.11	0.02	0.22
Raven Moon Entertainment, Inc.	1.00	0	0.00	-0.01	-0.02	0.00
Raven Moon Entertainment, Inc.	1.00	0	0.00	-0.01	-0.02	0.00
Raven Moon Entertainment, Inc.	1.00	-	-	-	-	-
Raven Moon Entertainment, Inc.	1.00	-	-	-	-	-
Raven Moon Entertainment, Inc.	0.00	-	-	-	-	-

Note: Leasing Edge Corp. SEC filings prior to the warrant distribution and Raven Moon SEC filings following warrant exercise are not available.

Table 8: DESCRIPTION OF FIRM EVENTS DURING AND AFTER THE WARRANT LIFE PERIOD
Details of extraordinary events for firms that announced a warrant dividend from 1993 through 2006.

Firm	Warrant period	Events during warrant period	Latest firm information
PANEL A: Firms that distributed warrants			
Action Products International, Inc.	6/30/03 - 6/9/06 1/7/05 - 1/6/06 7/20/06 - 1/31/08	Acquires Curiosity Kits, Inc.; Acquires I Made That Corp. Acquires all shares of NewMarket Technology, Inc. for APII stock.	Actively trading.
AESP, Inc.	6/1/03 - 3/23/05	Divests three subsidiaries in 2004 and 2005.	Security ceased in 2005.
American Educational Products Inc.	6/5/97 - 12/14/00	Proposed merger with largest shareholder	Acquired by largest customer in 2001.
American Toys Inc.	7/28/95 - 7/28/97 8/30/95 - 8/30/97 9/29/95 - 9/29/97	Spins off subsidiary; Changes name to US Wireless; Proposes acquisition of new CEO's firm	Dismisses CEO following improper transactions in 2001; Delisted in 2003.
Command Credit Corp	10/25/95 - 10/26/98	Acquires Integrated Systems International Inc. in 1996; Part of SEC fraud investigation in 1996; Changes name to Dawcin International Corp.; Acquires Air & Space America Inc in 1997;	Delisted in 1995 (protection of investors and the public interest)
Computone Corp	7/10/02 - 11/30/02	Changes name to Symbiat Inc.	Implements stockholder rights offering (1 for 3, $0.30/share) in 2003; Announces discontinuation of operations in 2004.

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Table 8 CONTINUED: DESCRIPTION OF FIRM EVENTS DURING AND AFTER THE WARRANT LIFE PERIOD

Firm	Warrant period	Events during warrant period	Latest firm information
PANEL A CONTINUED: Firms that distributed warrants			
CorVu Corp	4/28/00 - 5/1/02		Acquired by Rocket Software Inc. in 2007.
Creative Host Services, Inc.	7/3/00 - 11/30/04 10/2/00 - 11/30/04	Acquires GladCo Enterprises in 2000.	Acquired by Compass Group PLC in 2004.
Dotronix, Inc.	8/20/04 - 8/20/07	Acquires Grand Sierra Resort Corp in 2006.	Delisted in 1999.
eConnect	9/1/99 - 6/30/02	Divests subsidiary in 2001; Acquires Cormax Business Solutions Inc. in 2002;	CEO arrested for securities fraud in 2002.
FTS Group, Inc.	8/28/04 - 8/28/07	Acquires Wireless Unlimited in 2004; Spins off subsidiary in 2005;	Acquires See World Satellites, Inc. in 2006; Actively trading.
Innovative Coatings Corp	12/22/00 - 2/14/01	Changes name to Sino-Biotics, Inc. in 2005.	Acquired by ICC Holdings, Corp. in 2003.
Intellicell Corp.	12/10/97 - 12/10/00 2/16/99 - 12/10/00	Acquires Cellular Wholesalers, Inc. in 1999; Changes name to Focus Affiliates Inc. in 1999;	Delisted in 2000.
Java Centrale, Inc.	12/31/95 - 3/15/96	Acquires Paradise Bakery Inc. in 1996.	Bankruptcy in 1998.
Kestrel Energy	2/4/00 - 3/10/03	Various acquisitions and divestitures of assets in 2000, 2001, 2002;	Delisted in 2003.

Table 8 CONTINUED: DESCRIPTION OF FIRM EVENTS DURING AND AFTER THE WARRANT LIFE PERIOD

Firm	Warrant period	Events during warrant period	Latest firm information
PANEL A CONTINUED: Firms that distributed warrants			
Leasing Edge Corp	8/1/95 - 1/15/97	Acquires Superior Computer Systems, Inc. in 1996.	Delisted in 2000; part of SEC fraud investigation.
Marcum Natural Gas Services	9/10/98 - 8/14/00	Changes name to Metretek Technologies, Inc. in 1999.	Actively trading.
Pipeline Data, Inc.	1/20/01 - 4/25/05	Acquires Northern Merchant Services in 2002; Acquires SecurePay, Inc. in 2003; Acquires Charge.com in 2005.	Actively trading.
Premier Development Investment, Inc.	6/8/05 - 12/31/07	Acquires Player's Grille Restaurant in 2005.	Announced cessation of business activities in 2007.
Raven Moon Entertainment, Inc.	8/31/05 - 12/31/05 9/9/05 - 8/31/06 2/10/06 - 4/18/06 5/19/06 - 7/25/06 9/1/06 - 12/1/06	1/20 and 1/200 reverse splits in 2006 with exercised warrants exempt	Actively trading.
Universal Express, Inc.	1/31/03 - 1/31/04	Acquires Bags to Go Inc. in 2003.	Actively trading.
Vicom, Inc.	4/11/00 - 10/11/02	Bid made by Amara Group, Inc. (shareholder) in 2002.	Actively trading.

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Table 8 CONTINUED: DESCRIPTION OF FIRM EVENTS DURING AND AFTER THE WARRANT LIFE PERIOD

Firm	Warrant period	Latest firm information
PANEL B: Firms that announced without distributing warrants		
AirRover Wi-Fi Corp	na	Acquires Diamond I Technologies, Inc. in 2004; Acquired by NewMarket Technology, Inc. in 2007.
Computer Motion	na	Acquired by Intuitive Surgical Inc. in 2003.
Digital Communications Technology Corp	na	Firm cancels warrant dividend 6 months after announcing; Delisted in 1998
Equitex, Inc.	na	Acquires Hydrogen Power Inc. in 2006; Changes name to Hydrogen Power International Inc.; Delisted in 2006.
Hollywood Productions, Inc.	na	Changes name to Shopnet.com in 1999; Controlling shareholder investigated for securities fraud in 2001; Delisted in 2003.
Mister Jay Fashions International Inc.	na	Changes name to United Textile & Toys, Inc. in 1997; Part of securities fraud investigation in 1997; Delisted in 1997.
Multinet International Corp, Inc	na	Changes name three times within 1 year; Actively trading.
Princeton American Corp	na	Executive part of securites fraud investigation in 1996; Actively trading.

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VITA

Brett C. Olsen grew up in Hendricks, Minnesota, a small, quaint town in the agricultural southwest corner of the state. He received a Bachelor of Science degree in mechanical engineering in 1992 from North Dakota State University in Fargo, North Dakota. While at NDSU, Brett interned with Caterpillar, Inc., in Peoria and Pontiac, Illinois. He accepted a job in Pontiac following graduation as a design engineer. Brett worked for nine years within the fuel systems division of Cat. His final title prior to resigning was Systems Integration engineer, responsible for coordinating the design and implementation of test development strategies for the HEUI (Hydraulically-actuated Electonically-activated Unit Injector) fuel system.

While at Cat, Brett began taking MBA courses part-time at Illinois State University in Normal, Illinois. The finance bug bit him hard, and Brett decided to resign from Cat and pursue a career in academe. Following graduation at ISU in 2003, Brett began his doctoral studies at the University of Missouri-Columbia. Four years later, Brett will graduate from Mizzou with a Doctor of Philosophy degree in Business Administration, specializing in Finance. He will join the faculty of the University of Idaho as an Assistant Professor of Finance in the fall semester of 2007.

Brett met his wife Jamie while working at Cat. During their years living in and around Normal, Illinois, they had two sons, Samuel and Cooper. Elliot, their third son, arrived during Brett's doctoral work in Columbia, Missouri. They will move to Moscow, Idaho, with Sam (7), Cooper (3), Elliot (1), and their two dogs, Cosmo and Spencer.